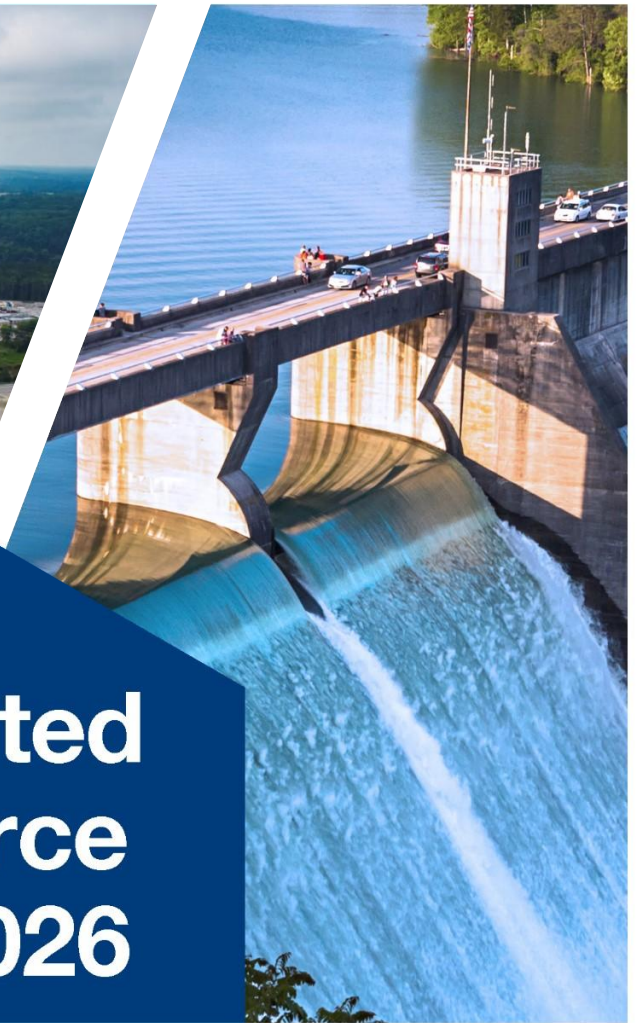




# Integrated Resource Plan 2026

VOLUME 2 / ENVIRONMENTAL IMPACT STATEMENT

AUGUST 2026



## **Integrated Resource Plan Final Environmental Impact Statement**

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**Abstract:** TVA's 2026 Integrated Resource Plan (IRP) evaluates the long-term demand for power in the TVA region, the resource options available for meeting that demand, and the potential economic, operating, and environmental impacts of these options. Consideration of stakeholder input is integral to TVA's IRP process. The IRP will provide strategic direction for meeting the region's energy needs between now and 2050, establishing a strong planning foundation and informing TVA's next long-range financial plan.

TVA identified three scenarios, or possible futures that TVA may find itself operating in: (1) Reference, (2) High Growth, and (3) Carbon Legislation. Three planning strategies, or alternative approaches TVA could employ to meet electricity demand, were evaluated against the backdrop of these scenarios: (A) Baseline Utility Planning, (B) Innovation, and (C) Distributed. The modeling process applied each strategy in each scenario, resulting in nine core resource portfolios. The IRP considered a wide range of supply-side, distributed, and demand-side resources to meet electricity needs in each of these portfolios. With consideration of stakeholder and public input, TVA further analyzed sensitivity cases which evaluate the change in a single key assumption to isolate the impact of that change on portfolio results.

The Environmental Impact Statement (EIS) assesses the natural, cultural, and socioeconomic impacts associated with the implementation of the 2026 IRP. The Baseline Utility Planning strategy is the No Action Alternative, and the remaining two strategies and the Power Supply Mix Ranges and Strategic Portfolio Direction through 2040 are the Action Alternatives. The EIS analyzes and identifies the relationship of the natural and human environment to each of the three strategies considered in the IRP.

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## List of Acronyms

| <b>Acronym</b>   | <b>Description</b>                       |
|------------------|------------------------------------------|
| °C               | Degrees Celsius                          |
| °F               | Degrees Fahrenheit                       |
| AC               | alternating current                      |
| ACS              | American Community Survey                |
| ACT              | Allen Aeroderivative Combustion Turbine  |
| Aero             | aeroderivative                           |
| ALF              | Allen Fossil Plant                       |
| ARC              | Appalachian Regional Commission          |
| B.P.             | before present                           |
| BART             | Best Available Retrofit Technology       |
| BESS             | Battery Energy Storage System            |
| BFN              | Browns Ferry Nuclear Plant               |
| BRF              | Bull Run Fossil Plant                    |
| Btu              | British Thermal Units                    |
| CAA              | Clean Air Act                            |
| CC               | Combined Cycle                           |
| CCR              | Coal Combustion Residuals                |
| CCS              | carbon capture and storage/sequestration |
| CFR              | Code of Federal Regulations              |
| CH <sub>4</sub>  | Methane                                  |
| CO               | carbon monoxide                          |
| CO <sub>2</sub>  | carbon dioxide                           |
| CO <sub>2e</sub> | CO <sub>2</sub> equivalent emissions     |
| CRN              | Clinch River Nuclear                     |
| CT               | Combustion Turbine                       |
| CUF              | Cumberland Fossil Plant                  |
| CWA              | Clean Water Act                          |
| DC               | Direct Current                           |
| DER              | Distributed Energy Resources             |
| DO               | dissolved oxygen                         |
| DOE              | Department of Energy                     |
| DR               | demand response                          |
| DSI              | dry sorbent injection                    |
| DSM              | Demand-side management                   |
| DSS              | Distributed Solar Solutions              |
| dV               | deciview                                 |
| EA               | Environmental Assessment                 |
| EBCI             | Eastern Band of Cherokee Indians         |
| EE               | energy efficiency                        |

| <b>Acronym</b> | <b>Description</b>                         |
|----------------|--------------------------------------------|
| EIS            | Environmental Impact Statement             |
| ELG            | Effluent Limitation Guidelines             |
| EO             | Executive Order                            |
| EPRI           | Electric Power Research Institute          |
| ESA            | Endangered Species Act                     |
| FGD            | flue gas desulphurization                  |
| FONSI          | finding of no significant impact           |
| FRP            | Flexibility Research Project               |
| FY             | Fiscal Year                                |
| GAF            | Gallatin Fossil Plant                      |
| GDP            | gross domestic product                     |
| GHG            | greenhouse gas                             |
| GP             | Generation Partners                        |
| GPP            | Green Power Providers                      |
| GW             | gigawatt                                   |
| GWh            | gigawatt hours                             |
| HAP            | Hazardous Air Pollutants                   |
| HRSG           | heat recovery steam generator              |
| HVAC           | heating, ventilation, and air conditioning |
| IPCC           | Intergovernmental Panel on Climate Change  |
| IRP            | Integrated Resource Plan                   |
| JOF            | Johnsonville Fossil Plant                  |
| kg             | kilogram                                   |
| KIF            | Kingston Fossil Plant                      |
| kV             | kilovolt                                   |
| kWh            | kilowatt-hours                             |
| LCA            | life cycle analysis                        |
| LNB            | low-NOx burner                             |
| LPC            | Local Power Companies                      |
| LSC            | low sulfur coal                            |
| m <sup>2</sup> | square meters                              |
| MATS           | Mercury and Air Toxics Standards           |
| MBCI           | Mississippi Band of Choctaw Indians        |
| MBTA           | Migratory Bird Treaty Act                  |
| mmBtu          | Million British Thermal Units              |
| MGD            | million gallons per day                    |
| MISO           | Midcontinent Independent System Operator   |
| Mm             | Mega-meters                                |
| MSA            | metropolitan statistical areas             |
| MW             | Megawatt                                   |
| MWh            | Megawatt-hour                              |

| <b>Acronym</b>    | <b>Description</b>                                 |
|-------------------|----------------------------------------------------|
| NAAQS             | National Ambient Air Quality Standards             |
| NCA               | National Climate Assessment                        |
| NEPA              | National Environmental Policy Act                  |
| NETL              | National Energy Technology Laboratory              |
| NFIP              | National Flood Insurance Program                   |
| NHPA              | National Historic Preservation Act                 |
| NLR               | National Laboratory of the Rockies (formerly NREL) |
| N <sub>2</sub> O  | Nitrous oxide                                      |
| NO <sub>2</sub>   | nitrogen dioxide                                   |
| NO <sub>3</sub>   | nitrate                                            |
| NOI               | Notice of Intent                                   |
| NO <sub>x</sub>   | nitrogen oxides                                    |
| NPDES             | National Pollutant Discharge Elimination System    |
| NRC               | Nuclear Regulatory Commission                      |
| NREL              | National Renewable Energy Laboratory (now NLR)     |
| NRHP              | National Register of Historic Places               |
| NWS               | National Weather Service                           |
| OBBA              | One Big Beautiful Bill Act                         |
| PA                | Programmatic Agreement                             |
| PAF               | Paradise Fossil Plant                              |
| Pb                | lead                                               |
| PC                | pulverized coal                                    |
| PCB               | polychlorinated biphenyl                           |
| PM                | particulate matter                                 |
| PM <sub>10</sub>  | Particulate matter less than 10 microns in size    |
| PM <sub>2.5</sub> | Particulate matter less than 2.5 microns in size   |
| PPA               | Power Purchase Agreement                           |
| ppm               | parts per million                                  |
| PSA               | Power Service Area                                 |
| PURPA             | Public Utility Regulatory Policies Act             |
| PV                | photovoltaic                                       |
| RCP               | representative concentration pathway               |
| RCRA              | Resource Conservation and Recovery Act             |
| RIA               | Renewable Investment Agreement                     |
| ROD               | Record of Decision                                 |
| RSO               | Renewable Standard Offer                           |
| SCF               | Standard cubic feet                                |
| SCPC              | supercritical pulverized coal                      |
| SCR               | selective catalytic reduction                      |
| SDTSA             | state-designated tribal statistical areas          |
| SF <sub>6</sub>   | Sulfur hexafluoride                                |



| <b>Acronym</b>  | <b>Description</b>                                           |
|-----------------|--------------------------------------------------------------|
| SHF             | Shawnee Fossil Plant                                         |
| SHPO            | State Historic Preservation Officer                          |
| SMR             | small modular reactors                                       |
| SNCR            | selective non-catalytic reduction                            |
| SO <sub>2</sub> | sulfur dioxide                                               |
| SO <sub>4</sub> | sulfate                                                      |
| SSI             | Solar Solutions Initiative                                   |
| TCP             | Traditional Cultural Properties                              |
| TIGER           | Topologically Integrated Geographic Encoding and Referencing |
| TSCA            | Toxic Substances Control Act                                 |
| TVA             | Tennessee Valley Authority                                   |
| TVA Act         | Tennessee Valley Authority Act of 1933                       |
| TWh             | terawatt hours                                               |
| U.S.            | United States                                                |
| U.S.C.          | United States Code                                           |
| USACE           | U.S. Army Corps of Engineers                                 |
| USCB            | U.S. Census Bureau                                           |
| USDA            | U.S. Department of Agriculture                               |
| USEPA           | U.S. Environmental Protection Agency                         |
| USFWS           | U.S. Fish and Wildlife Service                               |
| USGCRP          | U.S. Global Change Research Program                          |
| VOC             | volatile organic compounds                                   |
| WBN             | Watts Bar Nuclear                                            |
| WMA             | Wildlife management area                                     |
| WUTA            | Water Use Tabulation Area                                    |

# 1 Introduction

The Tennessee Valley Authority (TVA) has developed the Integrated Resource Plan (IRP) and associated programmatic Environmental Impact Statement (EIS) to address the demand for power in the TVA power service area (PSA), the resource options available for meeting that demand, and the potential environmental, economic, and operating impacts of these options. The IRP will provide strategic direction for meeting the energy needs of the TVA region between now and 2050 across a variety of possible future scenarios.

TVA is the largest producer of public power in the United States (U.S.). TVA provides wholesale power to 153 local power companies (LPCs) and directly sells power to 62 industrial and federal customers. TVA's power system serves approximately 10 million people in a seven-state, 80,000-square-mile region. TVA's PSA includes virtually all counties in Tennessee and portions of Alabama, Georgia, Kentucky, Mississippi, North Carolina, and Virginia. The TVA region shown in Figure 1-1 encompasses the PSA and the Tennessee River watershed.

As of FY 2025, TVA's generating assets include: three nuclear sites, 18 natural gas and/or oil-fired sites, four coal-fired sites, 29 conventional hydroelectric sites, one pumped-storage hydroelectric site, one diesel generator site, and nine operating solar installations. These assets have a summer net generation capability of 32,268 megawatts (MW). In addition, TVA maintains long-term agreements with third-party power producers totaling 8,482 MW and offers demand response (DR) programs that provide 1,390 MW of capacity. In total, TVA currently maintains 42,140 MW of capacity to meet the region's power supply needs.

The final IRP is detailed in Volume 1, which includes descriptions of the methodology and development of IRP recommendations. This document (Volume 2) contains the final EIS that analyzes the potential environmental effects of the IRP recommendations that may have a significant impact on the quality of the human environment. Volume 1 is incorporated into the EIS by reference.

## 1.1 Purpose and Need for Integrated Resource Planning

Like other utilities, TVA prepares IRPs. This planning process includes evaluating the long-term demand for power in the TVA region, the resource options available for meeting that demand, the potential economic, operating, and environmental impacts of these options, and public involvement. In the mid-1990s, TVA developed a comprehensive IRP, Energy Vision 2020 IRP and EIS (TVA 1995) and has since prepared IRPs and associated EISs in 2011 (TVA 2011a), 2015 (TVA 2015), and 2019 (TVA 2019a).

TVA developed the 2026 IRP and associated EIS to address regional and national changes within the utility marketplace. After a decade of flat electricity demand, the TVA region is now experiencing increasing demand for electricity driven by population, employment, and

industrial growth (particularly from data centers), weather trends, and increasing electrification. TVA is experiencing rising consumer demand for specific characteristics in generation resources, and in some cases, customers are willing to pay more to utilize those options. Additionally, U.S. energy policy and regulations have evolved since the last IRP. Finally, advancements are being made in emerging energy technologies, such as advanced nuclear and advanced storage. Upon approval by the TVA Board of Directors (TVA Board), the 2026 IRP will replace the 2019 IRP (TVA 2019a). The purpose of the IRP is to provide TVA with direction on how to best meet future electricity demand. The IRP process evaluates TVA's current energy resource portfolio and alternative future portfolios of energy resource options on a least-cost, system-wide basis to meet the future electrical energy needs of the TVA region while considering TVA's mission of energy, environmental stewardship, and economic development. Consideration of stakeholder input is integral to TVA's IRP process.

An updated IRP is needed to provide strategic direction for meeting the region's energy needs between now and 2050, establish a strong planning foundation, and inform TVA's next long-range financial plan.

# TVA Power System

In addition to assets operated by TVA, TVA also maintains long-term power purchase agreements for additional solar, wind, gas, and coal capacity.

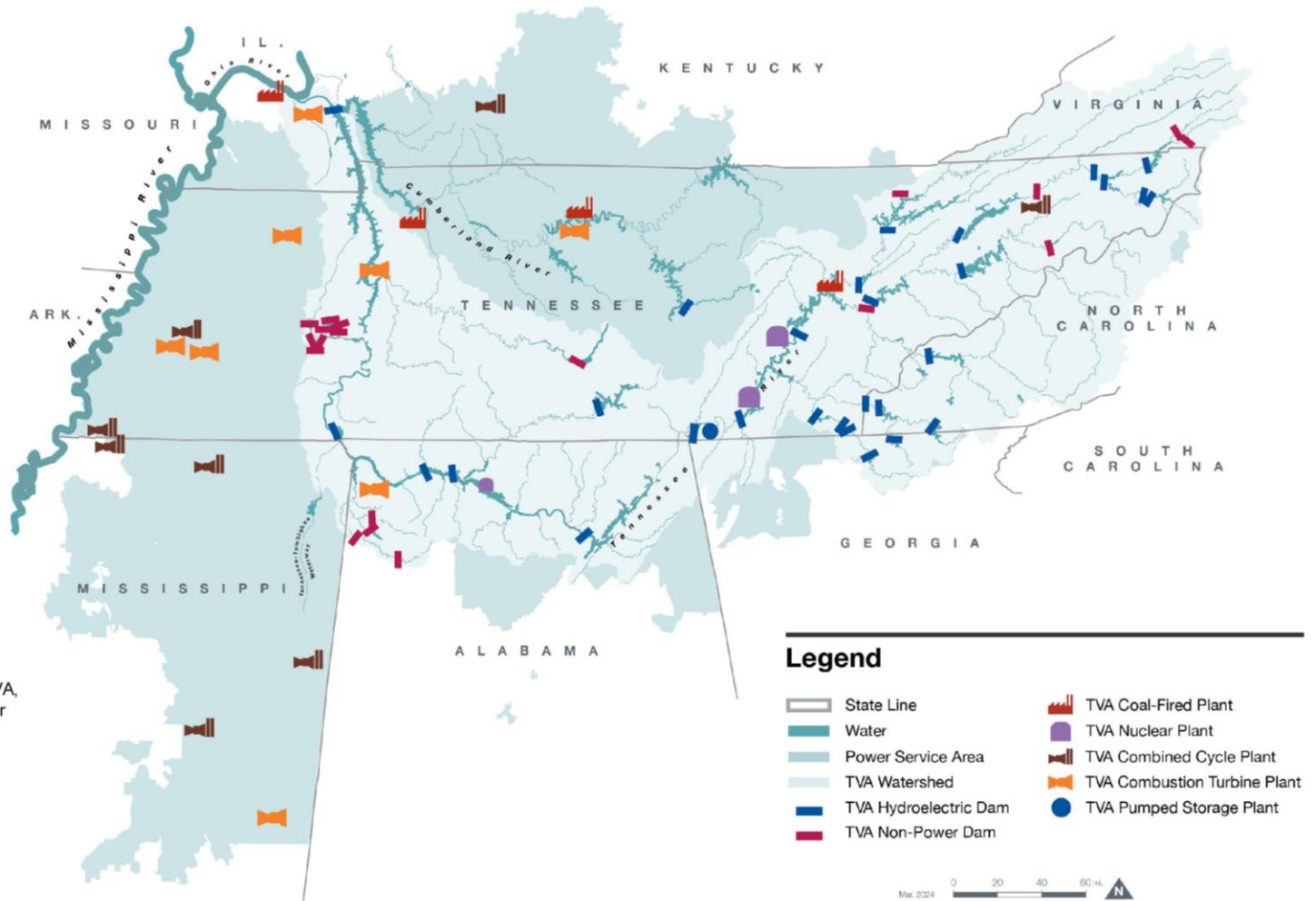


Figure 1-1: TVA PSA and Watershed

## 1.2 Environmental Review Process

This EIS has been prepared by TVA in accordance with the National Environmental Policy Act of 1969 (NEPA), as amended (42 U.S. Code [U.S.C.] §§ 4321 *et seq.*), and TVA NEPA procedures (18 Code of Federal Regulations [CFR] part 1318). NEPA requires federal agencies to consider the impact of their proposed actions on the environment before making decisions. For major federal actions that are likely to have significant environmental impacts, NEPA requires that an EIS be prepared.

Due to the comprehensive nature of the IRP, TVA is completing a programmatic EIS. A programmatic EIS is appropriate when a decision involves a policy or program, or a series of related actions by an agency over a broad geographic area. In a programmatic EIS, the environmental impacts of the alternative actions are addressed at a regional level, with some extending to a national or global level. TVA will address the site-specific effects associated with projects that are proposed to implement the IRP in subsequent tiered environmental reviews.

The IRP and EIS are developed with stakeholder involvement and public input. TVA used the input from the scoping period in development of the IRP and EIS. Scoping is a procedure that solicits public input to the NEPA process to ensure that: (1) issues are identified early and properly studied; (2) issues of little significance do not consume substantial time and effort; (3) the NEPA document is thorough and balanced; and (4) delays caused by an inadequate review are avoided. Engagement in TVA's 2026 IRP officially began with a Notice of Intent (NOI) in the Federal Register that initiated a 45-day public scoping period from May 19 to July 3, 2023. In addition to publishing an NOI, TVA notified the public of the initiation of the IRP study by providing information on the TVA webpage, notifying the media, and sending notices to numerous individuals, organizations, and intergovernmental partners. The objective was to gather input from the public and key stakeholders to help frame the IRP study and identify future conditions, strategies, and resource options to be evaluated. The NOI also initiated the environmental review process for the IRP, consistent with the requirements of NEPA.

During the scoping period, TVA received 43 official comments through the online portal, email, and mail-in options. Comments were primarily received from states in the TVA region, with the balance from four other states and Washington, D.C. Of the 43 submissions, 22 comments were received from individuals, nine from businesses, 10 from civic or non-governmental organizations, and two from government agencies. In addition to comments formally submitted by the public, TVA reviewed several hundred statements posted by the public on several social media pages.

Public comments covered a broad spectrum of issues. Common themes were:

- Support and opposition for various types of power generation sources

- Increasing decarbonization efforts
- Promoting distributed energy resources (DER)
- Interest in energy efficiency (EE) and energy storage alternatives
- Feedback on the IRP process and need for transparency
- Importance of reliability and resilience in the face of increasing demand
- More attention to environmental justice communities
- Concern about climate change and environmental impacts

Commenters also provided advice on scenarios and strategies to explore and suggestions to improve public outreach and stakeholder involvement. Additional information on the scoping effort and comments received can be found in the [Integrated Resource Plan Scoping Report](#) on TVA's IRP website ([www.tva.gov/irp](http://www.tva.gov/irp)).

Early in the planning process, TVA also established the IRP Working Group, a group of stakeholders with broad-ranging perspectives who meet regularly to provide input and feedback on every aspect of the IRP. The contributions of the Working Group are summarized in the IRP Volume 1, Section 2.2.

In September 2024, TVA published the draft IRP and EIS and distributed them to a broad range of individuals and groups; and federal, state, and local agencies for their review and comment. During the 75-day public comment period for the draft IRP and EIS (September 23 to December 11, 2024), TVA conducted 10 public meetings throughout the TVA region and two virtual webinars. Following the public comment period, TVA responded to the comments received and incorporated any necessary changes into the IRP and/or EIS. Public involvement for the draft IRP and EIS during the 75-day public comment and review period is included in Appendix H - Response to Comments on the Draft IRP and EIS.

In June 2026, TVA elected to also publish a preliminary final version of the IRP and EIS for public and stakeholder review. The additional public review was provided after TVA refreshed some IRP assumptions to align with key changes in the electric utility industry (e.g., passage of the One Big Beautiful Bill Act of 2025, executive orders, regulatory actions) and updated actual and forecasted electricity demand figures for the region. Following the comment period, TVA reviewed and considered the comments and information submitted, consistent with TVA NEPA procedures established in early 2026. TVA's review of the public and agency input on the preliminary final documents is addressed in Appendix J - Public and Agency Comments on the Preliminary Final IRP and EIS.

The TVA Board will consider the information and analyses in the EIS when it makes a decision on the recommended power supply mix ranges through 2040 and 2050, strategic portfolio direction, and key signposts to monitor.

In addition to NEPA, several other laws and executive orders (EOs) are considered by TVA when developing new power generation resources (Table 1-1). These laws and EOs may



affect the review and consideration of environmental consequences of an alternative plan or measures needed during its implementation. Most of these laws also have associated implementing regulations. In addition to these laws, TVA must comply with a variety of state and local requirements not included in Table 1-1.

Chapter 4 (Affected Environment) describes the regulatory setting for each resource in more detail. Chapter 5 (Anticipated Environmental Impacts) discusses applicable laws and their relevance to this analysis.

**Table 1-1: Laws and EOs Relevant to the Environmental Effects of Power System Planning, Construction and Operation**

| Environmental Resource Area                | Law / EO                                                                                                                                                                                                                                                                                                                                                                                                                  |
|--------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Water Quality                              | <ul style="list-style-type: none"> <li>Clean Water Act (CWA)</li> </ul>                                                                                                                                                                                                                                                                                                                                                   |
| Groundwater                                | <ul style="list-style-type: none"> <li>Safe Drinking Water Act</li> <li>Resource Conservation and Recovery Act (RCRA)</li> <li>Comprehensive Environmental Response, Compensation, and Liability Act</li> <li>Federal Insecticide, Fungicide, and Rodenticide Act</li> </ul>                                                                                                                                              |
| Air Quality                                | <ul style="list-style-type: none"> <li>Clean Air Act (CAA)</li> </ul>                                                                                                                                                                                                                                                                                                                                                     |
| Wetlands and Waters                        | <ul style="list-style-type: none"> <li>CWA</li> <li>EO 11990 – Protection of Wetlands</li> <li>Wild and Scenic Rivers Act</li> </ul>                                                                                                                                                                                                                                                                                      |
| Floodplains                                | <ul style="list-style-type: none"> <li>EO 11988 – Floodplain Management</li> </ul>                                                                                                                                                                                                                                                                                                                                        |
| Endangered and Threatened Species          | <ul style="list-style-type: none"> <li>Endangered Species Act (ESA)</li> <li>Migratory Bird Treaty Act (MBTA)</li> <li>Fish and Wildlife Coordination Act</li> <li>Bald and Golden Eagle Protection Act</li> </ul>                                                                                                                                                                                                        |
| Cultural Resources                         | <ul style="list-style-type: none"> <li>National Historic Preservation Act (NHPA)</li> <li>Archaeological Resources Protection Act</li> <li>Native American Graves Protection and Repatriation Act</li> <li>American Indian Religious Freedom Act</li> <li>EO 13007 – Indian Sacred Sites</li> <li>EO 13175 – Consultation and Coordination with Indian Tribal Governments</li> <li>EO 13287 – Preserve America</li> </ul> |
| Land Use                                   | <ul style="list-style-type: none"> <li>Farmland Protection Policy Act</li> </ul>                                                                                                                                                                                                                                                                                                                                          |
| Coal Mining                                | <ul style="list-style-type: none"> <li>Surface Mining Control and Reclamation Act</li> </ul>                                                                                                                                                                                                                                                                                                                              |
| Waste Management                           | <ul style="list-style-type: none"> <li>RCRA</li> <li>Comprehensive Environmental Response, Compensation, and Liability Act</li> <li>Toxic Substances Control Act (TSCA)</li> </ul>                                                                                                                                                                                                                                        |
| Infrastructure Planning and Sustainability | <ul style="list-style-type: none"> <li>Federal Power Act</li> <li>Inflation Reduction Act</li> <li>EO 14154 – Unleashing American Energy</li> <li>EO 14156 – Declaring a National Energy Emergency</li> <li>Fiscal Responsibility Act of 2023</li> <li>One Big, Beautiful, Bill Act (OBBA) of 2026</li> </ul>                                                                                                             |

Throughout 2025 and continuing in 2026, the utility industry experienced significant policy and regulatory shifts. EO 14156, issued January 20, 2025, formally declared a national energy emergency. In parallel, the U.S. Environmental Protection Agency (USEPA) announced intentions to provide regulatory relief affecting existing coal and future natural-gas generation. The USEPA proposed a rule to repeal all greenhouse gas (GHG) emissions standards for the power sector under Section 111 of the CAA (the “2024 GHG Rule”), as well as a final rule authorizing state permit writers to extend compliance deadlines under the Effluent Limitation Guidelines (ELG) for steam electric generating units.

In addition to these policy and regulatory changes, the One, Big, Beautiful Bill Act (OBBB) was signed into law on July 4, 2025. OBBB included updates to investment tax credit opportunities available for renewable, storage, and nuclear resources. All IRP scenarios reflect the impacts of OBBB on resource costs and national and regional energy prices.

More information on current and potential U.S. energy policy is explored in Volume 1, Section 2.4.4.

### **1.3 Relationship with Other NEPA Reviews**

Numerous environmental documents and reviews are relevant to TVA’s IRP and the current environmental review. These are briefly discussed below and are grouped by the type of action, program, or location. More information may be found at <https://www.tva.com/nepa>.

#### **1.3.1 Programs, Plans and Policies**

##### **2019 Integrated Resource Plan (June 2019)**

The 2019 IRP has provided direction for how TVA will meet the long-term energy needs of the Tennessee Valley region and updates TVA’s 2015 plan. The 2019 IRP and the associated EIS evaluated scenarios and strategies for providing electricity through 2038. As noted above, the 2019 plan will be replaced by the 2026 IRP.

##### **Changes to Green Power Providers Program Environmental Assessment (December 2019)**

In this document, TVA evaluated changes to how TVA assists residential customers interested in solar installations and the December 31, 2019, closure of its Green Power Providers Program to new applications.

##### **Diesel-fueled Generation in TVA Demand Response Program (February 2017)**

In 2017, TVA issued a final Environmental Assessment (EA) and finding of no significant impact (FONSI) for authorizing the use of customer-owned diesel-fueled generators to provide backup generation during certain DR events.

**Natural Resource Plan (July 2020)**

This plan guides TVA's natural resource stewardship activities, which primarily occur on TVA-managed public lands. This document and the associated EIS evaluated the resource management programs and activities, alternative approaches to TVA's resource management efforts, and the environmental impacts of the alternatives.

**Reservoir Operations Study (May 2004)**

In 2004, TVA established its current operating policy for the Tennessee River and reservoir system. The purpose of the Reservoir Operations Study was to determine whether changes in its reservoir operations policy will produce overall public value. This document addresses the operation of TVA's hydroelectric generation resources.

**Resilience 360 Program (August 2025)**

In 2025, TVA issued a final Programmatic EA and FONSI addressing a partnership program that would allow customers to improve and enhance resiliency during events that challenge the transmission of power on the grid. The program addresses backup generation in the form of on-site modular natural gas units or battery energy storage systems (BESSs) were reviewed.

**TVA Power Supply Flexibility Proposal (June 2020)**

In this document, TVA evaluated the offering of flexible power generation options to its LPC customers (Valley Partners) that have entered into long-term partnership agreements with TVA.

**TVA Solar Photovoltaic Projects (September 2014)**

TVA is increasing the amount of renewable energy in its energy portfolio by constructing and operating solar photovoltaic (PV) systems and/or purchasing electricity from solar facilities being constructed within TVA's PSA. In September 2014, TVA documented the potential environmental effects of implementing small solar projects in this programmatic EA and FONSI.

### 1.3.2 Power Generation – Coal and Gas

**Allen Fossil Plant (ALF)**

TVA evaluated options for closure of the plant, including ash impoundments, in the ALF Ash Impoundment Closures EIS and record of decision (ROD) (2020), ALF Decontamination and Deconstruction EA and FONSI (2019), and ALF Emission Control Project EA and FONSI (2014).

**Allen Aeroderivative Combustion Turbine (ACT)**

TVA addressed the addition of six natural gas-fired Aeroderivative (Aero) combustion turbines (CTs) at the ACT site in Memphis, Tennessee, in an EIS completed in July 2025. TVA issued a ROD in late 2025. The new units would generate approximately 200 MW and are expected to be in commercial operation in 2027.

**Bull Run Fossil Plant (BRF)**

BRF is retired, though its NEPA documents for various projects remain relevant, including the BRF Ash Impoundment Closure Project Supplemental EA and FONSI (2019), BRF Decontamination and Decontamination EA and FONSI (2023), BRF Landfill-Management of Coal Combustion Residuals EIS (2016), and BRF Potential Retirement EA and FONSI 2019.

**Closure of Coal Combustion Residual Impoundments EIS (2016)**

The Ash Impoundment Closure Programmatic EIS was used to support the implementation of TVA's goal to eliminate all wet coal combustion residuals (CCR) storage at its coal plants by closing CCR impoundments across the TVA system, and to assist TVA in complying with USEPA's CCR Rule. The EIS programmatically considers the impacts of the two primary closure methods. The ROD was issued in July 2016.

**Colbert Fossil Plant**

Documents available regarding retirement of this plant include a Decontamination and Deconstruction EA and FONSI (2016) and Colbert Ash Pond 4 Seismic Project EA and FONSI (2021).

**Cumberland Fossil Plant (CUF)**

Documents available for the retirement of the CUF include the Cumberland Retirement EIS and ROD (2023), CUF Wastewater Treatment Facility EA and FONSI (2019), CUF Management of Coal Combustion Residuals EIS and ROD (2019), and Access Road and Borrow Areas for CUF EA and FONSI (2017). In 2026, TVA supplemented the Cumberland Retirement EIS and issued a modified decision addressing continued operations.

**Gallatin Fossil Plant (GAF)**

Documents available regarding activities for GAF include the GAF Borrow Site EA and FONSI (2018), GAF Bottom Ash Process Dewatering Facility EA and FONSI (2017), GAF Installation of Air Pollution Control Equipment and Associated Facilities EA and FONSI (2013), and Gallatin Surface Impoundment Closure and Restoration Project EIS and ROD (2020).

**John Sevier Fossil Plant Deconstruction (2015)**

The EA and FONSI for the deconstruction of the John Sevier Fossil Plant near Rogersville, Tennessee, were issued in 2015. The EA evaluates the potential environmental effects of the future disposition of the physical structures associated with the retired coal-fired plant units, including the powerhouse, coal handling facilities, and surrounding support buildings.

**Continued Operation of Johnsonville Combustion Turbine Units 1 Through 10 (2025)**

In this document, TVA assessed the effects of continuing to operate CT units 1 through 10 to allow TVA to leverage existing infrastructure, minimize environmental disturbance, and avoid the higher costs and longer lead times associated with constructing new generation facilities. These units would also preserve approximately 650 MW of dispatchable generation capacity

and aid in maintaining system reliability during periods of peak demand. An EA and FONSI were issued in November 2025 for this project.

### **Johnsonville Aeroderivative Combustion Turbine Project (2022)**

In this document, TVA addressed the addition of 10 natural gas-fired Aero CTs at the Johnsonville Reservation in Humphreys County, Tennessee. The Aero CTs, which began commercial operation in 2025, generate approximately 550 MW. An EA and FONSI were issued in 2022 for this project.

### **Johnsonville Cogeneration Plant (2015)**

TVA evaluated the addition of a heat recovery steam generator (HRSG) to an existing CT at the Johnsonville Fossil Plant (JOF). The steam generator would provide steam to an adjacent industrial customer that was previously provided by now-retired coal-fired units. TVA issued the EA and FONSI in 2015.

### **Johnsonville Fossil Plant (JOF)**

Documents available involving closure activities of JOF include the JOF Decontamination and Deconstruction EA and FONSI (2018) and JOF Proposed Actions (2018).

### **Kingston Fossil Plant (KIF)**

Documents available regarding retirement activities for KIF include the KIF Borrow Site #3 EA and FONSI (2020), KIF Bottom Ash Dewatering Facility EA and FONSI (2016), KIF Landfill Expansion EA and FONSI (2019), and KIF Retirement DEIS (2023). The Kingston Retirement final EIS was published in February 2024; the ROD was published in April 2024. In 2026, TVA supplemented the Kingston Retirement EIS and issued a modified decision addressing continued operations.

### **New Caledonia Combustion Turbine Project (2025)**

In January 2025, TVA finalized an EIS to construct and operate six dual-fuel, simple cycle frame CTs on approximately 63 acres at TVA's existing New Caledonia site in Lowndes County, Mississippi. TVA published a ROD in March 2025. The CTs would generate approximately 500 MW and are expected to be in commercial operation by the end of 2027.

### **Paradise Fossil Plant (PAF)**

Documents available regarding retirement activities for PAF include the Potential Retirement of PAF EA and FONSI (2019), PAF Units 1 and 2 – Mercury Air Toxics Standards Compliant Project EA and FONSI (2013), PAF Decontamination and Deconstruction EA and FONSI (2021), and the Management of Coal Combustion Residuals from the PAF EA and FONSI (2017). Additionally, following a CT modernization study in 2019, an EA and FONSI were issued in 2021 on Paradise and Colbert Combustion Turbine Plants.

**Shawnee Fossil Plant (SHF)**

Documents available regarding retirement activities for SHF include the Management of Coal Combustion Residuals from SHF EIS and ROD (2018), SHF Bottom Ash Process Dewatering Facility EA and FONSI (2016), and SHF Units 1 and 4 EA and FONSI (2014).

**Widows Creek Fossil Plant**

Documents available regarding closure activities of this plant include the Widows Creek Fossil Plant Deconstruction EA and FONSI (2016) and the Widows Creek Fossil Plant Soil Excavation and Gypsum Stack Closure EA and FONSI (2014).

**1.3.3 Power Generation – Nuclear****Browns Ferry Nuclear Plant (BFN)**

The BFN Subsequent License Renewal Final SEIS (2023) addresses the potential environmental effects associated with obtaining Nuclear Regulatory Commission (NRC) subsequent license renewals for an additional 20 years for Units 1, 2, and 3 located in Limestone County, Alabama. TVA issued a ROD in February 2024. Also available is the BFN Thermal Performance Program Cooling Tower Capacity Improvements EA and FONSI (2020).

**Clinch River Nuclear Site (CRN) Advanced Nuclear Reactor Technology Park (2022)**

In 2022, TVA issued a programmatic EIS and ROD for site preparation, construction, operation, and decommissioning of various facilities at an advanced nuclear reactor technology park in Oak Ridge, Roane County, Tennessee. The facilities containing one or more advanced nuclear reactors would have a cumulative output not to exceed 800 MW. In 2025, TVA supplemented the EIS to assess a GE Hitachi Nuclear Energy BWRX-300 small modular reactor unit at the site.

**Fukushima Response Strategy (2013)**

A final EA and FONSI were issued for implementing TVA's response strategy for NRC requirements following the March 2011 earthquake and tsunami that struck the Fukushima Daiichi electrical power station in Japan. The strategy addresses improving TVA's ability to maintain or restore core cooling, containment, and spent fuel pool cooling capabilities in the event of a severe accident.

**Sequoyah Nuclear Plant Units 1 and 2 License Renewal Supplemental Environmental Impact Statement (2011)**

In this Supplemental EIS, TVA reviewed the continued operation of the two units at the Sequoyah Nuclear Plant for an additional 20 years (between 2020 and 2041).

**Watts Bar Nuclear Plant (WBN)**

Documents available regarding the Watts Bar facility include the WBN Unit 2 Replacement of Steam Generators EA and FONSI (2017), and the WBN Independent Spent Fuel Storage Installation Facility EA and FONSI (2014).



### 1.3.4 Power Generation – Solar, Storage and Other Renewables

#### Shawnee Project Phoenix Solar Facility EA and FONSI (2024)

In March 2024, TVA completed an EA for its pilot proposal to construct a solar facility at SHF, utilizing a portion of an area where CCRs are being closed and managed in place. The project is known as Project Phoenix.

#### Vonore BESS and Associated Subsystem (2022)

TVA issued a final EA and FONSI associated with the construction and operation of a BESS and associated transmission and fiber improvements near an industrial complex in Vonore, Tennessee. The BESS and associated substation project, which will become operational in 2026, is designed for 20 MW capacity – for two hours of continuous power and 40 MWh stored energy. The project is consistent with TVA's 2019 IRP, which called for the evaluation of demonstration battery storage projects to gain operational experience as a near-term action.

Further information on other TVA solar, storage, and other renewable projects, listed in Table 1-2, can be found at <https://www.tva.com/nepa>.

**Table 1-2: Other Solar, Storage, and Renewable Projects with NEPA Documents**

| Project Name                                                                                                                                                     | Year | Location                                                   |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------|------|------------------------------------------------------------|
| Five Western North Carolina Solar Farms – Hampton Solar Farm, Sweetwater Cove Solar Farm, Unnamed 1 MW Solar Farm, Carter Cove Solar Farm, Lance Cove Solar Farm | 2014 | Cherokee County, NC<br>Clay County, NC<br>Avery County, NC |
| Marshall Properties Solar Farm                                                                                                                                   | 2014 | Blairsville, GA                                            |
| General Mills Combined Heat and Power Project                                                                                                                    | 2014 | Murfreesboro, TN                                           |
| Starkville Solar Facilities                                                                                                                                      | 2014 | Oktibbeha County, MS                                       |
| Pulaski Energy Park Expansion                                                                                                                                    | 2014 | Giles County, TN                                           |
| Purchase of Power Generated at Bristol, VA Sanitary Landfill                                                                                                     | 2014 | City of Bristol's Sanitary Landfill, VA                    |
| River Bend Solar Project                                                                                                                                         | 2015 | Colbert County, AL                                         |
| Providence Solar Center                                                                                                                                          | 2016 | Madison County, TN                                         |
| Selmer North I & II Solar Projects                                                                                                                               | 2016 | McNairy County, TN                                         |
| Wildberry Solar Center                                                                                                                                           | 2016 | Fayette County, TN                                         |
| Houston, Mississippi Solar Farms                                                                                                                                 | 2016 | Chickasaw County, MS                                       |
| Latitude Solar Center                                                                                                                                            | 2016 | Hardeman County, TN                                        |
| Jonesborough Solar Site                                                                                                                                          | 2017 | Washington County, TN                                      |
| Millington Solar Farm                                                                                                                                            | 2017 | Shelby County, TN                                          |
| Muscle Shoals Solar Project                                                                                                                                      | 2017 | Colbert County, AL                                         |
| Naval Air Station Meridian Solar Farm                                                                                                                            | 2017 | Lauderdale County, MS                                      |
| Haywood Solar Farm                                                                                                                                               | 2017 | Haywood County, TN                                         |
| Memphis Solar Project                                                                                                                                            | 2018 | Memphis, Shelby County, TN                                 |
| Cumberland Solar Farm                                                                                                                                            | 2018 | Limestone County, AL                                       |
| Yum Yum Solar Project                                                                                                                                            | 2019 | Fayette County, TN                                         |
| Jackson Solar Project                                                                                                                                            | 2019 | Jackson, Madison County, TN                                |
| Bellefonte Solar Energy Center Project                                                                                                                           | 2020 | Jackson County, AL                                         |
| Elora Solar Energy Center Project                                                                                                                                | 2020 | Lincoln County, TN                                         |

| Project Name                                                    | Year | Location                             |
|-----------------------------------------------------------------|------|--------------------------------------|
| Knoxville Utilities Board Solar Project                         | 2020 | Knox County, TN                      |
| Horus Kentucky Solar Project                                    | 2021 | Simpson County, KY                   |
| Skyhawk Solar Project                                           | 2021 | Obion County, TN                     |
| Ridgely Energy Farm                                             | 2021 | Lake County, TN                      |
| SR Bell Buckle Solar Project                                    | 2021 | Bedford County, TN                   |
| SR McKellar Solar Project                                       | 2021 | Madison County, TN                   |
| SR Millington II Solar Facility                                 | 2022 | Shelby County, TN                    |
| SR Canadaville Solar Facility                                   | 2022 | Fayette County, TN                   |
| Golden Triangle I & II Solar and Battery Energy Storage Project | 2022 | Lowndes County, MS                   |
| Graceland Solar Project                                         | 2022 | Shelby County, TN                    |
| Logan County Solar Project                                      | 2023 | Logan County, KY                     |
| Gaynor Solar LLC – Volunteer Electric Cooperative Solar Project | 2023 | Pleasant Hill, Cumberland County, TN |
| Moore County Solar Project                                      | 2023 | Moore County, TN                     |
| Optimist Solar and BESS Project                                 | 2023 | Clay County, MS                      |
| Adamsville Solar Project                                        | 2024 | McNairy and Hardin Counties, TN      |
| SR Puryear Solar Project                                        | 2024 | Henry County, TN                     |
| Ripley II Utility Scale Solar Project                           | 2024 | Lauderdale County, TN                |
| SR Magnolia Utility Scale Solar Project                         | 2024 | Monroe County, MS                    |
| SR Middleton Utility Scale Solar Project                        | 2024 | Hardeman County, TN                  |
| Hillsboro Solar Project                                         | 2025 | Lawrence County, AL                  |
| Okolona Solar Project                                           | 2025 | Chickasaw County, MS                 |
| Spring Valley Solar Project                                     | 2026 | Colbert County, AL                   |

## 2 TVA Power System

### 2.1 Introduction

To meet the region's power supply needs, TVA currently maintains 42,140 MW of summer net dependable capability. TVA operates a generating asset portfolio of 32,268 MW, maintains long-term agreements with third-party power producers totaling 8,482 MW, and offers DR programs that provide 1,390 MW of capacity. Annual power generation by these facilities for the 2020-2025 fiscal years (FY) is summarized in Table 2-1. TVA operates a network of over 16,000 miles of transmission lines and 590 substations, switching stations, and switchyards. This system transmits power from TVA and non-TVA generating facilities to 1,351 customer connection points. Unless stated otherwise, the capacity of energy resources described in this EIS is the summer net dependable capacity, with the exception of renewables, including hydro, and storage which are typically provided in nameplate capacity.

**Table 2-1: FY 2020-2025 Generation by Type from Both TVA Facilities and Purchased Power**

| Type of Generation                    | Generation in million kilowatt-hours (kWh) per FY |                      |                      |                      |                      |                      |
|---------------------------------------|---------------------------------------------------|----------------------|----------------------|----------------------|----------------------|----------------------|
|                                       | FY 2025 <sup>1</sup>                              | FY 2024 <sup>1</sup> | FY 2023 <sup>1</sup> | FY 2022 <sup>1</sup> | FY 2021 <sup>1</sup> | FY 2020 <sup>1</sup> |
| Nuclear                               | 56,157                                            | 65,235               | 67,102               | 64,475               | 66,265               | 64,531               |
| Coal                                  | 30,733                                            | 23,959               | 23,618               | 23,752               | 25,764               | 22,141               |
| Natural Gas and/or oil-fired          | 59,418                                            | 55,534               | 48,170               | 54,611               | 44,126               | 42,822               |
| Hydroelectric                         | 17,213                                            | 15,035               | 15,115               | 16,477               | 18,510               | 19,543               |
| Wind                                  | 4,562                                             | 3,718                | 3,754                | 4,383                | 3,919                | 3,839                |
| Solar                                 | 1,719                                             | 1,618                | 1,381                | 1,023                | 468                  | 250                  |
| Biomass                               | 51                                                | 30                   | 23                   | 22                   | 26                   | 30                   |
| Other Program Renewables <sup>2</sup> | 577                                               | 564                  | 628                  | 713                  | 700                  | 665                  |
| <b>TOTAL</b>                          | <b>170,470</b>                                    | <b>165,693</b>       | <b>159,791</b>       | <b>165,456</b>       | <b>159,778</b>       | <b>153,821</b>       |

Source: TVA 2025a; TVA 2024a, TVA 2023a, TVA 2022a, TVA 2021a, TVA 2020a

<sup>1</sup> Includes purchased power gas, coal fired and hydroelectric.

<sup>2</sup> From contract renewable resources through historical renewable energy programs that consist of power purchase agreements (PPAs) and energy purchased from qualifying facilities through TVA's Dispersed Power Production Program.

### 2.2 TVA Customers, Sales, and Power Exchanges

TVA sells power at wholesale to its 153 LPCs. In FY 2025, it sold 167,612 million kilowatt-hours (kWh) of electricity; total revenue from these sales was \$13.5 billion. In FY 2024, it sold 162,933 kWh of electricity, with total revenues of \$12.1 billion. LPCs in turn distribute electricity to residential, commercial, and industrial customers within their service areas.

These non-profit, publicly owned LPCs are diverse and include municipal systems and rural electric cooperatives. The largest, Memphis Light, Gas and Water, serves approximately 421,000 electric customers and accounted for 9 percent of TVA's 2025 operating revenues. Some of the smallest LPCs serve less than 1,500 customers. Many provide only electrical service while others also provide water, wastewater, telecommunications, and/or natural gas service. Revenues from LPCs accounted for approximately 90 percent of TVA's total operating revenues for 2025.

In addition to the LPCs, TVA sells power directly to 62 industries and federal installations. The direct served industries include chemical, metal, paper, textile, data centers, and automotive manufacturers. The federal installations include the Department of Energy (DOE) Oak Ridge Operations in Tennessee and military bases in the region. Revenues from direct served industries and federal installations accounted for approximately 8 percent of TVA's total operating revenues in 2025. Since 2015, power sales to federal installations have decreased while sales to direct served industries have increased.

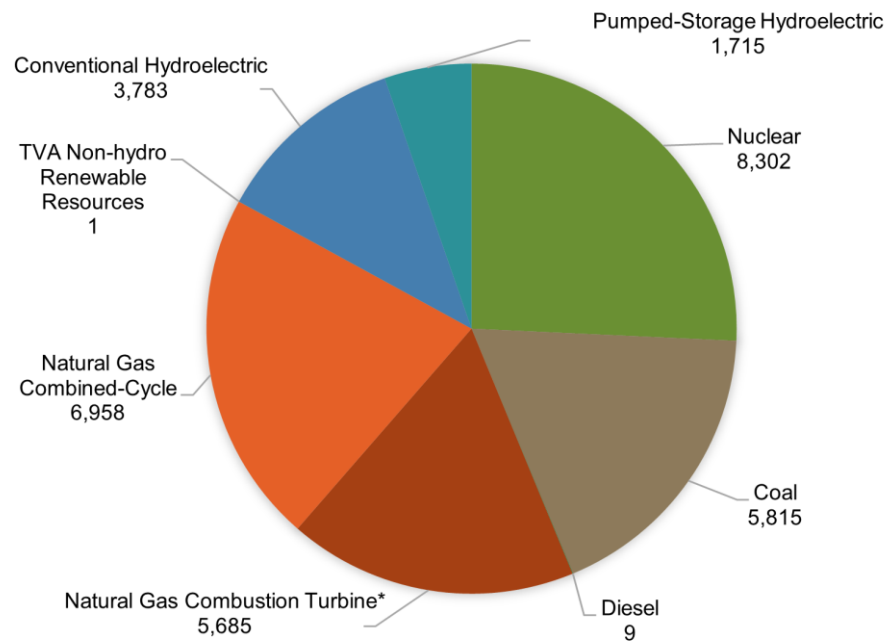
The TVA PSA (Figure 1-1) was established by the Tennessee Valley Authority Act of 1933 (TVA Act). The TVA Act restricts TVA from entering into contracts that would make TVA or its LPCs a source of power outside the area for which TVA or its LPCs were the primary source of power on July 1, 1957.

The TVA Act authorizes TVA to exchange, buy, or sell power with 13 neighboring electric utilities. This arrangement gives TVA the ability to purchase power when its generating capacity cannot meet demand or when purchasing power from a neighboring utility is more economical for TVA than generating it. The arrangement also allows TVA to sell power to neighboring utilities when its generation exceeds demand. TVA conducts these exchanges through 69 transmission system interconnections. To the extent allowed by federal law, TVA offers transmission services to others to transmit power throughout the TVA PSA.

In 2020, TVA began providing a flexibility option to LPCs that enter into a long-term partnership agreement. The flexibility option, named Generation Flexibility, allows these LPCs to locally generate or purchase up to approximately 5 percent of their average total hourly energy sales to meet their individual customers' needs. Revised Flexibility Agreements, made available to LPCs in August 2023, permit projects to be located anywhere in TVA's PSA, either connected to the LPC distribution system or TVA's transmission system, and make it easier for LPCs to partner in projects. As of August 2024, 147 LPCs have signed the long-term partnership agreement with TVA, and 102 of these LPCs have signed a Power Supply Flexibility Agreement.

## **2.3 TVA-Owned Generating Facilities**

TVA owns and/or operates under long-term lease 32,268 MW of summer net generating capability (Figure 2-1).



Source: TVA 2025a

\*Natural Gas CT sums all generation from Johnsonville, which includes co-generation and Aero units

**Figure 2-1: FY 2025 TVA-Owned/Operated Summer Net Generating Capability, in MW by Type of Generation**

### 2.3.1 Coal-Fired Generation

As of September 2025, TVA has 24 active coal-fired generating units at four plant sites with a total summer net dependable capability of approximately 5,815 MW (Figure 1-1, Table 2-2). The coal-fired units range in size from 134 MW (SHF Units 1-9) to 1,235 MW (CUF Unit 1). The oldest unit was placed in service in 1953 at SHF, and the newest is CUF Unit 2, which began operation in 1973. For additional information, see the 2026 IRP (Volume 1, Section 2.6).

**Table 2-2: Characteristics of TVA Coal-Fired Generating Facilities**

| Facility   | Number of Units | 2025 Summer Net Capability (MW) | Commercial Operation Date (First and Last Unit) | Boiler Type <sup>1</sup> | Emission Controls <sup>2</sup>                    |
|------------|-----------------|---------------------------------|-------------------------------------------------|--------------------------|---------------------------------------------------|
| CUF        | 2               | 2,470                           | 1973                                            | SCPC                     | FGD, LNB, SCR                                     |
| GAF        | 4               | 976                             | 1956, 1959                                      | PC                       | FGD, SCR                                          |
| KIF        | 9               | 1,298                           | 1954, 1955                                      | PC                       | LNB (4 units), SCR, FGD                           |
| SHF        | 9               | 1,071                           | 1953, 1955                                      | PC                       | DSI, FGD (2 units), LSC, LNB, SCR (4 units), SNCR |
| Total Coal | 24              | 5,815                           |                                                 |                          |                                                   |

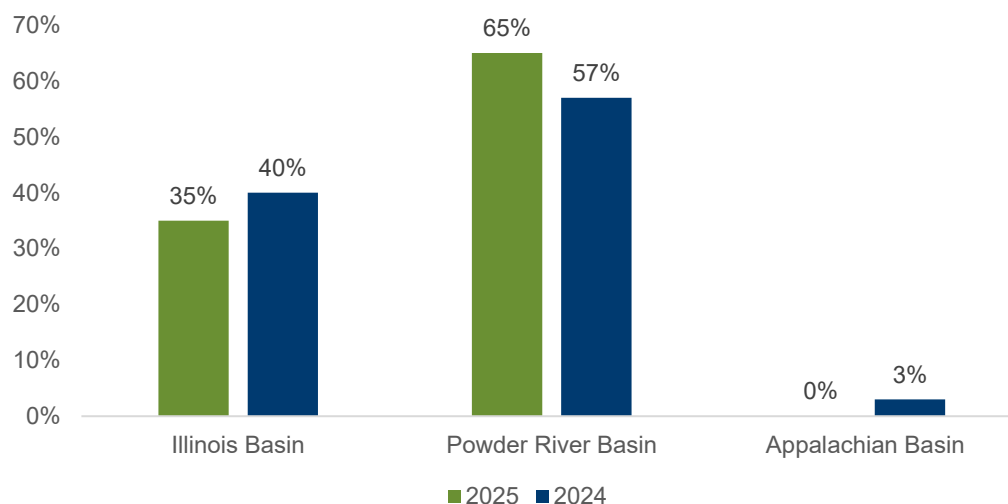
<sup>1</sup> PC – pulverized coal; SCPC – supercritical pulverized coal

<sup>2</sup> DSI – dry sorbent injection; FGD – flue gas desulfurization (“scrubber”); LNB – low-NOx burner; LSC – low sulfur coal, may be blended with high sulfur coal; SCR – selective catalytic reduction; SNCR – selective non-catalytic reduction.

In February 2026 the TVA Board authorized TVA to take steps to allow for the continued operation of CUF and KIF, subject to permitting and regulatory requirements, to meet rapidly increasing demand for electricity and address associated reliability concerns in the TVA region. TVA also re-evaluated and updated planning assumptions related to end-of-life expectations for all coal units.

**Fuel Procurement.** TVA coal consumption has greatly decreased since 2010 because of coal unit retirements, increased generation from other resources, and increased EE. Coal inventory decreased in 2024 as compared to 2023. Coal supply availability and transportation performance continued to improve in 2023 and 2024. Throughout 2024, TVA was able to meet burn and increase inventory stockpiles due to current market conditions reflecting an approximate balance between demand and available supply, weaker export markets, and stable natural gas prices. Coal inventory levels in 2025 remained consistent with those of 2024. TVA also invested in additional multi-year coal supply contracts to help provide stability in coal supply availability. These investments are expected to support fuel resiliency with TVA’s overall coal supply. Coal consumption at TVA’s coal-fired generating facilities during both 2023 and 2024 was approximately 12 million tons, and increased to 14 million tons in 2025.

In recent years, TVA has obtained coal from the Appalachian Basin (Kentucky, Pennsylvania, Tennessee, West Virginia, and Virginia) and Illinois Basin (Illinois, Indiana, and Kentucky) regions in the eastern U.S. and from the Powder River Basin (Wyoming) region in the western U.S. TVA-purchased coal by basin for 2024 and 2025 is shown in Figure 2-2.



Source: TVA 2025a

**Figure 2-2: FY 2024 and 2025 Coal Purchases by Mining Region**



TVA purchases coal under both long-term (more than one year) and short-term (one year or less) contracts; 94 percent of 2024 purchases and 100 percent of 2025 purchases were with long-term contracts. During 2025, 46 percent of TVA's coal supply was delivered by rail, 13 percent was delivered by barge, and 41 percent was delivered by a combination of barge and rail. These percentages vary from year to year depending on the coal sourcing areas and other factors.

TVA uses large quantities of limestone to operate the FGD systems at its four coal plants. This limestone is acquired from quarries in the vicinity of the plants and transported to the plants primarily by truck.

### 2.3.2 Nuclear Generation

TVA operates seven nuclear units at three sites with a total net summer dependable capacity of 8,302 MW (Figure 1-1, Table 2-3). The newest nuclear unit, WBN Unit 2, began commercial operation in 2016 after initial construction efforts were halted in the mid-1980s. In 2017, TVA received approval from the NRC for an extended power uprate at BFN, which was completed by the end of 2019.

**Table 2-3: Characteristics of TVA Nuclear Generating Units**

| Facility | Units | 2025 Summer Net Capability (MW) | Type              | Commercial Operation Date (First and Last Unit) | Operating License Expiration |
|----------|-------|---------------------------------|-------------------|-------------------------------------------------|------------------------------|
| BFN      | 3     | 3,662                           | Boiling Water     | 1974, 1977                                      | 2053, 2054, 2056             |
| Sequoyah | 2     | 2,292                           | Pressurized Water | 1981, 1982                                      | 2040, 2041                   |
| WBN      | 2     | 2,348                           | Pressurized Water | 1996, 2016                                      | 2035, 2055                   |
| Total    | 7     | 8,302                           |                   |                                                 |                              |

The second or subsequent license renewal application for all three BFN units was submitted in January 2024. The NRC approved the renewals on December 11, 2025, which extended the licenses for an additional 20 years on all three BFN units – to 2053, 2054, and 2056, respectively. Now, work on the first license renewal application for WBN Unit 1 is underway, targeting submission in late 2026 and approval in 2028, which will be followed by work on the second license renewal for Sequoyah Units 1 and 2. TVA has an Early Site Permit to potentially construct and operate small modular reactors at TVA's CRN in Oak Ridge, Tennessee, and in 2022, the TVA Board approved a programmatic approach to exploring advanced nuclear technology.

**Fuel Procurement.** TVA's seven nuclear units use a total of about 4 million pounds of natural uranium equivalent ( $U_{235}$ ) per year. Converting uranium to nuclear fuel generally involves four stages: mining and milling of uranium ore to produce uranium concentrates;

conversion of uranium concentrates to uranium hexafluoride gas; enrichment of uranium hexafluoride; and fabrication of the enriched uranium hexafluoride into fuel assemblies. TVA currently has sufficient enriched uranium and fabrication in inventory or under contract to provide all its requirements.

### 2.3.3 Natural Gas-Fired and Oil-Fired Generation

As shown in Table 2-4, TVA's natural gas-fueled fleet consists of 93 CT blocks at 10 sites (68 simple-cycle units, one cogeneration unit, 10 Aero units, 14 combined-cycle power units). The oldest CTs were completed in 1971 and the newest in 2025. Eight CTs are co-located at the coal-fired GAF site and 32 are at the sites of four now-retired coal plants (ALF, Colbert, JOF, and PAF). The remaining 45 CTs are located at five stand-alone plant sites. Some CT sites are also co-located with natural gas CC plants (Allen, Lagoon Creek, and Paradise). The individual CT units range in generating capacity from 46 MW (ACT) to 216 MW (Colbert CT Units 9-11 and Paradise CT Units 5-7). Sixty-one of the CT units are also capable of using fuel oil, and 49 are capable of quick start-up, reaching full generation capability in about 10 minutes. Commercial plant operations began for Colbert CT Units 9-11 and Paradise CT Units 5-7 in 2023, and for Johnsonville Aero CT Units 21-30 in 2025. TVA has other ongoing projects at its Cumberland and Kingston sites, an Aero CT project at its ACT site, and a simple cycle CT project on TVA land in Caledonia, Mississippi.

TVA also has 14 natural gas-fueled CC units at eight sites. At CC plants, electricity is first generated by CT units; the hot exhaust from the CTs is then run through a HRSG which creates steam to drive a steam turbine generator, greatly increasing overall plant output and efficiency. Three of the CC sites are adjacent to now-retired coal plants (ALF, John Sevier, and PAF), and three are co-located with CT units (ACT, Lagoon Creek, and Paradise). The three-unit Caledonia plant is leased by TVA through a long-term agreement, and the other CC plants are owned by TVA. The arrangement of CTs and steam generators varies, with each steam generator paired with a CT at some plants while at others, two or three CTs drive a single steam generator. Some of the turbines at the newest CC plants can be operated in traditional CC mode, or as stand-alone quick-start CT units in the event of an outage to the steam turbine or HRSG. The total summer net capabilities are 5,089 MW for the CT units, 6,958 MW for the CC units, 66 MW for the cogeneration unit, and 530 MW for the Aero CT units.

**Table 2-4: Characteristics of TVA Natural Gas-Fueled Plants**

| Facility                 | Units | 2025 Summer Net Capability (MW) | Commercial Operation Date (First and Last Unit) | Oil Fueling Capability |
|--------------------------|-------|---------------------------------|-------------------------------------------------|------------------------|
| <b>Simple Cycle (CT)</b> |       |                                 |                                                 |                        |
| ACT                      | 2     | 92                              | 1971, 1972                                      | Yes                    |
| Brownsville              | 4     | 425                             | 1999                                            | No                     |
| Colbert                  | 11    | 998                             | 1972, 2023                                      | Yes/No                 |
| Gallatin                 | 8     | 534                             | 1975, 2000                                      | Yes                    |

| Facility                            | Units | 2025 Summer Net Capability (MW) | Commercial Operation Date (First and Last Unit) | Oil Fueling Capability |
|-------------------------------------|-------|---------------------------------|-------------------------------------------------|------------------------|
| Gleason                             | 3     | 463                             | 2000                                            | No                     |
| Johnsonville <sup>1</sup>           | 13    | 208                             | 1975, 2000                                      | Yes                    |
| Kemper                              | 4     | 273                             | 2002                                            | Yes                    |
| Lagoon Creek                        | 12    | 844                             | 2001, 2002                                      | Yes                    |
| Marshall                            | 8     | 571                             | 2002                                            | Yes                    |
| Paradise                            | 3     | 681                             | 2023                                            | No                     |
| CT Subtotal                         | 68    | 5,089                           |                                                 |                        |
| <b>Combined Cycle (CC)</b>          |       |                                 |                                                 |                        |
| Ackerman <sup>2</sup>               | 2     | 713                             | 2007                                            | No                     |
| Allen <sup>3</sup>                  | 1     | 1,106                           | 2018                                            | No                     |
| Caledonia <sup>4</sup>              | 3     | 819                             | 2003                                            | No                     |
| John Sevier <sup>5</sup>            | 1     | 871                             | 2012                                            | Yes                    |
| Lagoon Creek <sup>6</sup>           | 1     | 596                             | 2010                                            | No                     |
| Magnolia                            | 3     | 951                             | 2003                                            | No                     |
| Paradise <sup>7</sup>               | 1     | 1,100                           | 2017                                            | No                     |
| Southaven                           | 3     | 802                             | 2003                                            | No                     |
| CC Subtotal                         | 14    | 6,958                           |                                                 |                        |
| <b>Cogeneration</b>                 |       |                                 |                                                 |                        |
| Johnsonville                        | 1     | 66                              | 1975, 2000                                      | ---                    |
| <b>Aeroderivative CT</b>            |       |                                 |                                                 |                        |
| Johnsonville                        | 10    | 530                             | 2025                                            | ---                    |
| Total Natural Gas and/or Oil-Fueled | 93    | 12,643                          |                                                 |                        |

Source: TVA 2025a

<sup>1</sup> As of September 30, 2025, TVA had 10 idled units at Johnsonville CT Facility (Units 1-10). These units are included in their respective locations in the table; however, the capacity from these units is excluded.

<sup>2</sup> Ackerman CC Facility is a single steam cycle unit driven by two gas turbines (2x1 configuration).

<sup>3</sup> Allen CC Facility is a single steam cycle unit driven by two gas turbines (2x1 configuration).

<sup>4</sup> Caledonia CC Plant ("Caledonia CC") is currently a leased facility operated by TVA.

<sup>5</sup> John Sevier CC Facility ("John Sevier CCF") is a single steam cycle unit driven by three gas turbines (3x1 configuration).

<sup>6</sup> Lagoon Creek CC Facility is a single steam cycle unit driven by two gas turbines (2x1 configuration).

<sup>7</sup> Paradise CC Facility is a single steam cycle unit driven by three gas turbines (3x1 configuration).

**Fuel Procurement.** TVA's consumption of natural gas has greatly increased in recent years as natural gas-fueled generation, particularly from CC plants, has increased and coal-fired generation has decreased. In 2014, TVA used about 56 billion cubic feet of natural gas to fuel its CT and CC plants and to fuel generating facilities at some non-TVA plants that sell power to TVA under terms of a power purchase agreement (PPA). Since 2014, natural gas consumption has increased and has averaged 300 billion cubic feet over the past five years. Natural gas consumption was 290 billion cubic feet in 2019, 297 in 2020, 285 in 2021, 337 in 2022, 299 in 2023, and 370 for 2024.

Annual natural gas consumption can vary due to several factors, including deviations in weather demand, generation availability across primary generation sources, and price

competition. TVA Power Operations added two CT peaking plants (Colbert and Paradise) in 2023, and the Johnsonville Aero gas turbines became operational in 2025.

TVA purchases natural gas from multiple suppliers on a daily, monthly, seasonal, and term basis. TVA transports the gas across multiple interstate pipelines to gas-generating facilities. TVA contracts for natural gas storage to provide peaking supply and balancing services to accommodate changes in generation. Due to the variety of suppliers and characteristics of the pipeline transportation network, it is not possible to break down the natural gas supply by sourcing area or extraction technique.

Fuel oil is purchased on the spot market for immediate delivery to the plants. TVA maintains an inventory of fuel oil at all its plants with oil fueling capability to provide a short-term backup supply in the event the gas supply is disrupted.

#### **2.3.4 Diesel-Fired Generation**

TVA owns one diesel-fired generating facility with 9 MW of summer net capability. This plant, located in Meridian, Mississippi, consists of five units completed in 1998. These units are not currently dispatched for generation to the transmission grid. Diesel fuel is purchased on the spot market and transported via TVA tanker trucks from third party terminals and/or other TVA on-site fuel tanks.

#### **2.3.5 Hydroelectric Generation**

The TVA hydroelectric generating system consists of 29 hydroelectric dams with 109 conventional hydroelectric generating units. Twenty-eight of these dams are on the Tennessee River and its tributaries, and one dam (Great Falls) is on a Cumberland River tributary (Figure 1-1). TVA also operates the four-unit Raccoon Mountain Pumped-Storage Plant near Chattanooga, Tennessee, with a summer net capability of 1,715 MW. The 86-MW Unit 2 at the Hiwassee hydroelectric plant in southwestern North Carolina is a reversible turbine/generator with the ability to operate as a pumped storage hydroelectric plant.

The summer net capability of the TVA hydroelectric system is 5,498 MW; this includes 3,783 MW of conventional hydroelectric generation and 1,715 MW from Raccoon Mountain. Conventional hydroelectric plants range in size from the 4-unit, 7-MW Wilbur plant to the 21-unit, 631-MW Wilson plant. The oldest of the conventional plants, Ocoee No. 1, was completed in 1911, and the newest, Tims Ford, was completed in 1970. Beginning in the early 1990s, TVA began its Hydro Modernization Program to replace outdated turbines and other equipment in the hydroelectric plants. Renamed the Hydro Life Extension Program, these modernization efforts have been completed on 68 out of 109 conventional hydroelectric units and the four pumped storage units. These project efforts allowed TVA to extend the operating life of its fleet and, in some cases, increase its MW output or increase overall unit efficiency.

TVA made additional improvements and updates to the Raccoon Mountain facility, which added 84 MW of pumped storage capacity. TVA continues to modernize its remaining hydroelectric units at the rate of two or three units per year. These ongoing efforts are designed to maintain the units' generating capacity and improve their efficiency; they will not necessarily result in increased capacity. Details about the hydroelectric plants and the operation of the hydroelectric system are available in the Reservoir Operations Study (TVA 2004).

### **2.3.6 Non-Hydro Renewable Generation**

TVA owns approximately 1 MW of solar capability across nine operating small PV solar installations (Figure 1-1). Renewable resources are typically referred to in nameplate capacity, or maximum hourly generating capability. TVA has also been adding solar through PPAs based on economics and to meet customer demand. TVA has long-term PPAs for 1,438 MW of operating solar nameplate capacity and has contracted for an additional 2,528 MW of solar nameplate capacity expected to come online over the next few years, including contracts signed in the latest procurement cycle.

## **2.4 Purchased Power**

For FY 2021 through FY 2025, purchased power comprised 13 to 20 percent of TVA's total power supply. In FY 2025, TVA purchased 33,379 million kWh of power, which comprised 20 percent of its total power supply. Approximately 3 percent of this purchased power was purchased on the spot market, 2 percent through short-term PPAs, and 95 percent through long-term PPAs.

TVA has major PPAs for nearly 8,500 MW of generating capacity, with an additional 2,848 MW under contract but not yet online (TVA 2025a). The major PPA contracts/facilities, other than those that are part of specific programs, are listed in Table 2-5. Additionally, TVA purchases hydroelectric generation from nine U.S. Army Corps of Engineers (USACE) dams on the Cumberland River and its tributaries through a long-term contract with the Southeastern Power Administration, a federal power marketing agency.

Under the Public Utility Regulatory Policies Act (PURPA), TVA is required to purchase energy from qualifying facilities at a price equal to what it would cost TVA to generate this energy itself or purchase this energy from another source. Qualifying facilities are cogeneration or small power production facilities that meet certain ownership, operating, and efficiency criteria. Cogeneration (also known as combined heat and power) facilities produce electricity and another form of useful thermal energy (heat or steam) for industrial or other uses. A qualifying small power production facility has a capacity of 80 MW or less and generates power through renewable (hydroelectric, wind or solar), biomass, waste, or geothermal resources. TVA fulfills this requirement through the Dispersed Power Production program. As of September 30, 2025, there were 1,344 generation sources, with a combined qualifying capacity of 281 MW, whose power TVA purchases through the Dispersed Power

Production program. Most of this power is generated by a 45-MW cogeneration plant operated by International Paper in Lowndes County, Mississippi, and by a 30-MW cogeneration plant operated by DTE Energy in Marshall County, Kentucky. Most of the smaller Dispersed Power Production generation sources are solar PV facilities with a capacity of less than 600 kW and installed on or in association with municipal, institutional, and commercial buildings.

Since 2003, TVA has executed several Dispersed Power Production programs that issue contracts with PURPA qualifying facilities to promote and increase renewable energy. These programs have been developed and improved throughout the years leading to more efficient implementation practices.

**Table 2-5: Major Power Purchase Agreement Contracts/Facilities**

| Facility                       | Owner/Marketer                 | Location | Capacity (MW) <sup>1</sup> | Contract End Date |
|--------------------------------|--------------------------------|----------|----------------------------|-------------------|
| <b>Natural Gas</b>             |                                |          |                            |                   |
| Decatur Energy Center          | Capital Power                  | AL       | 833                        | 2032              |
| Morgan Energy Center           | Calpine Energy Services        | AL       | 735                        | 2028              |
| Wansley CC (1 unit)            | Southern Company               | GA       | 250                        | 2024              |
| Wansley CC (1 unit)            | Southern Company               | GA       | 250                        | 2025              |
| Harris CC                      | Southern Company               | AL       | 500                        | 2024              |
| Bethlehem Energy Center        | Calpine Energy Services        | PA       | 500                        | 2028              |
| Sandersville Plant             | Morgan Stanley                 | GA       | 146                        | 2026              |
| Zion Energy Center             | Calpine Energy Services        | IL       | 479                        | 2025              |
| Nodaway Power Plant            | Associated Electric Coop       | MO       | 50                         | 2024              |
| <b>Lignite Coal</b>            |                                |          |                            |                   |
| Red Hills Power Plant          | PurEnergy                      | MS       | 440                        | 2032              |
| <b>Coal</b>                    |                                |          |                            |                   |
| Daniel Coal Plant              | Southern Company               | MS       | 500                        | 2025              |
| Bowen Coal Plant               | Southern Company               | GA       | 250                        | 2025              |
| <b>Diesel</b>                  |                                |          |                            |                   |
| McMinnville                    | City of McMinnville            | TN       | 23                         | 2029              |
| Powell Valley                  | Powell Valley                  | TN       | 20                         | 2031              |
| University of Tennessee Martin | University of Tennessee        | TN       | 8                          | 2028              |
| City of Ripley                 | City of Ripley                 | TN       | 8                          | 2028              |
| University of Mississippi      | University of Mississippi      | MS       | 20                         | 2028              |
| Mississippi State University   | Mississippi State University   | MS       | 26                         | 2028              |
| City of Scottsboro             | City of Scottsboro             | AL       | 10                         | 2035              |
| <b>Wind</b>                    |                                |          |                            |                   |
| Buffalo Mountain (Windrock)    | Invenergy                      | TN       | 25                         | 2025              |
| Lost Lakes                     | EDPR                           | IA       | 101                        | 2030              |
| Caney River                    | ENEL Green Power North America | KS       | 201                        | 2031              |



| Facility                    | Owner/Marketer                          | Location | Capacity (MW) <sup>1</sup> | Contract End Date |
|-----------------------------|-----------------------------------------|----------|----------------------------|-------------------|
| Pioneer Prairie             | EDPR                                    | IA       | 198                        | 2031              |
| White Oak                   | NextEra Energy Resources                | IL       | 150                        | 2031              |
| Bishop Hill                 | Brookfield Renewable                    | IL       | 200                        | 2032              |
| Cimarron                    | NextEra Energy Resources                | KS       | 165                        | 2032              |
| California Ridge            | Brookfield Renewable                    | IL       | 200                        | 2032              |
| <b>Solar</b>                |                                         |          |                            |                   |
| West Tennessee Solar Farm   | University of Tennessee                 | TN       | 4                          | 2032              |
| River Bend                  | NextEra Energy Resources                | AL       | 75                         | 2036              |
| Millington                  | Silicon Ranch                           | TN       | 53                         | 2038              |
| Skyhawk                     | Origis Energy                           | TN       | 100                        | 2043              |
| Elora                       | NextEra                                 | TN       | 150                        | 2042              |
| Muscle Shoals Solar         | Orsted                                  | AL       | 227                        | 2041              |
| McKeller                    | Silicon Ranch                           | TN       | 70                         | 2038              |
| Bell Buckle                 | Silicon Ranch                           | TN       | 35                         | 2043              |
| Canadaville                 | Silicon Ranch                           | TN       | 16                         | 2042              |
| Golden Triangle II          | Mississippi Solar 6                     | MS       | 150                        | 2040              |
| <b>Storage</b>              |                                         |          |                            |                   |
| Golden Triangle II          | Mississippi Solar 6                     | MS       | 50                         | 2040              |
| <b>Biomass</b>              |                                         |          |                            |                   |
| Chestnut Ridge Landfill Gas | Waste Management                        | TN       | 5                          | 2031              |
| <b>Hydroelectric</b>        |                                         |          |                            |                   |
| Cumberland Hydro            | DOE                                     | TN, KY   | 402                        | 2026              |
| BSMH                        | Brookfield Smoky Mountain Hydropower LP | TN, NC   | 377                        | 2024              |

<sup>1</sup> Capacities for the solar PV facilities are direct current (DC); all other capacities are alternating current (AC).

**Green Power Providers (GPP) Program.** The GPP program is an end user generation program that began in 2003 as the Generation Partners (GP) pilot program. Under the GP pilot program, TVA purchased renewable energy generated by facilities installed by residential, commercial, and industrial customers. TVA purchased qualifying renewable generation at retail cost plus a premium rate via a generation credit on the participant's monthly bill via a 10-year PPA. In 2007, the TVA Board adopted a dual metering standard under PURPA that required TVA to make available to its distributors the option to participate in a dual metering program modeled after the GP pilot program. In 2012, the GP pilot program was replaced with the GPP program, which operated similarly to its predecessor and consistent with the dual metering standard TVA adopted in 2007. Qualifying generating systems had a maximum capacity of 50 kW<sub>DC</sub> (direct current, DC) and included solar PV panels, wind turbines, low-impact hydropower, and systems using several types of biomass fuels. A \$1,000 incentive for new participants was phased out in 2015 for new non-residential participants and in 2016 for new residential participants. Additionally, the generation credit paid decreased in concert with the significant decrease in the installed cost of solar. For calendar year 2018, the GPP program capacity for new applicants was capped at 10 MW<sub>DC</sub>.

Generation credit rates for the 20-year contract period were \$0.09/kWh for systems with a capacity of up to 10 kW<sub>DC</sub> and \$0.075/kWh for larger systems.

The maximum capacity of individual systems installed under the two programs has varied from a high of 1 MW<sub>DC</sub> to the current 50 kW<sub>DC</sub>. As of January 2024, the combined GP and GPP program had over 3,500 generating systems with a total nameplate capacity of about 108 MW<sub>DC</sub>. Solar PV facilities comprised about 90 percent of this capacity. Biomass (landfill gas, wastewater methane and wood waste and chips) comprised about 10 percent of capacity. Wind generation provided about 96 kW<sub>DC</sub> and small hydroelectric systems provided 9 kW<sub>DC</sub>. In February 2019, the TVA Board approved a revised net metering standard, the closure of the GPP program to new applicants effective January 1, 2020, and the phasing out of the GPP program completely as existing contracts with participants expire.

**Renewable Standard Offer (RSO).** In October 2010, TVA issued the RSO to promote the development of renewable energy in the TVA PSA. TVA's RSO program was designed for developers of new renewable energy projects greater than 50 kW and less than or equal to 20 MW in size located within the TVA region; and offered set prices and terms and conditions (or a "standard offer") to developers of small to mid-size renewable projects under long-term contracts up to 20 years to promote renewable generation from qualified sources. Qualifying fuel sources included solar PV, wind, and biomass from wood waste, agricultural crops or waste, animal and other organic waste, energy crops, and landfill gas and wastewater methane. The RSO program was closed to new proposals in 2015. As of January 2025, 15 RSO facilities with over 138 MW of generating capacity were operating. TVA may still seek and enter into additional long-term, negotiated PPAs for new landfill gas and digester gas-to-energy projects if they meet similar criteria used under RSO, plus additional, negotiated business case justifications.

**Solar Solutions Initiative (SSI).** In February 2012, TVA initiated the SSI, a targeted incentive program aimed to support the existing TVA-region's solar industry and to recruit new industry to the region. In addition to terms similar to those of the RSO, SSI provided incentive payments for solar projects in the RSO program greater than 50 kW and less than or equal to 1 MW that used local certified solar installers. As of January 2025, the program had 56 operating facilities with a total capacity of about 37 MW.

**Distributed Solar Solutions (DSS).** At the end of 2015, TVA closed the SSI program to new proposals and initiated the DSS program. The DSS program was designed to encourage the TVA-region LPCs to develop and operate solar projects with capacities between 50 kW and 2 MW. The program was offered in 2016 and 2017, and as of January 2025, the program has 11 facilities with a total capacity of about 20.6 MW operating.

**Renewable Investment Programs.** In 2018, TVA launched two programs to support accelerated renewable investment: Renewable Investment Agreement (RIA) and the Flexibility Research Project (FRP) pilot. RIA supports utility scale renewable generating

facilities for large commercial and industrial customers, and FRP supports community solar, in partnership with LPCs. Community scale solar provides opportunities for LPC customers to invest in LPC sponsored community solar facilities as a lower cost alternative to constructing and operating their own rooftop or other solar facilities. In 2020, the RIA program was rebranded to Green Invest. FRP closed in January 2021. One project is operational of around 1 MW with the Knoxville Utility Board, and one additional proposal that is still being considered.

## **2.5 Demand-Side Management Programs**

TVA has had a portfolio of demand-side management (DSM) programs focusing on EE and DR for many years. EE programs are designed to reduce the use of energy while still providing reliable electric service. Smart electric technology programs improve consumer energy performance, safety, and comfort. DR programs are designed to temporarily reduce a customer's use of electricity, typically during peak periods and for system reliability or economic reasons. Because the energy use is typically shifted to off-peak times, DR typically has little effect on total energy use. It does, however, provide system reliability and reduce the need for peaking generation capacity. DR program participants receive credits on their electric bills. The TVA DSM portfolio is a combination of fully deployed mature programs, recently initiated programs, and programs under development. Refer to Volume 1, Appendix G for more information.

## **2.6 Transmission System**

TVA operates one of the largest transmission systems in the U.S. It serves an area of 80,000 square miles through a network of 16,400 miles of transmission line; 583 substations, switchyards, and switching stations; and 1,351 individual customer connection points. The system connects to switchyards at generating facilities and transmits power from them at either 161 kilovolts (kV) or 500 kV to LPCs and direct served customers. Substations at delivery points reduce the voltage for delivery through LPC distribution lines serving end users.

The TVA transmission system operates at a range of voltages:

- 500-kV lines – 2,486 miles
- 345- and 230-kV lines – 150 miles
- 161-kV lines – 11,992 miles
- 138- and 115-kV lines – 221 miles
- 69-kV lines – 946 miles
- 46-kV lines – 533 miles
- 26- and 13-kV lines – 16 miles

The TVA transmission system has 69 interconnections with 13 neighboring electric systems and delivered nearly 168 billion kWh of electricity to TVA customers in 2025. These interconnections allow TVA and its neighboring utilities to buy and sell power from each other and to transmit power through their systems to other utilities. Pursuant to its Transmission Service Guidelines, TVA offers transmission services to eligible customers to transmit wholesale power in a manner that is comparable to TVA's own use of the transmission system.

In recent years, TVA has built an average of about 65 miles of new transmission lines and several new substations and switching stations per year to serve new customer connection points and/or to increase the capacity and reliability of the transmission system.

### 3 Alternatives

TVA uses a scenario planning approach in integrated resource planning, a common approach in the utility industry. Scenario planning is useful for determining how various business decisions will perform in an uncertain future. The IRP develops a least-cost plan that is consistent with TVA's requirements under Section 113 of the Energy Policy Act of 1992. The IRP objectives, including the least-cost planning principles, are described in Section 2.1 of Volume 1. Multiple strategies, which represent business decisions within TVA's control, are modeled against multiple scenarios, which represent uncertain futures outside of TVA's control. The intersection of a single strategy and a single scenario results in a resource portfolio. A portfolio is a long-term capacity plan through 2050 that is unique to each combination of strategy and scenario. Additional information can be found in Chapter 2 of Volume 1, incorporated herein by reference.

#### 3.1 Development of Scenarios

The 2026 IRP includes three unique scenarios for evaluation (Figure 3-1):

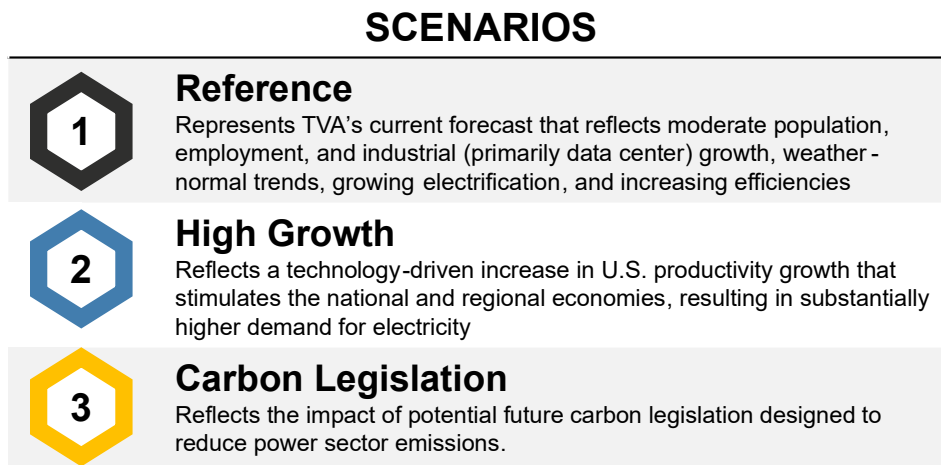


**Figure 3-1: Key Characteristics of the Three Scenarios**

Generally defined, scenarios are the future worlds in which TVA may find itself operating. They are driven by factors outside of TVA's control but to which TVA must be prepared to respond. The IRP scenarios were designed assuming that key uncertainties would deviate from historical trends in the future. Key uncertainties identified relate to electricity demand, environmental policy and regulations, macro-economic trends, and other factors. These and other aspects of the scenarios are described in detail in Volume 1, Section 2.4.

## 3.2 Alternative Strategies and Associated Capacity Expansion Plans

### 3.2.1 Development of Alternative Strategies

TVA decided on three distinct strategies to explore in the IRP analysis. Strategy A, Baseline Utility Planning, is the No Action Alternative. The two other strategies represent action alternatives, along with the Preferred Alternative.

- Strategy A: Baseline Utility Planning (No Action Alternative)
- Strategy B: Innovation
- Strategy C: Distributed

Figure 3-2 provides key characteristics of the three alternative strategies. Narratives for alternative strategies were developed to generally explain the goal of each strategy and then resource types to be emphasized were identified to achieve each strategy's goal. Baseline Utility Planning represents fundamental least-cost planning, and all strategies apply a planning reserve margin to provide sufficient resources to account for variations in load and generating unit availability. The other strategies emphasize specific themes – from promotion of emerging, firm, dispatchable resources through innovation, R&D and partnerships to promotion of distributed and demand-side resources or smaller, more dispersed resources that enhance local resiliency, as shown in Figure 3-3. The mechanism applied to promote resources required minimum additions in order to drive diverse portfolio outcomes. The Strategy Design Matrix provides the roadmap for how resource promotions were applied in capacity planning. Further details on strategy design can be found in Volume 1, Section 2.5.

## STRATEGIES

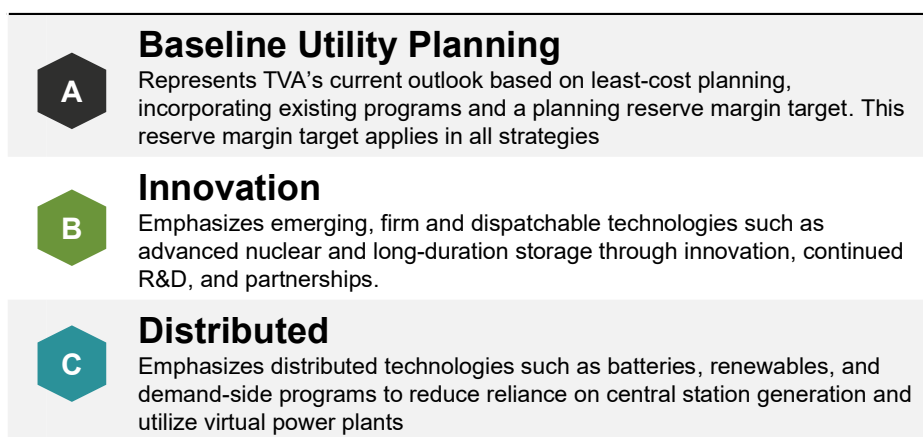


**Figure 3-2: Key Characteristics of the Three Alternative Strategies**



| STRATEGY      | UTILITY-SCALE RESOURCES |      |                     |                   |            |                 |                       | DISTRIBUTED AND DEMAND-SIDE RESOURCES |                     |           |           |
|---------------|-------------------------|------|---------------------|-------------------|------------|-----------------|-----------------------|---------------------------------------|---------------------|-----------|-----------|
|               | Nuclear                 | Coal | Gas CC and Frame CT | Aero CTs and RICE | Renewables | Battery Storage | Long-duration Storage | Distributed Solar                     | Distributed Storage | EE        | DR        |
| A Baseline    | Base                    | Base | Base                | Base              | Base       | Base            | Base                  | Base                                  | Base                | Base      | Base      |
| B Innovation  | Emphasize               | Base | Base                | Base              | Base       | Base            | Emphasize             | Base                                  | Base                | Base      | Emphasize |
| C Distributed | Base                    | Base | Base                | Emphasize         | Emphasize  | Emphasize       | Base                  | Emphasize                             | Emphasize           | Emphasize | Emphasize |

**Figure 3-3: Promotion Levels for Selected Energy Resources Associated with Each Strategy**

### 3.2.2 Capacity Expansion Plans

The three scenarios forecasted varying levels of electricity demand, which drove varying levels of capacity requirements and need for incremental resources in each scenario. The planning model then applied the resource emphasis identified for each strategy and solved for an optimal, least-cost portfolio for each unique scenario and strategy combination.

Capacity expansion plans are comprised of baseline firm supply plus incremental capacity change, or the total MW available. The following provides a summary of the capacity expansion plans, also known as resource portfolios, developed for each of the alternative strategies. Capacity additions are quantified in MW and annual energy production is quantified in terawatt hours (TWh). The forecasted capacity available from existing resources changes over the study window as purchased power contracts expire and some generating units are projected to reach the end of their useful life (see Volume 1, Table 2-2).

Key themes regarding capacity and expansion plans across all portfolios through 2040 and additional sensitivity analysis include:

- New capacity is needed in all scenarios to support load growth or replace expiring and end of life capacity.
- Firm, dispatchable technologies are needed to ensure system reliability throughout the year.
- Gas expansion serves broad system needs, with the ability to provide firm, dispatchable capacity, economic energy, and system flexibility.
- Storage expansion continues, driven by both battery storage and the potential for additional pumped storage.
- New nuclear technologies, with continued advancements, can support load growth and reduce fuel volatility and regulatory risks.
- Solar expansion plays a complementary role, meeting customer needs and providing economic energy.
- EE deployment reduces energy needs, particularly between now and 2040, and DR programs grow with the system and the use of smart technologies.

A mix of resource types – both supply and demand-side – will be required to meet system needs. In all scenarios, TVA will continue to provide affordable, reliable, and resilient energy for years to come.

The figures below show the portfolio results through 2040. Results are presented in two ways – incremental capacity from now through 2040 (Figure 3-4) and total energy in 2040 (Figure 3-5). Incremental capacity represents the new resources selected to fill capacity needs. Capacity needs are driven by forecasted growth in energy demand and the expiration or expected end of life of approximately 11,000 MW of existing capacity. Total energy represents the energy expected from the economic dispatch of resources in the capacity plans for each portfolio. The results for each scenario are grouped together. Within a scenario, strategy results are grouped by resource type, which varies based on strategic focus and the impact on portfolio optimization. Further information on capacity plans can be found in Volume 1, Chapter 3 and Volume 1, Appendix H.

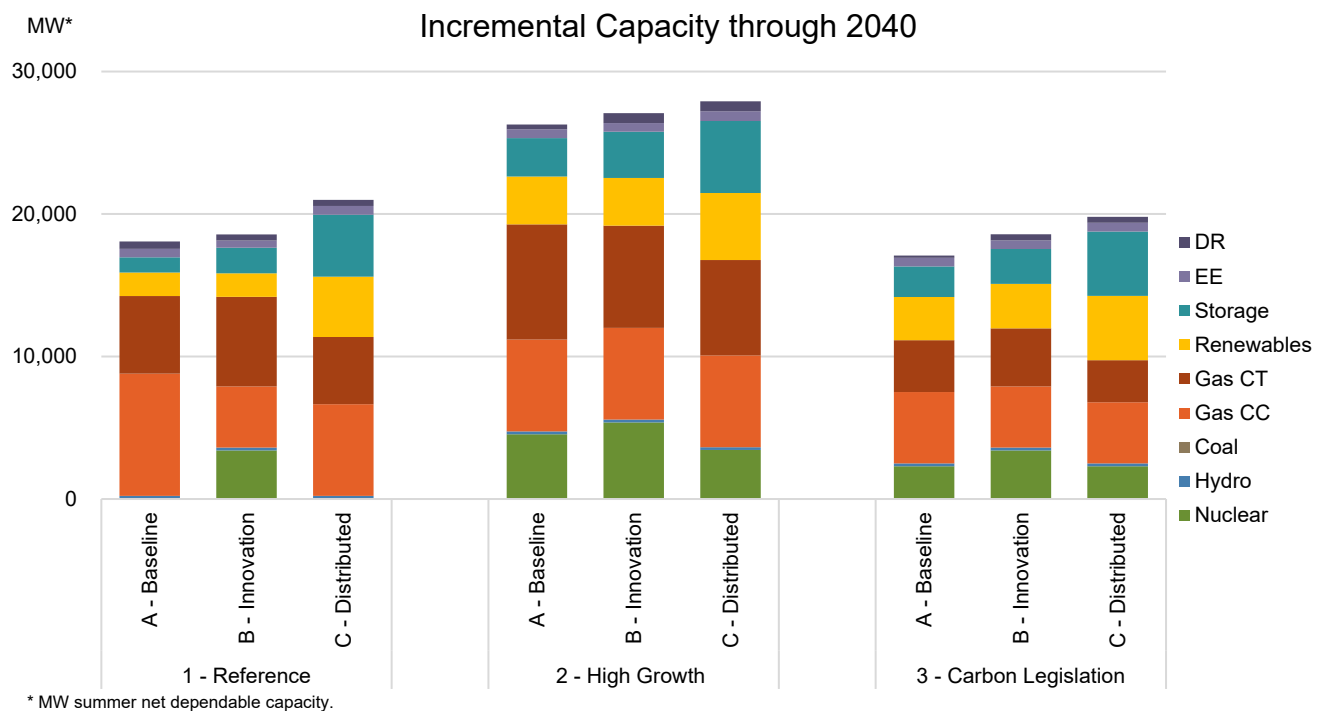


**Figure 3-4: Incremental Capacity through 2040 (Summer NDC)**

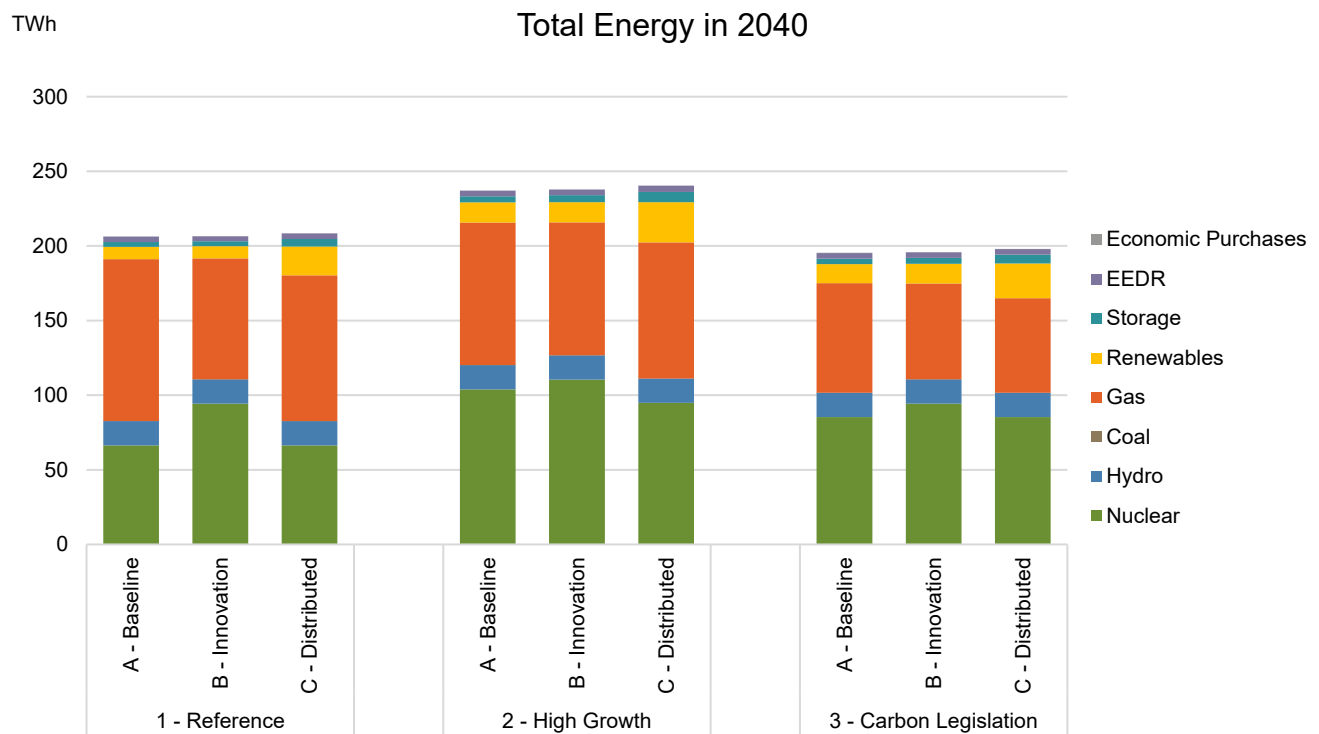


**Figure 3-5: Total Energy in 2040**

Similar to the above portfolio results, the figures below extend the portfolio results through 2050, again displayed in two ways – incremental capacity changes from now through 2050 (Figure 3-6) and total energy in 2050 (Figure 3-7). Within a scenario, strategy results are grouped by resource type, which varies based on strategic focus and the impact on portfolio optimization. Further information on capacity and energy plans can be found in Volume 1, Sections 3.2 through 3.4, and Volume 1, Appendix H.

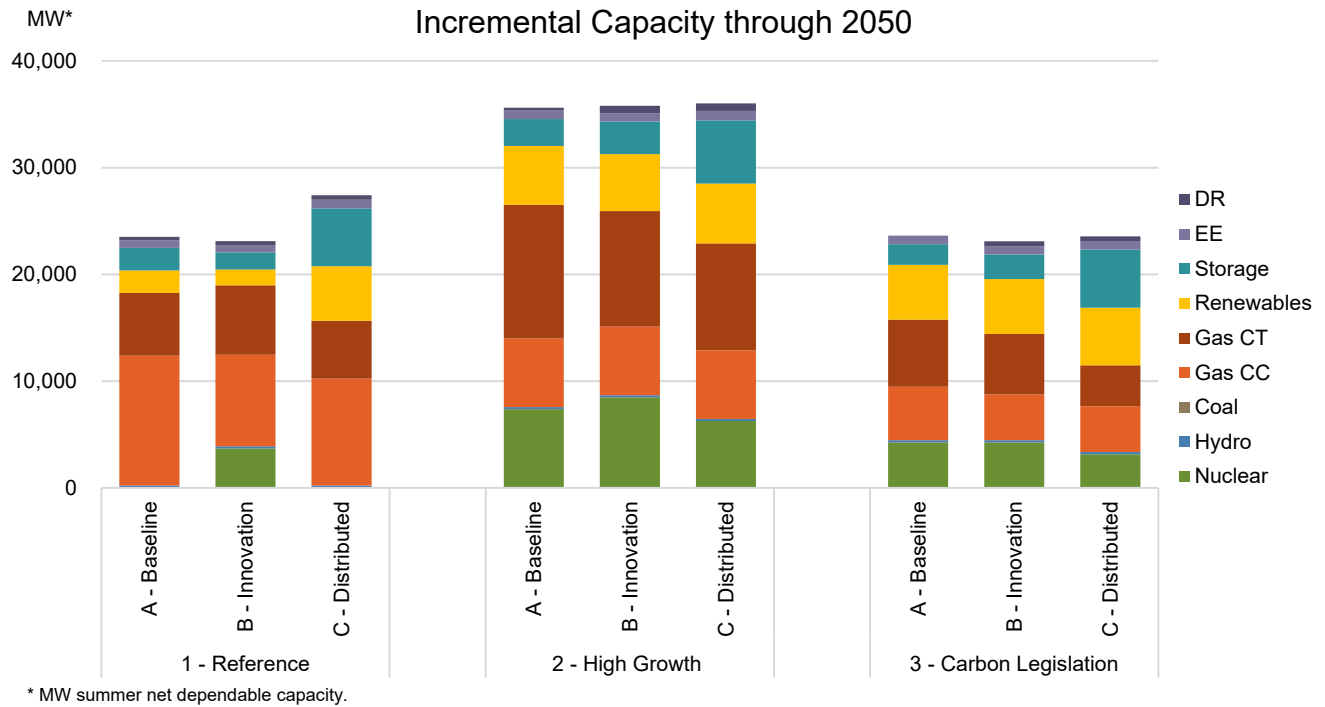


**Figure 3-6: Incremental Capacity through 2050 (Summer NDC)**

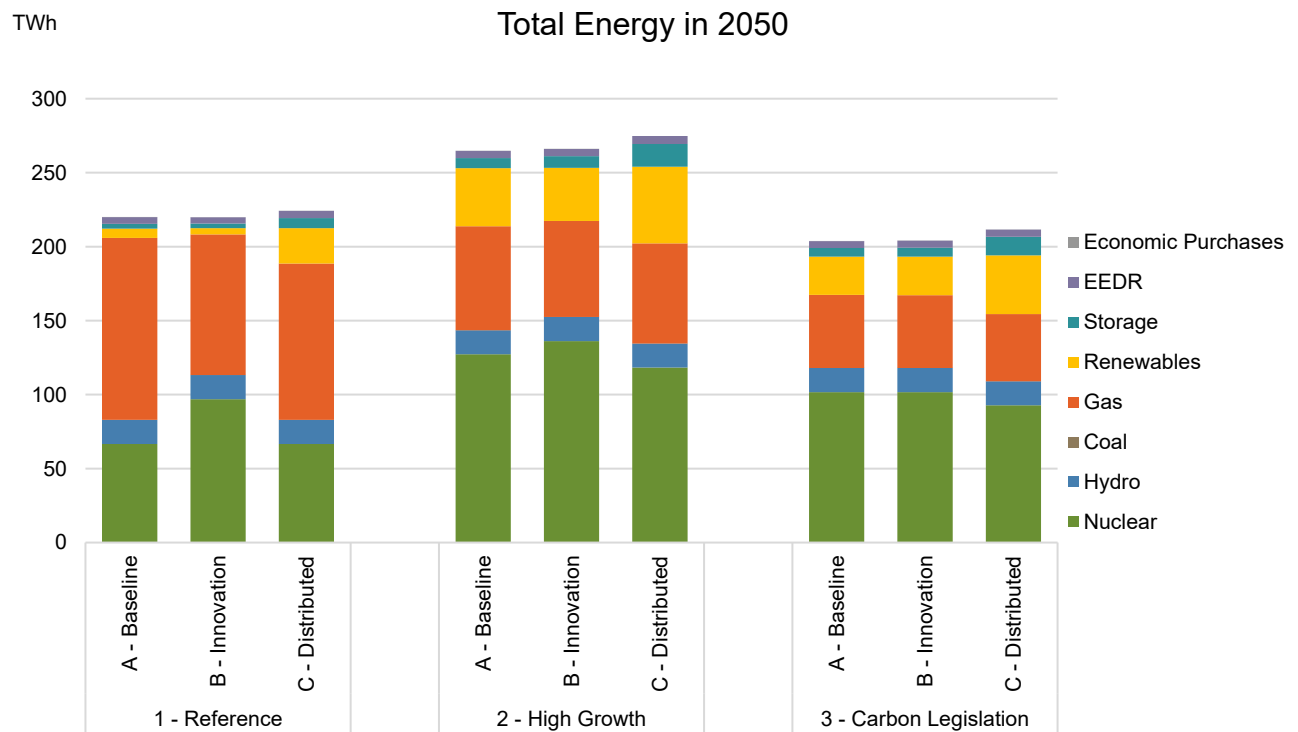


**Figure 3-7: Total Energy in 2050**

### 3.2.3 Sensitivity Analysis

When analyzing core portfolio results and considering stakeholder and public input, TVA identified questions warranting further evaluation related to key assumptions that could influence results. TVA used sensitivity analysis to assess potential impacts, varying a key assumption to isolate the impact of that change on portfolio results. For additional insights, TVA performed sensitivity analysis focused in the following areas:

- Electricity demand changes
- Resource costs and availability
- Natural gas commodity prices

In general, sensitivity results fell within the capacity expansion bounds for resource selection of the nine core portfolios with the exception of Higher EE Availability and Deployment and Supercharged Growth. Additionally, earlier and later coal end of life cases were evaluated and show very little variation in incremental capacity by 2040; rather, it is the timing of resource additions that differs. A discussion of each sensitivity is included in Volume 1, Section 3.10. The results of sensitivity analyses, along with the results of the nine core portfolios, metrics, and the EIS, were considered in developing the IRP recommendations, including the Preferred Alternative. Sensitivities are also included in the extended range of environmental impacts found throughout Volume 2, Section 5.5 for multiple resources.

### 3.2.4 Potential Retirement or End of Life of TVA Generating Facilities

Several TVA facilities have units that could reach end of life during the planning period. For planning purposes, existing TVA coal plants are expected to reach end of life by 2039, subject to TVA Board approval and further environmental review. In addition, based on unit age, TVA expects some of its oldest gas CC plants to reach end of life in the late 2030s and 2040s.

The following sections describe in general the activities that would occur upon potential retirement or end of life of these facilities.

#### 3.2.4.1 Natural Gas Plants

Decommissioning is the performance of activities required to ready a facility for deactivation. Key decommissioning activities at natural gas-fired CT and CC facilities include:

- Tag out all unit or plant equipment except service water, lighting, etc.
- Remove and properly dispose of hazardous and other wastes, including polychlorinated biphenyl (PCB)-containing equipment.
- Empty all storage tanks and reuse or dispose of contents (fuel oil, glycol, demineralized water, raw water, condensable fluids from gas supply).
- Open all equipment electrical breakers not in use.
- Drain oil, fuel, and fluids.

- Salvage, store, and relocate, as practical, all useable equipment, components, materials, spare parts, office products, etc.
- Salvage and store all key plant records.

Deactivation is the shutting down of power and energized systems as appropriate as well as severing and/or isolating power, water, fuel supply and piping to the plant to provide a cold, dark and dry structure. Activities may also include rerouting of power and services as required for any facilities that will remain operational.

Limited decontamination involves removing select regulated materials in a safe and practical manner with the intention of leaving the plant in a status that does not present a hazard or risk to the environment or personnel. Work may include abatement and disposal of regulated materials. Regulated materials include but are not limited to PCB equipment, asbestos, hazardous waste, solid waste, products, etc. Key decontamination activities at CTs include:

- Removal and proper disposal of regulated materials, as practical.
- Periodic materials condition monitoring.
- Periodic waste removal as materials deteriorate over time.

Decommissioning may also include the demolition of structures or infrastructure and the preparation and reclamation of the site for future use.

#### **3.2.4.2 Coal Plants**

Decommissioning is the performance of activities required to ready a facility for deactivation. Work performed includes removal of equipment, components, and parts that can be used at other sites; draining of oil/fluids from equipment; removal of coal and ash from boilers and other equipment; removal of hazardous materials and potential waste-like materials; removal of PCB equipment; removal of furniture/furnishings; removal of information technology assets; and removal of plant records. Key decommissioning activities at coal plants include:

- Tagging out all unit or plant equipment except service water, lighting, etc.
- Emptying and cleaning hoppers, bins, bunkers, etc.
- Opening all equipment electrical breakers not in use.
- Draining oil and fluids
- Salvaging, storing, and relocating as practical all useable equipment, components, materials, spare parts, office products, etc.
- Salvaging and storing all key plant records.

Deactivation work is similar to natural gas facilities but may also include removing power and services, installing bulkheads, and sealing tunnels. Activities may also include rerouting of power and services as required for any facilities that would remain operational. Key deactivation activities at coal plants include:

- Performing electrical and mechanical isolation of systems, components, and areas.
- Installing bulkheads and/or fill tunnels.
- Providing alternate power and services (sump pumps, Federal Aviation Administration stack lighting, etc.).

Limited decontamination involves removing select regulated materials in a safe and practical manner with the intention of leaving the plant in a status that does not present a hazard or risk to the environment or personnel. Limited contamination work may include abatement and disposal of regulated materials, which include but are not limited to PCB equipment, asbestos, hazardous waste, solid waste, products, etc. Key decontamination activities at coal plants include:

- Removal and proper disposal of regulated materials, as practical.
- Periodic materials condition monitoring.
- Periodic waste removal as materials deteriorate over time.

Decommissioning may also include the demolition of structures or infrastructure and the preparation and reclamation of the site for future use.

### 3.3 Strategy Performance

Reflecting least-cost planning principles and feedback from the IRP Working Group, TVA developed a set of metrics to assess the performance of the portfolios. Metrics were grouped into four categories – low cost, risk informed, environmentally responsible, and diverse, reliable, and flexible system operations. Metrics were calculated for the nine portfolios and were used to evaluate strategy performance for each category (Figure 3-8).

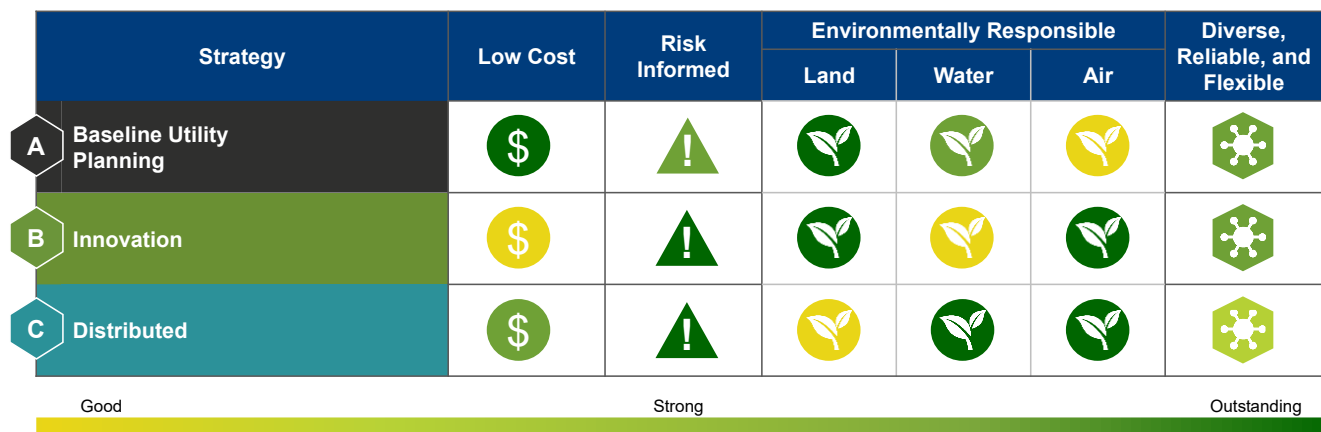


**Figure 3-8: 2026 IRP Strategy Performance Summary**

Looking across the metric categories, there were key tradeoffs to consider. Key takeaways include:



- Strategy A that applies baseline utility planning is the lowest cost strategy overall, though its reliance on natural gas generation results in higher risk than alternative strategies.
- Strategy B is the most expensive overall, as it would require significant investments in nuclear expansion, but performs well in risk informed and operational metrics with low variation in operating cost due to lower fuel price volatility.
- Strategy C is generally the median in cost and performs well in risk informed metrics due to low variation in operating cost due to lower fuel price volatility; Strategy C is most challenged in operational metrics as higher reliance on intermittent renewable generation increases the risk of unserved energy or energy curtailment.
- All strategies include timeline, technological, transmission, and/or market depth uncertainty and execution risks, which are amplified by load growth and regulatory impacts.
- Strategies feature environmental tradeoffs, such as Strategy C having the highest land use, Strategy B having the highest water consumption, and Strategy A having the highest carbon dioxide (CO<sub>2</sub>) intensity.
- All strategies perform well in operational metrics on an absolute basis and would continue to result in a reliable and resilient system.

### **3.3.1 Strategy A: Baseline Utility Planning (No Action Alternative)**

Baseline Utility Planning represents fundamental least-cost planning. No specific resource types are emphasized beyond existing programs. Resources are modeled and chosen economically to meet the reserve margin constraint for reliability. Planning reserve margins are included for summer and winter peak seasons, and they apply in all strategies. These targets are developed separately from the IRP and employ an industry best-practice 1-in-10-year loss-of-load expectation level of reliability.

As Strategy A applies no resource promotions, it is the lowest cost strategy overall, though its higher reliance on natural gas generation results in higher risk than alternative strategies. Strategy A portfolios have the highest natural gas generation and the lowest land use on average across the strategies.

See Volume 1, Section 3.7 for more information about Strategy A performance.

### **3.3.2 Strategy B: Innovation**

Under the Innovation strategy, TVA focuses on developing emerging technologies that are firm and dispatchable, meaning that they can be reliably and predictably turned on and off to meet demand. These technologies include advanced nuclear and long duration storage. Under this strategy, TVA would increase efforts in research and development to advance and deploy these new technologies. This could be executed through partnerships with the

federal government or other organizations, such as universities, research labs, and startups, to share resources and expertise.

Strategy B is the most expensive overall, as it would require significant investments in nuclear expansion. Land use is comparable to Strategy A, but water consumption is highest in this strategy. Technological risks are greatest in portfolios with more reliance on emerging energy technologies, and Strategy B portfolios have the highest amount of new nuclear. This strategy performs well in operational metrics with low variation in operating cost due to lower fuel price volatility, and it features median performance in unserved energy and curtailment metrics.

See Volume 1, Section 3.7 for more information about Strategy B performance.

### **3.3.3 Strategy C: Distributed**

The Distributed strategy emphasizes resources that are more geographically dispersed in nature, both at utility and distribution scale. At the utility scale, this strategy would emphasize battery storage and smaller natural gas generators, such as Aero CTs and reciprocating internal combustion engines, which are more modular and can be sized and adapted to meet both local and system needs. This strategy also emphasizes utility scale solar where individual solar farms are often smaller in capacity compared to traditional thermal generation and are therefore more distributed across the service territory. Finally, this strategy includes increased incentives to encourage customers to install distributed generation and participate in DSM programs. Distributed generation includes distributed solar and storage while DSM options include EE and DR programs. This strategy would require the use of existing and potentially expanded customer partnerships and programmatic solutions to increase uptake of these distributed resources. Program design would need to ensure that the incentive structure is balanced and fair, so that it does not disrupt the grid or lead to higher costs for other non-participating customers.

Strategy C is generally the median in cost. Strategy C portfolios have the highest renewable and storage additions on average. With the largest solar buildouts under this strategy, transmission risks and land use are greatest. Water consumption intensity is lowest as higher renewable generation displaces thermal generation. Operationally, higher reliance on intermittent renewable generation increases the risk of unserved energy or energy curtailment.

See Volume 1, Section 3.7 for more information about Strategy C performance.

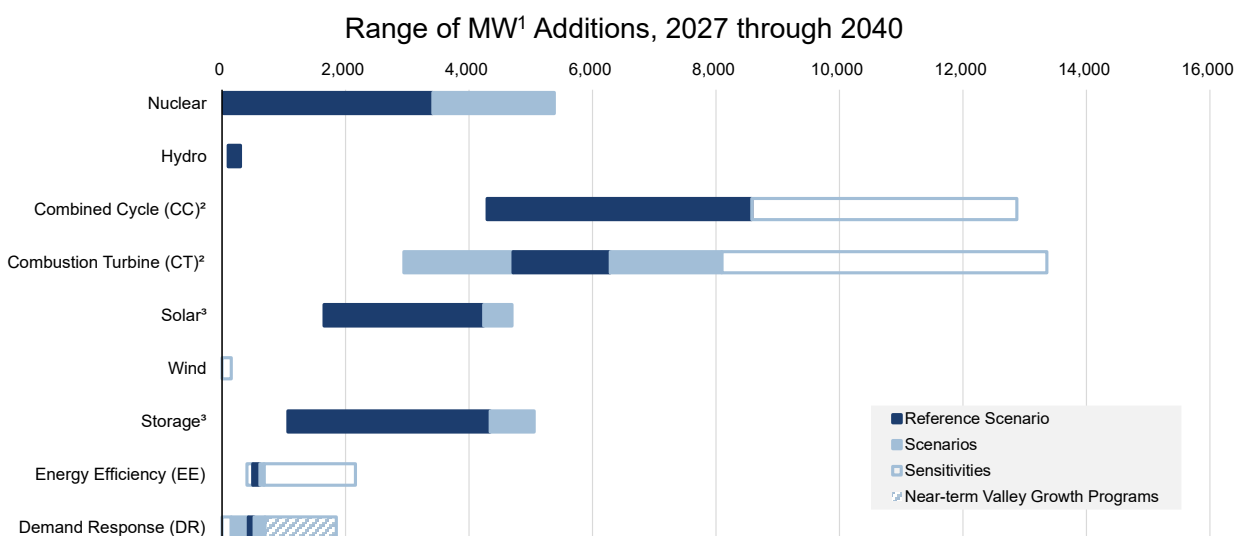
## **3.4 Preferred Alternative – Power Supply Mix Ranges and Strategic Portfolio Direction**

The IRP results – including the nine core portfolios, metrics, sensitivities, and EIS – provide robust analysis that offers insights into the potential power supply mix and impacts to the customer priorities of power cost, reliability, resiliency, and environmental responsibility. The

implementation process is described in detail in Volume 1, Chapter 4 and was guided by the objectives of resource planning outlined in Volume 1, Chapter 2, which evaluates cost, operational, environmental, and risk factors in order to provide reliable service at the lowest system cost. The resulting 2026 IRP Power Supply Mix Ranges and Strategic Portfolio Direction is TVA’s preferred alternative.

### 3.4.1 Power Supply Mix Ranges through 2040

Exploring potential scenarios and strategies in the IRP is fundamental to ensuring TVA is well prepared to meet the region’s energy needs however the future unfolds. The chart below shows the power supply mix ranges – or incremental additions – from now through 2040. The ranges encompass the full set of results, with reference scenario results shown in the dark blue bars, and alternative scenario and sensitivity results outside of the reference ranges shown in the light blue bars and outline-only bars, respectively. In general, the upper end of most ranges are set by the High Growth scenario or the Supercharged Growth sensitivity.



<sup>1</sup> MW capacity expressed in summer net dependable capacity.

<sup>2</sup> CC and CT additions could include control technologies, such as carbon capture and storage/sequestration (CCS), alternative fuel co-firing (e.g., hydrogen), or gas re-firing of existing coal burners.

<sup>3</sup> Solar and storage include utility-scale and distributed resource additions.

**Figure 3-9: Power Supply Mix Ranges through 2040**

### 3.4.2 Strategic Portfolio Direction

TVA’s IRP analysis reaffirms the importance of adhering to least-cost planning principles to ensure the continued delivery of affordable, reliable, and resilient power to the Tennessee Valley. The results underscore that no single resource will fully meet future system needs; rather, maintaining a diverse portfolio remains essential. In the near-term, TVA should prioritize the addition of firm, dispatchable resources, particularly natural gas and storage, to address capacity requirements. TVA should also continue collaborating with industry and federal partners to prepare for the potential deployment of firm, dispatchable advanced

nuclear technologies, which could support long-term load growth while mitigating fuel volatility and regulatory risks. Finally, complementary deployment of solar, demand-side, and distributed generation resources should be used to satisfy capacity requirements, provide economic energy, and/or meet customer needs.

The 2026 IRP's strategic portfolio direction includes the following recommended actions:

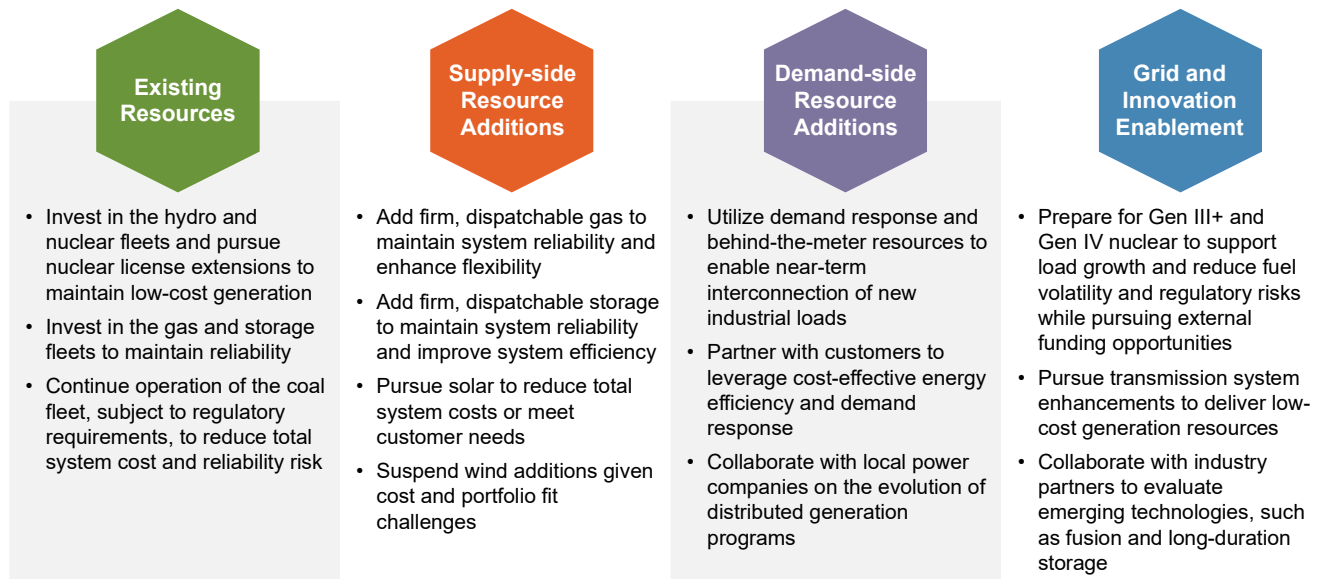


Table 3-1 outlines the IRP ranges, current actions in progress, and planned actions through 2040 for existing resources and mature resource additions, including supply-side and demand-side resources. A combination of resource additions is needed to ensure the region continues to have affordable, reliable, and resilient power. Additions will vary within the ranges based on movements in key signposts.

**Table 3-1: Strategic Portfolio Direction – Planned Resource Actions through 2040 (Preferred Alternative)**

| Resource Type | Gigawatts (GW) by 2040 | Actions in Progress                                                                                              | Planned Actions through 2040                                                                                                                    |
|---------------|------------------------|------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|
| Nuclear       | Up to 5 GW             | Pursuing license extensions for and investing in the existing nuclear fleet; evaluating advanced nuclear options | Continue investing in the existing nuclear fleet and cost-effective opportunities to increase output; potential for advanced nuclear deployment |
| Hydro         | Up to 1 GW             | Ongoing investments in the Hydro Life Extension (HLE) program, leveraging cost-effective ways to increase output | Continue investing in the existing hydro fleet, maximize cost-effective uprate potential, and evaluate market opportunities                     |

| Resource Type | Gigawatts (GW) by 2040              | Actions in Progress                                                                                                                                                    | Planned Actions through 2040                                                                                                                                                                        |
|---------------|-------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Coal          | -                                   | Continuing operation of coal fleet, subject to regulatory requirements, as an immediate, cost-effective option to reduce total system cost and system reliability risk | Evaluate existing fleet, as needed                                                                                                                                                                  |
| Gas CC        | 4 to 13 GW                          | 2 GW of CC capacity being added by 2028 to address capacity requirements and provide grid support                                                                      | Continue investing in the existing fleet and evaluate future CC additions and market opportunities for system reliability needs                                                                     |
| Gas CT        | 3 to 13 GW                          | 2 GW of Frame and Aero capacity being added by 2028 to address capacity requirements, provide grid support, and enhance system flexibility                             | Continue investing in the existing fleet and evaluate future CT additions and market opportunities for system reliability, flexibility, and resiliency needs                                        |
| Solar         | 2 to 5 GW<br>(3 to 12 GW nameplate) | 3 GW of Green Invest, self-directed, and Generation Flexibility solar projects contracted to come online by 2030                                                       | Evaluate solar additions to either lower system costs or meet customer needs utilizing regular procurement cycles                                                                                   |
| Wind          | <1 GW<br>(Up to 1 GW nameplate)     | Suspend wind additions given cost and portfolio fit challenges                                                                                                         | Gauge how changes in signposts are affecting cost and system fit challenges                                                                                                                         |
| Storage       | 1 to 5 GW<br>(1 to 8 GW nameplate)  | 0.7 GW of Green Invest, self-directed, and Generation Flexibility battery projects contracted to come online by 2030; evaluating pumped storage option                 | Continue investing in the existing pumped storage fleet and evaluate storage options to support reliability, resiliency, and system flexibility; potential for additional pumped storage deployment |
| EE            | 1 to 2 GW                           | Investing in residential, commercial, and industrial EE programs using insights from the Energy Programs Potential Study                                               | Partner with customers to realize cost-effective EE program potential, reducing power generation resource needs                                                                                     |
| DR            | Up to 2 GW                          | Investing in residential, commercial, and industrial DR programs to enable interconnection of new industrial loads and to serve system needs                           | Collaborate with customers to realize cost-effective DR program potential, reducing power generation resource needs                                                                                 |

A portion of resource additions will be driven by LPCs through flexible generation options or the evolution of contractual arrangements. Also, TVA will continue to evaluate future market offers received on a one-off basis in the context of least-cost planning and the IRP's strategic direction.

Additions of new energy resources of all types typically require additional investments in the transmission system. Generally, these investments include optimizing existing infrastructure through projects such as reconductoring transmission lines and upgrading substations, along with building new transmission infrastructure such as transmission lines, substations, and other devices that support system reliability and stability. Where possible, TVA prefers to utilize brownfield sites with existing infrastructure and easements. TVA is also expanding its use of grid-enhancing technology, such as advanced conductors and dynamic line ratings, to greater leverage the existing transmission system when adding new generation and storage to the system.

Additions of new gas-fired resources typically require new or expanded gas pipeline infrastructure. The TVA region has a robust gas pipeline network, and future siting efforts will seek to leverage existing pipelines and minimize the need for infrastructure expansion to the extent possible. To support reliability of gas-fired plants, TVA typically contracts for a high level of fuel delivery priority and/or invests in a backup fuel source on site, depending on the expected operations profile of a particular plant.

The strategic portfolio direction also includes recommended actions to advance emerging technologies, such as advanced nuclear. Actions for emerging resources focus on enabling and demonstrating emerging energy technologies and leveraging partnerships that reduce cost and risk.

For additional information on the 2026 IRP Recommendations, including the Power Supply Mix Ranges through 2040 and 2050, Strategic Portfolio Direction, and Key Signposts and Implications, see Volume 1, Chapter 4.

### **3.5 Summary Comparison of Environmental Impacts of the Alternatives**

This section provides a summary of the environmental impacts of the alternatives. Detailed analysis of the anticipated environmental impacts is provided in Chapter 5.

While the total amount of energy generated during the 2026-2050 planning period is, by design, similar across the alternative strategies, which encompass the Power Supply Mix Ranges, for each scenario, the way this energy is generated varies across strategies (Figure 3-4 through Figure 3-7). This is a result of the differences between the alternative strategies and their focus on different energy resources as described in Volume 2, Section 3.2 and Volume 1, Section 2.5.

Environmental impacts differ less between strategies than between scenarios, as the scenario dictates load and U.S. energy policy which are primary drivers of environmental profiles. For most environmental resources, impacts would be greatest in Scenario 2 (High Growth) and lowest in Scenario 3 (Carbon Legislation). IRP strategies feature environmental tradeoffs, such as Distributed (C) having the highest land use, Innovation (B) having the

highest water consumption, and Baseline (A) having the highest air quality and climate impacts.

While the IRP is not site-specific, the IRP and EIS provide insights into potential impacts to communities across the region. For example, the average system cost metric is directionally indicative of overall trends in customer bills (Strategy A is the lowest cost strategy overall), and metrics related to carbon emissions are directionally indicative of air quality trends in the region (Strategies B and C have the lowest air emissions). Site-specific aspects of actions that are later proposed to implement the IRP strategic direction will be addressed and considered in tiered environmental reviews.



## 4 Affected Environment

### 4.1 Introduction

This chapter describes the natural and socioeconomic resources that could be affected by the alternative strategies and portfolios developed in the integrated resource planning process. These resources are generally described at a regional scale rather than a site-specific scale. The primary study area is the TVA PSA and the Tennessee River watershed (Figure 1-1), including all counties in Tennessee and portions of Alabama, Georgia, Kentucky, Mississippi, North Carolina, and Virginia. TVA's power system serves approximately 10 million people in the seven-state, 80,000-square-mile region. All but one of TVA's hydroelectric plants, as well as all its nuclear plants, are located in the Tennessee River watershed. Its coal-fired plants are in the Tennessee River watershed as well as along the Cumberland and Ohio rivers (Figure 1-1). Natural gas and fuel oil-fired generators are located at 17 sites. Nine operating small PV solar installations are located within the TVA PSA. The seven windfarms that TVA purchases power from (see Section 2.4) are outside the TVA region. TVA also purchases power from several USACE hydroelectric plants in the Cumberland River drainage basin. Some of these plants are in the TVA region, and the others are in southern Kentucky north of the TVA region.

For some resource issues, such as air quality, climate change, and renewable energy resources, impacts may extend beyond the TVA region. For most resources, the primary study area consists of 181 counties and two independent cities where TVA is a major provider of electric power.

### 4.2 Air Quality

#### 4.2.1 Regulatory Framework for Air Quality

The CAA, as amended, is the comprehensive law that addresses air quality by regulating emissions of air pollutants from stationary sources (such as power plants and factories) and mobile sources (such as automobiles). It requires the USEPA to establish National Ambient Air Quality Standards (NAAQS) for specific air pollutants and directs the states to develop State Implementation Plans to achieve these standards. This is primarily accomplished through permitting programs that establish limits for emissions of air pollutants from various sources. The CAA also requires USEPA to set standards for emissions of hazardous air pollutants (HAPs).

#### 4.2.2 Criteria Air Pollutants

USEPA has established NAAQS for the six criteria air pollutants: carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO<sub>2</sub>), ozone, particulate matter (PM), and sulfur dioxide (SO<sub>2</sub>). TVA's entire PSA, except for a small SO<sub>2</sub> nonattainment area in part of Sullivan County, Tennessee, is currently designated as attainment, attainment/unclassifiable, or unclassifiable

with respect to all NAAQS. There are currently no other NAAQS nonattainment areas within the TVA PSA.

An unclassifiable status or attainment/unclassifiable status means that an area has insufficient air quality monitoring data to make a firm determination of attainment. However, the unclassifiable or attainment/unclassifiable status areas are treated as in attainment with NAAQS, for the purposes of CAA planning and permitting requirements.

In general, for all six criteria pollutants regulated under the NAAQS, air quality nationwide has been improving for several decades (Table 4-1). This has been due in large part to compliance with CAA-related regulations developed by the USEPA and state/local agencies that have dramatically reduced pollutant emissions from stationary and mobile sources. The reductions in emissions of air pollutants have come about because of the development and use of emission control technologies that prevent pollutants from forming during combustion or other processes, technologies that remove the pollutants from the exhaust streams after the pollutants have formed, and the switch to cleaner fuels. A summary of improvements in air quality nationally is provided in Table 4-1, which shows the percent improvement for each NAAQS-regulated pollutant from the start of each decade since 1980 through 2024. For some of the listed pollutants, there are multiple standards based on different sampling time intervals. The standards for PM also address two different sizes of particles, one for particles less than 10 microns in size (PM<sub>10</sub>), and one for particles less than 2.5 microns in size (PM<sub>2.5</sub>). The major criteria pollutants emitted by power plants are nitrogen oxides (NO<sub>x</sub>; including NO<sub>2</sub>) and SO<sub>2</sub>. Ozone is not directly emitted by any source; it is formed by a chemical reaction between NO<sub>x</sub> and volatile organic compounds (VOCs) in the presence of sunlight. VOCs are produced by both man-made and natural sources; in the Southeast, most VOCs are from natural sources and power plants are not significant emitters of VOCs.

**Table 4-1: Percent Change in Ambient Concentrations of Air Pollutants in the U.S., 1980-2024**

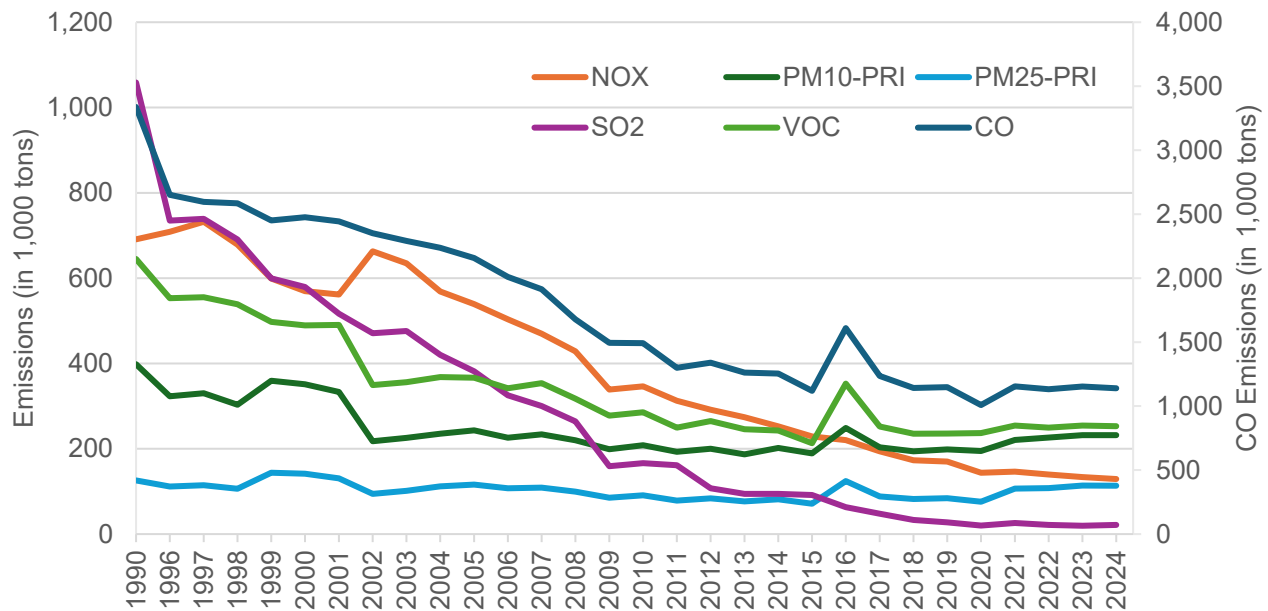
| Air Pollutant               | 1980 vs 2024 | 1990 vs 2024 | 2000 vs 2024 | 2010 vs 2024 |
|-----------------------------|--------------|--------------|--------------|--------------|
| CO                          | -87          | -80          | -67          | -25          |
| Pb                          | --           | --           | --           | -86          |
| NO <sub>2</sub> (annual)    | -69          | -63          | -54          | -31          |
| NO <sub>2</sub> (1-hour)    | -66          | -55          | -40          | -23          |
| Ozone (8-hour)              | -29          | -24          | -18          | -7           |
| PM <sub>10</sub> (24-hour)  | ---          | -36          | -39          | -7           |
| PM <sub>2.5</sub> (annual)  | ---          | ---          | -46          | -27          |
| PM <sub>2.5</sub> (24-hour) | ---          | ---          | -45          | -21          |
| Sulfur Dioxide (1-hour)     | -95          | -93          | -87          | -79          |

Source: USEPA 2026a

Improvement in air quality has been realized in TVA's PSA as well, as many counties in this region were previously designated as nonattainment for one or more NAAQS, and in recent decades have come into attainment. The improvement in air quality and attainment of

NAAQS in the region is even more remarkable, considering that several of the NAAQS have been made substantially more stringent in the past two decades. The improvements in air quality in TVA's PSA is representative of what has happened nationally.

Regional emissions trends for the TVA PSA are approximated for this assessment by using statewide Tennessee emissions. TVA serves nearly all of Tennessee, and portions of several adjacent states, so the emissions trends for Tennessee are used here as a surrogate for regional emissions trends in the TVA PSA. Figure 4-1 shows the trend lines of Tennessee pollutant emissions from 1990 through 2024, based on data obtained from USEPA's National Emissions Inventory website at <https://www.epa.gov/air-emissions-inventories/air-pollutant-emissions-trends-data> (USEPA 2025).



Source: USEPA 2025

**Figure 4-1: Trends in Emissions of Air Pollutants in Tennessee, 1990-2024**

The data in Figure 4-1 represent, for each pollutant, the sum of emissions from all stationary and mobile source sectors, including wildfires and prescribed fires for those years where fires were inventoried. As shown in this chart, there is a significant downward trend for all pollutants in the region, especially for pollutants of concern emitted from stationary combustion sources such as SO<sub>2</sub> and NO<sub>x</sub>.

TVA's emissions reductions are responsible for much of the statewide Tennessee stationary source SO<sub>2</sub> and NO<sub>x</sub> emissions reductions since 1990. The utility sector SO<sub>2</sub> emissions in Tennessee, the vast majority of which were from TVA in 1990, decreased from 817,612 tons in 1990 to 24,532 tons in 2022, a decrease of 97 percent.

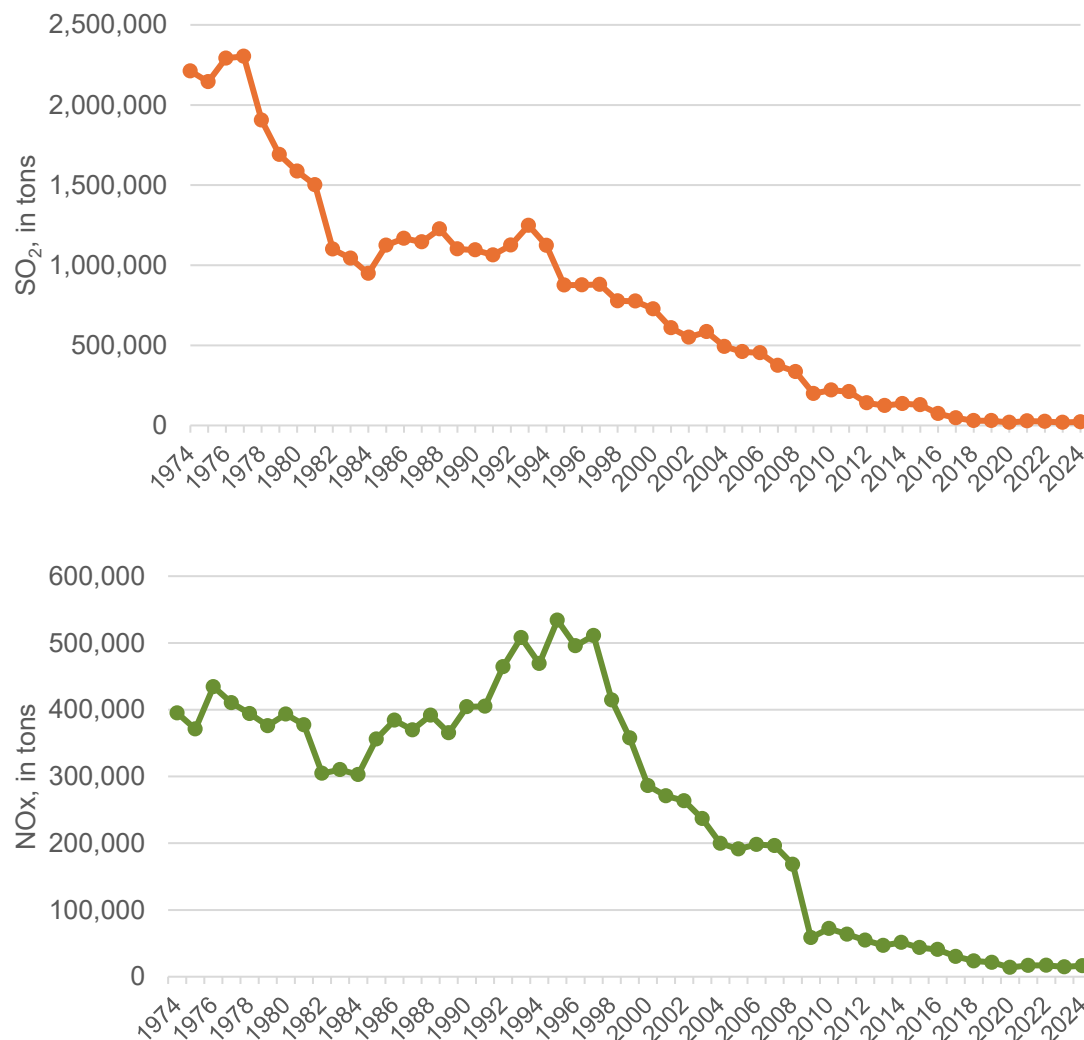
Utility sector NOx emission in Tennessee, primarily attributed to TVA, increased from 240,359 tons in 1990 to 283,464 tons in 1997, before decreasing for the next two decades to 17,048 tons in 2022, a decrease of 94 percent from the 1997 peak.

Nationally, electric utility emissions have fallen to the point where they no longer represent the largest emitting sector for the pollutants of primary focus. According to data from the National Emissions Inventory, in 2024 on-road vehicles produce 42 percent of all NOx emissions in Tennessee (52,420 tons per year) and non-road vehicles produce 10 percent of all NOx emissions in Tennessee (12,977 tons per year) (USEPA 2025). NOx is a concern due to its role as a precursor in the formation of fine PM and ozone.

### 4.2.3 TVA Emissions

#### 4.2.3.1 TVA System-Wide Emissions

The trends in TVA's reported SO<sub>2</sub>, NOx, and mercury emissions are shown in Figure 4-2. These data represent emissions from TVA's facilities across its entire PSA.



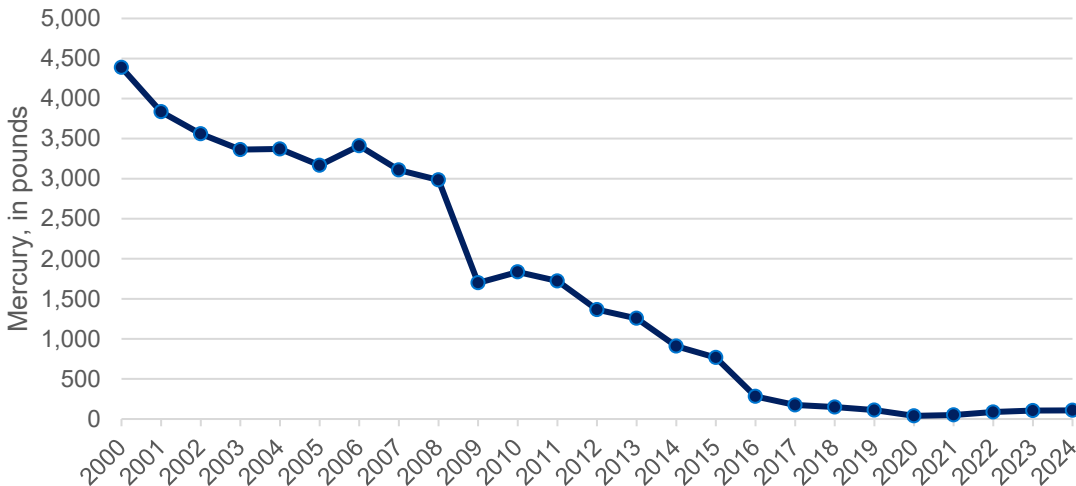


**Figure 4-2: TVA Emission Trends for SO<sub>2</sub>, 1974-2024 (top), NO<sub>x</sub>, 1974-2024 (middle), and Mercury, 2000-2024 (bottom)**

#### 4.2.3.2 Emissions from Existing Coal Facilities

Several TVA facilities have units that are in operation, though may reach end of life in the future. Table 4-2 lists those units and the emissions by plant over a five-year period (2020-2024). Table 4-2 also shows the annual emissions by plant in tons, and emission rates in units of pounds per megawatt-hour (lbs/MWh).

**Table 4-2: Five-Year (2020-2024) Average Emissions of Existing Coal Units**

| Facility and Units | Generation (MWh)  | SO <sub>2</sub> (5-yr average) |            | NO <sub>x</sub> (5-yr average) |            | Mercury (5-yr average) |              |
|--------------------|-------------------|--------------------------------|------------|--------------------------------|------------|------------------------|--------------|
|                    | 5-year avg.       | tons/yr                        | lbs/MWh    | tons/yr                        | lbs/MWh    | lbs/yr                 | lbs/GWh      |
| SHF 1-9            | 5,804,527         | 12,452                         | 4.3        | 6,299                          | 2.2        | 16.40                  | 2.83E-03     |
| KIF 1-9            | 3,061,790         | 2,072                          | 1.4        | 1,336                          | 0.9        | 18.57                  | 6.06E-03     |
| GAF 1-4            | 4,138,791         | 1,496                          | 0.7        | 1,173                          | 0.6        | 19.50                  | 4.71E-03     |
| CUF 1-2            | 9,842,081         | 6,112                          | 1.2        | 3,837                          | 0.8        | 18.33                  | 1.86E-03     |
| <b>Total</b>       | <b>22,847,189</b> | <b>22,131</b>                  | <b>7.6</b> | <b>12,646</b>                  | <b>4.4</b> | <b>72.8</b>            | <b>0.015</b> |

\*GWh = gigawatt hours

#### 4.2.4 Hazardous Air Pollutants

HAPs are toxic air pollutants that are known or suspected to cause cancer or other serious health effects or adverse environmental effects. The CAA identifies 187 pollutants as HAPs. Most HAPs are emitted by human activity, including motor vehicles, factories, refineries and power plants. There are also indoor sources of HAPs, such as building materials and cleaning solvents. Some HAPs are emitted by natural sources, such as volcanic eruptions and forest fires. Exposure to HAPs can result from breathing air toxics, drinking water in which HAPs have deposited, or eating food exposed to HAPs deposition on soil or water.

Exposure to high levels of HAPs can cause various chronic and acute harmful health effects, including cancer. The level of exposure that may result in adverse health impacts varies for each pollutant.

Emissions of HAPs, including organic compounds, acid gases, and heavy metals, have also been generally decreasing in recent decades, along with the SO<sub>2</sub> and NO<sub>x</sub> emissions, as coal use has decreased and as coal and gas-fired electric generating units are fitted with better emissions controls.

#### 4.2.5 Mercury

One HAP that has been singled out for a focused effort at emission reduction with respect to fossil-fueled facilities is mercury. Mercury is emitted to the air by human activities, such as burning coal or manufacturing, and from natural sources, such as volcanoes. Once it is in the environment, mercury cycles between air, water, and soils, being re-emitted and re-deposited. Worldwide, artisanal and small-scale mining produce the highest level of man-made methyl-mercury (38 percent), followed by coal combustion (21 percent), non-ferrous metal production (15 percent), and cement production (11 percent) (USEPA 2023a).

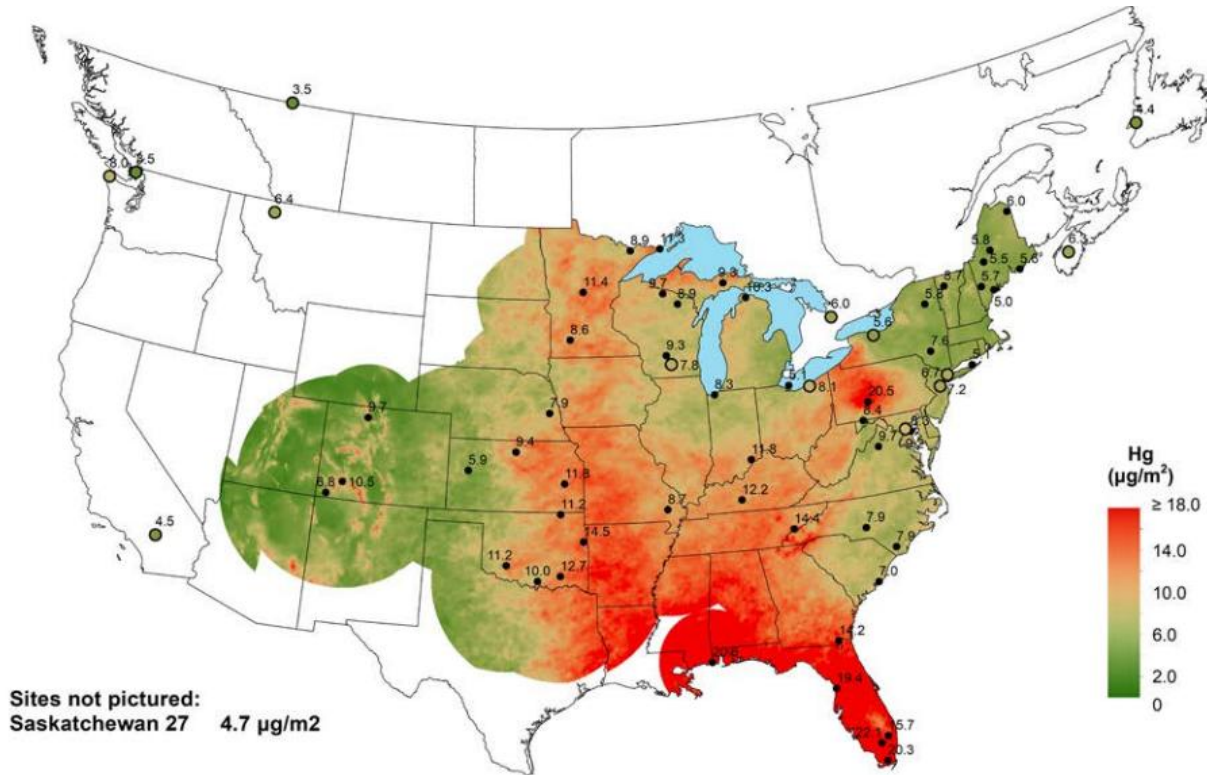
Once mercury is deposited in streams and lakes, it can be converted to methyl-mercury, the most toxic form of mercury, through microbial activity. Methyl-mercury accumulates in fish at levels that may cause harm to the fish and the animals that eat them. Some wildlife species with high exposures to methyl-mercury have shown increased mortality, reduced fertility, slower growth and development, and abnormal behavior that affects survival (USEPA 1997). Studies have also shown impaired neurological development in fetuses, infants and children with high exposures to methyl-mercury. In January 2017, USEPA and the Food and Drug Administration issued a final fish consumption advisory recommending that pregnant and breastfeeding women, those who may become pregnant, and young children avoid some marine fish and limit consumption of others. TVA region states have also issued advisories on fish consumption due to mercury for several rivers and reservoirs across the TVA region (see Section 4.4.2).

In 2011, USEPA finalized the Mercury and Air Toxics Standards (MATS) rule to reduce mercury and other toxic air pollution from coal and oil-fired power plants. USEPA estimated this rule would prevent about 90 percent of the mercury in coal burned in power plants from being emitted to the air. USEPA also estimated the rule would result in a 5 percent reduction in U.S. nationwide mercury deposition from 2005 levels. This small overall reduction is largely because mercury emissions tend to be deposited globally, rather than locally, with most of the deposition occurring in precipitation. In 2017, mercury emissions were reported at approximately 4 tons, an 86 percent reduction compared to 2010 levels, with a 96 percent and an 81 percent reduction in acid gas HAPs and non-mercury metals respectively (USEPA 2023b).

Deposition occurs in two forms: wet (dissolved in rain, snow, or fog) and dry (solid and gaseous particles deposited on surfaces during periods without precipitation). Wet mercury



deposition is measured at Mercury Deposition Network monitors operated by the National Atmospheric Deposition Program. The highest wet deposition of mercury in the U.S. occurs in Florida and along the Gulf Coast, as shown in Figure 4-3. Mercury deposition in the TVA region ranges from nine to 15 micrograms per square meter, in the medium-high range for North America.



Source: NADP 2023

**Figure 4-3: Total Wet Mercury Deposition in the U.S. in 2022**

TVA mercury emissions have decreased 98 percent from 4,388 pounds in 2000 to 94 pounds in 2022 (Figure 4-2). Much of this reduction has resulted from the retirement of coal-fired units and the installation and operation of flue gas desulphurization (FGD) and selective catalytic reduction (SCR) systems on most of the remaining coal units. TVA has also taken specific measures to reduce mercury emissions in response to MATS, including the installation of activated carbon injection systems on some units and the retirement and replacement of PAF Units 1 and 2 with natural gas-fueled generation.

#### 4.2.6 Visibility

Air pollution can impact visibility, which is a particularly important issue in national parks and wilderness areas where millions of visitors expect to be able to enjoy scenic views. Historically, “visibility” has been defined as the greatest distance at which an observer can see a black object viewed against the horizon sky. However, visibility is more than just a



measurement of how far an object can be seen; it is a measurement of the conditions that allow appreciation of the inherent beauty of landscape features.

Visibility in the eastern U.S. is estimated to have declined from 90 miles to approximately 15-25 miles due to air pollution from various sources (USEPA 2023c). Visibility impairment is caused when sunlight is scattered or absorbed by fine particles of air pollution obscuring the view. Some haze-causing particles are emitted directly to the air, while others are formed when gases are transformed into particles. In the TVA region, the largest contributor to visibility impairment is ammonium sulfate particles formed from SO<sub>2</sub> emissions (primarily from coal-fired power plants). Other particles impacting visibility include nitrates (from motor vehicles, utilities, and industry), organic carbon (predominantly from motor vehicles), elemental carbon (from diesel exhaust and wood burning) and dust (from roads, construction, and agricultural activities). Visibility extinction is a measure of the ability of particles to scatter and absorb light and is expressed in units of inverse mega-meters (Mm<sup>-1</sup>). Another metric used to measure visibility impairment is the deciview (dV), which is calculated from the atmospheric light extinction coefficient ( $b_{ext}$ ) expressed in inverse megameters (Mm<sup>-1</sup>):

$$dV \text{ index} = 10 \ln (b_{ext}/10 \text{ Mm}^{-1}).$$

The dV unit is used to establish thresholds under visibility rules in 40 CFR 51, Appendix Y, as a basis for determining whether modeled visibility impacts from a source are great enough to warrant Best Available Retrofit Technology (BART) retrofits. Substantial progress toward attaining natural visibility conditions nationwide has been made since the issuance of the BART requirements in 2005. Some of the improvements have been due to BART implementation, and much improvement has also resulted from other regulatory programs to reduce stationary source and mobile source emissions.

The CAA designated national parks greater than 6,000 acres and wilderness areas greater than 5,000 acres as Class I areas to protect their air quality under more stringent regulations. There are eight Class I areas in the vicinity of the TVA region: Great Smoky Mountains National Park, Mammoth Cave National Park, Joyce Kilmer-Slick Rock Wilderness, Shining Rock, Linville Gorge, Cohutta, Sipsey, and Upper Buffalo Wilderness Areas (Figure 4-4). The Great Smoky Mountains National Park is the largest Class I area in the TVA region.

In 1999, USEPA promulgated the Regional Haze Rule to improve visibility in Class I areas. This regulation requires states to develop long-term strategies to improve visibility with the goal of restoring natural background visibility conditions by 2064. Visibility trends are evaluated using the average of the 20 percent worst days and the 20 percent best days with the goal of improving conditions on the 20 percent worst days, while preserving visibility on the 20 percent best days.

The trend in visibility improvement measured at Great Smoky Mountains National Park is shown in Figure 4-5, which shows the visibility improvement in dV on average for the worst

20 percent of days and the best 20 percent of days. From 1990 to 2024, there was about a 48 percent improvement in both the visibility on the worst days and the best days (FED 2026). For a comparison with natural conditions (no human emissions impacts), the Federal Land Manager Environmental Database lists the natural conditions at the Great Smoky Mountains as 11.2 dV on the haziest days and 4.6 dV on the clearest days.

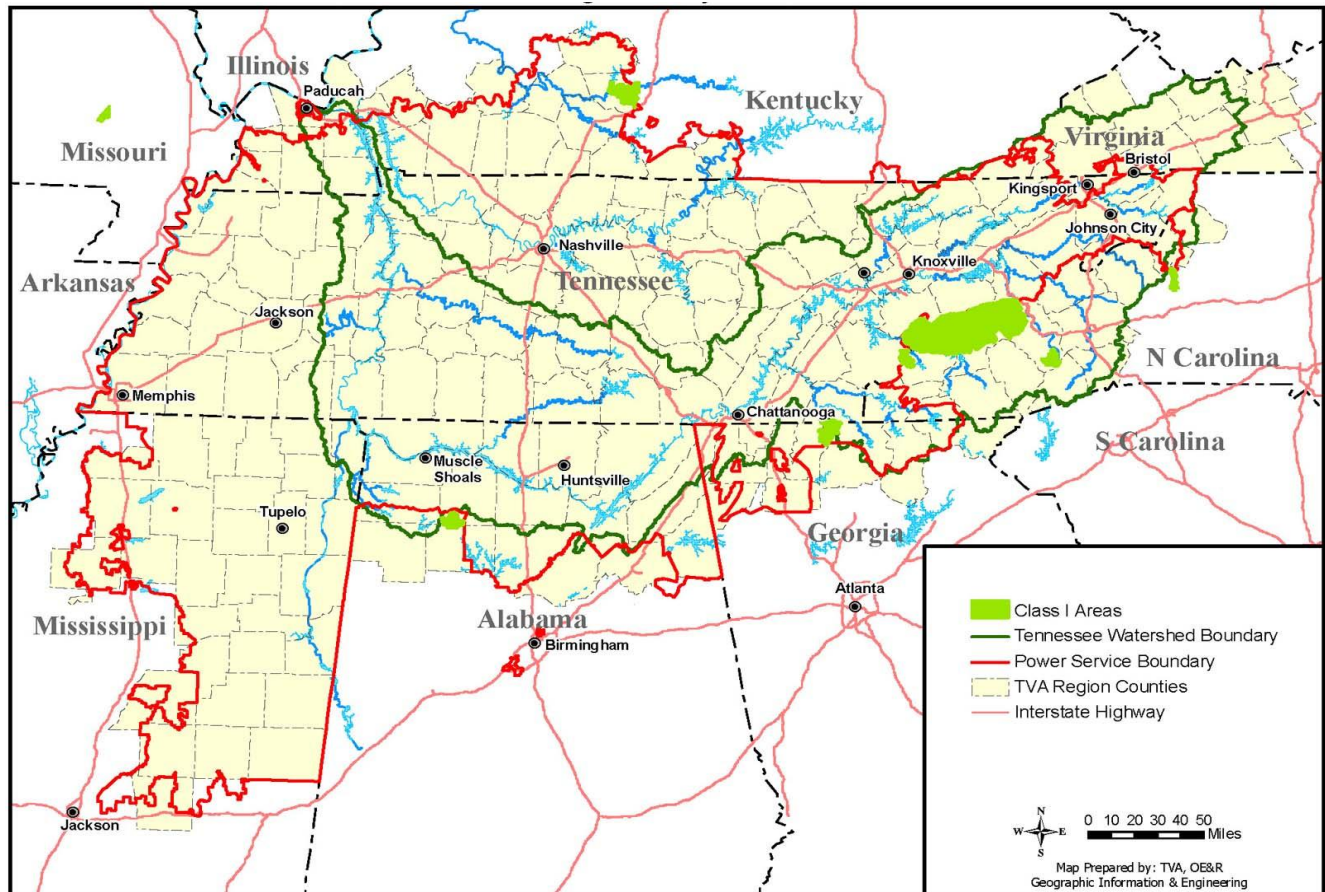
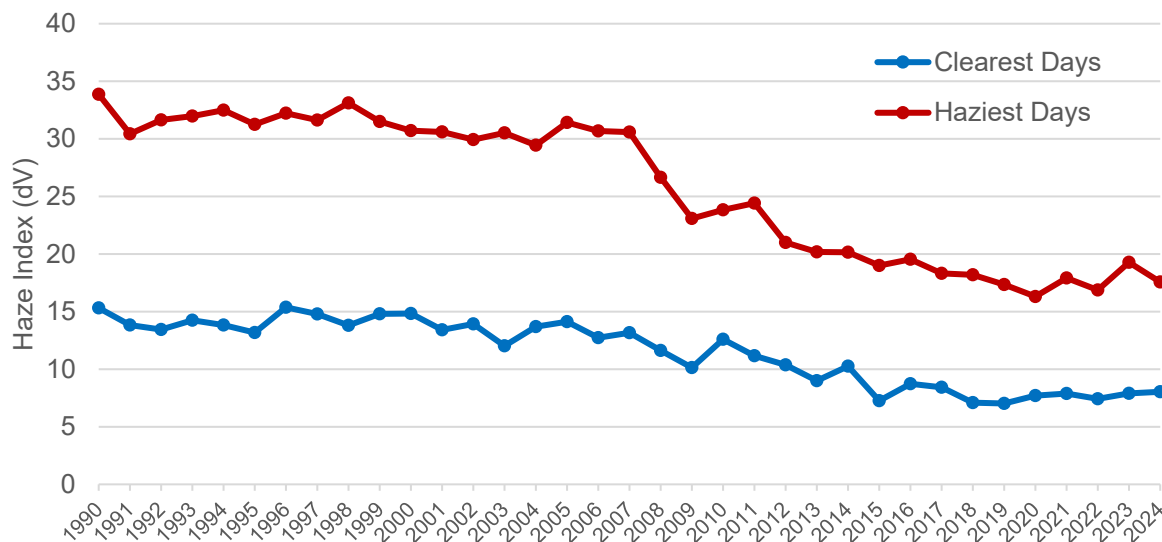


**Figure 4-4: The TVA Power Service Area and Class I Areas**



Source: FED 2026

Note: Smaller dV values indicate better visibility.

**Figure 4-5: Change in Visibility in the Great Smoky Mountains National Park on the Worst 20 Percent of Days and the Best 20 Percent of Days, 1990-2024**

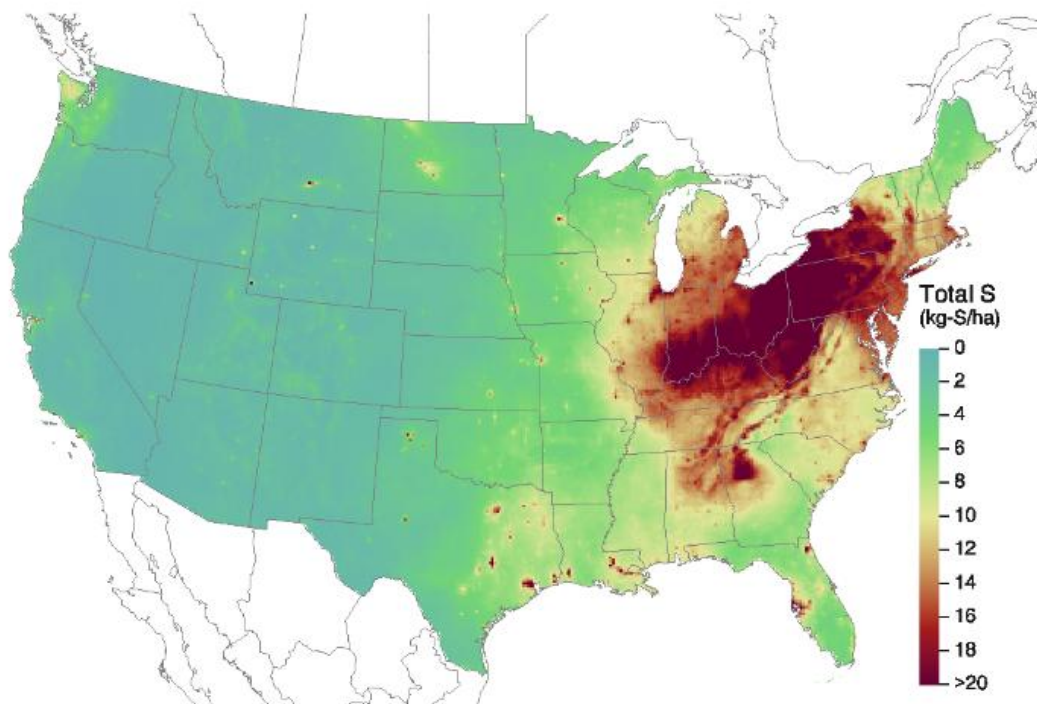
#### 4.2.7 Acid Deposition

Acid deposition, also called acid rain, is primarily caused by SO<sub>2</sub> and NO<sub>x</sub> emissions which are transformed into sulfate (SO<sub>4</sub>) and nitrate (NO<sub>3</sub>) aerosols, then deposited in precipitation (rain, snow, or fog). Acid deposition causes acidification of lakes and streams in sensitive ecosystems, which can adversely impact aquatic life. Acid deposition can also reduce agricultural and forest productivity. Some ecosystems, such as high elevation spruce-fir forests in the southern Appalachians, are quite sensitive to acidification, while other ecosystems with more buffering capacity are less sensitive to the effects of acid deposition. The acidity of precipitation is typically expressed on a logarithm scale called pH, which ranges from zero to 14 with seven being neutral. pH values less than seven are considered acidic and values greater than seven are considered basic or alkaline. It is thought that the average pH of pre-industrial rainfall in the eastern U.S. was approximately 5.0 (Charlson and Rodhe 1982).

Based on the data reflected in Figure 4-1, on emissions for the state of Tennessee, together with TVA emissions data in Figure 4-2, as of 2017, the TVA SO<sub>2</sub> emissions were greater than those of the state of Tennessee and TVA NO<sub>x</sub> emissions totaled less than 14 percent of statewide total emissions. As stated above in 2022, TVA's SO<sub>2</sub> emissions in Tennessee have decreased by 97 percent since 1990 and its NO<sub>x</sub> emissions in the state have decreased by 94 percent from their peak level in 1997. Emissions from utilities across the eastern U.S. have also decreased significantly, and emissions from mobile sources have started a substantial downward trend as well in the past decade or more.

The 1990 CAA Amendments established the Acid Rain Program to reduce  $\text{SO}_2$  and  $\text{NO}_x$  emissions and the resulting acid deposition. Since this program was implemented in 1995, reductions in  $\text{SO}_2$  and  $\text{NO}_x$  emissions have contributed to significant reductions in acid deposition, concentrations of  $\text{PM}_{2.5}$  and ground-level ozone, and regional haze. Other regulatory programs aimed at industrial emitters and vehicle engines (on road and nonroad) are also driving down emissions.

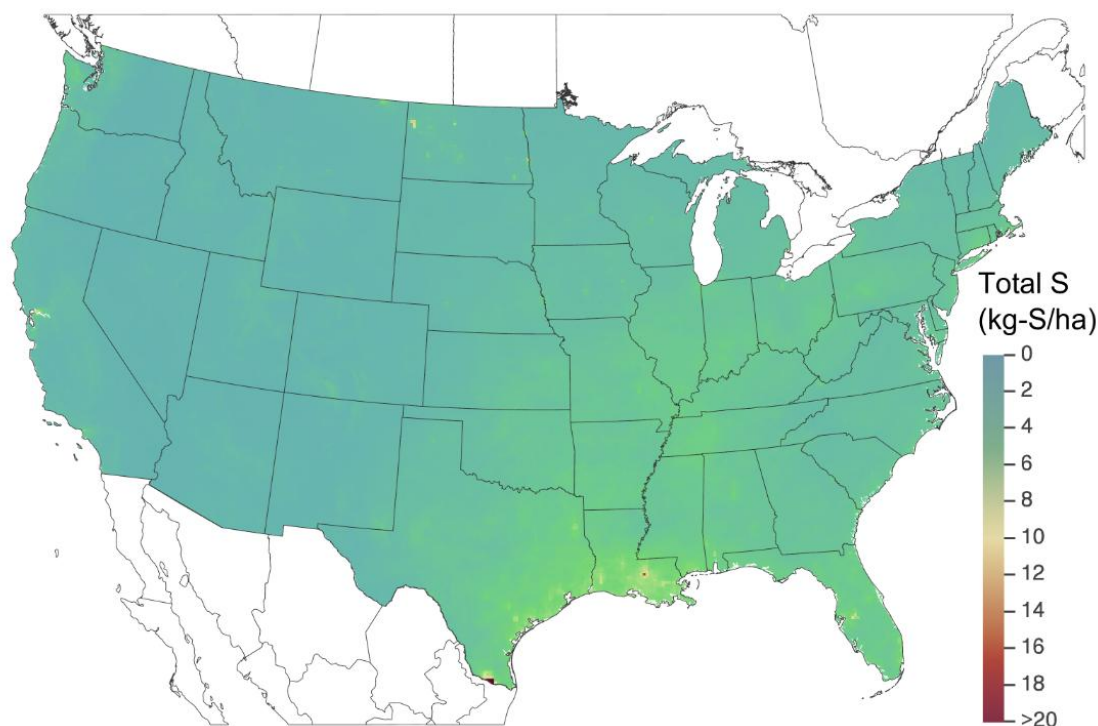
Figure 4-6 and Figure 4-7 illustrate the dramatic decreases in total  $\text{SO}_4$  deposition between 2000 and 2021 (most recent data available) across the U.S. (USEPA 2023d). Similar reductions in  $\text{NO}_3$  deposition have also occurred over the 2006 to 2023 period. Even by the year 2000, deposition of  $\text{SO}_4$  and  $\text{NO}_3$  was decreasing across the U.S., as pollution control retrofits were already in place for many large utility sources. However, the decreases since that time have been even more dramatic. The values in Figure 4-6 and Figure 4-7 are based on a hybrid approach of combining monitoring and modeling to develop the plots.



Source: USEPA 2023d

**Figure 4-6: Year 2000 Total  $\text{SO}_4$  Deposition**





Source: USEPA 2023d

**Figure 4-7: Year 2021 Total SO<sub>4</sub> Deposition**

### 4.3 Climate and Greenhouse Gases

The TVA region spans the transition between a humid continental climate to the north and a humid subtropical climate to the south. This provides the region with generally mild temperatures (i.e., a limited number of days with temperature extremes), ample rainfall for agricultural and water resources, vegetation-killing freezes from mid-autumn through early spring, frequent severe thunderstorms, infrequent tornado events, infrequent snow, and infrequent impacts from tropical storms, primarily in the form of heavy rainfall. The seasonal climate variation induces a dual-peak in annual power demand, one for winter heating and a second for summer cooling. Rainfall does not fall evenly throughout the year but tends to peak in late winter/early spring and again in mid-summer. Winds over the region are generally strongest during winter and early spring and lightest in late summer and early autumn. Solar radiation (insolation) varies seasonally with the maximum sun elevation above the horizon and longest length in summer. However, insolation is moderated by frequent periods of cloud cover typical of a humid climate.

This section describes the current climate and recent climate trends of the TVA region in more detail. It describes emissions of GHGs, widely considered to be a major source of climate change (NAS and RS 2020) and projected changes in climate during this century, based on the Fourth National Climate Assessments (NCA) and Fifth NCA (USGCRP 2017, USGCRP 2023), produced by the U.S. Global Change Research Program (USGCRP), and related sources. Identifying recent trends in regional climate parameters such as temperature and precipitation is a challenge because year-to-year variation may be larger

than the multi-decadal change in a climate variable. Climate is frequently described in terms of the climate “normal,” the 30-year average for a climate parameter (NCEI 2021). The climate normals described below are for the most recent period of record, 1991–2020. Earlier and more recent data are also presented where available. The primary sources of these data are National Weather Service (NWS) records and records from the rain gauge network maintained by TVA in support of its reservoir operations. NWS records, unless stated otherwise, are from Memphis, Nashville, Chattanooga, Knoxville, and the Tri-Cities area in Tennessee, and Huntsville, Alabama.

#### 4.3.1 Climate Normals and Trends

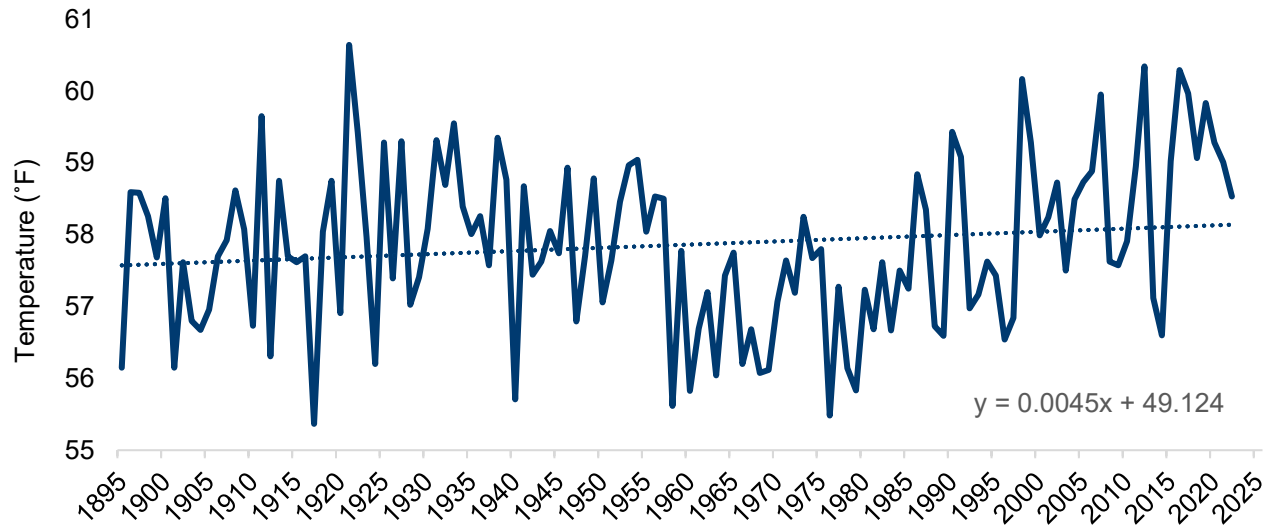
**Temperature.** Observed average monthly temperatures for the TVA region during 1991–2020 ranged from 40.0 degrees Fahrenheit (°F) in January to 79.7°F in July (Table 4-3). These data show considerable year-to-year variability with an overall warming trend of 0.5–0.6°F (0.3–0.4 degrees Celsius [°C]) per decade for 1991–2020. This is greater than the global average trend reported by the U.S. Climate Change Science Program (Lanzante et al. 2006), which shows an increase in global surface temperature of about 0.16°C per decade between 1979 and 2004. Longer term temperature data for Tennessee (assumed to be representative of the TVA region) are illustrated in Figure 4-8, Figure 4-9, and Figure 4-10. Both annual average temperature and annual average winter temperature showed increases (0.45°F/100 years and 1.05°F/100 years, respectively) since the 1890s. The annual average summer temperature showed a small, long-term increase of 0.06°F/100 years.

For additional information regarding the historical weather data and trends used in the development of IRP scenario load forecasts, see Volume 1, Appendix B.

**Table 4-3: Monthly, Seasonal and Annual Temperature Averages for Six NWS Stations in the TVA Region, 1991–2020**

|    | Jan    | Feb  | Mar  | Apr    | May  | Jun    | Jul  | Aug  | Sep    | Oct  | Nov  | Dec  |
|----|--------|------|------|--------|------|--------|------|------|--------|------|------|------|
| °F | 40.0   | 43.9 | 51.6 | 60.5   | 69.0 | 76.5   | 79.7 | 78.9 | 72.9   | 61.5 | 50.1 | 42.9 |
| °C | 4.5    | 6.6  | 10.9 | 15.8   | 20.5 | 24.7   | 26.5 | 26.0 | 22.7   | 16.4 | 10.1 | 6.0  |
|    | Winter |      |      | Spring |      | Summer |      | Fall | Annual |      |      |      |
| °F | 42.2   |      |      | 60.4   |      | 78.4   |      | 61.5 | 60.6   |      |      |      |
| °C | 5.7    |      |      | 15.8   |      | 25.8   |      | 16.4 | 15.9   |      |      |      |

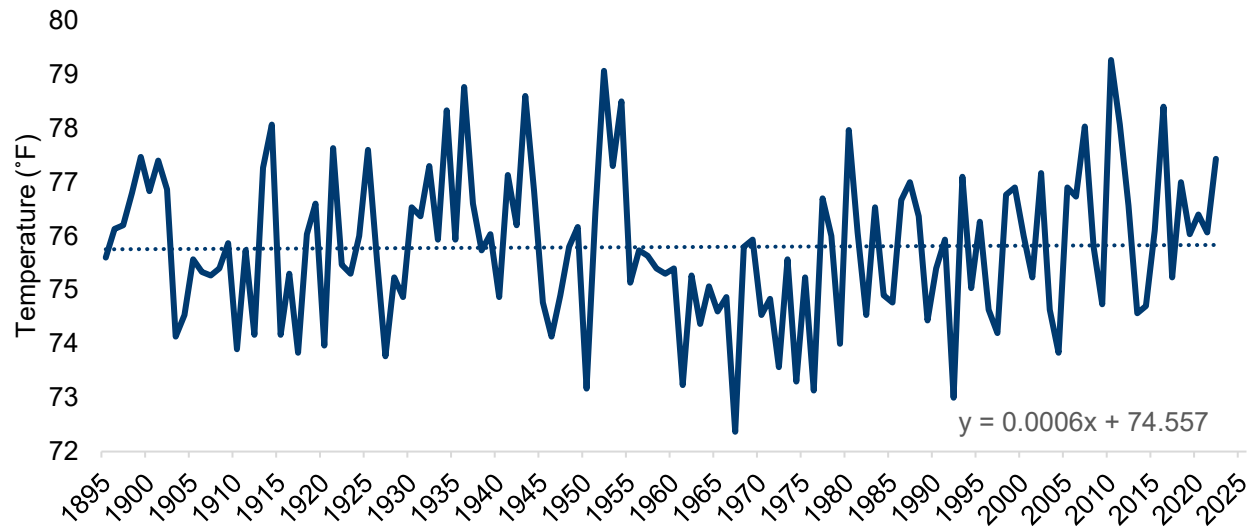
Source: NWS 2023



Source: WRCC 2023

Note; The dashed line is the trend based on least squares regression analysis.

**Figure 4-8: Annual Average Temperature (°F) in Tennessee, 1895–2025**

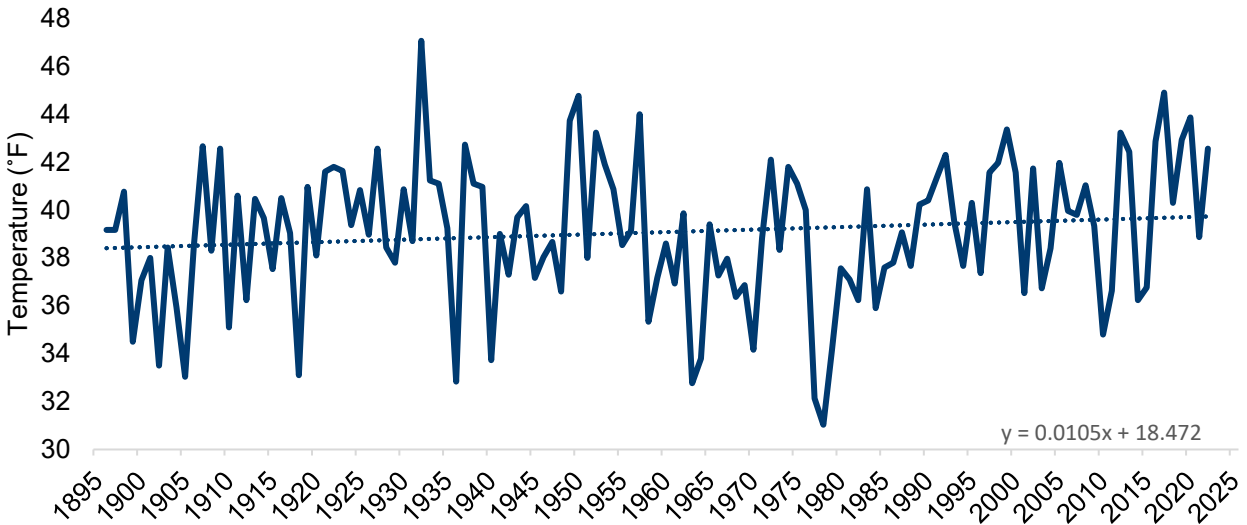


Source: WRCC 2023

Note: The dashed line is the trend based on least squares regression analysis.

**Figure 4-9: Annual Average Summer Temperature (°F) in Tennessee, 1895–2025**





Source: WRCC 2023

Note: The dashed line is the trend based on least squares regression analysis.

**Figure 4-10: Annual Average Winter Temperature (°F) in Tennessee, 1896–2025**

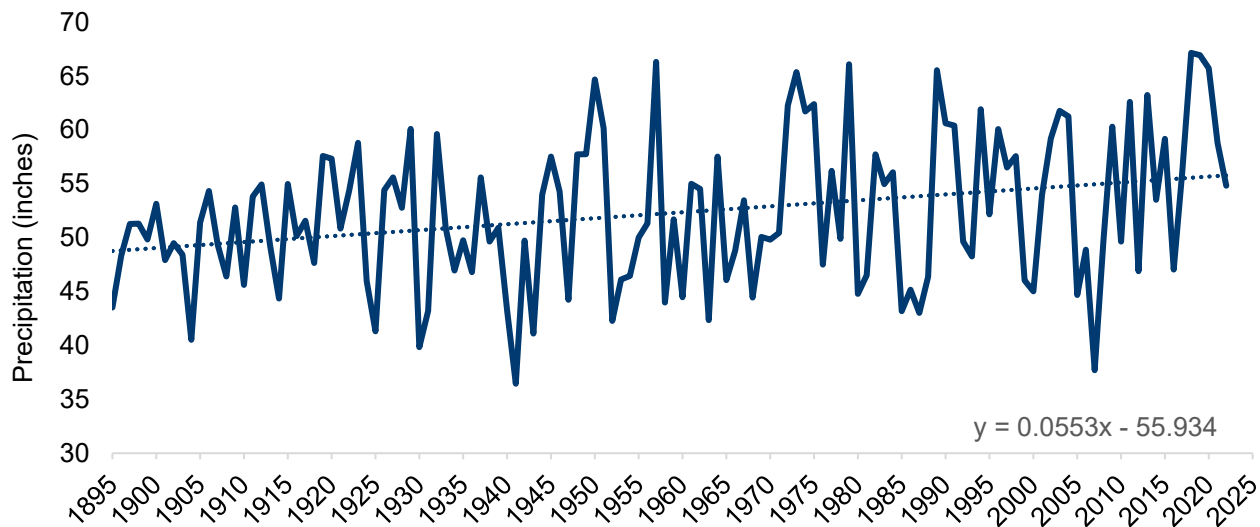
**Precipitation.** The observed average annual precipitation in the Tennessee River watershed during 1890–2025 was 54.8 inches; monthly averages range from 2.07 inches in December to 8.10 inches in May (Table 4-4). The wettest locations in the TVA region occur in southwestern North Carolina, and the driest locations are in northeast Tennessee (NACSE 2024). There has been a decrease in the frequency and intensity of certain cold season events such as snowfalls, and estimates show that the Southeast is at an increased risk for extreme precipitation and flooding events (USGCRP 2023).

**Table 4-4: Monthly, Seasonal, and Annual Precipitation Averages in the Tennessee River Watershed for 1890-2025**

|             | Jan  | Feb   | Mar           | Apr   | May           | Jun           | Jul         | Aug           | Sep   | Oct  | Nov  | Dec  |
|-------------|------|-------|---------------|-------|---------------|---------------|-------------|---------------|-------|------|------|------|
| Inches      | 3.18 | 5.39  | 5.35          | 5.93  | 8.10          | 5.91          | 4.75        | 3.79          | 4.61  | 3.32 | 2.43 | 2.07 |
| Centimeters | 8.08 | 13.69 | 13.59         | 15.06 | 20.57         | 15.01         | 12.07       | 9.63          | 11.71 | 8.43 | 6.17 | 5.26 |
|             |      |       | <b>Winter</b> |       | <b>Spring</b> | <b>Summer</b> | <b>Fall</b> | <b>Annual</b> |       |      |      |      |
| Inches      |      |       | 10.64         |       | 19.38         | 14.45         | 10.36       | 54.83         |       |      |      |      |
| Centimeters |      |       | 27.03         |       | 49.22         | 36.71         | 26.31       | 139.27        |       |      |      |      |

Source: TVA

Figure 4-11 shows Tennessee annual total precipitation for the period 1895 through 2025. These data show that over this period of record, the average annual precipitation has increased at an average rate of around 11 percent per 100 years, as is apparent from the linear regression equation provided on this chart. The increase in average annual precipitation occurred prior to 1970, and there has been no significant trend for the last 50 years.



Source: WRCC 2023

Note: The dashed line is the trend based on least squares regression analysis.

**Figure 4-11: Annual Average Precipitation in Tennessee, 1895-2025**

### 4.3.2 Greenhouse Gas Emissions

The sun is the primary source of energy for the Earth's climate. About 30 percent of the sun's energy that reaches Earth is reflected back to space by clouds, gases and small particles in the atmosphere. The remainder is absorbed by the atmosphere and the surface (Walsh et al. 2014a). Changes in global scale climate are primarily in response to processes that alter the balance between incoming solar energy and outgoing energy from the Earth. In the surface-albedo feedback, which quantifies the fraction of sunlight reflected by the surface of the Earth, increasing temperatures melts the ice over land and bodies of water. This exposes the darker surface underneath, which absorbs more energy, thereby contributing to further warming, rather than reflecting it, which would contribute to temperature decrease (USGCRP 2023). In nature, CO<sub>2</sub> is exchanged continually between the atmosphere, plants, and animals through processes of photosynthesis, respiration, and decomposition, and between the atmosphere and oceans through gas exchange. Billions of tons of carbon in the form of CO<sub>2</sub> are annually absorbed by oceans and living biomass (i.e., sinks) and are annually emitted to the atmosphere through natural and man-made processes (i.e., sources) (Galloway et al. 2014). Climate change impacts are already seen in the deterioration of such ecosystems, which increases risks to human populations. These risks are projected to grow with additional warming and atmospheric CO<sub>2</sub> (USGCRP 2023).

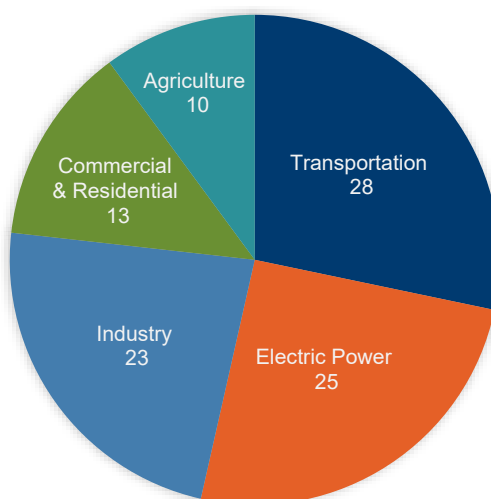
Similar to the glass in a greenhouse, certain gases, primarily CO<sub>2</sub>, nitrous oxide (N<sub>2</sub>O), methane (CH<sub>4</sub>), hydrofluorocarbons, perfluorocarbons and sulfur hexafluoride (SF<sub>6</sub>), absorb heat that is radiated from the surface of the Earth. Increases in the atmospheric concentrations of these gases cause the Earth to warm by trapping more heat (Walsh et al. 2014a) in a phenomenon known as the "greenhouse effect." Though some halogenated gases have decreased due to ozone-depletion policies, the atmospheric abundance of many of these well-mixed GHGs have continued to increase (USGCRP 2023). The 2022 global

average of atmospheric CO<sub>2</sub> set a record high at 417.06 parts per million (ppm). This was a 2.13-ppm increase from 2021, marking the 11<sup>th</sup> year in a row where CO<sub>2</sub> in the atmosphere increased by over 2 ppm (NOAA 2023). While water vapor is the most abundant GHG in the atmosphere, it is not included in the above list of GHGs because changes in the atmospheric concentration of water vapor are generally considered to be the result of climate feedbacks related to the warming of the atmosphere, rather than a direct result of human activity. That said, the impact of water vapor is critically important to projecting future climate change (Walsh et al. 2014a), as it factors into the intensity of precipitation extremes (USGCRP 2023). Quantifying the effect of feedback loops on global and regional climate is the subject of ongoing data collection and active research (Walsh et al. 2014a).

The magnitude of the warming induced by the greenhouse effect depends largely on the amount of GHG accumulating in the atmosphere (Walsh et al. 2014b). GHGs are assigned global warming potentials, a measure of the relative amount of infrared radiation they absorb, their absorbing wavelengths and their persistence in the atmosphere. All these gases remain in the atmosphere long enough to become well mixed, meaning the amount that is measured in the atmosphere is roughly the same all over the world, regardless of the source of the emissions.

The primary GHG emitted by electric utilities is CO<sub>2</sub> produced by the combustion of fossil fuels. CO<sub>2</sub> is also produced by the combustion of biomass fuels, although these fuels when derived from plant (i.e., vegetation) sources are often considered to be carbon-neutral since the subsequent plant regrowth sequesters carbon. Small amounts of SF<sub>6</sub>, which has a very high global warming potential relative to other GHGs (Global Warming Potential for SF<sub>6</sub> = 22,800 times CO<sub>2</sub> on a pound-for-pound basis, per 40 CFR 98), are emitted due to its use in high-voltage circuit breakers, switchgears, and other electrical equipment. Methane, which has a global warming potential of 25 times that of CO<sub>2</sub> (per 40 CFR 98), is emitted during coal mining and from natural gas wells and delivery systems.

The nationwide anthropogenic emissions of GHGs below is the latest available data from the USEPA for each of several sectors of the economy. The 2022 estimates by sector are shown in the chart in Figure 4-12 and represent the most recent data available. Transportation and electricity generation each represented approximately 28 and 25 percent, respectively, of nationwide GHG emissions in 2021, with industrial sources, commercial and residential buildings, and agriculture each representing successively smaller portions of the total.



Source: USEPA 2023e

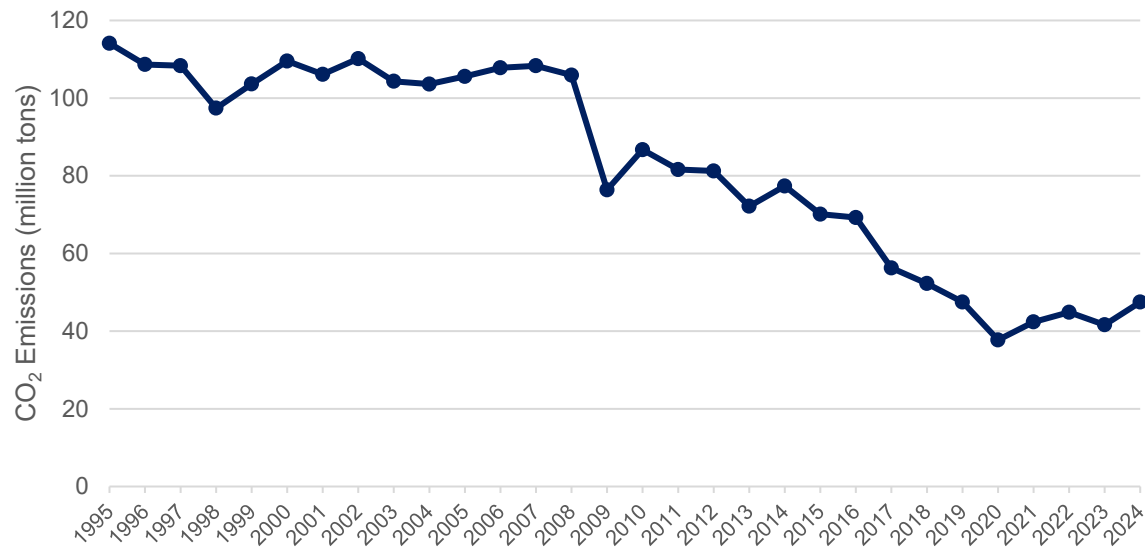
**Figure 4-12: U.S. 2021 GHG Emissions by Economic Sector - Percent**

According to 2021 data from the U.S. Energy Information Administration, transportation comprises 49.3 percent of Tennessee’s CO<sub>2</sub> emissions from fossil fuel consumption and is the largest CO<sub>2</sub> emitter of all end-use sectors in the state (USEIA 2023a).

TVA and the Baker School of Public Policy and Public Affairs at the University of Tennessee – Knoxville (UTK) collaborated on a Valley Pathways Study (UTK 2024), informed by stakeholder input. This study established a GHG baseline for the region and looked across economic sectors such as transportation, industry, agriculture, and building emissions to evaluate potential paths for achieving a competitive and clean economy by 2050. The Valley Pathways Study indicates that in 2019, the Valley region generated an estimated 200 million metric tons of carbon dioxide equivalent (CO<sub>2</sub>-eq) across all sectors of the economy, or about 3 percent of U.S. GHG emissions, which aligns to population percentage. According to the study, transportation contributed the largest share at 36 percent, and the electricity sector represented 27 percent of the total emissions.

#### **4.3.2.1 TVA System-Wide Emissions**

As of 2024, CO<sub>2</sub> emissions from the TVA power system have decreased by 58.40 percent since 1995 (Figure 4-13). This decrease is mainly due to the retirement of coal plants, which emit large quantities of CO<sub>2</sub> relative to other types of electrical generation, and the replacement of coal generation with nuclear and natural gas-fueled generation. Nuclear generation does not result in emissions of CO<sub>2</sub>, and CO<sub>2</sub> emissions from natural gas-fueled generation are about half that of coal. In terms of lbs/MWh, TVA’s CO<sub>2</sub> emissions rate averaged 679.84 (lbs/MWh) for 2024, including that of owned and purchased power. This is significantly lower than the 2023 USEPA eGRID national rate of 771.52 lbs/MWh, as well as the regional rate of 895.69 lbs/MWh (TVA 2025b).



Source: TVA 2025b

**Figure 4-13: CO<sub>2</sub> Emissions (million tons) From Generation of Power Marketed by TVA, 1995-2024**

### 4.3.3 Forecast Climate Trends

The modeled projections of temperature and precipitation cited here are from the Fourth and Fifth NCA (USGCRP 2017, USGCRP 2023). The publications cite climate change projections for various emission scenarios, which result in representative concentration pathways (RCPs) that each relate to a given amount of radiative forcing in the year 2100. For example, an RCP2.6 scenario means that emissions would increase at a rate sufficient to create 2.6 watts per square meter (m<sup>2</sup>) of radiative forcing in 2100.

Climate change continues to exhibit the same trends in the Southeast with virtually no exception from what was reported in the Fourth NCA (USGCRP 2023). For the Southeast, the Fourth NCA projects that temperatures will rise under all emission scenarios presented, including a “very low” scenario where emissions peak soon and begin to decrease globally (RCP2.6). Under a low emissions increase scenario (RCP4.5) that includes a modest rise in global GHG emissions that peaks in about 20 years and then declines steeply, the Fourth NCA projects that average annual temperatures in the Southeast will be 3.4°F higher than recent climate normals by mid-century with temperatures 4.4°F higher by late century (USGCRP 2017). Additionally, the Fifth NCA predicts that future climate change impacts (under RCP4.5) may cause billions of dollars’ worth of damages to U.S. transportation infrastructure by 2050, with especially high cost in the Southeast, which also faces some of the highest economic risk related to energy infrastructure damage (USGCRP 2023). The Fourth NCA report, however, notes that Southeast temperatures have not increased in the last century, contrary to climate model projections of what should have happened with the increase in atmospheric GHG concentrations that has already occurred (USGCRP 2017).

For extreme high temperatures, under a high emissions scenario (RCP8.5, with GHG emissions continuing to increase at near their present rate of increase) the Fourth NCA states that climate model predictions show large changes from the near present climate normal (USGCRP 2017). Direct annual climate damages are projected to be especially large in the Southeast, with overall agricultural yield expected to decrease as well (USGCRP 2023). For the coldest and warmest day of the year, the climate modeling predicts that the coldest day of the year will be on average nearly 5°F warmer and the warmest day of the year will be nearly 6°F warmer by mid-century in the Southeast. The Fourth NCA concludes that extreme temperatures will increase by even more than average temperatures. This prediction also deviates from observed trends for hot days, which have decreased in the Southeast over the past century (USGCRP 2017). While observed hot days have decreased, this does not mean that the region is not affected by extreme high temperature, as heatwaves have become hotter and lengthier in duration in recent decades (USGCRP 2023).

Climate models are generally unreliable at predicting precipitation variability and amounts across different geographic areas, or variability over time. One reason for this is their inability to simulate convective precipitation processes, given that these processes occur at scales smaller than the grid scales used to run global circulation climate models (USGCRP 2017). However, the Fifth NCA (see Figure 2-4 of that report) provides projections for changes in seasonal precipitation across North America by comparing present day (2002-2021) precipitation totals to that of the first half of the last century (1901-1960). In the last two decades, the Southeast has received more precipitation in the fall but seen drier conditions in the spring and summer (USGCRP 2023).

## **4.4 Water Resources**

This section describes water resources in the TVA region that could be affected by the alternative strategies. Potentially affected water resources include groundwater, surface water, water supply, and aquatic life.

### **4.4.1 Groundwater**

#### **4.4.1.1 Regulatory Framework for Groundwater**

The Safe Drinking Water Act of 1974 established the sole source aquifer protection program, which regulates certain activities in areas where the aquifer (water-bearing geologic formations) provides at least half of the drinking water consumed in the overlying area. This act also established both the Wellhead Protection Program, a pollution prevention and management program used to protect underground sources of drinking water, and the Underground Injection Control Program to protect underground sources of drinking water from contamination by fluids injected into wells. Several other environmental laws contain provisions aimed at protecting groundwater, including the Resource Conservation and Recovery Act (RCRA), the Comprehensive Environmental Response, Compensation, and Liability Act, and the Federal Insecticide, Fungicide, and Rodenticide Act. On April 17, 2015, the USEPA published the Disposal of Coal Combustion Residuals from Electric Utilities final



rule (CCR Rule) in the *Federal Register* to provide a comprehensive set of national criteria for the management of CCR produced by electric utilities. The CCR Rule requires groundwater monitoring and addresses the potential risks of coal ash contaminants migrating into groundwater when groundwater protection standards are statistically exceeded. On May 18, 2023, the USEPA proposed changes to the CCR regulations for inactive electric utilities, referred to as “legacy CCR surface impoundments.” On May 8, 2024, USEPA finalized changes to the CCR regulations for inactive surface impoundments at inactive electric utilities, referred to as “legacy CCR surface impoundments.” In February 2026, deadlines related to CCR Management Unit requirements were extended, but the overall goal of the legacy CCR rule remains. Within tailored compliance deadlines, owners and operators of legacy CCR surface impoundments must comply with all existing requirements applicable to inactive CCR surface impoundments at active facilities, except for the location restrictions and liner design criteria.

#### **4.4.1.2 TVA Region Aquifers**

Three basic types of aquifers occur in the TVA region: alluvial, sand (composed primarily of sand with lesser amounts of gravel, clay, and silt), and fractured bedrock (primarily carbonate but non-carbonate also present). Groundwater movement in alluvial and sand aquifers occurs through the pore spaces between sediment particles. Carbonate rocks are another important class of aquifers. Carbonate rocks, such as limestone and dolomite, contain a high percentage of carbonate minerals (e.g., calcite) in the rock matrix. Carbonate rocks in some parts of the region readily transmit groundwater through enlarged fractures and cavities created by dissolution of carbonate minerals by acidic groundwater. Fractured non-carbonate rock aquifers include sedimentary and metamorphic rocks (e.g., sandstone, conglomerate, and granite gneiss) which transmit groundwater through fractures, joints, and beddings planes. Eight major aquifers occur in the TVA region (Table 4-5). These aquifers generally align with the major physiographic divisions of the region.

The aquifers include (in order of increasing geologic age): Quaternary age alluvium occupying the floodplains of major rivers, notably the Mississippi River; Tertiary and Cretaceous age sand aquifers of the Coastal Plain Province; Pennsylvanian sandstone units found mainly in the Cumberland Plateau section; carbonate rocks of Mississippian, Silurian and Devonian age of the Highland Rim section; Ordovician age carbonate rocks of the Nashville Basin section; Cambrian-Ordovician age carbonate rocks within the Valley and Ridge Province; and Cambrian-Precambrian metamorphic and igneous crystalline rocks of the Blue Ridge Province.

The largest withdrawals of groundwater for public water supply are from the Tertiary and Cretaceous sand aquifers in the Mississippi Alluvial Plain and Coastal Plain physiographic areas. These withdrawals account for about two-thirds of all groundwater withdrawals for public water supply in the TVA region. The Pennsylvanian sandstone and Ordovician carbonate aquifers have the lowest groundwater use (less than 1 percent of withdrawals)



and lowest potential for groundwater use. Groundwater use is described in more detail in Section 4.4.3.

The quality of groundwater in the TVA region largely depends on the chemical composition of the aquifer in which the water occurs (Table 4-5). Precipitation entering the aquifer is generally low in dissolved solids and slightly acidic. As it seeps through the aquifer it reacts with the aquifer matrix and the concentration of dissolved solids may increase.

**Table 4-5: Aquifer, Well, and Water Quality Characteristics in the TVA Region**

| Aquifer Description                                                                                                                                                                                                                        | Well Characteristics<br>(common range, maximum) |                  | Water Quality Characteristics                                                                                 |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|------------------|---------------------------------------------------------------------------------------------------------------|
|                                                                                                                                                                                                                                            | Depth (feet)                                    | Yield (gpm)      |                                                                                                               |
| Quaternary alluvium: Sand, gravel, and clay. Unconfined.                                                                                                                                                                                   | 10–75, 100                                      | 20–50, 1,500     | High iron concentrations in some areas.                                                                       |
| Tertiary sand: Multi-aquifer unit of sand, clay, silt and some gravel and lignite. Confined; unconfined in the outcrop area.                                                                                                               | 100–1,300, 1,500                                | 200–1,000, 2,000 | Problems with high iron concentrations in some places.                                                        |
| Cretaceous sand: Multi-aquifer unit of interbedded sand, marl and gravel. Confined; unconfined in the outcrop area.                                                                                                                        | 100–1,500, 2,500                                | 50–500, 1,000    | High iron concentrations in some areas.                                                                       |
| Pennsylvanian sandstone: Multi-aquifer unit, primarily sandstone and conglomerate, interbedded shale and some coal. Unconfined near land surface; confined at depth.                                                                       | 100–200, 250                                    | 5–50, 200        | High iron concentrations are a problem; high dissolved solids, sulfide or sulfate are problems in some areas. |
| Mississippian carbonate rock: Multi-aquifer unit of limestone, dolomite, and some shale. Water occurs in solution and bedding-plane openings. Unconfined or partly confined near land surface; may be confined at depth.                   | 50–200, 250                                     | 5–50, 400        | Generally hard; high iron, sulfide, or sulfate concentrations are a problem in some areas.                    |
| Ordovician carbonate rock: Multi-aquifer unit of limestone, dolomite, and shale. Partly confined to unconfined near land surface; confined at depth.                                                                                       | 50–150, 200                                     | 5–20, 300        | Generally hard; some high sulfide or sulfate concentrations in places.                                        |
| Cambrian-Ordovician carbonate rock: Highly faulted multi-aquifer unit of limestone, dolomite, sandstone, and shale; structurally complex. Unconfined; confined at depth.                                                                   | 100–300, 400                                    | 5–200, 2,000     | Generally hard, brine below 3,000 feet.                                                                       |
| Cambrian-Precambrian crystalline rock: Multi-aquifer unit of dolomite, granite gneiss, phyllite, and metasedimentary rocks overlain by thick regolith. High yields occur in dolomite or deep colluvium and alluvium. Generally unconfined. | 50–150, 200                                     | 5–50, 1,000      | Low pH and high iron concentrations may be problems in some areas.                                            |

Note: gpm = gallons per minute

Source: Webbers 2003

#### **4.4.1.3 Causes of Degraded Groundwater Quality**

Causes of degraded groundwater quality may include:

- Spills – Electrical generating plants and other industrial facilities often utilize chemicals, including fuels, in their processes or to operate machinery. If accidental spills of these chemicals occur during usage, storage, or transport, vertical migration of the chemicals into the underlying groundwater aquifer may occur.
- Waste Storage – Over time, many electrical generating stations stored waste byproducts (e.g., CCR) either in landfills or in surface impoundments. Rainfall infiltration into and through dry stacked waste can migrate vertically downward over time, carrying contaminants into groundwater, particularly in unlined landfills or surface impoundments. Capping and covering the waste controls and prevents rainfall infiltration. Depending on hydrogeologic and geologic conditions, storage of waste in unlined landfills and surface impoundments may result in direct contact between the waste material and groundwater, whereby contaminants can leach from the waste material into groundwater over time. Modern landfills constructed with both a clay liner and geosynthetic liner system prevent vertical migration of contaminants into groundwater; however, after long periods of time the storage of waste in lined landfills could result in degraded groundwater quality if the liner fails and contaminants leach from the landfill into groundwater over time.
- Air pollution – Airborne pollutants (e.g., mercury, sulfates) can affect groundwater through rainfall and infiltration.

#### **4.4.2 Surface Water**

The quality of the TVA region's surface waters – its streams, rivers, lakes, and reservoirs – is critical to the protection of human health and aquatic life. Water resources provide habitat for aquatic life, recreation opportunities, domestic and industrial water supplies, and other benefits. Major watersheds in the TVA region include the entire Tennessee River Basin, most of the Cumberland River Basin, and portions of the lower Ohio, lower Mississippi, Green, Pearl, Tombigbee, and Coosa River basins. Fresh water abounds in much of this area and generally supports most beneficial uses, including fish and aquatic life, public and industrial water supply, waste assimilation, agriculture, and water-contact recreation, such as swimming. Water quality in the TVA region is generally good.

##### **4.4.2.1 Regulatory Framework for Surface Water Quality**

The Federal Water Pollution Control Act, commonly known as the Clean Water Act (CWA), is the primary law that affects water quality. It establishes standards for the quality of surface waters and prohibits the discharge of pollutants from point sources unless a National Pollutant Discharge Elimination System (NPDES) permit is obtained. NPDES permits also address CWA Section 316(b) requirements for the design, location, construction, and capacity of cooling water intakes to reflect the best technology available for minimizing

environmental impact as well as Section 316(a) requirements for effluent limitations on thermal discharges to assure maintenance of a balanced indigenous population of fish and wildlife. Section 404 of the CWA further prohibits the discharge of dredge and fill material to waters of the U.S., which include many wetlands, unless authorized by a permit issued by the USACE. In addition, Section 401 of the CWA requires applicants for federally issued permits to obtain a state Water Quality Certification ensuring that proposed activities will comply with applicable water quality standards and will not result in more than de minimis degradation of state waters.

The seven states in the TVA PSA have enacted laws regulating water quality and implementing the CWA. As part of this implementation, the states classify water bodies according to their uses and establish water quality criteria specific to these uses. Each state has also issued an antidegradation statement containing specific conditions for regulated actions and designed to maintain and protect current uses and water quality conditions.

#### **4.4.2.2 Surface Water Quality of TVA Region River Systems**

##### **Tennessee River Basin**

The Tennessee River Basin contains all except one of TVA's dams and covers about half of the TVA PSA (Figure 4-14). A series of nine locks and dams built mostly in the 1930s and 1940s regulates the entire length of the Tennessee River and allows navigation from the Ohio River upstream to Knoxville (TVA 2004). Almost all the major tributaries have at least one dam, creating 14 multi-purpose storage reservoirs and seven single-purpose power reservoirs. The construction of the TVA dam and reservoir system fundamentally altered both the water quality and physical environment of the Tennessee River and its tributaries. While dams promote navigation, flood damage reduction, power generation, water supply, water quality, and river-based recreation by moderating the flow effects of floods and droughts throughout the year, they also disrupt the daily, seasonal, and annual flow patterns characteristic of a river. Damming of most of the rivers was done at a time when there was little regard for aquatic resources (Voigtlander and Poppe 1989). Beyond changes in water quality, flood control activities and hydropower generation have altered the flow regime (the main variable in aquatic systems) to suit human demands (Cushman 1985). This system of dams and their operation is the most significant factor affecting water quality and aquatic habitats in the Tennessee River and its major tributaries. Portions of several rivers downstream of dams are included on state CWA Section 303(d) lists of impaired waters (e.g., Tennessee Department of Environment and Conservation [TDEC] 2022) due to low dissolved oxygen (DO) levels, flow modifications and thermal modifications resulting from impoundment. TVA has undertaken several major efforts (e.g., TVA's Lake Improvement Plan, Reservoir Release Improvement Plans, and Reservoir Operations Study) to mitigate some of these impacts on aquatic habitats and organisms. While these actions have resulted in improvements to water quality and habitat conditions in the Tennessee River Basin, the Tennessee River and its tributaries remain substantially altered by human activity.

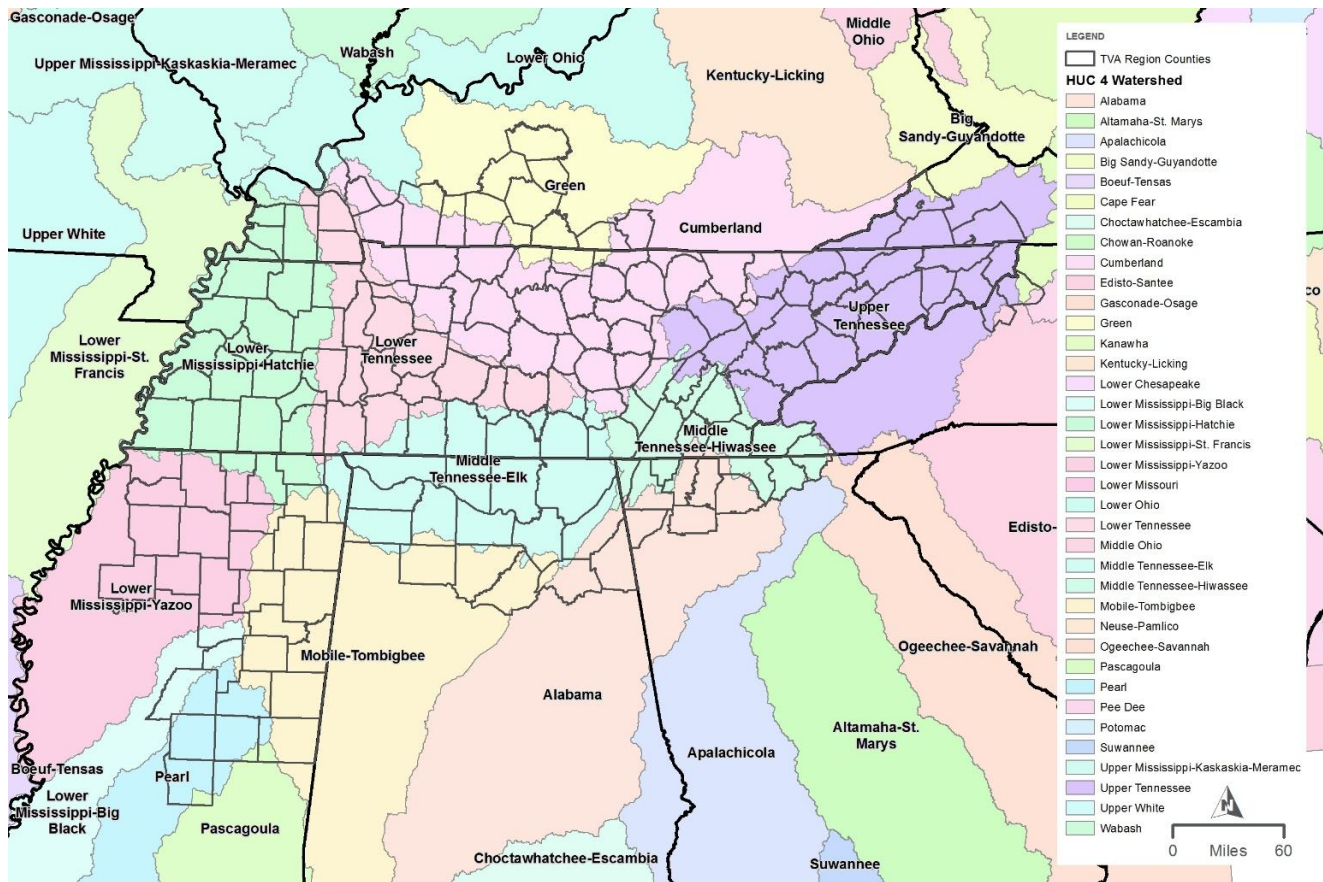


**Figure 4-14: Major Watersheds Within TVA Region**

Major water quality concerns within the Tennessee River Basin include point and nonpoint sources of pollution that degrade water quality at several locations on mainstream reservoirs and tributary rivers and reservoirs.

**Mainstem Reservoirs.** The nine mainstem reservoirs on the Tennessee River differ from TVA's tributary reservoirs primarily in that they are shallower, have greater flows and retain the water in the reservoir for a shorter period. Although DO in the lower lake levels is often reduced, it is seldom depleted. Winter drawdowns on mainstem reservoirs are much less severe than tributaries, so bottom habitats generally remain wetted all year. This benefits benthic (bottom-dwelling) organisms but promotes the growth of aquatic plants in the extensive shallow overbank areas of some reservoirs. Tennessee River mainstem reservoirs generally support healthy fish communities, ranging from about 50 to 90 species per reservoir. Good to excellent sport fisheries exist, primarily for black bass, crappie, sauger, white and striped bass, sunfish, and catfish. The primary commercial species are channel and blue catfish, and buffalo.

**Tributary Reservoirs and Tailwaters.** Tributary reservoirs are typically deep and retain water for long periods of time. This results in thermal stratification, the formation of an upper layer that is warmer and well oxygenated (high DO), an intermediate layer of variable

thickness and a lower layer that is colder and poorly oxygenated (low DO). These aquatic habitats are simplified compared to undammed streams and fewer species are found. Aquatic habitats in the tailwater can also be impaired due to intermittent flows and low DO levels, which restrict the movement, migration, reproduction, and available food supply of fish and other organisms. Dams on tributary rivers affect the habitat of benthic invertebrates, which are a vital part of the food chain of aquatic ecosystems. Benthic invertebrates include worms, snails, and crayfish (which spend all their lives in or on the stream beds), and mussels, clams, and aquatic insects (which live on the stream beds during all or part of their life cycles). Many benthic organisms have narrow habitat requirements that are not always met in reservoirs or tailwaters below dams. Farther downstream from dams, the number of benthic species increases as natural re-aeration occurs and DO levels and water temperatures rise.

TVA regularly evaluates several water quality indicators as well as the overall ecological health of reservoirs through its Ecological Health Monitoring Program. This program evaluates five metrics: chlorophyll concentration, fish community health, bottom life, sediment contamination and DO (TVA 2004). Scores for each metric from monitoring sites in the deep area near the dam (forebay), mid-reservoir, and at the upstream end of the reservoir (inflow) are combined for a summary score and rating. Ecological ratings, major areas of concern, and fish consumption advisories are listed in Table 4-6.

One of TVA's four operating coal-fired power plants, one CC natural gas plant and all of TVA's nuclear plants are in the Tennessee River watershed. All these facilities depend on the river system for cooling water. Two of TVA's CT plants are along or close to the Tennessee River; however, they do not depend on the Tennessee River for cooling water.

**Table 4-6: Ecological Health Ratings, Major Water Quality Concerns, and Fish Consumption**

| Reservoir   | Ecological Health Rating – Score | Latest Survey Date | Concerns                     | Fish Consumption Advisories                               |
|-------------|----------------------------------|--------------------|------------------------------|-----------------------------------------------------------|
| Apalachia   | Fair – 69                        | 2024               | --                           | Mercury – North Carolina statewide advisory               |
| Bear Creek  | Poor – 42                        | 2023               | DO, chlorophyll, bottom life | Mercury – Dam forebay area                                |
| Beech       | Poor – 55                        | 2024               | DO                           | Mercury – Entirety of reservoir                           |
| Blue Ridge  | Good – 80                        | 2023               | --                           | Mercury, PCBs – Entirety of reservoir                     |
| Boone       | Fair – 62                        | 2024               | DO, bottom life              | PCBs, chlordane – Entirety of reservoir                   |
| Cedar Creek | Fair – 60                        | 2023               | DO, bottom life              | Mercury – Dam forebay to 1-mile upstream of dam           |
| Chatuge     | Poor – 54                        | 2024               | DO, sediments                | Mercury – Entirety of reservoir<br>PCBs – Georgia portion |
| Cherokee    | Fair – 61                        | 2024               | DO, bottom life              | Mercury – Entirety of reservoir                           |



| Reservoir           | Ecological Health Rating – Score | Latest Survey Date | Concerns                                                                         | Fish Consumption Advisories                                                                                                                                              |
|---------------------|----------------------------------|--------------------|----------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Chickamauga         | Good – 81                        | 2023               | --                                                                               | Mercury – Hiwassee River from Highway 58 (RM 7.4) upstream to Highway 11 (RM 18.9)                                                                                       |
| Douglas             | Fair – 60                        | 2022               | DO, bottom life                                                                  | None; however, TDEC has issued fish consumption advisories for the French Broad River (FBRM 71.4 to 77.5) and Nolichucky River (NoRM 0.0 to 92.1) due to mercury.        |
| Fontana             | Fair – 71                        | 2022               | Bottom life                                                                      | Mercury – Entirety of reservoir                                                                                                                                          |
| Fort Loudoun        | Fair – 59                        | 2023               | DO (forebay), chlorophyll (mid-reservoir), bottom life                           | Mercury – Portion of reservoir upstream of U.S. 129<br>PCBs – Entirety of reservoir<br>Mercury, PCBs – Little River embayment                                            |
| Fort Patrick Henry  | Fair – 67                        | 2022               | Chlorophyll                                                                      | PCBs – Entirety of reservoir                                                                                                                                             |
| Guntersville        | Fair – 75                        | 2024               | --                                                                               | Mercury – Crow Creek, Widows Creek, Sequatchie River, Short Creek, Long Island Creek, and Town Creek embayments                                                          |
| Hiwassee            | Poor – 57                        | 2024               | DO, bottom life (forebay)                                                        | Mercury – North Carolina statewide advisory                                                                                                                              |
| Kentucky            | Good – 74                        | 2023               | Chlorophyll (Big Sandy embayment), chlorophyll (forebay and Big Sandy embayment) | Mercury – Kentucky statewide advisory; Tennessee: Big Sandy River and Beech Creek embayments; and West Sandy Creek dewatering area<br>PFAS – Kentucky statewide advisory |
| Little Bear Creek   | Fair – 64                        | 2023               | DO                                                                               | Mercury – Dam forebay area                                                                                                                                               |
| Melton Hill         | Fair – 69                        | 2024               | DO, bottom life (forebay only)                                                   | PCBs – entirety of reservoir                                                                                                                                             |
| Nickajack           | Good – 81                        | 2024               | --                                                                               | PCBs – Entirety of reservoir<br>PCBs, chlordane – Chattanooga Creek                                                                                                      |
| Normandy            | Poor – 55                        | 2022               | DO, chlorophyll                                                                  | Mercury – Entirety of reservoir                                                                                                                                          |
| Norris              | Fair – 63                        | 2023               | DO, bottom life (Powell mid-reservoir)                                           | Mercury – Clinch River portion                                                                                                                                           |
| Nottely             | Poor – 53                        | 2023               | DO, chlorophyll (mid-reservoir), bottom life (forebay)                           | Mercury – Entirety of reservoir                                                                                                                                          |
| Parksville/Ocoee #1 | Fair – 62                        | 2023               | Sediments                                                                        | PCBs – Entirety of reservoir                                                                                                                                             |

| Reservoir     | Ecological Health Rating – Score | Latest Survey Date | Concerns                                                                             | Fish Consumption Advisories                                                                                                                                                        |
|---------------|----------------------------------|--------------------|--------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Pickwick      | Fair – 63                        | 2024               | DO (Bear Creek embayment), chlorophyll                                               | Mercury – Vicinity of TRM 230; Bear Creek, Cane Creek, Spring Creek, and Little Bear Creek embayments<br>PCBs – Tennessee portion (TRM 207 to TRM 215)                             |
| South Holston | Fair – 69                        | 2024               | DO                                                                                   | Mercury – Tennessee portion                                                                                                                                                        |
| Tellico       | Poor – 56                        | 2023               | DO, bottom life (forebay only)                                                       | PCBs – Entirety of reservoir                                                                                                                                                       |
| Tims Ford     | Poor – 55                        | 2022               | DO, bottom life                                                                      | None                                                                                                                                                                               |
| Watauga       | Fair – 67                        | 2024               | DO                                                                                   | Mercury – Entirety of reservoir                                                                                                                                                    |
| Watts Bar     | Good – 73                        | 2024               | DO (forebay), bottom life                                                            | PCBs – Entirety of reservoir<br>Mercury and PCBs – Poplar Creek embayment<br>Mercury – Emory River (RM 12.4 to 28.4)                                                               |
| Wheeler       | Fair – 64                        | 2023               | DO (Elk River embayment), chlorophyll, bottom life (forebay and Elk River embayment) | Mercury – Vicinity of TRM 277 and TRM 320; Flint Creek, Fox Creek, Limestone Creek, and Round Island Creek embayments<br>PFOS – TRM 296-303; Bakers Creek and Fox Creek embayments |
| Wilson        | Fair – 62                        | 2024               | DO, chlorophyll, bottom life (forebay only)                                          | Mercury – Big Nance Creek embayment                                                                                                                                                |

Source: TVA 2026a

Notes: DO = Dissolved Oxygen; PCB = Polychlorinated biphenyls; PFOS = Perfluorooctane sulfonate; RM = River Mile; FBRM = French Broad River Mile; NoRM = Nolichucky River Mile; TRM = Tennessee River Mile

### Other Major River Systems

The other major rivers within the TVA region (the Cumberland, Mobile, and Mississippi River) share a diversity of aquatic life equal to or greater than the Tennessee River Basin. As with the Tennessee River, these river systems have seen extensive human alteration, including construction of reservoirs, navigation channels, and locks. Despite these changes, diverse aquatic communities are present in each of these river systems.

#### 4.4.2.3 Causes of Degraded Surface Water Quality

Causes of degraded surface water quality may include:

- Wastewater discharges – Municipal sewage treatment systems, industrial facilities, concentrated animal feeding operations, and other sources discharge waste into streams and reservoirs. These discharges are controlled through state-issued NPDES permits issued under the authority of the CWA. NPDES permits regulate the amounts of various pollutants in the discharges (including heat) and establish monitoring and reporting requirements.



- **Runoff discharges** – Runoff from agriculture, forest management (silvicultural) activities, urban uses, and mined land can transport sediment and other pollutants into streams and reservoirs. Runoff from some commercial and industrial facilities and some construction sites is regulated through state NPDES stormwater permitting programs. Runoff from agriculture, silvicultural and other sources not regulated under the NPDES program is referred to as “nonpoint source” runoff.
- **Cooling Systems** – Electrical generating plants and other industrial facilities withdraw water from streams or reservoirs, use it to cool facility operations, and discharge heated water into streams or reservoirs. The aquatic community may be impacted due to temperature changes in the receiving waters and from fish and other organisms being impinged upon the intake screens or entrained in the facility cooling system. These water intakes and discharges are controlled through state-issued NPDES permits.
- **Air pollution** – Airborne pollutants (e.g., mercury, sulfates) can affect surface waters through rainout (the removal of foreign substances from the atmosphere by precipitation) and deposition.

Following is an overview of how power generation can affect water quality.

**Coal and Natural Gas Plant Wastewater.** Coal-fired power plants have several liquid waste streams that may be permitted for discharge to surface waters and these streams may include condenser cooling water, cooling tower blowdown, ash transport water, metal-cleaning wastewaters, combustion residual leachate, and various low volume wastes, including sumps and drains. CC natural gas plant wastewaters include cooling tower blowdown and various low volume wastewaters. Coal and gas plant sites use best management practices to control stormwater runoff, such as retention ponds to capture sediment and oil/water separators to remove oil and grease as required by regulations. Discharges at coal and natural gas plants are regulated by permits issued by the state under the NPDES program, which may require treating the waters prior to discharge. Periodic analytical monitoring and toxicity testing, as required, ensure there are no adverse effects to the receiving water or to aquatic life. See Section 4.7.1 for further discussion of CCR management at TVA coal plants.

**Nuclear Plant Wastewater.** Liquid waste streams at nuclear plant sites include condenser cooling water, cooling tower blowdown, water treatment wastewaters, steam generator blowdown, liquid rad-waste including tritiated wastewater, and various low volume wastes including sumps and drains.

Periodic analytical monitoring and toxicity testing is performed on these discharges as required by the NPDES permit to ensure that plant wastes do not contain chemicals at deleterious levels that could affect aquatic life. Best management practices are used to

control stormwater runoff and may include retention ponds to capture sediment and oil/water separators. The radiological component of discharges from nuclear plants is regulated by the NRC and by states under the CWA.

**Thermal Plant Cooling Systems.** All of TVA's coal-fired and nuclear plants and two CC gas plants withdraw water from reservoirs or rivers for cooling and discharge the heated water back into the water body (see Section 4.4.3). In some cases, the cooling water is chemically treated to prevent corrosion or biofouling of the cooling system. TVA conducts extensive monitoring programs to help ensure permit compliance and to provide information about potential adverse effects from the heated and/or chemically treated discharges. Plant-specific monitoring includes concentrations of various chemicals, toxicity, discharge flow rates, discharge and receiving stream temperatures, DO, fish communities, and benthic organisms.

Recent programs have also focused on spawning and development of cool-water fish species such as sauger, the attraction of fish to the heated discharges and changes in undesirable aquatic micro-organisms such as blue-green algae. In general, these monitoring programs have not detected significant negative effects resulting from release of heated water from TVA facilities in the Tennessee River drainage basin.

**Runoff and Air Pollution.** Many nonpoint sources of water pollution are not subject to government regulations or control. Principal causes of non-point source pollution are agriculture, including runoff from fertilizer, pesticide applications, erosion, and animal wastes; silvicultural activities; mining, including erosion and acid drainage; and urban runoff. Pollutants reach the ground from the atmosphere as dust falls or is carried to the ground by precipitation.

**Low DO Levels and Low Flow Downstream of Dams.** A major water quality concern is low DO levels in reservoirs and in the tailwaters downstream of dams. Long stretches of river can be affected, especially in areas where pollution further depletes DO. In addition, flow in these tailwaters is heavily influenced by the amount of water released from the upstream dams; in the past, some of the tailwaters were subject to periods of little or no flow. Since the early 1990s, TVA has addressed these issues in the Tennessee River system by installing equipment and making operational changes to increase DO concentrations below 16 dams and to maintain minimum flows in tailwaters (TVA 2004).

**NPDES Permit Requirements.** All of TVA's coal, CC natural gas, and nuclear generating facilities have state-issued NPDES permits for discharging to surface waters or pretreatment permits issued under state-approved programs for discharging into public sewer systems. At a minimum, these permits restrict the discharge of pollutants to levels established by USEPA ELG. Additional, and sometimes more restrictive, limits may also be included based on state water quality standards.

Finalized 316(b) regulations for existing facilities (USEPA 2014) require TVA and other utilities to perform additional evaluations of the impacts of their facilities and cooling water intakes and may require modifications to plant cooling systems and/or plant operations to reduce impacts to fish and other aquatic organisms.

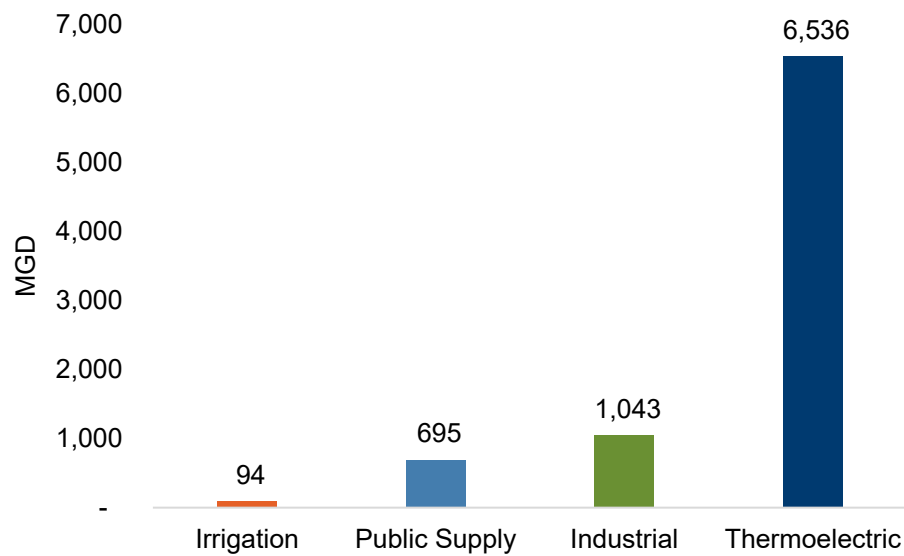
**Fuel Cycle Impacts.** The extraction, processing, and transportation of fuel can affect water quality. Runoff and other discharges from coal and uranium mines, natural gas well sites, and from fuel processing facilities can discharge sediment and other pollutants into surface waters. These discharges are typically subject to NPDES permit requirements, as well as permit requirements specific to coal and uranium mining. Mining operations can also result in the alteration and elimination of streams. Mining and natural gas extraction can also affect groundwater quality and quantity. Impacts to water quality from the extraction of natural gas by hydraulic fracturing are described in more detail in Section 5.2.1.3.

#### 4.4.3 Water Supply

The TVA PSA contains most of the Tennessee River Basin, which is considered one of the most water rich basins in the U.S. The Tennessee River Basin, which is about half of the TVA PSA, is one of the most intensively used basins in the contiguous U.S. as measured by intensity of freshwater withdrawals in gallons per day per square mile. While the withdrawal rate is high, the basin has a low consumptive use by returning over 95 percent of the withdrawals back for downstream use (Sharkey and Springston 2022).

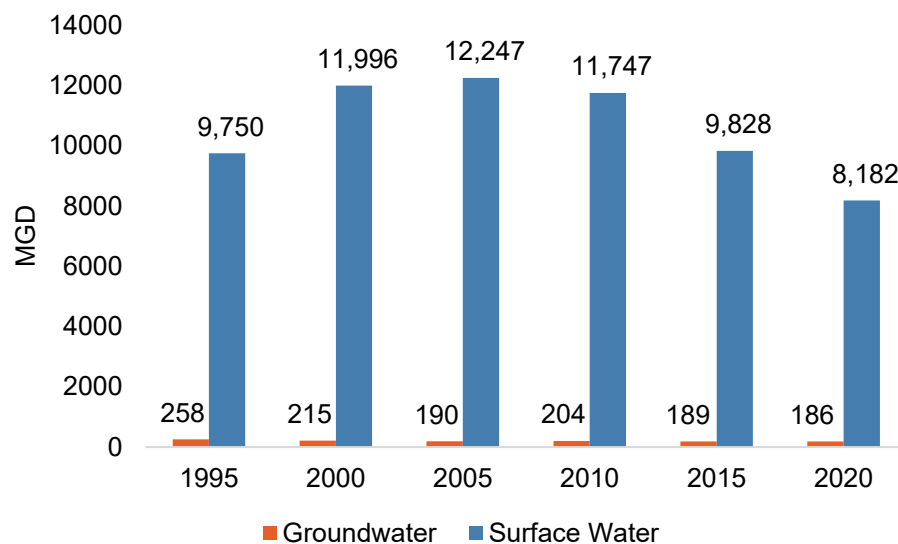
Off-stream water use in the Tennessee River watershed is categorized as thermoelectric power, industrial, public supply, and irrigation. Water use is summarized by source of water (surface water or groundwater) and location of withdrawal (reservoir catchment area). Water returns to the watershed are used to estimate consumptive use.

Total water withdrawals in 2020 were estimated to average 8,368 million gallons per day (MGD) and the 2020 total withdrawal rate was 16.5 percent lower than it was in 2015. This was largely due to a reduction in thermoelectric withdrawal of 20.5 percent (Sharkey and Springston 2022). Of the total withdrawal, 97.8 percent, or 8,182 MGD came from surface water. Groundwater supplied the remaining 2.2 percent, or 186 MGD. Return flow totaled 7,965 MGD, or 95.2 percent of total withdrawal. Total net water demand was 403 MGD, or 4.8 percent of total withdrawal. Water withdrawals for 2020 by category are shown in Figure 4-15. Groundwater and surface water withdrawals in the Tennessee River Basin from 1995 to 2020 are shown in Figure 4-16.



Source: Sharkey and Springston 2022

**Figure 4-15: 2020 Water Withdrawals by Category in the Tennessee River Basin**



Source: Sharkey and Springston 2022

**Figure 4-16: Groundwater and Surface Water Withdrawals in the Tennessee River Basin, 1995 to 2020**

Since 1995, the Tennessee River Basin's public water supply has been sourced primarily from surface water. In 2020, public supply water was comprised of 82.4 percent surface water and 17.6 percent ground water. Total surface water withdrawals in the Tennessee River Basin have been decreasing since 2005.

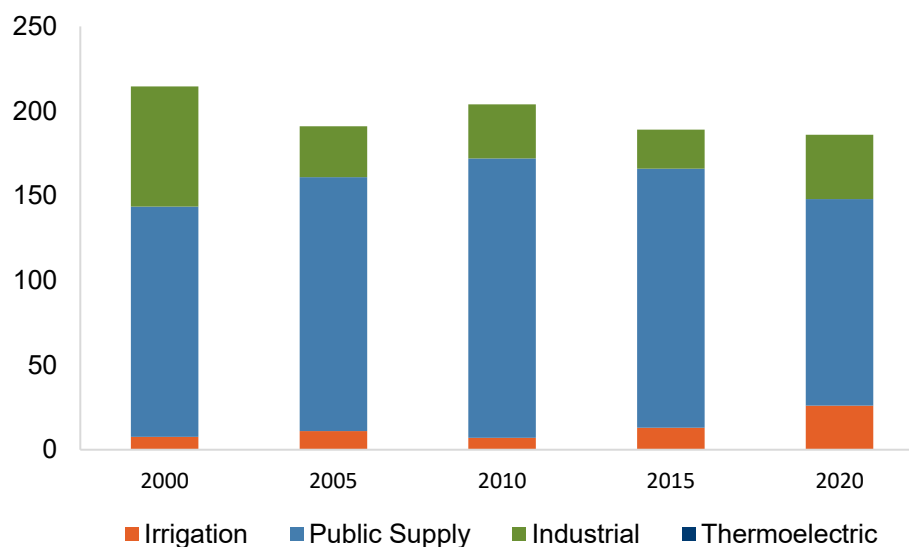
#### 4.4.3.1 Groundwater Use

The use of groundwater to meet public water supply needs vary across the TVA PSA and is the greatest in West Tennessee and Northern Mississippi. This variation is the result of several factors, including groundwater availability, surface water availability, where both

surface and groundwater are present in adequate quantity and quality, which water source can be developed most economically, and public water demand, which is largely a function of population. There are numerous sparsely populated, rural counties in the region with no public water systems. Residents in these areas are self-served by individual wells or springs.

Approximately 60 percent of all groundwater withdrawals were supplied by Tertiary sand aquifers in West Tennessee and North Mississippi. Aquifers in Shelby County, Tennessee (Memphis), accounted for about 38 percent of the total in 2015. The dominance of groundwater uses over surface water use in the western portion of the TVA PSA is due to the availability of prolific aquifers and the absence of adequate surface water resources in some areas. Additionally, several TVA facilities, primarily CC plants, which use groundwater for industrial purposes (e.g., fire protection and cooling) are in this area.

The largest use of groundwater is for public water supply, shown in Figure 4-17, which includes data for the Tennessee River Basin. Approximately 17.6 percent of the water used for domestic supply and 27.2 percent of water used for irrigation in the Tennessee River Basin is groundwater. Groundwater is also used for industrial, mining, livestock, and aquaculture purposes. Total groundwater use for public water supply in 2020 was 122 MGD in the Tennessee River Basin. Groundwater withdrawal for industrial use in the Tennessee River Basin was 38 MGD, or 3.6 percent of total industrial withdrawal. Groundwater use for irrigation was 26 MGD, or 27.2 percent of total irrigation use. Wheeler-Wilson was the Water Use Tabulation Area (WUTA) with the highest groundwater withdrawal, at 43 MGD (Sharkey and Springston 2022). Groundwater use has shown a decreasing trend from 1995 to 2020, except for 2010. In 2020, groundwater withdrawals reached their lowest level since 1995.

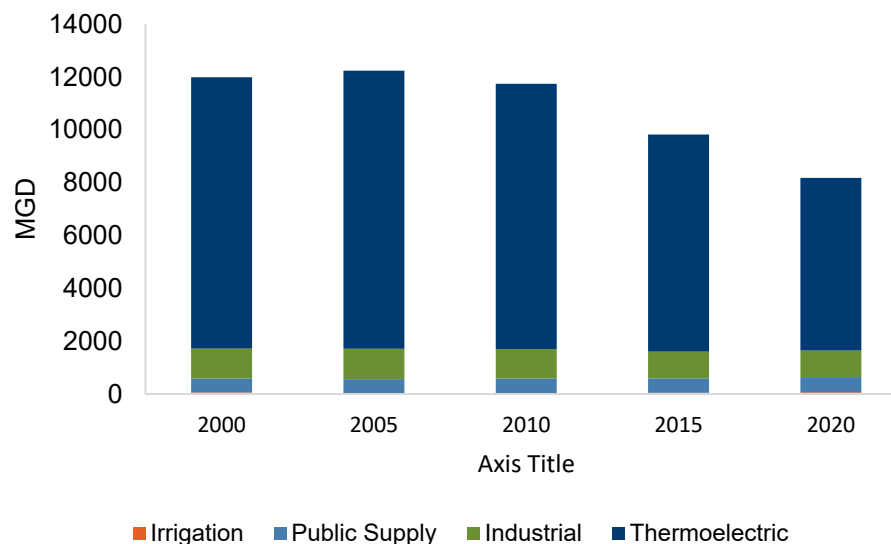


Source: Sharkey and Springston 2022

**Figure 4-17: Groundwater Use by Category in the Tennessee River Basin, 2000 to 2020**

#### 4.4.3.2 Surface Water Use

Most of the water used for thermoelectric, public supply, aquaculture, and industrial uses is surface water. In 2020, the total surface water use in the Tennessee River Basin was 8,182 MGD. Surface water supplied the entire thermoelectric withdrawal of 6,536 MGD. Surface water was the source for 1,005 MGD, or 96.4 percent of the industrial withdrawal; 573 MGD, or 82.4 percent of the public water supply withdrawal; and 68 MGD, or 72.8 percent of the irrigation withdrawal. Wheeler-Wilson was the WUTA with the highest surface withdrawal, at 3,520 MGD (Sharkey and Springston 2022). Surface water continued to supply most of the water used in the watershed in 2020. Except for the 2020 public supply, surface water withdrawals by source have remained relatively constant over the 2000 to 2020 period. As metropolitan areas within the TVA region increase in population, water use for public supply in these areas has increased. Figure 4-18 includes data for surface water uses in the Tennessee River Basin.



Source: Sharkey and Springston 2022

**Figure 4-18: Surface Water Use by Category in the Tennessee River Basin, 2000 to 2020**

#### 4.4.3.3 Water Use for Thermoelectric Power Generation

Thermoelectric power generation uses steam produced from the combustion of fossil fuels or from a nuclear reaction. A substantial volume of cooling water is required to condense steam into water. All TVA coal-fired plants and nuclear plants are cooled by water withdrawn from adjacent rivers or reservoirs. Surface water withdrawals may be supplemented by groundwater withdrawn via production wells at some plants, though the quantity of groundwater withdrawn is significantly less than the quantity of surface water withdrawn. The amount of water required is highly dependent on the type of cooling system employed. While the volume of water used to cool the plants is large, most of this water is returned to the adjacent rivers or reservoirs.

Total 2020 thermoelectric withdrawal in the Tennessee River Basin was 6,536 MGD, of which 6,463 MGD, or 98.9 percent, was returned. The largest WUTA withdrawal was 3,294 MGD from the Wheeler-Wilson WUTA. This accounted for 50.4 percent of total thermoelectric withdrawal. The Wheeler-Wilson withdrawal was used to generate 33,105 million kWh of electricity, or 40.2 percent of the total power generated in the Tennessee River watershed (Sharkey and Springston 2022). The largest withdrawal within the Wheeler-Wilson WUTA was at BFN in Limestone County, Alabama. The second largest WUTA withdrawal was from the Watts Bar-Chickamauga WUTA, which comprised 2,601 MGD, or 39.8 percent of total thermoelectric withdrawal. The Watts Bar-Chickamauga WUTA withdrawal was used to generate 39,602 million kWh of electricity, or 48.1 percent of the total power generated in the Tennessee River watershed (Sharkey and Springston 2022).

#### **4.4.3.4 Trends in Thermoelectric Water Withdrawal**

Nationally, water use factors have been declining since the 1960s. The national power plant water use factors have declined from a high of about 60,000 gallons (gal)/MWh to a low of about 23,000 gal/MWh (EPRI 2002). The reduction was primarily due to increasing use of closed-cycle cooling, particularly in the western U.S. where water is relatively scarce. TVA's water use factor is higher than the national average because the TVA system was designed and located to specifically take advantage of open-cycle cooling and therefore has a lower percentage of closed-cycle cooling systems than the national average. While closed-cycle cooling systems withdraw less water, they consume more water in their cooling tower systems due to evaporation. TVA's systems are designed for less overall water consumption, even though they do require more water withdrawal upfront.

The average percent of total withdrawal for thermoelectric use between 2000 and 2015 was 83.8 percent. Thermoelectric withdrawal in 2020 was 20.5 percent lower than it was in 2015, and the percentage of total withdrawal in 2020 dropped to 78.1 percent (Sharkey and Springston 2022).

In 2000 and 2005, the thermoelectric unit water requirement for power generation was 39 gallons per kilowatt-hour (gal/KWh). It rose in 2010 to 42 gal/KWh and remained nearly the same in 2015. In 2020, the thermoelectric unit water requirement for power generation dropped to 29 gal/KWh. From 2015 to 2020, there was an increase in thermoelectric power generation of 16.9 percent. However, during the same period, there was a 20.5 percent reduction in water withdrawal. Changes in cooling technology, closure of three fossil plants, conversions to CC plants, and increased hydrogeneration due to increased rainfall led to the decrease in the thermoelectric unit water requirement in 2020 (Sharkey and Springston 2022).



#### 4.4.4 Aquatic Life

##### 4.4.4.1 Regulatory Framework for Aquatic Life

Aside from the Endangered Species Act (ESA) and related state laws described in Section 4.5.3, and harvest regulations established by states, the CWA is the major law affecting aquatic life. Water quality standards and NPDES discharge limits are established, in part, to protect aquatic life. CWA Section 316 regulates (a) the design and operation of cooling water intake structures to minimize adverse effects to aquatic life from entrainment and impingement, and (b) wastewater discharges in order to minimize adverse effects of heat on aquatic life.

The Federal Power Act requires hydropower projects with licenses to provide conditions for the protection, mitigation and enhancement of fish and wildlife that are consistent with agency recommendations, such as those of the U.S. Fish and Wildlife Service (USFWS).

##### 4.4.4.2 Aquatic Life within the TVA Region

The TVA region encompasses portions of several major river systems, including all of the Tennessee River drainage and portions of the Cumberland River drainage, Mobile River drainage (primarily the Coosa and Tombigbee Rivers), and larger eastern tributaries to the Mississippi River in Tennessee and Mississippi (Figure 4-14). These river systems support a large variety of freshwater fishes and invertebrates (including freshwater mussels, snails, crayfish, and insects). Due to the presence of several major river systems, the region's high geologic diversity (see Section 4.5.1), and the lack of glaciation, the region is recognized as a globally important area for freshwater biodiversity (Stein et al. 2000).

Invasive aquatic animals in the TVA region that harm or potentially harm aquatic communities include the common, grass, bighead, and silver carp; alewife; blueback herring; rusty crayfish; Asiatic clam; and zebra mussel. Because of their potential to affect water intake systems, TVA uses chemical and warm-water treatments to control Asiatic clams and zebra mussels at some of its generating facilities.

#### 4.5 Land Resources

This section describes the land resources in the TVA region that could be affected by the alternative strategies. The potentially affected land resources include geology, vegetation and wildlife, endangered and threatened species, wetlands, parks, managed areas and ecologically significant sites, land use, and cultural resources.

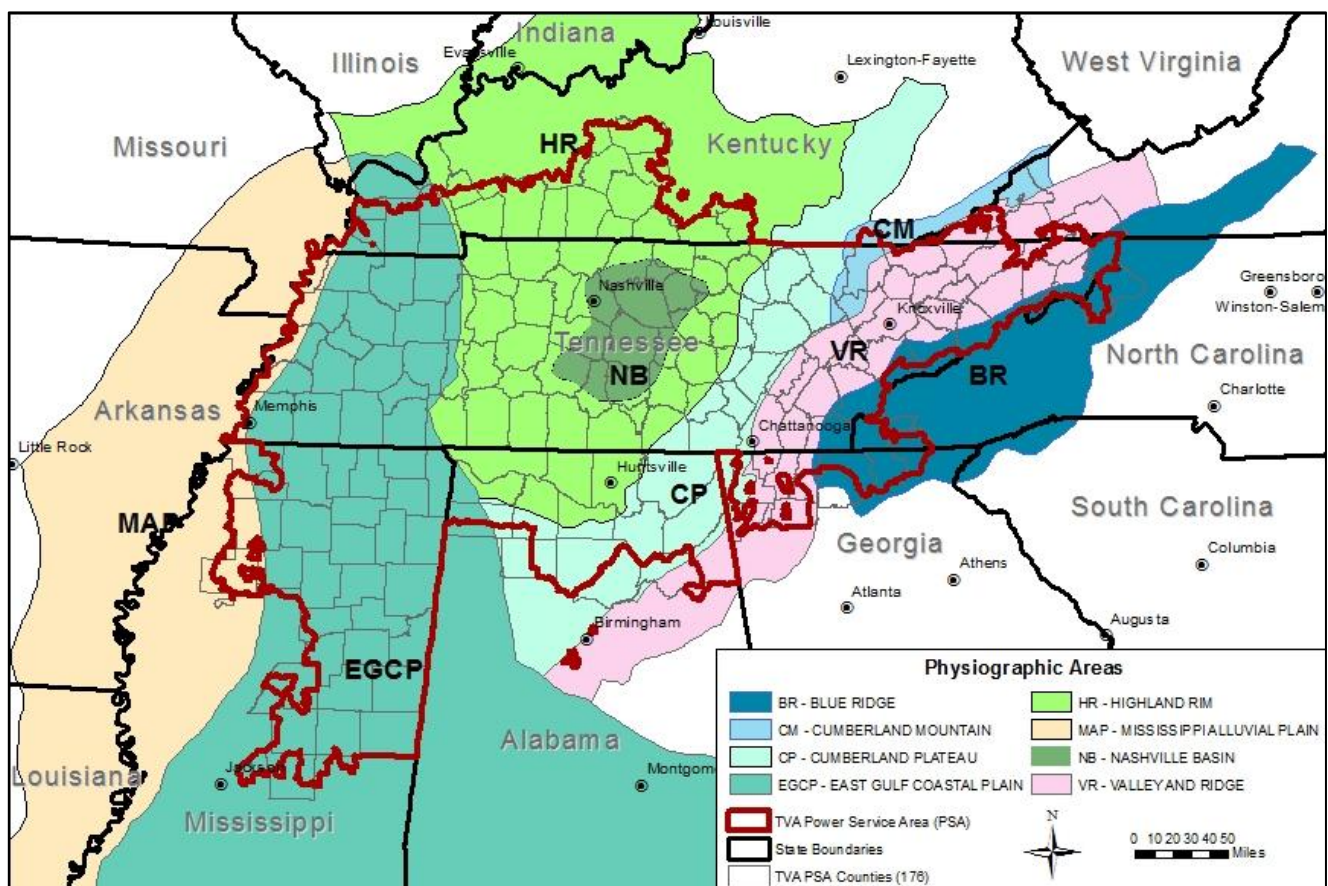
##### 4.5.1 Geology

The TVA region encompasses portions of the following major physiographic provinces and physiographic sections (Figure 4-19) (Fenneman 1938, Miller 1974):

- Blue Ridge
- Valley and Ridge

- Interior Low Plateaus Province
  - Highland Rim
  - Nashville Basin
- Appalachian Plateaus Province
  - Cumberland Plateau
  - Cumberland Mountains
- Coastal Plain Province
  - East Gulf Coastal Plain

Physiographic provinces and sections are areas of characteristic geomorphology and geology resulting from similar geologic events.



Source: Adapted from Fenneman (1938).

**Figure 4-19: Physiographic Areas of TVA Region**

The easternmost part of the region is the Blue Ridge physiographic province, an area composed of the remnants of an ancient mountain chain. This province has the greatest variation in terrain within the TVA region. Terrain ranges from nearly level along floodplains at elevations of about 1,000 feet to rugged mountains that reach elevations greater than 6,000 feet above sea level. The rocks of the Blue Ridge have been subjected to significant

folding and faulting and are primarily sedimentary (shales, sandstones, conglomerates, quartzite) and metamorphic (slate, phyllite, gneiss) rocks of Precambrian and Cambrian age.

Located west of the Blue Ridge and east of the Appalachian Plateau, the Valley and Ridge Province is characterized by alternating valleys and ridges that trend northeast to southwest. Ridges have elevations up to 3,000 feet and are generally capped by dolomites and resistant sandstones, while valleys have been formed in less resistant dolomites and limestones. Dominant soils in this province are residual clays and silts derived from in-place weathering of rock. Karst features such as sinkholes and springs are common in the Valley and Ridge province.

The Appalachian Plateaus Province is an elevated area between the Valley and Ridge and Interior Low Plateaus provinces. It is comprised of two sections in the TVA region: the extensive Cumberland Plateau and the smaller Cumberland Mountains (Figure 4-19). The Cumberland Plateau rises about 1,000 to 1,500 feet above the adjacent provinces and is formed by layers of near horizontal Pennsylvanian sandstones, shales, conglomerates, and coals, and underlain by Mississippian and older shale and limestones. The sandstones are resistant to erosion and have produced a relatively flat landscape cut by deep stream valleys. Toward the northeast, the Cumberland Mountains section is more rugged due to extensive faulting and several peaks exceeding 3,000 feet elevation. The province has a long history of coal mining and encompasses the Appalachian coal field (USGS 1996). Coal mining has historically occurred in much of the province. The most recent Appalachian coal mining within the TVA region has been from the southern end of the province in Alabama, the northern portion of the Cumberland Plateau section in Tennessee and the Cumberland Mountains section.

Two sections of the Interior Low Plateaus Province occur in the TVA region. The Highland Rim section is a plateau that occupies much of central Tennessee and parts of Kentucky and northern Alabama. The bedrock of the Highland Rim is Mississippian limestones, chert, shale, and sandstone. The terrain varies from hilly to rolling to extensive relatively flat areas in the Northwest and Southeast. The southern end of the Illinois Basin coal region (USGS 1996) overlaps the Highland Rim in northwest Kentucky and includes part of the TVA region. The Nashville Basin (also known as the Central Basin) section is an oval area in middle Tennessee with an elevation about 200 feet below the surrounding Highland Rim. The bedrock is composed of generally flat-lying limestones. Soil cover is usually thin, and streams cut into the limestone bedrock. Karst is well-developed in parts of both the Highland Rim and the Nashville Basin.

The Coastal Plain Province encompasses much of the western and southwestern TVA region (Figure 4-19). Most of the Coastal Plain portion of the TVA region is in the extensive East Gulf Coastal Plain section. The underlying geology is a mix of poorly consolidated gravels, sands, silts, and clays. Soils are primarily of windblown and alluvial (deposited by water) origin, low to moderate fertility and easily eroded. The terrain varies from hilly to flat in

broad river bottoms. The Mississippi Alluvial Plain section occupies the western edge of the TVA region and much of the historic floodplain of the Mississippi River. Soils are deep and often poorly drained. The New Madrid Seismic Zone, an area of large prehistoric and historic earthquakes, is in the northern portion of the section.

#### **4.5.1.1 Geologic Carbon Dioxide Sequestration Potential**

Carbon capture, use, transport, and storage provide carbon management by reducing net GHG emissions. Globally, more than a quarter billion tons of CO<sub>2</sub> have been captured and stored as-of 2023. The sequestration (i.e., capture and permanent storage) of CO<sub>2</sub> from large stationary industrial sources such as natural gas processing and coal-fired power plants is an important potential component of efforts to significantly reduce anthropogenic CO<sub>2</sub> emissions. Successful large-scale, economical CO<sub>2</sub> sequestration (also referred to as carbon capture and storage/sequestration [CCS]) would minimize net emissions.

Few power plant CCS projects are currently operating and the technology for commercial scale CCS continues to develop. In January 2023, there were 417 carbon capture, storage, and combined capture and storage projects globally at various stages of development. Of these, 177 projects were located in the U.S., including 12 operational projects, 100 in developmental status, and 29 terminated projects. In January 2023, 24 CCS projects of various development statuses were in the vicinity of the TVA region, with projects in Alabama, Kentucky, Mississippi, North Carolina, and Virginia. Further, only 54 of U.S. CCS projects were tied to power plants and only 11 of those were in the vicinity of the TVA region (NETL 2023).

Geologic CO<sub>2</sub> storage involves capturing and separating the CO<sub>2</sub> from the power plant exhaust; purifying and compressing the CO<sub>2</sub>; and transporting the supercritical CO<sub>2</sub> by pipeline to the storage site where it is pumped through wells into deep geological formations. At temperatures exceeding 87.98°F (31.1°C) and pressures exceeding 72.9 atmospheres, CO<sub>2</sub> becomes supercritical, requiring much less volume for storage of this liquid-like material. Supercritical CO<sub>2</sub> remains in the supercritical condition at depths below 2,600 feet, where natural temperatures and fluid pressures exceed the critical point for CO<sub>2</sub> at most places on earth. When the CO<sub>2</sub> capacity of the formation has been reached or when the pressure of the formation or injection well has reached a pre-determined level, CO<sub>2</sub> injection stops and the wells are permanently sealed and monitored (NETL 2010a, NETL 2015).

Since January 2021, DOE has invested in over a hundred projects advancing carbon capture, use, transport, and storage. In 2022, the U.S. captured and geologically stored 20 million metric tons of CO<sub>2</sub>. By 2030, DOE anticipates this domestic capacity to expand to 128 million metric tons. DOE-funded carbon capture, utilization, and storage activities include bench scale tests in North Carolina, multiple research endeavors at the University of Kentucky, and various efforts at Tennessee's Oak Ridge National Laboratory (Intensified, Flexible, and Modular Carbon Capture Demonstration 2020-2022, Porous Catalyst Polymers for CO<sub>2</sub> Capture and Conversion 2021-2024, Integrated Process for Direct Air Capture and

Conversion of CO<sub>2</sub> 2020-2023, and Direct Air Capture with Building Handling Equipment 2020-2022) (DOE 2023a, DOE 2023b).

The Kemper County integrated gasification CC plant was constructed near the southern edge of the TVA PSA in Mississippi; as originally designed, CO<sub>2</sub> from the plant would have been captured and used for enhanced oil recovery in oil fields south of the TVA PSA (DOE 2010, NETL 2015). Due to problems unrelated to the area's CO<sub>2</sub> sequestration potential, the plant is being operated as a CC plant fueled by natural gas (Wagman 2017).

#### **4.5.2 Vegetation and Wildlife**

The TVA region encompasses nine ecoregions (Omernik 1987), which generally correspond with physiographic provinces and sections (see Section 4.5.1 and Figure 4-19):

1. Blue Ridge
2. Ridge and Valley
3. Central Appalachian
4. Southwestern Appalachian
5. Interior Plateau
6. River Valley and Hills
7. Southeastern Plains
8. Mississippi Valley Loess Plain
9. Mississippi Alluvial Plain

The terrain, plant communities, and associated wildlife habitats in these ecoregions vary from bottomland hardwood and cypress swamps in the floodplains of the Mississippi Alluvial Plain to high elevation balds and spruce-fir and northern hardwood forests in the Blue Ridge. This provides space for a biodiverse TVA Region, with about 5,000 species of plants, 16 species of reptiles, 29 species of amphibians, 180 species of breeding birds and 40 species of mammals occurring and being monitored in Tennessee alone (NRCS 2024a, TWRA 2015, TBRC 2023). Although many plants and animals are widespread across the region, others are restricted to one or a few ecoregions. For example, high elevation communities in the Blue Ridge support several plants and animals found nowhere else in the world (Ricketts et al. 1999), as well as isolated populations of species typically found in more northern latitudes.

##### **4.5.2.1 Regulatory Framework for Vegetation and Wildlife**

Aside from the ESA and related state laws described in Section 4.5.3, there are few laws specifically focused on protecting plant species and plant communities. The Plant Protection Act of 2000 consolidated previous legislation and authorized the U.S. Department of Agriculture (USDA) to issue regulations to prevent the introduction and movement of identified plant pests and noxious weeds. EO 13112 – Invasive Species directs federal agencies to prevent the introduction of invasive species (both plants and animals), control their populations, restore invaded ecosystems, and take other related actions. EO 13751 – Safeguarding the Nation from the Impacts of Invasive Species amends EO 13112 and



directs actions to continue coordinated federal prevention and control efforts related to invasive species. Agencies are also directed to incorporate consideration of human and environmental health, climate change, technological innovation, and other emerging priorities into their efforts to address invasive species (USDA 2018a). Funding to address these biological threats has been provided in regulatory actions throughout the years, most recently in the 2021 Infrastructure Investment and Jobs Act, also known as the Bipartisan Infrastructure Law, and the Inflation Reduction Act of 2022.

A number of species of wildlife are protected under the ESA and related state laws. In addition to these laws, the regulatory framework for protecting birds includes the Migratory Bird Treaty Act (MBTA) of 1918, the Bald and Golden Eagle Protection Act of 1940, and EO 13186 – Responsibilities of Federal Agencies to Protect Migratory Birds. The MBTA and EO 13186 address most native birds occurring in the U.S. The MBTA makes the incidental taking, killing, or possession of migratory birds, their eggs, or nests unlawful, except as authorized under a valid permit. EO 13186 focuses on federal agencies taking actions with the potential to have negative impacts on populations of migratory birds. It provides broad guidelines on avian conservation responsibilities and requires agencies whose actions affect or could affect migratory bird populations to develop a memorandum of understanding on migratory bird conservation with the USFWS. TVA is currently in consultation with USFWS for the development of a memorandum of understanding under EO 13186.

Aside from federal and state laws regulating the hunting, trapping or other capture, and possession of some species, most wildlife other than birds and aquatic species (Section 4.4.4) generally receive no legal protection in inland areas.

#### **4.5.2.2 Regional Vegetation**

The southern Blue Ridge Ecoregion, which corresponds to the Blue Ridge physiographic province, is one of the richest centers of biodiversity in the eastern U.S. and one of the most floristically diverse (Griffith et al. 1998). The most prevalent land cover (80 percent) is forest, dominated by the diverse, hardwood-rich mesophytic forest and its Appalachian oak subtype (Dyer 2006; USGS 2016). About 14 percent of the land cover is agricultural and most of the remaining area is developed. Relative to the other eight ecoregions, the Blue Ridge Ecoregion had the least change in land cover from 1973 through 2000 (USGS 2016).

Over half (56 percent) of the Ridge and Valley Ecoregion, which corresponds to the Valley and Ridge physiographic province, is forested. Dominant forest types are the mesophytic forest and Appalachian oak sub-type. In the southern portion of the region, the southern mixed forest and oak-pine sub-type (Dyer 2006, USGS 2016) dominate. About 30 percent of the area is agricultural and 9 percent is developed (USGS 2016).

The Cumberland Mountains physiographic section comprises the southern portion of the Central Appalachian Ecoregion. This ecoregion is heavily forested (83 percent), primarily with mesophytic forests including large areas of Appalachian oak (Dyer 2006, USGS 2016).

The remaining land cover is mostly agriculture (7 percent), developed areas (3 percent) and mined areas (3 percent). The dominant source of land cover change from 1973 through 2000 was mining (USGS 2016), and this ecoregion, together with the Southwestern Appalachian Ecoregion, comprises much of the Appalachian coalfield.

The Southwestern Appalachian Ecoregion corresponds to the Cumberland Plateau physiographic section. About 75 percent of the land cover is forest, predominantly mesophytic forest; about 16 percent is agricultural and 3 percent is developed (USGS 2016). The rate of land cover change from 1973 through 2000 was relatively high, mostly due to forest management activities.

The Interior Plateau Ecoregion consists of the Highland Rim and Nashville Basin physiographic sections. The limestone cedar glades and barrens communities associated with thin soils and limestone outcrops in the Nashville Basin support rare, diverse plant communities with a high proportion of endemic (i.e., restricted to a particular area) species (Baskin and Baskin 2003). About 38 percent of the ecoregion is forested, 50 percent in agriculture and 9 percent developed (USGS 2016). Forests are predominantly mesophytic, with a higher proportion of American beech, American basswood, and sugar maple than in the Appalachian oak subtype (Dyer 2006). Eastern red cedar is also common. For the ecoregion as a whole, the rate of land cover change from forest and agriculture to developed land has increased steadily since data has been recorded (NRCS 2024a). The rate of these changes from the 1970s to the present has been very high in the greater Nashville and Huntsville areas.

A small area in the northwest of the TVA region is in the Interior River Valley and Hills Ecoregion, which overlaps part of the Highland Rim physiographic section. This ecoregion is relatively flat lowland dominated by agriculture (almost two-thirds), with about 20 percent forested hills, 7 percent developed, and 5 percent wetlands (USGS 2016). It contains much of the Illinois Basin coalfield. Drainage conditions and terrain strongly affect land use. Bottomland deciduous forests and swamp forests are common on wet lowland sites, with mixed oak and oak-hickory forests on uplands. A large portion of the lowlands has been cleared for agriculture. The rate of land cover change from 1973 through 2000 was moderate and primarily from forest to agriculture and from agriculture and forest to developed.

The Southeastern Plains and Mississippi Valley Loess Plain Ecoregions correspond, respectively, to eastern and western portions of the East Gulf Coastal Plain physiographic section. These ecoregions are characterized by a mosaic of forests (52 percent of the land area), agriculture (22 percent), wetlands (10 percent) and developed areas (10 percent). Forest cover decreases and agricultural land increases from east to west. Natural forests of pine, hickory, and oak once covered most of the ecoregions, but much of the natural forest cover has been replaced by heavily managed timberlands, particularly in the Southeastern Plains (USGS 2016). The Southeastern Plains in Alabama and Mississippi include the Black Belt, an area of rich dark soils and prairies. Much of this area has been cleared for



agricultural purposes and only remnant prairies remain. The rate of land cover change in the Southeastern Plains Ecoregion is the highest of the nine ecoregions in the TVA region, with intensive forest management practices the leading cause of the change. The rate of land cover change in the Mississippi Valley Loess Plain Ecoregion is moderate to high relative to the other ecoregions.

The Mississippi Alluvial Plain is a flat floodplain area originally covered by bottomland deciduous forests. A large portion has been cleared for agriculture and subjected to drainage activities including stream channelization and extensive levee construction. Most of the land cover is agricultural and the remaining forests are southern floodplain forests dominated by oak, tupelo, and bald cypress. The rate of land cover change since the 1970s has been moderate (USGS 2016), with the major land cover change from agriculture to developed.

The major forest regions in the TVA region include mesophytic forest, southern-mixed forest, and Mississippi alluvial plain (Dyer 2006). The mesophytic forest is the most diverse. While canopy dominance is shared by several species, red maple and white oak have the highest average importance values. A distinct section of the mesophytic forest, the Appalachian oak section, is dominated by several species of oak including black, chestnut, northern red, scarlet, and white oaks. The Nashville Basin mesophytic forest has close affinities with the beech-maple-basswood forest that dominates much of the Midwest. The oak-pine section of the southern mixed forest region occurs in portions of Alabama, Georgia, and Mississippi, where the dominant species are loblolly pine, sweetgum, red maple and southern red oak (Dyer 2006). The Mississippi alluvial plain forest region is restricted to its namesake physiographic region. The bottomland forests in this region are dominated by American elm, bald cypress, green ash, sugarberry, and sweetgum.

Numerous plant communities (recognizable assemblages of plant species) occur in the TVA region. Several of these communities are rare, restricted to very small geographic areas and/or threatened by human activities. A disproportionate number of these imperiled communities occur in the Southern Appalachian region; smaller numbers are found in the other ecoregions (NatureServe 2024). Many of the imperiled communities occur in the Southern Appalachian spruce-fir forest; cedar glades; grasslands, prairies and barrens; Appalachian bogs, fens and seeps; and bottomland hardwood forest ecosystems. Major threats to the Southern Appalachian spruce-fir forest ecosystem include invasive species such as the balsam wooly adelgid, acid deposition, ozone exposure, and climate change (TWRA 2009). The greatest concentration of cedar glades is in the Nashville Basin; a few also occur in the Highland Rim and the Valley and Ridge. Cedar glades contain many endemic plant species, including a few listed as endangered (Baskin and Baskin 2003); threats include urban development, highway construction, agricultural activities, invasive plants, reservoir impoundment, and incompatible recreational use. The category of grasslands, prairies, and barrens includes remnant native prairies; they are scattered across the TVA region but most common on the Highland Rim. This category also includes the high

elevation grassy balds in the Blue Ridge and the Black Belt prairie in the East Gulf Coastal Plain. Threats to these areas include agricultural and other development, invasive plants and altered fire regimes. Appalachian bogs, fens and seeps are often small, isolated, and support several rare plants and animals. Threats include drainage for development and altered fire regimes. Bottomland hardwood forests are most common in the Mississippi Alluvial Plain and East Gulf Coastal Plain; they also occur in other physiographic regions. About 60 percent of their original area is estimated to have been lost, largely by conversion to croplands (USEPA 2023f).

#### 4.5.2.3 Wildlife Population Trends

Many animals are wide-ranging throughout the TVA region; most species tolerant of humans have stable or increasing populations. The populations of many animals have been greatly altered by changes in habitats from agriculture, mining, forestry, urban and suburban development, and the construction of reservoirs. While some species flourish under these changes, others have shown marked declines. For example, populations of birds dependent on grassland and forest have shown decreases in their numbers by 30 to 60 percent (NABCI 2022). Across North America, 54 percent of grassland-breeding birds qualify as birds of conservation concern because of declining populations (USFWS 2021). A large number of the declining birds are Neotropical migrants, species that nest in the U.S. and Canada and winter south of the U.S. Over 28 inland species of birds breeding in the TVA region are considered to be of conservation concern, with eight coastal species also possibly occurring within the region (USFWS 2021). A few additional bird species are considered to be of management concern because of overly abundant populations, leading to damage to natural ecosystems and human interests (USFWS 2011); the resident population of the Canada Goose in the TVA region is an example of such a species.

Global amphibian declines have been well documented but declines in amphibian populations specific to the TVA region have also been reported (Caruso and Lips 2012). The primary causes for these declines are the loss and fragmentation of habitats from urban and suburban development and agricultural and forest management practices.

Introduced pathogens have also contributed to wildlife population declines. For amphibians, diseases such as chytridiomycosis and snake fungal disease, caused by *Ophidiomyces ophiodiicola*, have led to population declines and decreasing biodiversity (Allender et al. 2015; Scheele et al. 2019). Populations of bats have been observed dying off in the TVA region after the introduction of a novel pathogen causing white nose-syndrome (see Section 4.5.3.2).

The construction of the TVA and USACE reservoir systems created large areas of habitat for waterfowl, herons and egrets, ospreys, gulls, and shorebirds, especially in the central and eastern portions of the TVA region where this habitat was limited. Ash and gypsum settling and storage ponds at TVA fossil plants have provided regionally important habitat for these birds and other wetland species although many of these areas are being closed (see Section

4.7). These overall increases in aquatic habitats, as well as the ban on the use of the pesticide dichlorodiphenyltrichloroethane, have resulted in large increases in resident and migratory populations of several birds in the TVA region. Both short-term and long-term changes in the operation of the reservoir system affect the quality of habitat for these species (TVA 2004), as do pond management practices at fossil plants.

#### **4.5.2.4 Invasive Species**

Invasive species are species that are not native to the ecosystem under consideration and whose introduction causes or is likely to cause economic or environmental harm or harm to human health (NISC 2016). Invasive species include terrestrial and aquatic plants and animals, as well as other organisms such as microbes. Human actions, both intentional and unintentional, are the primary means of their introductions.

Several plants designated by the USDA as noxious weeds under the Plant Protection Act occur in the TVA region: hydrilla, giant hogweed, cogongrass, itchgrass, and tropical soda apple (USDA 2010). Hydrilla is a submersed aquatic plant present in several TVA reservoirs. Giant hogweed generally occurs near stream bank areas as water is an important link to giant hogweed establishment and proliferation. Cogongrass is an upland plant present in several TVA region counties in Alabama and Mississippi. It occurs on and near several TVA transmission line rights-of-way and can be spread by line construction and maintenance activities. Itchgrass grows in generally disturbed and agricultural areas, as well as roadsides. Tropical soda apple has been reported from a few counties in the TVA region and primarily occurs in agricultural areas.

There are 58 additional invasive plants considered to be an established or emerging threat that occur on or near TVA generating facilities and transmission line rights-of-way (TN-IPC 2023). These include tree-of-heaven, Asian bittersweet, autumn olive, Chinese privet, kudzu, phragmites, Eurasian water milfoil, multiflora rose, and tall fescue. Phragmites occurs in ash ponds at several TVA coal-fired plants and is otherwise uncommon in the TVA region. In recent years, the non-native eelgrass Rockstar Hybrid has displaced native aquatic plants in several TVA reservoirs.

Invasive terrestrial animals at TVA generating facilities that require occasional management include the rock pigeon, European starling, house sparrow, and fire ant. These species have little effect on the operation of TVA's power system.

#### **4.5.3 Endangered and Threatened Species**

The TVA region provides habitat for numerous species of plants and animals that have declining populations or are otherwise rare and considered to be endangered, threatened, or of special concern at the national and state levels.

#### **4.5.3.1 Regulatory Framework for Endangered and Threatened Species**

The ESA (16 U.S.C. §§ 1531-1543) was passed to conserve the ecosystems upon which endangered and threatened species depend and to conserve and recover those species. An endangered species is defined by the ESA as any species in danger of extinction throughout all or a significant portion of its range. A threatened species is likely to become endangered within the foreseeable future throughout all or a significant part of its range. Areas known as critical habitats, essential to the conservation of listed species, also can be designated under the ESA. The ESA establishes programs to conserve and recover endangered and threatened species and makes their conservation a priority for federal agencies. Under Section 7 of the ESA, federal agencies are required to consider the potential effects of their proposed action on endangered and threatened species and critical habitats. If the proposed action has the potential to affect these resources, the federal agency is required to consult with the USFWS and implement avoidance and minimization measures to address adverse effects.

TVA has made a broad no effect determination at the programmatic EIS level because of both the inability to quantify effects across the entire TVA region and the conceptual (i.e., not site specific) nature of proposed actions. As the IRP is implemented with site-specific actions, TVA would conduct site-specific analysis and consult with the USFWS per Section 7 of the ESA procedures as warranted.

All seven states in the TVA region have enacted laws protecting endangered and threatened species and additional species classified as “in need of management,” “state protected,” etc.

#### **4.5.3.2 Endangered and Threatened Species in the TVA Region**

Thirty-four species of plants and 114 species of animals in the TVA region are listed under the ESA as endangered or threatened, with 16 formally proposed for such listing by the USFWS (USFWS 2026). Across the TVA region, there are also 45 areas designated as critical habitat essential to the conservation of listed species. In addition to the species listed under the ESA, about 1,432 plant and animal species are formally listed as protected species by one or more of the states or otherwise identified as species of conservation concern (TVA 2026b).

The highest concentrations of terrestrial and aquatic species listed under the ESA occur in the Blue Ridge, Appalachian Plateaus, and Interior Low Plateau regions. Relatively few listed species occur in the Coastal Plain and Mississippi Alluvial Plain regions. The taxonomic groups with the highest proportion of species listed under the ESA are fish and mollusks. Factors contributing to the high proportions of vulnerable species in these groups include the high number of endemic species in the TVA region and the alteration of their habitats by reservoir construction and water pollution. River systems with the highest numbers of listed aquatic species include the Tennessee, Cumberland, and Coosa rivers.

Populations of a few listed species have increased, primarily because of conservation efforts, to the point where they are no longer listed under the ESA (e.g., bald eagle,

peregrine falcon, Tennessee coneflower, and snail darter) or their listing status has been downgraded from endangered to threatened (e.g., large-flowered skullcap and small whorled pogonia). However, some of the listed species with populations continue to decline due to a multitude of factors. The formerly common northern long-eared bat was listed in 2015 under the ESA as threatened and upgraded to an endangered listing in 2022 due to recent dramatic population declines caused by white-nose syndrome. The same pathogen has also impacted the Indiana bat, little brown bat, and the formerly common tricolored bat, which was proposed for listing as endangered under the ESA in 2022. In the TVA region, this pathogen was first reported in 2009.

#### **4.5.3.3 Endangered and Threatened Species in the Vicinity of TVA Generating Facilities**

In addition to ESA-listed species within the TVA region, several species not listed on the Information for Planning and Consultation (IPaC) for the TVA region are known to occur on or very near TVA generating facilities and transmission lines. Appendix A lists the endangered and threatened species reported in the vicinity of TVA generating facilities. Species considered to be locally extirpated are not listed in Appendix A.

#### **4.5.4 Wetlands**

Wetlands are areas that are inundated or saturated by water at a frequency and duration sufficient to support, and under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions (40 CFR § 230.3(t)). Wetlands generally include swamps, marshes, bogs, and similar areas. Wetlands are highly productive and biologically diverse ecosystems that provide multiple public benefits such as flood control, reservoir shoreline stabilization, improved water quality, and habitat for fish and wildlife resources.

##### **4.5.4.1 Regulatory Framework for Wetlands**

Section 404 of the CWA prohibits the discharge of dredge and fill material to waters of the U.S., which include wetlands, unless authorized by a permit issued by the USACE. The scope of this regulation includes most construction activities in wetlands. EO 11990 – Protection of Wetlands requires federal agencies to minimize the destruction, loss, or degradation of wetlands and to preserve and enhance their natural and beneficial values. Wetlands are also protected by state regulations (e.g. Tennessee’s Aquatic Resources Alteration Permit program).

##### **4.5.4.2 Wetlands in the TVA Region**

Wetlands occur across the TVA region and are most extensive in the South and West, where they comprise 5 percent or more of the landscape (USGS 2016). Wetlands in the TVA region consist of two main systems: palustrine wetlands such as marshes, swamps, and bottomland forests dominated by trees, shrubs, and persistent emergent vegetation, and lacustrine wetlands associated with lakes such as aquatic bed wetlands (Cowardin et al. 1979). Riverine wetlands associated with moving water within a stream channel are also present

but relatively uncommon. Almost 200,000 acres of wetlands are associated with the TVA reservoir system, where they are more prevalent on mainstem reservoirs and tailwaters than tributary reservoirs and tailwaters (TVA 2004). Almost half of this area is forested wetlands; other types include aquatic beds and flats, ponds, scrub/shrub wetlands, and emergent wetlands.

Manmade emergent wetlands occur on many TVA generating facility sites, often in association with CCR disposal ponds and water treatment ponds. However, CCR and water treatment ponds are excluded from regulation under CWA Section 404. Some of these wetlands provide important wildlife habitat; due to their location and composition, they do not provide the surrounding watershed with any significant flood abatement, or nutrient or sediment retention wetland functions. Many of these wetlands are being eliminated as TVA converts wet CCR storage ponds to dry storage facilities. Approximately 7,769 acres of wetlands are mapped on the National Wetlands Inventory (NWI) dataset within TVA transmission line rights-of-way (USFWS 2023). Due to routine periodic vegetation maintenance, the rights-of-way are dominated by scrub-shrub and emergent wetlands; forest wetlands make up less than 1 percent of the wetlands.

National and regional trends studies have shown a large, long-term decline in wetland area both Nationally and in the Southeast (Dahl 2000, Dahl 2006, Dahl 2011, Hefner et al. 1994). Wetland losses have been greatest for forested and emergent wetlands and have resulted from drainage for agriculture, forest management activities, urban and suburban development, and other factors. The rate of loss has significantly slowed over the past 20 years due to regulatory mechanisms for wetland protection. While the rate of wetland loss has slowed, urbanization continues to impact the ecological function of wetlands across the Southeast. Threats to wetlands associated with urbanization include habitat fragmentation, invasive species, hydrologic alteration, and changes in species composition due to global climate change (Wright et al. 2006).

#### **4.5.5 Floodplains**

Floodplains are the relatively level land areas along a stream or river that are subject to periodic flooding. The area subject to a 1-percent chance of flooding in any given year is normally called the 100-year floodplain. The area subject to a 0.2-percent-chance of flooding in any given year is normally called the 500-year floodplain. It is necessary to evaluate development in the 100-year floodplain to ensure that the project is consistent with the requirements of EO 11988 – Floodplain Management.

##### **4.5.5.1 Regulatory Framework for Floodplains**

TVA adheres to the requirements of EO 11988, Floodplain Management. The objective of EO 11988 is “...to avoid to the extent possible the long- and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative.” The EO is not intended to prohibit floodplain development in all cases, but rather to create a



consistent government policy against such development under most circumstances (U.S. Water Resources Council 1978). The EO requires that agencies avoid the 100-year floodplain unless there is no practicable alternative.

For “Critical Actions,” the minimum floodplain of concern is the 500-year floodplain. The U.S. Water Resources Council defines “critical actions” as “any activity for which even a slight chance of flooding would be too great” (U.S. Water Resources Council 1978). Critical actions can include facilities producing hazardous materials (such as liquefied natural gas terminals), facilities whose occupants may be unable to evacuate quickly (such as schools and nursing homes), and facilities containing or providing essential and irreplaceable records, utilities, and/or emergency services (such as large power-generating facilities, data centers, museums, hospitals, or emergency operations centers). TVA currently incorporates floodplain analyses with respect to the 500-year floodplain in addition to analyses in alignment with EO 11988.

#### **4.5.5.2 Floodplains in the TVA Region**

In the TVA region, floodplains are associated with reservoirs, streams, ponds, and sinkholes. Power generation facilities of any type, as well as electric transmission lines, could be proposed by TVA or outside entities anywhere in the TVA region.

Floodplains are mapped under the Federal Emergency Management Agency (FEMA) National Flood Insurance Program (NFIP). Through their floodplain ordinances, counties and municipalities ensure that development within the floodplain complies with the NFIP.

In addition, development across, along, or in the Tennessee River and its tributaries is also subject to the requirements of Section 26a of the TVA Act. Activities proposed within Section 26a jurisdiction and/or in places where TVA owns property or property rights would be subject to review under EO 11988 in conjunction with TVA’s Section 26a or land use approvals, or both.

#### **4.5.6 Parks, Managed Areas, and Ecologically Significant Sites**

Numerous areas across the TVA region are recognized and, in many cases, managed for their recreational, biological, historic, and scenic resources. These areas are owned by (1) federal and state agencies, (2) local governments, (3) non-governmental organizations such as the Nature Conservancy, (4) regional land trusts and private corporations, and (5) private individuals.

Parks, managed areas, and ecologically significant sites are typically managed for one or more of the following objectives:

- Recreation areas – Managed for outdoor recreation or open space. Examples include national, state and local parks and recreation areas, reservoirs (TVA and other), picnic and camping areas, trails and greenways, and TVA small wild areas.

- Species/Habitat Protection – Places with endangered or threatened plants or animals, unique natural habitats, or habitats for valued fish or wildlife populations. Examples include national and state wildlife refuges, mussel sanctuaries, TVA habitat protection areas and nature preserves.
- Resource Production/Harvest – Lands managed for production of forest products, hunting, and fishing. Examples include national and state forests, state game lands and wildlife management areas (WMAs) and national and state fish hatcheries.
- Scientific/Educational Resources – Lands protected for scientific research and education. Examples include biosphere reserves, research natural areas, environmental education areas, TVA ecological study areas, and federal research parks.
- Historic Resources – Lands with significant historic resources. Examples include national battlefields and military parks, state historic sites, and state archaeological areas.
- Scenic Resources – Areas with exceptional scenic qualities or views. Examples include national and state scenic trails, scenic areas, wild and scenic rivers, and wilderness areas.
- Agricultural Resources – Lands with significant local agricultural production and open space value, often in areas where suburban development is increasing. Examples include working family farms protected by conservation easements.

Numerous parks, managed areas, and ecologically significant sites occur throughout the TVA PSA in all physiographic regions but are mostly concentrated in the Blue Ridge and Mississippi Alluvial Plain physiographic regions. Individual ecologically significant areas vary in size from a few acres to thousands of acres. Many areas cross state boundaries or are managed cooperatively by multiple agencies.

Parks, managed areas, and ecologically significant sites occur on or very near many TVA generating plant reservations, including the Allen, Colbert, Gallatin, Kingston, and Shawnee plants. This is especially the case at hydroelectric plants, where portions of the original dam reservations and reservoir lands have been developed into state and local parks. WMAs that are managed by state wildlife divisions are also located on some TVA property; for instance, in Tennessee, the Tennessee Wildlife Resources Agency (TWRA) manages portions or full parts of Owl Hollow Mill WMA, Chickamauga WMA, Watts Bar WMA, Paint Rock WMA, Rankin Bottom WMA, Nolichucky WMA, Beech River WMA, and more, with other WMA's abutting TVA property (TWRA 2023, TVA 2023b). TVA transmission line rights-of-way cross seven National Park Service units, nine National Forests, six National Wildlife Refuges, and numerous state WMAs, state parks, and local parks (TVA 2018a).

#### 4.5.7 Land Use

Major land uses in the TVA region include forestry, agriculture, and urban/suburban/industrial (USDA 2018b). About 4.4 percent of the TVA region is water, primarily lakes and rivers (USDA 2020). This proportion has increased slightly since 1982 (when monitoring was started), primarily due to the construction of small lakes and ponds. About 5.7 percent of the land area is in federal ownership; this proportion has also increased slightly since 1982. The major components of federal land are national parks, national forests, national wildlife refuges, and TVA reservoir lands. Of the remaining non-federal land area, about 9 percent is classified as developed and 80 percent as rural (USDA 2020). Rural undeveloped lands include farmlands (19 percent of the rural area) and forestland (about 42 percent of the rural area). The greatest change since 1982 has been in developed land, which almost doubled in area due to high rates of urban and suburban growth in much of the TVA region. The rate of land development was high during the 1990s and early 2000s and slowed in the late 2000s. More recent data for Tennessee shows that total developed land has grown almost three percent between 2012 and 2017 (USDA 2020).

Approximately 53 percent of the TVA region is forested (USGS 2021). Forestland is predicted to decrease between 1997 and 2060 in the majority of counties in the TVA region, with several counties in the vicinity of Memphis, Nashville, Huntsville, Chattanooga, Knoxville and the Tri-Cities area of Tennessee predicted to lose more than 25 percent of forest area (Wear and Greis 2013). Loss of forest area within the TVA region is primarily a result of increasing urbanization and development.

**Agriculture.** Agriculture is a major land use and industry in the TVA region. In 2012, 41 percent of the land area in the TVA region was farmland that comprised 151,000 individual farms (USDA 2014). Average farm size was 160 acres, a 6.3 percent increase since 1982. The proportion of land in farms has decreased by 4.2 percent since 1982; since 2007, the decrease was 0.3 percent. Over the 1982–2012 period, the number of farms decreased by 14.7 percent while the average size of farms increased by 6.3 percent. Statewide data for states within the TVA region shows a decline in the number of farms between 1997 and 2017. Between 2012 and 2017, statewide data for Tennessee and Georgia show a small increase in the number of farms (USDA 2019). The number of small farms (between 1 and 9 acres) in Tennessee has increased between 2012 and 2017, following a national trend (USDA 2019). Average farm sizes range between 155 and 326 acres for states within the TVA region and have generally increased in size between 1997 and 2017.

For the state of Tennessee, cropland and pastureland comprise 17.8 and 15.2 percent, respectively, of rural, non-federal land in 2017 (USDA 2020). Both cropland and pastureland have decreased in area since 1982; however, the rate of cropland and pastureland loss in Tennessee has declined (USDA 2018b). While the proportion of land in farms is greatest in Mississippi, southern Kentucky and central and western Tennessee, the highest farm income occurs in northern Alabama and Georgia (EPRI and TVA 2009). Region-wide, the major crop

items by land area are forage crops (hay and crops grown for silage), soy, wheat, corn, and cotton. The major farm commodities by sales are cattle and calves, poultry and eggs, grains and beans, cotton, and nursery products (USDA 2019).

Although the area of irrigated farmland is small (6.4 percent of farmland), it increased by 25 percent from 1987 to 2017 (USDA 2019). The area of irrigated farmland is likely to increase in the future as temperature and precipitation patterns become less predictable or if drought conditions become more prevalent (EPRI and TVA 2009). Between 2012 and 2017, statewide data from Kentucky, Tennessee, North Carolina, and Virginia show minor decreases in the percentage of farms using irrigation; however, in most cases, the acres of irrigated farmland have increased (USDA 2019).

Crops grown specifically to produce biomass for use as fuels (dedicated energy crops) are a potentially important commodity in the TVA region. In 2002, the Census of Agriculture began recording information on short rotation woody crops, which grow from seed to harvestable tree in 10 years or less. These crops have traditionally been used by the forest products industry for producing pulp or engineered wood products and are also a potential source of biomass for power generation. In 2012, there were 117 farms in the TVA region growing at least 2,704 acres of short rotation woody crops, a large decrease from the 286 farms in 2007. Between 2012 and 2017, statewide data for states within the TVA region shows small increases in the number of farms and acres producing short rotation woody crops in Alabama, Georgia, Kentucky, and Mississippi and decreases in North Carolina, Tennessee, and Virginia (USDA 2019).

In 2012, the Census of Agriculture began recording information on the cultivation of switchgrass, a bioenergy crop that can be directly used as fuel and for producing ethanol. In 2012, it was grown by 18 farms in the TVA region that harvested at least 1,800 acres (USDA 2014). Most of these farms were in eastern Tennessee and grew switchgrass as part of research studies at the University of Tennessee. Between 2012 and 2017, the number of farms growing switchgrass in Tennessee has decreased from 18 to 3 (USDA 2019).

Three facilities in the TVA region produce ethanol from corn, primarily for use as biofuels with a total production capacity of 263 million gallons per year (Renewable Fuels Association 2024). A large proportion of their corn feedstock is likely grown within the TVA region. Corn grown in the TVA region is also likely used by ethanol producers elsewhere.

**Prime Farmland.** The Farmland Protection Policy Act of 1981 (7 U.S.C. 4201 et seq.) recognizes the importance of prime farmland, which is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops, and is available for these uses (USDA 2018b). The purpose of the Act is to minimize the extent to which federal programs contribute to the unnecessary and irreversible conversion of farmland to non-agricultural uses. Prime farmland has the combination of soil properties, growing season, and moisture supply needed to produce sustained high yields of crops in an economic manner if it is treated and managed according to acceptable farming

methods. Prime farmland is designated independently of current land use, but it cannot be areas of water, urban, or built-up land.

Approximately 23 percent of the TVA region is classified as prime farmland (NRCS 2024b). An additional roughly 4 percent of the TVA region would be classified as prime farmland if drained or protected from flooding.

**Forest Management.** About 50 percent of the forestland in the TVA region is classified as timberland (USDA Forest Service 2024), forestland that is producing or capable of producing more than 20 cubic feet of merchantable wood per acre per year and is not withdrawn from timber harvesting by law. About 13.5 percent of timberland is in public ownership, which includes national forests, state and local lands, and other federal lands. About 87 percent is under private ownership, which includes both corporations and non-corporate owners. While the majority of corporate timberlands have historically been owned by forest industries, this proportion has decreased in recent years as many forest product companies have sold timberlands due to changing market conditions.

#### 4.5.8 Cultural Resources

Cultural resources include prehistoric and historic archaeological sites, districts, buildings, structures, and objects. Cultural resources are considered historic properties if included in, or considered eligible for inclusion in, the National Register of Historic Places (NRHP), a designation maintained by the National Park Service. The eligibility of a resource for inclusion in the NRHP is based on the Secretary of the Interior's criteria for evaluation (36 CFR § 60.4), which state that significant cultural resources possess integrity of location, design, setting, materials, workmanship, feeling and association, and:

- A. Property is associated with events that have made a significant contribution to the broad patterns of our history.
- B. Property is associated with the lives of persons significant in our past.
- C. Property embodies the distinctive characteristics of a type, period, or method of construction or represents the work of a master, or possesses high artistic values, or represents a significant and distinguishable entity whose components lack individual distinction.
- D. Property has yielded, or is likely to yield, information important in prehistory or history.

##### 4.5.8.1 Regulatory Framework for Cultural Resources

Because of their importance to the nation's heritage, historic properties are protected by several laws. Federal agencies, including TVA, have a statutory obligation to facilitate the preservation of historic properties, stemming primarily from the National Historic Preservation Act (NHPA; 16 U.S.C. §§ 470 *et seq.*). Other relevant laws include the Archaeological and Historic Preservation Act (16 U.S.C. §§ 469-469c), Archaeological

Resources Protection Act (16 U.S.C. §§ 470aa-470mm) and the Native American Graves Protection, Repatriation Act (25 U.S.C. §§ 3001-3013), and the American Indian Religious Freedom Act (42 U.S.C. § 1996).

Section 106 of the NHPA requires federal agencies to consider the potential effects of their actions on historic properties and to allow the Advisory Council on Historic Preservation an opportunity to comment on the action. Section 106 involves four steps: (1) initiate the process; (2) identify historic properties; (3) assess adverse effects; and (4) resolve adverse effects. This process is carried out in consultation with the State Historic Preservation Officer (SHPO) of the state in which the action would occur. Tribal Historic Preservation Officers (THPO) and federally recognized Indian tribes attach religious and cultural significance to historic properties regardless of locations. Section 110 of the NHPA sets out the broad historic preservation responsibilities of federal agencies and is intended to ensure that historic preservation is fully integrated into their ongoing programs. Federal agencies are responsible for identifying and protecting historic properties and avoiding unnecessary damage to them. Section 110 also charges each Federal agency with the affirmative responsibility for considering projects and programs that further the purposes of the NHPA, and it declares that the costs of preservation activities are eligible project costs in all undertakings conducted or assisted by a federal agency.

In November 2019, TVA executed a Program Alternative Programmatic Agreement (PA) following consultation with the Advisory Council on Historic Preservation; THPOs and federally recognized Indian tribes that have expressed an interest in TVA's PSA, including the Absentee Shawnee Tribe of Indians of Oklahoma, Alabama-Coushatta Tribe of Texas, Alabama-Quassarte Tribal Town, Cherokee Nation, The Chickasaw Nation of Oklahoma, Coushatta Tribe of Louisiana, Delaware Nation, Eastern Band of Cherokee Indians, Eastern Shawnee Tribe of Oklahoma, Jena Band of Choctaw Indians, Kialegee Tribal Town, Mississippi Band of Choctaw Indians (MBCI), The Muscogee (creek) Nation, Osage Nation, Poarch Band of Creek Indians, The Quapaw Tribe of Indians, The Seminole Nation of Oklahoma, Shawnee Tribe, Thlopthlocco Tribal Town, and The United Keetoowah Band of Cherokee Indians; and, SHPOs in Alabama, Georgia, Kentucky, Mississippi, North Carolina, Tennessee, and Virginia. The PA lays out a standardized internal review process for routine undertakings unlikely to have an adverse effect on architectural and archaeological cultural resources.

#### **4.5.8.2 Archaeological Resources**

The Tennessee Valley is one of the most archaeological rich regions in the U.S. Archaeological evidence is well-documented in the area with evidence of activity at least as early as 14,000 years ago, which was likely part of a rapid population expansion following a wave of migration from eastern Asia. The Valley has been populated by humans ever since. In the Tennessee Valley, cultural chronology before the European invasion is broken into four broad time periods: following the Paleo-Indian Period are the Archaic (11,000 – 3,000 before present [B.P.]), Woodland (3,000 – 1,100 B.P.), and Mississippian (1,100 – 500 B.P.,



or AD 900-1,500) periods. Archaic peoples are known for collecting tree nuts and freshwater mussels, seasonal movements over the landscape to collect different kinds of resources as they became available, and a relatively dispersed population. By the Woodland period, the harvest of certain wild plant foods intensified, leading to cultivation and, eventually, domestication. Woodland people mostly lived in permanent or semi-permanent villages, carried out long-distance trade networks, developed elaborate rituals, made fired-clay pots and vessels, and buried their dead in large, conical-shaped earthen mounds. During the Mississippian period more complex social systems developed, based on maize-based agriculture, with large polities headed by powerful chiefs. Tragically, exploration of the Southeast by Spaniards inadvertently infected native peoples with diseases that had never been known in North America, leading to pandemics that decimated native populations coast to coast. Little is known about the particulars of this period, but by the late 17<sup>th</sup> century Mississippian chiefdoms had been replaced by, or reorganized into, the tribes that we know today as the Cherokee, Creek, Chickasaw, Choctaw, Seminole, and Shawnee. With the expansion of the English colonies, these and all the other native groups living in the eastern U.S. were gradually pushed into remnants of their former territories while forming, breaking, and re-forming alliances with the British, the French, the Spanish, and later the Americans. First British, and later Americans brought enslaved Africans to do the hard work of running farms and plantations. Although history has recorded events in our country since the earliest contact with Europeans, history is incomplete and much of what we know about the past 500 years comes from, or is enhanced by, archaeological evidence.

For over 80 years, TVA has been actively engaged in identifying archaeological resources on TVA lands and easements. In the 1930s and 1940s, under authority of the Antiquities Act of 1906, TVA completed large regional surveys in all the lands to be affected by the planned reservoir projects and excavated dozens of major archaeological sites. The work continued in the 1960s and 70s with the construction of reservoir projects such as Normandy and Tims Ford under the Reservoir Salvage Act, and during planning for the several nuclear projects that TVA pursued. The NHPA was passed in 1966; Section 106 of this Act requires federal agencies to consider the potential effects of their undertakings on historic properties, including significant archaeological sites. TVA began complying with this Act once it was passed, but compliance became more systematic in the late 1980s after the Advisory Council on Historic Preservation published regulations implementing Section 106 (36 CFR Part 800.1-16). These regulations created a process for agencies to identify historic properties, evaluate project effects on those properties, and avoid, minimize, or mitigate adverse effects, all in consultation with SHPOs, THPOs, and federally recognized Indian tribes, and others with an interest in the project. Today, TVA completes some level of identification and evaluation of archaeological sites as Section 106 compliance prior to taking or approving ground disturbing activities.

TVA maintains digital records of all archaeological sites identified on TVA property, as well as sites identified during phase I surveys off TVA land, such as surveys in connection with

transmission line projects, in CRMS. Identifying and managing archaeological resources requires careful documentation of the location, nature, and condition of each archaeological resource. Whenever a TVA action has the potential to adversely affect a sensitive resource TVA's preference, and that of TVA's consulting parties, is to avoid the site, and if avoidance is not feasible, to minimize the effects through design changes and/or best management practices. In rare instances avoidance is not possible, and in those cases the adverse effects are mitigated by the scientific collection of valuable data from the site before the site is damaged or destroyed. Mitigation consists of the scientific excavation of the site, archiving the data, and conserving the artifacts, all in consultation with SHPOs, THPOs, and federally recognized Indian tribes and other appropriate consulting parties.

#### **4.5.8.3 Historic Architectural Resources**

Historic architectural resources—sites, structures, buildings, objects, and districts that are either 50 years of age or older or are exceptionally significant—are found throughout TVA's PSA and the Tennessee River watershed. Those historic architectural resources are either eligible for listing or listed in the NRHP, and can include houses, barns, and public buildings. Many of the generating plants, corporate offices, and recreation facilities owned, leased, or otherwise occupied by TVA are also historic properties.

Fifty-nine percent of TVA's inventoried facilities (excluding transmission assets) are at least 50 years of age or older. Of those that are historic, 83 percent are historic properties—listed in or eligible for listing in the NRHP. TVA's 70 generating facilities are comprised of hydroelectric, fossil, nuclear, gas, and solar facilities. Eighty-four percent of TVA's historic generating facilities are also historic properties. All of TVA's hydroelectric projects are historic properties (listed in or eligible for listing in the NRHP); one of these, Wilson Dam, is listed as a National Historic Landmark. In addition to hydroelectric plants, two TVA fossil plants (SHF and BRF, now retired) are historic properties; the remaining fossil plants are either no longer extant or have been determined ineligible due to a lack of integrity because of modifications and alterations. Only one nuclear plant (BFN) is a historic property. None of TVA's gas or solar facilities are historic properties. The large number of TVA's historic generating facilities that remain historic properties poses a unique challenge as TVA aims to balance preservation and retention of historic fabric and character-defining features with safe and efficient energy production to meet the growing demand for electricity.

In addition to generation, TVA's facilities also include historic corporate offices (Knoxville and Muscle Shoals) and non-power dams, including two systems of smaller dams for recreation and flood control and NRHP-listed Normandy and Tellico Hydroelectric Projects. Transmission assets were excluded from this discussion, given TVA's on-going programmatic efforts to evaluate these resources.

In FY 2019, TVA initiated a multi-year project to develop a comprehensive inventory for historic architectural resources on TVA land and adjacent to TVA transmission lines. Surveys and assessments continue to grow the inventory. In addition to conducting surveys, the

inventory project includes adding historic architectural resource records in TVA's CRMS. The addition of this data not only improves efficiency of Section 106 project reviews, but also serves as a planning tool for the management of TVA's historic properties. Additionally, in FY 2023, TVA began fieldwork for systematic updates of NRHP documentation as a part of the inventory project for the first of several groups of NRHP-listed hydroelectric projects. Additional updates are anticipated to continue through 2031.

In 2019, TVA began development of a complete history of TVA's transmission system that will support a consistent assessment of TVA's historic transmission assets. In 2023, TVA entered into a new PA with the Tennessee SHPO about the cultural resource management of historic transmission assets in Tennessee. In this PA, TVA agreed to update the NRHP documentation for nine hydroelectric dams, create a TVA Transmission Digital Museum, and document the history of transmission office buildings. Part of the agreement stipulates that TVA will track all projects on historic transmission assets in Tennessee, document any adverse effects, and explain how they were resolved through the mitigation outlined in the agreement.

#### **4.5.8.4 Traditional Cultural Properties**

The TVA region is a diverse cultural landscape that held special meaning to its past inhabitants and to their descendants. Some of these places can be considered Traditional Cultural Properties (TCP). A TCP is defined as a property that is eligible for inclusion on the NRHP because of its association with cultural practices or beliefs of a living community that (a) are rooted in that community's history, and (b) are important in maintaining the continuing cultural identity of the community (Parker and King 1998). Similarly, a cultural landscape is defined as "a geographic area, including both cultural and natural resources and the wildlife or domestic animals therein, associated with a historic event, activity, or person or exhibiting other cultural or aesthetic values" (Birnbaum 1994). TVA does not make public sensitive information regarding the location or other information regarding sacred sites or TCPs identified by consulting tribes. Some examples of TCPs within the study area include mound sites, segments of the Trail of Tears, and stacked stone features. The Trail of Tears consisted of many routes and sub-routes that were traveled by Native Americans during their removal from their ancestral homelands. Segments of the Trail of Tears cross TVA transmission lines at approximately 278 locations (TVA 2018a). Stacked stone features often appear as single or a group of cylindrically stacked limestone. The origin and purpose of these stone features is uncertain, but a resolution passed by the United South and Eastern Tribes, Inc., in 2007, recommended that all federal agencies involved in the Section 106 process consider stacked stone features that cannot be conclusively linked to a historic origin to be a TCP under NRHP Criterion A (USET 2007).

## **4.6 Availability of Renewable Energy Resources**

The alternative strategies being evaluated include the potential for additional renewable generating resources. TVA includes all renewable resources in its definition of renewable

energy, including hydroelectric generation. This assessment of the availability of renewable resources does not include TVA's existing hydroelectric facilities and considers renewable resources in the context of many state renewable portfolio standards to include solar, wind, small hydroelectric (see Volume 1, Section 2.6), and upgrades to existing large hydroelectric plants, biomass (including biogas), and geothermal energy. Geothermal generation using currently available and near-term emerging technologies is not considered further because of the lack of a developable resource in the TVA region (Augustine 2011).

Following is an assessment of the availability of potential renewable resources for generating electricity in and near the TVA region.

#### **4.6.1 Hydroelectric Energy Potential**

Hydroelectric generation (excluding the Raccoon Mountain pumped storage facility) presently accounts for about 10 percent of TVA's annual energy supply (see Section 2.3.5). TVA has gradually increased this capacity by upgrading the hydroelectric turbines and associated equipment. To date, this program has increased TVA's hydroelectric generating capacity by about 15 percent. This capacity increase qualifies as renewable energy under most renewable portfolio standards.

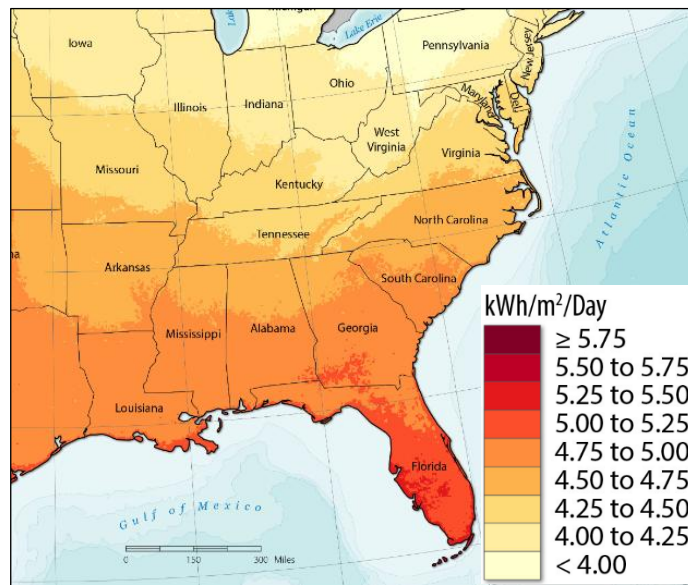
With 43 plants in service in the U.S., pumped storage hydropower accounts for 70 percent of the current grid storage in 2022, a drop from 93 percent in 2019 due to battery installations. There was an estimated 22 gigawatts (GW) of storage capacity with 553 gigawatt hours (GWh) of storage potential in 2022, and pumped storage hydropower is considered one of the lowest cost technologies for 4-16 hours duration storage. In the U.S., development of pumped storage hydropower projects has slowed, with changes mostly from upgrades or retirements (EERE 2023).

In November 2025, TVA completed an EIS to evaluate increasing pumped storage hydropower capacity within its PSA. The EIS evaluates new pumped storage hydropower facilities at two locations in Jackson County, Alabama, and expansion of the existing Raccoon Mountain Pumped Storage Plant in Marion County, Tennessee.

#### **4.6.2 Solar Energy Potential**

Solar energy resource potential is a function of average daily solar insolation (see Section 4.3) and is expressed as kWh/m<sup>2</sup>/day (available energy [kWh] per unit area [m<sup>2</sup>] per day). Solar resource measurements are reported as either direct normal radiation (no diffuse light) or total radiation (a combination of direct and diffuse light). Diffuse or scattered light, which is common in eastern North America, is caused by cloud cover, humidity, or particulates in the air. Solar PV panels are capable of generating with both direct and diffuse light sources. These measurements do not incorporate losses from converting PV-generated energy (DC) to alternating current (AC) or the reduced efficiency of some PV panels at high temperatures. Figure 4-22 shows the average annual total solar resource for the region based on 1998 to 2016 data. All current and foreseeable solar generation in the TVA region is flat plate PV, as concentrated solar technologies are not economically feasible due to high amounts of diffuse

light. The PV potential assumes flat-plate panels are oriented to the south and installed at an angle from horizontal equal to the latitude of the location. More detailed, state-specific maps are available from the National Laboratory of the Rockies (NLR), formerly known as the National Renewable Energy Laboratory (NREL) (NLR 2018). The TVA region has between 4.1 and 4.8 kWh/m<sup>2</sup>/day of available solar insolation for flat-plate PV panels, with the potential greatest in the southwestern portion of the region and decreasing toward the northeast. Most of the larger (i.e., >1 MW capacity) utility-scale solar facilities operating, under construction, or proposed in the TVA region are in areas with between 4.5 and 4.8 kWh/m<sup>2</sup>/day of insolation. TVA continues to evaluate a variety of PV installations across the PSA, although land availability, construction cost, community restrictions, interconnection, and transmission factors often limit the land available for these projects.



Source: Adapted from NLR 2018.

**Figure 4-20: Solar Photovoltaic Generation Potential in the TVA Region**

Because PV is the most abundant renewable resource, it is difficult to accurately assess a feasible potential total value for the TVA region. Factors that impact solar deployment at all scales include cost, land availability, community support, and transmission/interconnection constraints. Although solar resources in the TVA region are plentiful, particularly in West Tennessee, North Mississippi, and North Alabama (Figure 4-22), both storage options (short-term and medium-term) and the solar deployments that would power them (small and large scale) would need to be economically feasible for the companies undertaking those projects.

Gagnon et al. (2016) examined the technical potential of PV systems installed on rooftops. Technical potential includes the number and area of rooftops (dependent in large part on population density), geographic location, system, topographic, and land-use constraints, and system performance, but not projected costs. Across most of the TVA region, between 80 and 90 percent of small buildings (e.g., single family homes) were technically suitable for PV



systems, although that number will be much smaller in reality due to several factors such as shading, cost, and infrastructure. For the TVA region states, the proportion of 2013 electricity sales that could be provided by small building, rooftop PV ranged from a low of 16.0 percent for Kentucky to 23.5 percent for North Carolina. With the inclusion of rooftop PV on medium and large buildings, the proportion of 2013 electricity sales that could be provided by rooftop solar ranged from 25.2 percent for Kentucky to 33.8 percent in Georgia.

#### 4.7 Solid and Hazardous Wastes

This section focuses on the solid and hazardous wastes produced by construction and operation of generating plants and transmission facilities. Wastes typically produced by construction activities include vegetation, demolition debris, oily debris, packing materials, scrap lumber, and domestic wastes (garbage). Non-hazardous wastes typically produced by common facility operations include sludge and demineralizers from water treatment plant operations, personal protective equipment, oils and lubricants, spent resins, desiccants, batteries, and domestic wastes. In 2018, TVA facilities produced approximately 20,884 tons of non-hazardous solid waste. This quantity decreased to approximately 17,351 tons in 2022, 12,160 tons in 2023, and 11,214 tons in 2024. The amount of waste produced at any one facility, however, can vary significantly from year to year due to maintenance, decommissioning, and asset improvement activities. To reduce waste generation, especially hazardous waste, TVA has incorporated into its procedures waste minimization efforts including reuse and recycling, substitution of less hazardous products and chemical traffic control.

Hazardous, non-radiological wastes typically produced by common facility operations include paint and paint solids, paint thinners, discarded out-of-date chemicals, parts washer liquids, sand blast grit, chemical waste from cleaning operations, and broken fluorescent bulbs. The amount of these wastes generated varies with the size and type of facility (Table 4-7). The decrease in tonnage from coal plants was due to closure of fossil plants. Hazardous wastes, wastes requiring special handling under the Toxic Substances Control Act (TSCA), and universal waste (see explanations below) generated from routine facility operations are generally shipped to Trans Cycle in Pell City, Alabama, and Waste Management's Emelle, Alabama, facility for disposal.

**Table 4-7: Annual Quantities (in tons) of Hazardous Wastes Generated by Routine Operations at TVA Facilities, 2020-2024**

| Year | Type of Facility |               |                     |                   |       | Total |
|------|------------------|---------------|---------------------|-------------------|-------|-------|
|      | Coal Plant       | Nuclear Plant | Hydroelectric Plant | Natural Gas Plant | Other |       |
| 2020 | 34.3             | 5.0           | 15.9                | 0.0               | 31.5  | 86.7  |
| 2021 | 24.0             | 9.1           | 6.9                 | 0.04              | 15.2  | 55.2  |
| 2022 | 5.5              | 1.9           | 4.4                 | 0.08              | 23.3  | 35.2  |
| 2023 | 4.3              | 7.6           | 4.0                 | 7.3               | 116.8 | 140.0 |
| 2024 | 2.5              | 2.9           | 7.4                 | 75.6              | 7.9   | 96.3  |



|                | Type of Facility |     |     |      |      |      |
|----------------|------------------|-----|-----|------|------|------|
| Annual Average | 14.1             | 5.3 | 7.7 | 16.6 | 38.9 | 82.7 |

Hazardous wastes are defined by RCRA to include those that meet the regulatory criteria of ignitability, corrosivity, reactivity, or toxicity. They can include such materials as paints, solvents, corrosive liquids, and discarded chemicals. Wastes regulated under the TSCA that are typically encountered at TVA sites include PCBs, which have been historically used in insulating fluids in electrical equipment. PCB items are typically shipped to Trans Cycle Industries in Pell City, Alabama, and Waste Management in Emelle, Alabama.

Used oil is considered a waste if not recycled. Used oils include gear oils, greases, mineral oils, and an assortment of other petroleum- and synthetic-based oils. The majority of TVA's used oil is recycled annually. Used oil containing 50 or greater ppm PCB is regulated by TSCA and must be disposed of as PCB-contaminated oil.

Universal wastes are a subset of hazardous wastes that are widely available, easily recyclable, and generally pose a relatively low threat. However, these wastes can contain materials that cannot be released into the environment. This classification includes batteries, pesticides, fluorescent bulbs, and equipment containing mercury. In 2024, approximately 32.8 tons of universal waste were generated and recycled by TVA.

Wastes generated from renewable sources generally fall into these categories of wastes and do not require special management. The generation of wastes from operations of renewable facilities is small. Wastes result from the decommissioning of wind or solar facilities. As solar generation increases, the commercial recycling of PV panels has increased, allowing the recovery of high-value materials that are used in PV modules (e.g., silicon, indium, silver, tellurium, copper). However, it is estimated that in the U.S. less than 10 percent of PV modules are sent to recyclers; most modules are disposed of in landfills (Curtis et al. 2021). During decommissioning, wind turbines are typically landfilled and associated infrastructure are typically recycled.

Coal-fueled generating plants produce large quantities of ash and other coal combustion solid wastes and nuclear plants produce radioactive wastes. These wastes are described in more detail below.

#### 4.7.1 Coal Combustion Solid Wastes

The primary solid wastes produced by coal combustion are fly ash, bottom ash, boiler slag, char, spent bed material, and FGD residue. The properties of these wastes (also known as CCR) vary with the type of coal plant, the chemical composition of the coal, and other factors. Ash and slag are formed from the noncombustible matter in coal and small amounts of unburned carbon. Fly ash is composed of small, silt- and clay-sized, mostly spherical

particles carried out of the boiler by the exhaust gas. Bottom ash is heavier and coarser with a grain size similar to fine sand to fine gravel and falls to the bottom of the boiler where it is typically collected by a water-filled hopper. Boiler slag, a coarse, black, granular material, is produced in cyclone furnaces when molten ash is cooled in water. Ash and slag are primarily composed of silica ( $\text{SiO}_2$ ), aluminum oxide ( $\text{Al}_2\text{O}_3$ ), and iron oxide ( $\text{Fe}_2\text{O}_3$ ).

FGD residue is formed in FGD systems (scrubbers) by the interaction of sulfur in the flue gas with finely ground limestone or slaked lime. TVA's FGD systems at CUF and KIF use limestone as the reagent to bond with the sulfur, producing hydrated calcium sulfate ( $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ ), also known as synthetic gypsum. The gypsum and fly ash from these systems are stored separately, allowing ready marketing of these materials for beneficial use in production of wallboard and ready-mix concrete, respectively. The FGD systems at the GAF and on SHF Units 1 and 4 use slaked lime as the reagent and produce calcium sulfite ( $\text{CaSO}_3$ ). Unlike the other plants with FGD systems that segregate the ash and FGD residue waste streams, the CCR at GAF and SHF are combined in a single dry waste stream.

During 2024, TVA produced approximately 1.8 million tons of CCR, with approximately 43 percent being gypsum, 23 percent being fly ash, 7 percent being bottom ash, and 26 percent being dry scrubber product (Table 4-8). Of the 1.8 million tons, about 1.3 million tons, or 72 percent, were utilized or marketed. From 2019 to 2021, on average, TVA utilized or marketed approximately 1.1 million tons of CCR per year, 61 percent of the total CCR produced during this time. Additionally, from 2013 to 2016, TVA utilized or marketed approximately 1.2 million tons of CCR on average per year, which was 30 percent of the total CCR produced during this time. Thus, while the total quantity of CCR utilized or marketed has remained relatively consistent, the proportion utilized or marketed has fluctuated, though it has mostly increased. The reduced total production of CCR results from coal plant retirements. TVA fly ash is utilized as a replacement for Portland cement in ready mix concrete. TVA gypsum is used to produce wallboard and cement. The uses for TVA boiler slag include abrasives and blasting agents. Opportunities for reuse of the combined fly ash and FGD residue CCR produced at GAF and SHF are currently very limited.

CCR is regulated by 40 CFR Part 257, Subpart D, and Part 261, also known as the CCR Rule. This rule regulates the disposal of CCR as solid waste under the subtitle D of RCRA.

**Table 4-8: TVA Coal Combustion Residual Production and Utilization, 2020-2024**

| Material    | CCR in Tons |         |         |         |         |         |         |           |         |           |
|-------------|-------------|---------|---------|---------|---------|---------|---------|-----------|---------|-----------|
|             | 2020        |         | 2021    |         | 2022    |         | 2023    |           | 2024    |           |
|             | Prod.       | Util.   | Prod.   | Util.   | Prod.   | Util.   | Prod.   | Util.     | Prod.   | Util.     |
| Fly Ash     | 388,338     | 307,775 | 452,847 | 263,408 | 384,782 | 253,902 | 400,577 | 354,598   | 420,977 | 215,146   |
| Bottom Ash  | 125,717     | 3858    | 157,740 | 16,684  | 122,312 | 19,951  | 120,830 | 14,547    | 129,821 | 16,797    |
| Boiler Slag | 13,368      | 20,578  | 0       | 0       | 0       | 0       | 0       | 0         | 0       | 0         |
| Gypsum*     | 779,660     | 967,071 | 872,486 | 812,258 | 610,298 | 952,834 | 701,810 | 1,066,869 | 782,754 | 1,067,105 |

|                            | CCR in Tons |   |         |   |         |   |         |   |         |   |
|----------------------------|-------------|---|---------|---|---------|---|---------|---|---------|---|
| Dry<br>Scrubber<br>Product | 245,265     | 0 | 374,487 | 0 | 413,679 | 0 | 430,111 | 0 | 479,524 | 0 |

Note: Prod. = production; Util. = utilization

\*Gypsum utilization totals more than 100 percent of production because material is harvested from the landfill, thereby reducing the volume of material stored.

The CCR that is not sold for reuse is currently stored in landfills at the coal plant sites. TVA operates four coal-fired plants (CUF, GAF, KIF, and SHF). All four of the facilities have been converted to dry storage and disposal. TVA is in the process of closing inactive CCR surface impoundments and landfills fleetwide.

#### 4.7.2 Nuclear Waste

The nuclear fuel used for power generation produces liquid, gaseous, and solid radioactive wastes (“radwaste”) that require storage and disposal. These wastes are categorized as high-level waste and low-level waste based on the type of radioactive material, the intensity of its radiation, and the time required for decay of the radiation intensity to natural levels.

**High-Level Waste.** About 99 percent of high-level waste generated by nuclear plants is spent fuel, including the fuel rod assemblies. Nuclear fuel is made up of small uranium pellets placed inside long tubular metal fuel rods that are grouped into fuel assemblies and placed in the reactor core. In the fission process, uranium atoms split in a chain reaction yielding heat. Radioactive fission products, which are the nuclei left over after the atom has split, are trapped and gradually reduce the efficiency of the chain reaction. Consequently, the oldest fuel assemblies are removed and replaced with fresh fuel at about 18-month intervals. Because nuclear plants normally operate continuously at full load, spent fuel production varies little from year to year. On average, TVA’s seven operating nuclear units produce 250 tons of high-level waste per year.

After it is removed from the reactor, spent fuel is stored at the nuclear plants in pools (steel lined, concrete vaults filled with water) inside the plant. The spent fuel pools were originally intended to store spent fuel onsite until a monitored retrievable storage facility and a permanent repository were built by the DOE as directed by the Nuclear Waste Policy Act of 1982. Because these facilities have not yet been built, the storage capacity of the spent fuel pools at WBN, Sequoyah, and BFN nuclear plants has been exceeded. TVA, like other utilities, now stores spent fuel at all three nuclear plants in above-ground dry storage casks constructed of concrete and metal and placed on concrete pads inside of the plant security perimeter.

**Low-Level Waste.** Low-level waste consists of items that have contacted radioactive materials. Nuclear plants have systems for collecting these radioactive wastes, reducing their volume, and packaging them for interim onsite storage and eventual shipment to approved processing and storage facilities. At nuclear plants, these wastes consist of solids such as:

- filters, including spent resins (primarily from water filtration systems), sludge from tanks and sumps, cloth and paper wipes, plastic shoe covers, tools and materials;
- liquids such as tritiated waste (i.e., containing tritium), chemical waste, and detergent waste; and
- gases such as radioactive isotopes created as fission products and released to the reactor coolant.

Dry active wastes, which typically have low radioactivity, are presently shipped to a processor in Oak Ridge, Tennessee, for compaction and then to a disposal facility in Clive, Utah. Wet active wastes with low radioactivity are shipped to the Energy Solutions Clive disposal facility in Utah or Waste Control Specialists in Texas. Table 4-9 lists the amounts of low-level waste produced at TVA nuclear plants between 2017 and 2025.

**Table 4-9: Low-Level Radioactive Waste Generated at TVA Nuclear Plants (cubic feet)**

|          | 2017   | 2018    | 2019    | 2020    | 2021    | 2022    | 2023    | 2024    | 2025   |
|----------|--------|---------|---------|---------|---------|---------|---------|---------|--------|
| BFN      | 68,589 | 103,439 | 89,448  | 64,677  | 95,138  | 106,788 | 91,767  | 79,274  | 61,954 |
| Sequoyah | 16,094 | 22,234  | 33,554  | 17,700  | 27,949  | 17,101  | 22,567  | 23,023  | 17,390 |
| WBN      | 4,065  | 36,207  | 19,416  | 21,400  | 26,183  | 57,746  | 28,395  | 22,090  | 17,300 |
| Total    | 88,748 | 161,880 | 142,418 | 103,777 | 149,270 | 181,635 | 142,729 | 124,387 | 96,644 |

Definition: Low-level radioactive waste includes class A, B and C radioactive waste as reported to the NRC.

**Mixed Waste.** Mixed Waste is a classification of waste that is dually regulated as radioactive and contains some other components regulated by additional environmental regulations (i.e., RCRA or TSCA). Examples of mixed waste, usually generated during maintenance activities, include lead paint chips, cleanup debris, resin and unpunctured aerosol cans that cannot be radiologically cleared. Because of the dual regulation, it is extremely difficult to find a properly permitted outlet for disposal of this material. Table 4-10 shows the mixed waste sent for disposal from TVA sites during 2017–2025.

**Table 4-10: Mixed Waste Generated at TVA Nuclear Plants and Other Facilities (kilograms [kg])**

|                     | 2017  | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024 | 2025 |
|---------------------|-------|------|------|------|------|------|------|------|------|
| BFN                 | 4,645 | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    |
| Sequoyah            | 2.3   | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    |
| WBN                 | 0     | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    |
| Power Service Shops | 0     | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    |
| Total               | 4,647 | 0    | 0    | 0    | 0    | 0    | 0    | 0    | 0    |

## **4.8 Socioeconomics**

This section describes social and economic conditions in the TVA region. It presents and compares qualitative and quantitative data from varying geographies to characterize the regional human population and associated demographics, sociocultural factors, and economics. Depending on availability and comparability, the census data derive from the U.S. Census Bureau (USCB) 2010 decennial census, the 2020 decennial census, and the most current population estimates from the 2022 American Community Survey (ACS) (2018 - 2022 5 Year estimates). These data were obtained utilizing USCB American FactFinder and USCB Topologically Integrated Geographic Encoding and Referencing (TIGER) Products. Spatial data for figures were obtained through USCB TIGER Products and ESRI. Other quantitative and qualitative data were gathered from TVA staff, regional commissions, counties and communities, and other relevant sources, as cited within each subsection.

Generally, when census data are presented, information on the TVA PSA is given as a baseline for comparison to smaller parts of the PSA. The TVA PSA considered for socioeconomics consists of 181 counties and two independent cities in seven states, including all counties in Tennessee and portions of Alabama, Georgia, Kentucky, Mississippi, North Carolina, and Virginia (see Appendix B-1 for a complete list of counties considered). Smaller areas are defined as relevant to the topic and may consist of metropolitan statistical areas (MSAs), urban or rural areas, counties, or census tracts.

Where relevant, information from USCB Division 6, East South Central, is employed for comparative purposes. Division 6 includes the majority of the TVA PSA, consisting of Alabama, Kentucky, Mississippi, and Tennessee (USCB 2000). USCB Division 6 data may be more comparable to the TVA PSA than that of USCB Region 3, the South, because of similarities in population densities, demographics, sociocultural characteristics, and economics. For many topics, U.S.-wide data are also employed due to their usefulness in understanding how the TVA PSA compares with the rest of the nation.

### **4.8.1 Population and Demographics**

Population and various demographic data are presented in this subsection. First, population change for the TVA PSA between 2010 and 2022 are compared with that for Division 6 and the U.S. Then, population variation across the TVA PSA and among its most populous MSAs is discussed. Finally, demographic variables for the TVA PSA are compared with those of Division 6 and the nation.

#### **4.8.1.1 Population**

As shown in Table 4-11, the estimated population of the TVA PSA was 9.8 million in 2010 and 10.5 million in 2022, a 7.4 percent increase. During the same time period, population in Division 6 and in the U.S. increased 5.2 percent and 7.0 percent respectively. The rate of population growth was greater in the TVA PSA as compared to the Division and the nation (USCB 2010, USCB 2022a). The annual rate of population growth in the TVA PSA between

2010 and 2020 was 0.7 percent (USCB 2010, USCB 2020, USCB 2022a). Between 2022 and 2040, the annual rate of population growth in the TVA PSA is projected to be 0.7 percent, greater than the projected growth rate of the nation of 0.4 percent (CBER 2022, GOPB 2023, KSDC 2022, SDC MS 2024, NC OSBM 2023, TN SDC 2022, Cooper Center 2022, USCB 2023a).

**Table 4-11: Population Data for the TVA PSA, TVA MSAs, Division 6, and U.S.**

| Area                                           | 2010 Population  | 2020 Population  | 2022 Population  | % Increase 2010 – 2020 | % Increase 2010 – 2022 | % of TVA PSA Pop., 2022 |
|------------------------------------------------|------------------|------------------|------------------|------------------------|------------------------|-------------------------|
| U.S.                                           | 309,338,421      | 331,449,281      | 331,097,593      | 7.1                    | 7.0                    | --                      |
| Division 6 (East South Central)                | 18,459,846       | 19,402,234       | 19,413,645       | 5.1                    | 5.2                    | --                      |
| TVA PSA                                        | 9,810,629        | 10,520,062       | 10,540,347       | 7.2                    | 7.4                    | --                      |
| <b>MSAs in TVA PSA</b>                         |                  |                  |                  |                        |                        |                         |
| Bowling Green, KY                              | 159,309          | 179,639          | 180,624          | 12.8                   | 13.4                   | 1.7                     |
| Chattanooga, TN-GA                             | 529,196          | 562,647          | 564,466          | 6.3                    | 6.7                    | 5.4                     |
| Clarksville, TN-KY                             | 261,619          | 320,535          | 322,949          | 22.5                   | 23.4                   | 3.1                     |
| Cleveland, TN                                  | 115,913          | 126,164          | 126,479          | 8.8                    | 9.1                    | 1.2                     |
| Dalton, GA                                     | 142,315          | 142,837          | 143,096          | 0.4                    | 0.5                    | 1.4                     |
| Decatur, AL                                    | 153,949          | 156,494          | 156,218          | 1.7                    | 1.5                    | 1.5                     |
| Florence-Muscle Shoals, AL                     | 147,260          | 150,791          | 151,599          | 2.4                    | 2.9                    | 1.4                     |
| Huntsville, AL                                 | 419,279          | 491,723          | 493,980          | 17.3                   | 17.8                   | 4.7                     |
| Jackson, TN                                    | 130,031          | 180,504          | 180,446          | 38.8                   | 38.8                   | 1.7                     |
| Johnson City, TN                               | 199,010          | 207,285          | 207,442          | 4.2                    | 4.2                    | 2.0                     |
| Kingsport-Bristol-Bristol, TN-VA               | 309,494          | 307,614          | 308,386          | -0.6                   | -0.4                   | 2.9                     |
| Knoxville, TN                                  | 838,748          | 879,773          | 884,359          | 4.9                    | 5.4                    | 8.4                     |
| Memphis, TN-AR                                 | 1,326,280        | 1,337,779        | 1,335,804        | 0.9                    | 0.7                    | 12.7                    |
| Morristown, TN                                 | 114,219          | 142,709          | 143,196          | 24.9                   | 25.4                   | 1.4                     |
| Nashville- Davidson- Murfreesboro-Franklin, TN | 1,675,757        | 1,989,519        | 1,990,873        | 18.7                   | 18.8                   | 18.9                    |
| <b>TVA MSA TOTALS</b>                          | <b>6,522,379</b> | <b>7,176,013</b> | <b>7,189,917</b> | <b>10.0</b>            | <b>10.2</b>            | <b>68.2</b>             |

Source: USCB 2010, USCB 2020, USCB 2022a

Population varies greatly among the counties in the TVA PSA. The larger population concentrations tend to be located along major river corridors: the Tennessee River and its tributaries from northeast Tennessee through Knoxville and Chattanooga into north Alabama; the Nashville area along the Cumberland River; and the Memphis area on the Mississippi River. Low population counties are scattered around the region, but most are in Mississippi, the Cumberland Plateau in Tennessee, and the Highland Rim in Tennessee and Kentucky.

As shown in Table 4-11, an increasing proportion of the total population of the TVA PSA, 66.5 percent in 2010 and an estimated 68.2 percent in 2020 and 2022, lives in USCB-



defined metropolitan statistical areas<sup>1</sup>. Two of these areas were estimated to have populations greater than one million in 2022: Nashville, 1.9 million, and Memphis, 1.3 million. The Knoxville and Chattanooga MSAs were estimated to have populations of approximately 884,000 and 564,000, respectively. These four MSAs accounted for 45 percent of the TVA PSA's population in 2022 (USCB 2010, USCB 2020, USCB 2022a).

While the proportion of the TVA region's population living in metropolitan areas was estimated to be lower than the national average of about 80 percent, the proportion has been increasing, and this trend appears likely to continue in the future. This is reflective of a decades-long nationwide trend of urbanization, characterized by a decline of population in rural areas and an increase in metropolitan areas. Population increase in metropolitan areas may be attributed to a combination of internal growth, outward expansion to include new growth or integration of communities previously existing outside the urban area, and in-migration of young adults seeking lifestyle and employment opportunities (USCB 2023c, Frey 2019). As a result, residential populations in the urban core areas of several cities in the TVA PSA have increased, including the largest cities. A notable exception to this trend is Memphis, Tennessee, which experienced a 4 percent decline in population between 2010 and 2022 (Bellow 2023).

The COVID-19 pandemic caused a major opposing shift in the migration flows of most states as people moved from metropolitan areas to rural counties to avoid exposure to the virus. A shift to remote work as many businesses remained closed potentially influenced geographic mobility. As a result, populations grew in rural counties during the pandemic, especially in Southern states. Most people moved to rural areas within their state of origin (Melotte 2023, USDA 2022).

Southern states within the TVA PSA - including Alabama, Georgia, North Carolina, and Tennessee - also benefit from another decades-long migration pattern of northeast residents moving to southern states. Many are seniors of the large Baby Boomer generation seeking a warmer climate, lower cost of living, housing opportunities, and a favorable tax environment. Others are opportunity-seeking young adults of the equally large Millennial generation, who form the backbone of labor forces and consumer bases. According to the Tennessee State Data Center, the population of both metropolitan and rural counties in Tennessee increased during and after the pandemic, resulting in widespread gains across the state (TN SDC 2022, Frey 2019).

#### **4.8.1.2 Demographics**

As shown in Table 4-12, the median age in the TVA PSA was 41.4 years in 2022, an increase from the median age of 37.9 years in 2010. In 2022, the TVA PSA had a higher population of people over 65 years of age (17 percent) as compared to Division 6 or the

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<sup>1</sup> The Memphis MSA has two counties outside the TVA PSA, Crittenden County, Arkansas and Tunica County, Mississippi.

nation as a whole, which had 16.8 percent and 16.5 percent, respectively. The percentage of people identifying themselves as white was 73.3 percent in the TVA PSA, greater than Division 6 and the U.S., which were 70.4 percent and 58.9 percent, respectively (USCB 2022a, USCB 2022b, USCB 2022c).

**Table 4-12: Demographics of the TVA PSA, Division 6, and U.S.**

| Geography  | Median Age | % White Alone | % Age 65 or More | % High School or Higher |
|------------|------------|---------------|------------------|-------------------------|
| U.S.       | 38.5       | 58.9          | 16.5             | 89.1                    |
| Division 6 | 38.9       | 70.4          | 16.8             | 88.2                    |
| TVA PSA    | 41.4       | 73.3          | 17.0             | 88.1                    |

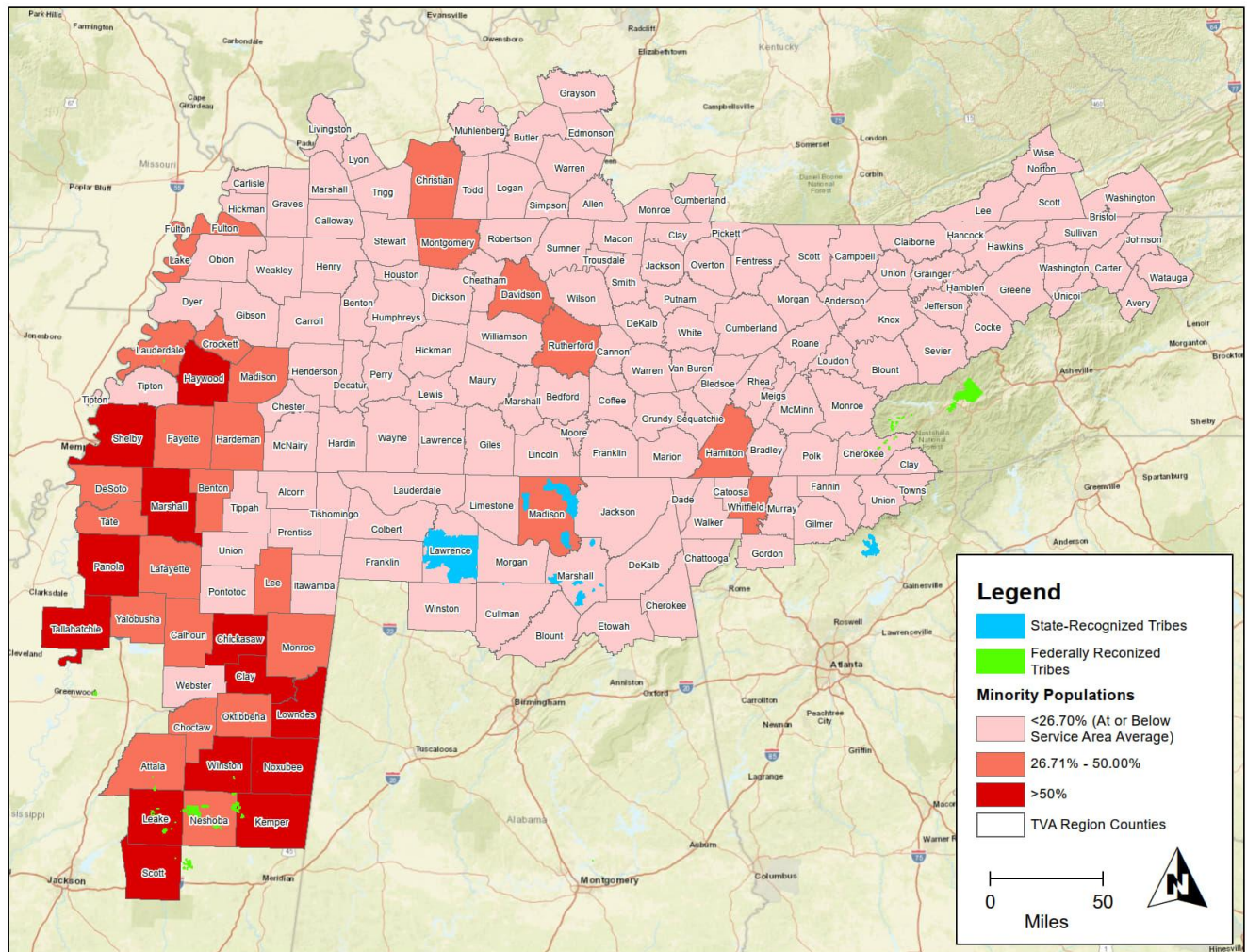
Source: USCB 2022a, USCB 2022b, USCB 2022c

As shown in Table 4-12, of the TVA PSA population 25 years old or older, approximately 88 percent held a high school diploma, equivalency diploma, or higher degree in 2022. This percentage is similar to Division 6 (88 percent) and the U.S. as a whole (89 percent) (USCB 2022c).

The TVA PSA considered for minority communities consists of 181 counties and two independent cities in seven states, including all counties in Tennessee and portions of Alabama, Georgia, Kentucky, Mississippi, North Carolina, and Virginia (see Appendix B-1 for a complete list of counties considered). Where relevant, TVA PSA-wide data is compared with information from USCB Division 6, East South Central. Division 6 includes the majority of the TVA PSA, consisting of Alabama, Kentucky, Mississippi, and Tennessee (USCB 2000).

In 2022, the minority population in the TVA PSA was 26.7 percent. As shown in Figure 4-24, 13 counties in the PSA had minority populations that exceeded 50 percent, well above the TVA PSA average. These included Haywood and Shelby counties in Tennessee and Lowndes, Winston, Chickasaw, Scott, Leake, Marshall, Panola, Clay, Tallahatchie, Kemper, and Noxubee counties in Mississippi. The minority percentages of each county are shown in Table 4-13. In these areas, the African American population composed the highest percentage of the population, averaging 52 percent (USCB 2022b).

An additional 38 counties had a minority population greater than the TVA PSA average. All of the counties with minority percentages higher than the TVA PSA as a whole are listed in Appendix B-4 (USCB 2022b).



Source: USCB 2022b, USCB 2023b

**Figure 4-24: Minority Populations at the County Level in the TVA PSA**

Three state-designated tribal statistical areas (SDTSA) are extant in the TVA PSA in northern Alabama and considered part of the minority population (USCB 2022b). These consist of the Cherokee Tribe of Northeast Alabama SDTSA in Marshall County, Echota Cherokee SDTSA in Cullman, Lawrence, and Madison counties, and United Cherokee Ani-Yun-Wiya Nation SDTSA in Marshall County. Their locations are shown in Figure 4-24.

**Table 4-13. Counties in the TVA PSA with Minority Populations Exceeding 50 Percent**

| Geography  | 2022 Population | 2022 Minority (%) | Black or African American (%) | American Indian, Alaskan Native (%) | Asian (%) | Native Hawaiian, Pacific Islander (%) | Some other race (%) | Two or more races (%) | Hispanic or Latino (%) |
|------------|-----------------|-------------------|-------------------------------|-------------------------------------|-----------|---------------------------------------|---------------------|-----------------------|------------------------|
| Division 6 | 19,413,645      | 29.6              | 20.0                          | 0.2                                 | 1.5       | 0.0                                   | 0.3                 | 2.7                   | 4.8                    |
| TVA PSA    | 10,540,347      | 26.7              | 15.7                          | 0.2                                 | 1.6       | 0.1                                   | 0.3                 | 2.9                   | 6.0                    |

| Geography               | 2022 Population | 2022 Minority (%) | Black or African American (%) | American Indian, Alaskan Native (%) | Asian (%) | Native Hawaiian, Pacific Islander (%) | Some other race (%) | Two or more races (%) | Hispanic or Latino (%) |
|-------------------------|-----------------|-------------------|-------------------------------|-------------------------------------|-----------|---------------------------------------|---------------------|-----------------------|------------------------|
| <b>TVA PSA Counties</b> |                 |                   |                               |                                     |           |                                       |                     |                       |                        |
| Chickasaw County, MS    | 17,024          | 50.9              | 43.7                          | 0.0                                 | 0.2       | 0.0                                   | 0.0                 | 1.9                   | 5.1                    |
| Clay County, MS         | 18,598          | 62.0              | 60.0                          | 0.0                                 | 0.0       | 0.0                                   | 0.0                 | 1.8                   | 0.2                    |
| Kemper County, MS       | 8,980           | 66.6              | 61.8                          | 3.8                                 | 0.0       | 0.0                                   | 0.0                 | 0.2                   | 0.8                    |
| Leake County, MS        | 21,335          | 52.3              | 39.8                          | 5.7                                 | 0.4       | 0.0                                   | 0.0                 | 1.4                   | 5.1                    |
| Lowndes County, MS      | 58,547          | 50.0              | 44.5                          | 0.1                                 | 1.1       | 0.0                                   | 0.4                 | 1.5                   | 2.4                    |
| Marshall County, MS     | 33,980          | 52.9              | 45.5                          | 0.0                                 | 0.1       | 0.0                                   | 0.5                 | 2.4                   | 4.3                    |
| Noxubee County, MS      | 10,261          | 74.4              | 73.6                          | 0.4                                 | 0.0       | 0.0                                   | 0.0                 | 0.2                   | 0.3                    |
| Panola County, MS       | 33,157          | 53.1              | 49.6                          | 0.1                                 | 0.3       | 0.4                                   | 0.1                 | 1.9                   | 0.6                    |
| Scott County, MS        | 27,943          | 51.3              | 35.6                          | 0.1                                 | 0.1       | 0.0                                   | 0.2                 | 3.5                   | 11.8                   |
| Tallahatchie County, MS | 12,621          | 65.1              | 61.4                          | 0.0                                 | 0.1       | 0.0                                   | 0.2                 | 1.5                   | 1.9                    |
| Winston County, MS      | 17,741          | 50.4              | 46.7                          | 0.5                                 | 0.1       | 0.0                                   | 0.0                 | 1.6                   | 1.5                    |
| Haywood County, TN      | 17,806          | 56.3              | 50.0                          | 0.0                                 | 0.1       | 0.0                                   | 0.4                 | 1.4                   | 4.3                    |
| Shelby County, TN       | 926,440         | 65.5              | 53.6                          | 0.1                                 | 2.9       | 0.0                                   | 0.3                 | 1.9                   | 6.8                    |

Source: USCB 2022b

#### 4.8.2 Sociocultural Characteristics

This subsection describes historical and cultural characteristics of USCB Division 6, which encompasses the majority of TVA's PSA. The USCB regions and divisions were developed based on "practice and tradition" rather than under any statute or legislation (USCB 1994). Division 6 overlaps the central portion of the culture region known as the South or Southeast. Culture region is a social science concept based on the idea that human culture is formed through the relationships created by people in close proximity and such associations are often related to the geography, climate, resources, population density, and history of an area (Beck et al. 2009).

Distinctions between urban and rural areas across the TVA PSA are described in this subsection. Following the 2020 Census, the USCB changed the way urban areas are defined, and released a new list of urban areas. USCB-defined urban areas comprise a densely settled core of census blocks that have at least 2,000 housing units or a population of at least 5,000. This includes adjacent territory containing non-residential and commercial uses. Rural areas are defined as all population, housing and territory not included within an urban area. In general, population density of urban areas has increased from 2,343 persons per square mile in 2010 to 2,553 in 2020 (USCB 2023c).

##### 4.8.2.1 Historical and Cultural Characteristics

Rural lifestyles dominated the Southeast until the mid- to late 20<sup>th</sup> century. Earlier in the century, the predominant rural lifestyle, along with high unemployment and poverty rates, extensive flooding, and lagging electrification influenced the passage of the TVA Act, which created TVA. The TVA Act was part of President Roosevelt's program to assist the nation during the Great Depression (TVA 2023c). The act directed TVA to "provide for the



agricultural and industrial development of [the Tennessee Valley],” among other purposes. Flood control and the development of fertilizers were TVA programs designed to assist farmers of the region. Electrification by TVA was intended to help modernize rural communities and encourage economic development. While the Tennessee Valley region has substantially modernized since passage of the TVA Act, rural traditions continue to influence Southeastern culture, including its values, attitudes, music, language, class and race distinctions, and political and religious views (Beck et al. 2009).

Much of the TVA PSA is included in the Appalachian region, which generally straddles the ridgeline of the Appalachian Mountains and encompasses parts of Alabama, Georgia, Kentucky, Maryland, Mississippi, New York, North Carolina, Ohio, Pennsylvania, South Carolina, Tennessee, and Virginia, and all of West Virginia. The Appalachian Regional Commission (ARC) was created in 1965 “to address the persistent poverty and growing economic despair of the Appalachian Region” (ARC 2023a). The ARC service territory extends beyond the Appalachian Mountains to include northern Alabama and a large portion of the TVA PSA in Mississippi. When ARC was formed, Appalachia, to which the region is often referred, was heavily dependent on farming, natural resource extraction, and heavy industries, and the region had a 31 percent poverty rate (ARC 2015). More recently, the region has incorporated manufacturing and professional service industries into its economy, and in 2021, the poverty rate of individuals declined to 14.5 percent, approximately 2 percent higher than the national rate of 12.6 percent (ARC 2021). Of the 423 counties in the Appalachian Region, 107 (25.3 percent) were classified as rural (defined as counties that are neither part of nor adjacent to a metropolitan area). Note that the USCB uses a different definition of rural as discussed in Section 4.8.2). Of the 26.3 million people that live in Appalachia, almost 2.5 million, or nearly 10 percent of residents, live in rural counties. Mississippi, Kentucky, and Virginia have the highest concentration of rural counties (ARC 2023b). However, pockets of the Appalachian population live near or in major metropolitan areas.

Portions of the TVA PSA in Mississippi are included in the Mid-South Delta subregion of the South, which generally surrounds the Mississippi River in Arkansas, Louisiana, and Mississippi (Beaulieu and Littles 2009). The subregion is characterized by dependence on natural resources that are integrally linked to cultural heritage and local economies. Similar to many other areas of the South, the Mid-South Delta subregion is distinguished by its sociocultural divisions based on class and race.

Similar to the Mid-South Delta subregion is the Mid-South subregion of the South, which encompasses portions of western and central Tennessee and Kentucky. Inhabitants of western portions of this subregion have strong cultural connections to the Mississippi River. Rural areas of the Mid-South are generally characterized by the predominance of farming traditions. According to the USDA Census of Agriculture, approximately 69,983 farms on nearly 11 million acres were active across Tennessee in 2017. Between 2012 and 2017, the

number of new farmers as well as the age of active farmers have increased. Market value of agricultural products sold increased 5 percent. Market value of agricultural products sold directly to consumers increased nearly 82 percent (American Farmland Trust 2023).

Resource extraction, especially in relation to coal, remains an important aspect of the economies in portions of the Appalachian region and the Mid-South subregion (USEIA 2023b). Many people in these areas have been employed in coal extraction for decades and often have generational connections to coal mining whether or not they are currently involved in the industry (Carley et al. 2018). These facts have influenced personal identities as well as the broader culture in these areas. Coal mining areas in the TVA PSA are in northern Alabama, eastern Tennessee, and extreme eastern Kentucky, and the southern portion of the Illinois Basin coalfield in western Kentucky (USEIA 2022). In recent years, TVA has obtained coal from the Appalachian Basin (Kentucky, Pennsylvania, Tennessee, West Virginia, and Virginia) and Illinois Basin (Illinois, Indiana, and Kentucky) regions in the eastern U.S. and from the Powder River Basin (Wyoming) region in the western U.S. (see Section 2.3.1). The Red Hills plant in east-central Mississippi, from which TVA purchases power, is supplied by a nearby lignite mine.

In addition to the communities described above, the TVA PSA encompasses land that historically was occupied by native Americans. TVA regularly consults with over 20 federally recognized Tribes that either reside within the PSA or have cultural or religious ties to the PSA. Many of the Tribes with whom TVA consults were subject to forcible relocation to Indian territory (now Oklahoma), mandated by the Federal government in the Indian Removal Act of 1830. Currently, the majority of these Nations are headquartered in the state of Oklahoma, and they retain strong ties to their ancestral homelands. Two federally recognized Tribes – the Eastern Band of Cherokee Indians (EBCI) in southwestern North Carolina and the MBCI in east central Mississippi – still reside in the Tennessee Valley. These sovereign nations are part of the minority population in the TVA PSA. The EBCI has approximately 13,000 tribal members. About 60 percent live on the 56,000-acre Qualla Boundary, land held in trust for the Tribe by the federal government located in western North Carolina. Tribal lands span Swain and Jackson counties, with smaller parcels in Cherokee, Graham and Haywood counties (DOJ 2024, Cherokee Chamber of Commerce 2024). The MBCI has approximately 10,000 tribal members, located on 35,000 acres in east central Mississippi, spanning 10 counties. Neshoba County is the largest of the reservation areas, and the location of the Tribe's headquarters. The MBCI is a major contributor to the state's economy and provides permanent full-time jobs for over 5,000 employees (Choctaw.org 2024a, Choctaw.org 2024b, RRT 2024). Demographic characteristics of Tribal Nations EBCI and MCB I located within the TVA PSA is shown in Table 4-14.



**Table 4-14: Demographics of Federally Recognized Tribal Nations in the TVA PSA**

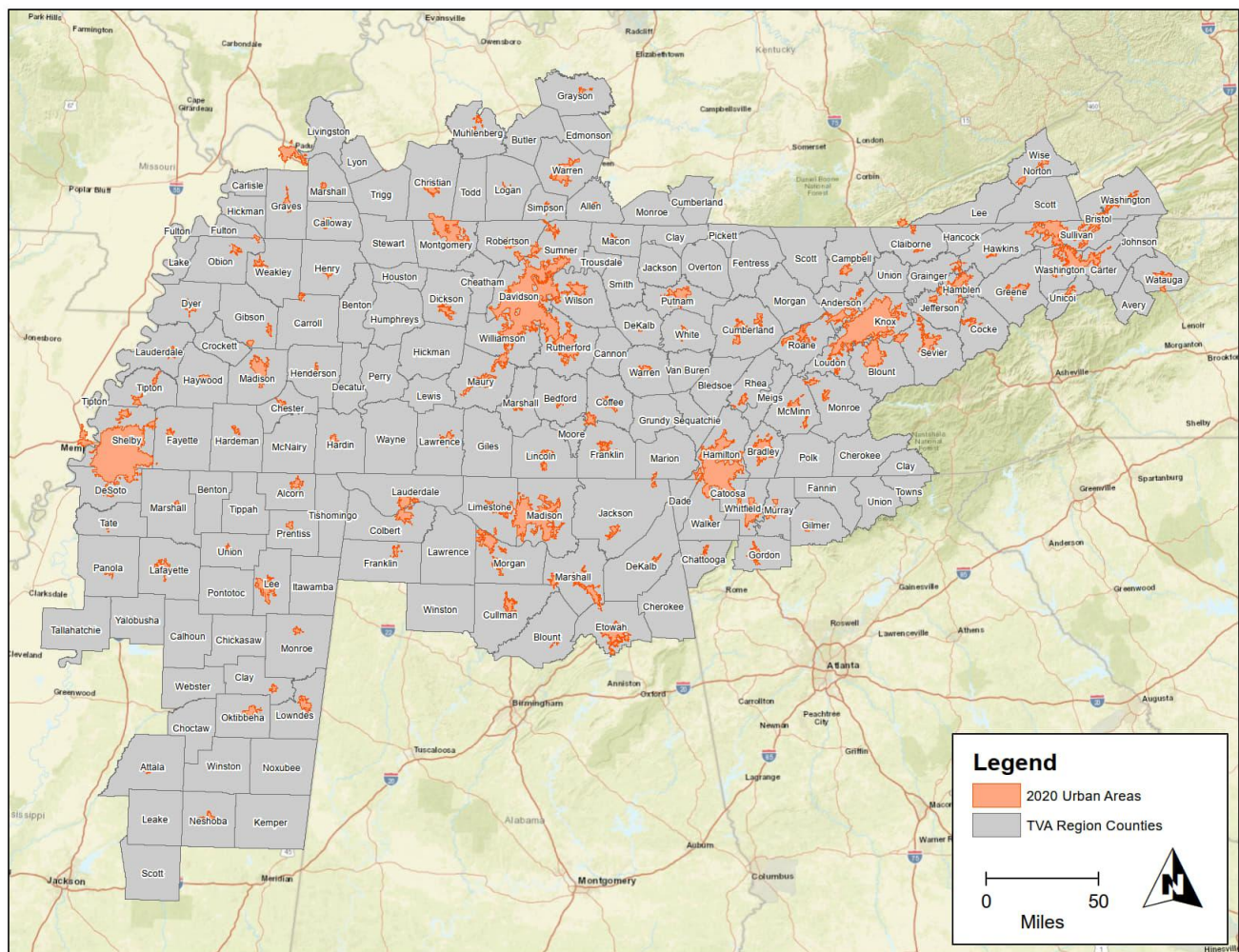
|                                                                              | <b>EBCI</b> | <b>MBCI</b> |
|------------------------------------------------------------------------------|-------------|-------------|
| Population                                                                   | 7,930       | 7,384       |
| Percent of Population under 5 years                                          | 4.9         | 9.0         |
| Percent of Population between ages 25 and 54                                 | 32.1        | 37.29       |
| Percent of Population 65 and over                                            | 17.4        | 8.7         |
| Median Age                                                                   | 37.7        | 28.3        |
| Percent of Population between ages 25 and 54                                 | 32.1        | 37.29       |
| Graduated high school or higher, 25 years old and over                       | 83.8        | 72.7        |
| Attained bachelor's degree or higher, 25 years old and over                  | 14.0        | 8.2         |
| Military veterans in the civilian population 18 years and over               | 8.2         | 5.7         |
| Population 16 years and over in labor force                                  | 2,875       | 2,917       |
| Percent Employed Population 16 years and over in the labor force             | 91.3        | 89.4        |
| Unemployment Rate                                                            | 8.7         | 10.6        |
| Employed in service occupations                                              | 32.2        | 43          |
| Median household income                                                      | 44,925      | 39,955      |
| Percent of Individuals Living below the Poverty Level                        | 21.0        | 42.8        |
| Occupied Housing Units                                                       | 3,324       | 1,976       |
| Percent of owner-occupied units                                              | 73.0        | 79.8        |
| Median Housing Value                                                         | 137,900     | 71,800      |
| Percent of civilian noninstitutionalized population with health insurance    | 62.3        | 65.6        |
| Percent of civilian noninstitutionalized population with no health insurance | 37.7        | 34.4        |

Source: USCB 2022d, USCB 2022e

#### 4.8.2.2 Urban-Rural Distinctions

As shown in Figure 4-25, the TVA PSA included 120 separate USCB-designated urban areas in 2020. Urban areas composed approximately 5 percent of the TVA PSA and contained nearly 56 percent of the population (USCB 2023d, USCB 2023b). This is compared with the U.S. as a whole, where approximately 80 percent of the population resided within approximately 3.1 percent of the total land area in 2020. Across Division 6, approximately 59 percent of the population lived in urban areas (USCB 2023c, USCB 2024, Visual Capitalist 2020).

USCB considers all portions outside of designated urban areas to be rural areas. In 2020, approximately 95 percent of the TVA PSA was considered rural, accounting for almost 44 percent of the population in the TVA PSA (USCB 2023b, USCB 2023d). Twenty percent of the U.S. population was considered rural in the same year (USCB 2024).



Source: USCB 2023b, USCB 2023c

**Figure 4-25: Urban and Rural Areas in the TVA PSA**

In 2022, the three most populous counties in or partially within the TVA PSA were Shelby, Davidson, and Knox counties, Tennessee as shown in Table 4-15. Each county had a population greater than 430,000 residents, and greater than 50 percent of land was classified as urban in the 2020 Census (USCB 2023d). Nashville and portions of its metropolitan area encompass Davidson County, Tennessee, and Shelby County is primarily composed of the City of Memphis. Knox County is largely composed of the Knoxville metropolitan area. The population of Davidson and Knox counties increased 13.3 percent and 11.4 percent respectively between 2010 and 2022, while the population of Shelby County decreased 0.1 percent (USCB 2010, USCB 2022a).

In 2022, the three least populous counties in or partially within the TVA PSA were Pickett County, Tennessee, and Carlisle and Hickman counties, Kentucky, as shown in Table 4-15. The entirety of these counties was considered rural areas in 2020, as defined by the USCB (USCB 2023d). The population of each county declined between 2010 and 2022. The population of Hickman County decreased the most (8.4 percent); while the population of

Carlisle and Pickett declined in population 6.3 percent and 0.7 percent, respectively (USCB 2010, USCB 2022a).

**Table 4-15: Population Data for the Most/Less Populous Counties in the TVA PSA**

| Geography           | 2010 Population | % Urban Population, 2010 | 2020 Population | % Urban Population, 2020 | % Land classified as Urban, 2020 | 2022 Population | % Increase 2010 – 2022 |
|---------------------|-----------------|--------------------------|-----------------|--------------------------|----------------------------------|-----------------|------------------------|
| Shelby County, TN   | 927,644         | 97.2                     | 929,744         | 96.6                     | 50.9                             | 926,440         | -0.1%                  |
| Davidson County, TN | 626,681         | 96.6                     | 715,884         | 96.9                     | 58.6                             | 709,786         | 13.3%                  |
| Knox County, TN     | 432,226         | 89.1                     | 478,971         | 90.8                     | 54.8                             | 481,406         | 11.4%                  |
| Pickett County, TN  | 5,077           | 0.0                      | 5,001           | 0.0                      | 0.0                              | 5,042           | -0.7%                  |
| Carlisle County, KY | 5,104           | 0.0                      | 4,826           | 0.0                      | 0.0                              | 4,782           | -6.3%                  |
| Hickman County, KY  | 4,902           | 0.0                      | 4,521           | 0.0                      | 0.0                              | 4,491           | -8.4%                  |

Source: USCB 2010, USCB 2022a, USCB 2023d

#### 4.8.2.3 Communities Near TVA Power Plants

Communities near TVA power plants are more likely to be affected by changes to the environment associated with building and operating power plants. Demographic indicators were obtained for a 3-mile radius surrounding TVA power plants. Indicators considered herein include minority, low-income, linguistic isolation, and age distribution population characteristics sources from ACS 2017-2021, as shown in Table 4-16. Sixteen TVA power plants have communities nearby with demographic characteristics that differ from the regional norms. For comparison, data available at the time of analysis is also provided for associated states and the U.S.

Comparative data for the 16 plants considered in this analysis indicate that three plant locations have minority percentages that are higher than their associated states: ACT and Lagoon Creek CC plants in Tennessee and Southaven CC in Mississippi. Both Allen and Southaven CC are located in the Memphis metropolitan area, while Lagoon Creek CC is in Brownsville, Tennessee, approximately 60 miles northeast of Memphis. The same plant locations, along with Bellefonte Nuclear in Alabama, and CUF and John Sevier CC in Tennessee, demonstrate higher percentages of low-income populations than their associated states. Eight of the 16 plants have higher percentages of the population over the age of 64 than their respective states. This is reflective of the overall higher median age of the TVA PSA, as discussed in Section 4.8.1.2. For the most part, data indicate that the numbers of people under age 5 or considered linguistically isolated surrounding the plant locations are not significant in comparison with associated states (USEPA 2023g). Appendix B-4 presents minority percentages for each county in the TVA PSA, including those in which the plants are located (see also Figure 1-1).

**Table 4-16: Population Characteristics for Selected TVA Power Plants**

| Geography / Plant  | Minority (%) | Low-Income (%) | Linguistically Isolated (%) | Under Age 5 (%) | Over Age 64 (%) |
|--------------------|--------------|----------------|-----------------------------|-----------------|-----------------|
| U.S.               | 39           | 31             | 5                           | 6               | 17              |
| Alabama            | 38           | 38             | 1                           | 6               | 18              |
| Bellefonte Nuclear | 14           | 48             | 0                           | 3               | 15              |
| Colbert CT         | 11           | 31             | 0                           | 2               | 37              |
| Kentucky           | 16           | 37             | 1                           | 6               | 17              |
| SHF                | 13           | 35             | 0                           | 6               | 13              |
| Mississippi        | 45           | 43             | 1                           | 6               | 17              |
| Ackerman CC        | 17           | 24             | 0                           | 4               | 23              |
| Caledonia CC       | 20           | 22             | 0                           | 5               | 16              |
| Magnolia CC        | 12           | 33             | 0                           | 7               | 28              |
| Southaven CC       | 77           | 47             | 1                           | 6               | 14              |
| Tennessee          | 28           | 35             | 2                           | 6               | 17              |
| Allen CC, ACT      | 99           | 55             | 0                           | 1               | 23              |
| CUF                | 17           | 38             | 0                           | 11              | 17              |
| GAF, Gallatin CT   | 13           | 20             | 1                           | 10              | 13              |
| John Sevier CC     | 5            | 46             | 1                           | 7               | 24              |
| Johnsonville CT    | 12           | 29             | 0                           | 6               | 15              |
| KIF                | 10           | 32             | 0                           | 3               | 23              |
| Lagoon Creek CC    | 30           | 41             | 0                           | 8               | 20              |
| Sequoyah Nuclear   | 4            | 24             | 0                           | 7               | 17              |
| WBN                | 2            | 41             | 0                           | 7               | 25              |

Source: USEPA 2023g

### 4.8.3 Economics

In this subsection, major industries and employment and income data are presented for the TVA PSA, as compared with Division 6 and the U.S. TVA's contribution to state revenues through its tax equivalent payments is also provided.

#### 4.8.3.1 Regional Economy

The gross domestic product (GDP) for the TVA region for FY 2023 was estimated at \$685.5 billion, based on Bureau of Economic Analysis GDP data by state and Bureau of Labor Statistics county level employment data. In 2022, the top three industries for employment in the TVA PSA and Division 6, listed by rank highest to lowest, were: (1) educational services, health care, and social assistance industries; (2) manufacturing; and (3) retail trade. For the U.S., these were: (1) educational services, health care, and social assistance industries; (2) professional, scientific, management, administrative, and waste management industries; and (3) retail trade (USCB 2023f). TVA revenues in FY 2023 were \$12.1 billion, representing about 1.8 percent of the total TVA region economy.

In the TVA PSA and Division 6, the economy depends more on manufacturing than the U.S. as a whole. While the relative importance of manufacturing has been declining for years, this has occurred to a greater degree for the nation overall than for the TVA region, in the TVA PSA manufacturing jobs still employ 13.9 percent of the civilian working population, second among industrial sectors (USCB 2023f). Factors contributing to the high proportion of manufacturing include location with good access to markets in the Northeast, Midwest, Southwest, and the rest of the Southeast; good transportation; relatively low wages and cost of living; right-to-work laws; and abundant, relatively low-cost resources including land and electricity.

TVA plays an important role in the regional economy through its Economic Development program. TVA works to attract new businesses to the Tennessee Valley, engage with communities and existing companies to grow the economy, and partner with state, regional, and local economic development organizations to amplify job growth and capital investment in the region (TVA 2022b). TVA offers site selection services, incentives, research and technical assistance to help companies locate, stay, and expand existing operations in the Tennessee Valley (TVA 2020b). Development efforts target six key markets: aerospace and defense, automotive and mobility technologies, clean technologies, food and industrial technologies, information systems and security and life sciences (TVA 2023d). Table 4-17 shows the amount of capital investment by TVA for FY 2019 through FY 2025.

**Table 4-17: TVA Capital Investment Between 2019 and 2025**

| FY    | Capital Investment<br>(in billions of U.S. dollars) |
|-------|-----------------------------------------------------|
| 2019  | \$8.9                                               |
| 2020  | \$8.6                                               |
| 2021  | \$8.8                                               |
| 2022  | \$10.2                                              |
| 2023  | \$9.2                                               |
| 2024  | \$8.9                                               |
| 2025  | \$6.6                                               |
| Total | \$61.2                                              |

Source: TVA 2019b, TVA 2022b, TVA 2023d, TVA 2020c, TVA 2021b, TVA 2024a, TVA 2025a

#### **4.8.3.2 TVA-Contributions to State Economies and Revenues**

TVA produces approximately 92 percent of the electricity generated in Tennessee, a state that ranks 30<sup>th</sup> in the nation for total energy production, and seventh in the nation for production of hydroelectric power (USEIA 2023c, USEIA 2023e). TVA operations at BFN near Athens, Alabama is the major reason Alabama ranks fifth in the nation for nuclear power production (USEIA 2023d).

As required in the TVA Act, TVA makes tax equivalent payments, also known as payments in lieu of taxes, to states where TVA sells electricity or owns power system assets; these



states are the seven TVA PSA states and Illinois, where TVA owns coal reserves. TVA also makes payments directly to local governments where TVA owns power facilities. The tax equivalent payments total 5 percent of gross proceeds from the sale of power in the prior FY, with some exclusions.

Each state regulates how the payments are distributed to governmental entities across the state. In most of the eight states, the apportionment of funds is determined by the existence of TVA property and/or its value in proportion to the total value of TVA property in the state. Exceptions to this are in Alabama, Illinois, and Virginia. Illinois divides the majority of its funds among areas with TVA coal reserves. Rather than basing the distribution on the value of TVA property within its jurisdiction, Alabama and Virginia distribute payments to counties or cities receiving power services from TVA. Table 4-18 shows the amount of tax equivalent payments to states for TVA FYs 2019 through 2023. TVA's tax equivalent payments totaled \$600 million in FY 2025, with payments over the past 10 years totaling more than \$5.5 billion and more than \$17.5 billion since 1941.

**Table 4-18: Tax Equivalent Payments by TVA to States Where TVA Produces Power or Acquired Lands**

| State          | Tax Equivalent Payments (in millions of U.S. dollars, rounded) |         |         |         |         |
|----------------|----------------------------------------------------------------|---------|---------|---------|---------|
|                | 2019                                                           | 2020    | 2021    | 2022    | 2023    |
| Alabama        | \$85.8                                                         | \$87.6  | \$79.3  | \$82.6  | \$97.8  |
| Georgia        | \$9.0                                                          | \$9.2   | \$8.4   | \$8.5   | \$10.1  |
| Illinois       | \$.40                                                          | \$.40   | \$.30   | \$.40   | \$.40   |
| Kentucky       | \$38.9                                                         | \$34.4  | \$29.7  | \$31.8  | \$40.0  |
| Mississippi    | \$41.9                                                         | \$42.8  | \$38.2  | \$39.3  | \$47.2  |
| North Carolina | \$3.1                                                          | \$3.4   | \$3.0   | \$3.1   | \$3.9   |
| Tennessee      | \$367.3                                                        | \$372.8 | \$339.5 | \$345.1 | \$410.0 |
| Virginia       | \$1.3                                                          | \$1.2   | \$1.1   | \$1.1   | \$1.3   |

Source: TVA 2019b, TVA 2020d, TVA 2021c, TVA 2022c

#### 4.8.3.3 Employment

In 2022, the participation rate of the civilian labor force, defined as the percentage of the population aged 16 or more that is either working or actively looking for work, was estimated to be 5.1 million, or 60.1 percent, in the TVA PSA. In comparison, the participation rate of the civilian work force was less than the nation (62.2 percent) but more than Division 6 (59.2 percent). The unemployment rate in the TVA PSA was 5.0 percent, lower than the nation (5.3 percent) and Division 6 (5.3 percent) during the same time period. There was considerable geographic variation in unemployment rates with adjacent counties sometimes having large differences. Unemployment rates across the TVA PSA range from a low of 0.8 percent in Trousdale County, Tennessee, located within the Nashville-Davidson-Murfreesboro-Franklin, Tennessee, metropolitan area, to a high of 14.1 percent in the rural county of Kemper County, Mississippi (USCB 2023f).



In 2022, the TVA PSA and Division 6 had similar percentages of people employed in various occupations as shown in Table 4-19. The TVA PSA had a higher percentage of employees in production, transportation, and material moving fields (17.7 percent) as compared to the nation (13.1 percent) (USCB 2023f).

**Table 4-19: Employment in Occupations in the TVA PSA, Division 6, and U.S.**

| Geography  | Percent Employed in:              |         |                  |                                         |                                             |
|------------|-----------------------------------|---------|------------------|-----------------------------------------|---------------------------------------------|
|            | Mgt., Business, Science, and Arts | Service | Sales and Office | Natural Res., Construction, Maintenance | Production, Transportation, Material Moving |
| U.S.       | 41.0                              | 16.8    | 20.5             | 8.7                                     | 13.1                                        |
| Division 6 | 33.6                              | 16.1    | 20.8             | 9.1                                     | 17.5                                        |
| TVA PSA    | 36.5                              | 15.7    | 20.9             | 9.2                                     | 17.7                                        |

Source: USCB 2023f

As discussed in Section 4.8.3.1, TVA's Economic Development program fosters job growth throughout the PSA by forming partnerships with state, regional, and local economic development organizations. TVA's efforts bring greater opportunities for businesses and working people in the cities and rural communities it serves. Table 4-20 shows the number of TVA-assisted jobs between 2019 and 2025. New and retained job numbers reported by TVA are certified and provided to TVA by its customers, defined as an entity that purchases or distributes power from TVA. New jobs are defined as newly created, paid positions (including contract jobs) at a facility of a TVA customer. Retained jobs are paid positions (including contract jobs) at a facility of a TVA customer that was created prior to the current TVA FY and that continue to be filled in the current TVA FY (TVA 2023d).

**Table 4-20: TVA-Assisted Jobs Between 2019 and 2025**

| FY   | New Jobs | Retained Jobs | Total Jobs |
|------|----------|---------------|------------|
| 2019 | 21,400   | 45,100        | 66,500     |
| 2020 | 19,000   | 48,000        | 67,000     |
| 2021 | 22,550   | 58,350        | 80,900     |
| 2022 | 26,500   | 40,000        | 66,500     |
| 2023 | 12,275   | 46,125        | 58,400     |
| 2024 | 10,360   | 42,390        | 52,750     |
| 2025 | 9,316    | 43,254        | 52,570     |

Source: TVA 2019c, TVA 2020c, TVA 2021b, TVA 2022d, TVA 2023a, TVA 2024b, 2025a

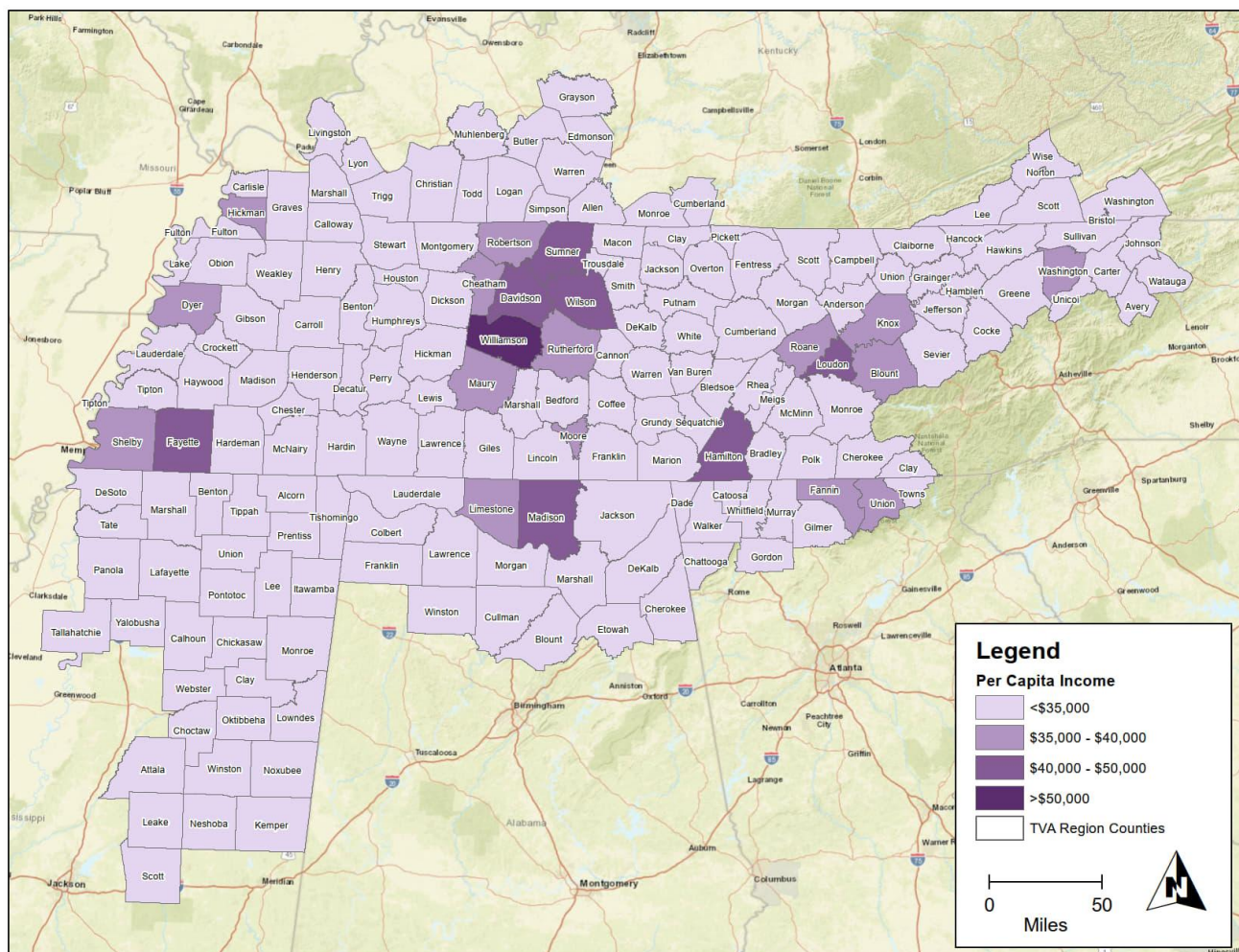
### **TVA Regional Employment**

TVA employs a total of 5,118 people at 62 generating facilities throughout its PSA. BFN, near Athens, Alabama, accounts for just over 26 percent of the total number of TVA plant employees. Two other facilities, WBN near Spring City in East Tennessee, and Sequoyah Nuclear Plant near Soddy-Daisy, Tennessee (north of Chattanooga), together account for an

additional 36 percent of the total number of employees. The number of power plant employees has decreased in recent years as fossil plants have been retired.

#### 4.8.3.4 Income

In 2022, per capita income in the TVA PSA ranged from \$19,695 (Lake County, Tennessee) to \$61,451 (Williamson County, Tennessee). Only five counties in the TVA PSA had incomes above the nation's per capita income of \$41,261. Four of the five were located in Tennessee (Williamson County, Davidson County, Wilson County, and Hamilton County). One county was located in Madison County, Alabama. Each of these counties were located within a metropolitan area. Per capita income in Division 6 was \$33,716. Within the TVA PSA, only 29 counties had per capita income greater than the Division, indicating that higher per capita income concentrates in few areas in the TVA PSA. Figure 4-26 illustrates the differences in per capita income rates of TVA-region counties (USCB 2023f).



Source: USCB 2023f, USCB 2023b

**Figure 4-26: Per Capita Incomes of TVA PSA Counties**

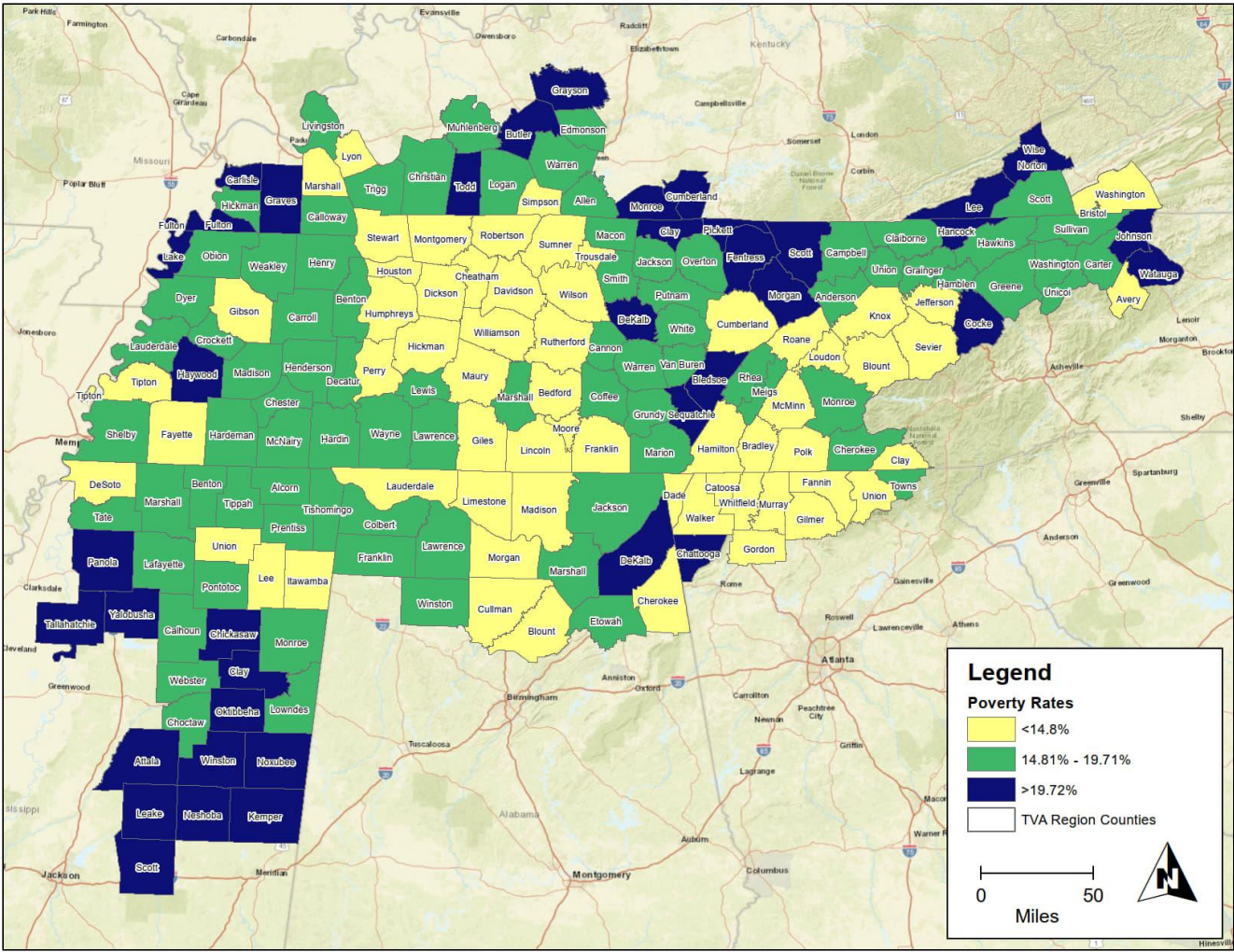
The TVA PSA considered for low-income communities consists of 181 counties and two independent cities in seven states, including all counties in Tennessee and portions of

Alabama, Georgia, Kentucky, Mississippi, North Carolina, and Virginia (see Appendix B-1 for a complete list of counties considered). Low-income populations were defined as those with poverty rates above the TVA PSA average rate of 14.8 percent. Additional low-income populations were identified at the census tract level using poverty rates reported in the 2022 ACS (USCB 2023e).

The percentage of the TVA PSA population living below the poverty level was 14.8 percent. Within the TVA PSA, 124 counties and two independent cities had poverty rates above the PSA average, as illustrated in Figure 4-27. The 2022 ACS estimates for per capita income and the percentage of the population living in poverty for PSA counties are included in Appendix B-2 (USCB 2023e).

A total of 1,196 census tracts in 178 counties or independent cities and seven states had poverty rates above the TVA PSA average. Low-income census tracts are in all but five counties of the TVA PSA. The per capita income levels and poverty rates from the 2022 ACS are included in Appendix B-3 (USCB 2023g).





Source: USCB 2023f, USCB 2023b

Figure 4-27: Poverty Rates of Counties in the TVA PSA

## 5 Anticipated Environmental Impacts

This chapter describes the anticipated environmental impacts of the portfolios resulting from the alternative strategies, sensitivities, and the Preferred Alternative. The chapter addresses the general process TVA uses to site new power facilities and the potential environmental impacts of the continued operation of TVA's supply-side generating facilities, facilities from which TVA purchases power through PPAs, and the generating facilities that TVA is likely to own or purchase power from in the future. The major supply-side generation resource types considered in the IRP include nuclear, hydroelectric, coal, natural gas, renewables, and storage (Figure 5-1). The chapter then describes the environmental impacts of distributed and demand-side resource types, including distributed generation, distributed storage, EE programs, and DR programs. These are followed by a description of the environmental impacts of the construction and upgrading of the transmission system necessary to support future generating facilities. Finally, this chapter describes potential mitigation measures and commitment of resources.

| Major Resource Type(s) |  Nuclear                                                                             |  Hydro |  Coal                                                  |  Gas                                                                                                       |  Renewables                                                          |  Storage                                                                    |  EE and DR |
|------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|
| Resource Technologies  | <ul style="list-style-type: none"> <li>Advanced pressurized water reactor</li> <li>Light water small modular reactor</li> <li>Gen IV small modular reactor</li> </ul> | <ul style="list-style-type: none"> <li>Hydro uprates</li> </ul>                         | <ul style="list-style-type: none"> <li>Supercritical pulverized coal</li> <li>Supercritical pulverized coal w/carbon capture</li> </ul> | <ul style="list-style-type: none"> <li>Combined cycle</li> <li>Combined cycle w/carbon capture</li> <li>Combustion turbine</li> <li>Aeroderivative</li> <li>Reciprocating engine</li> </ul> | <ul style="list-style-type: none"> <li>Utility scale solar</li> <li>Distributed solar</li> <li>Midwest wind</li> <li>Southeast high-hub wind</li> </ul> | <ul style="list-style-type: none"> <li>Pumped storage</li> <li>Lithium-ion battery</li> <li>Advanced chemistry battery</li> <li>Distributed storage</li> </ul> | <ul style="list-style-type: none"> <li>Energy efficiency</li> <li>Demand response</li> </ul>  |

Hydro - hydroelectric

**Figure 5-1: Summary of Resource Options**

### 5.1 Facility Siting and Review Processes

When planning new generating facilities, TVA uses several criteria to screen potential sites. Generating facilities are often needed in specific parts of the TVA PSA to support the efficient operation and reliability of the transmission system. Once a general area is identified, sites are screened by numerous engineering, environmental, and financial criteria. Specific screening criteria include regional geology and local terrain; proximity to major highways, railroads and barge access; proximity to major natural gas pipelines; proximity to high-voltage transmission lines; land use and land ownership; regional air quality; sources of process water; the presence of and proximity to floodplains; proximity to parks, natural areas and recreation areas; potential impacts to endangered and threatened species, wetlands, and historic properties; and potential impacts to low-income populations. Through this systematic process, TVA attempts to minimize the potential environmental impacts of the construction and operation of new generating facilities.

New transmission facilities are typically required to transmit power between two defined points or to improve transmission capacity and/or reliability in a defined area. As with generating facilities, potential transmission line routes, substation locations, and switching station locations are screened by numerous engineering, environmental and financial criteria. Specific screening criteria include slope; the presence of highways, railroads, and airports; land use and land ownership patterns; proximity to occupied buildings, parks and recreation areas; and potential impacts to endangered and threatened species, floodplains, waterways, wetlands, and historic properties. TVA also provides for and encourages participation by potentially affected landowners in this screening process.

TVA is not responsible for the siting and operation of natural gas pipelines that may have to be built to serve new natural gas plants. Instead, TVA purchases natural gas service from pipeline companies who are responsible for constructing and operating the pipeline. Construction and operation of natural gas pipelines are subject to various state and federal environmental requirements, depending on how and where constructed. If a pipeline is built specifically to serve a new TVA plant, TVA may be required to evaluate the potential environmental impacts.

The results of the site screening process, as well as the potential impacts of the construction and operation of generating and transmission facilities at the screened alternative locations, are described in comprehensive environmental review documents made available to the public, consistent with the requirements of NEPA. During this environmental review process, TVA consults with the appropriate SHPO on the potential impacts to historic properties and, as necessary, with the USFWS and relevant state agencies on the potential impacts to federal and/or state endangered and threatened species and their designated critical habitats.

Independent power producers, from whom TVA purchases power under long-term PPAs, typically use a site screening process like the TVA process described above for new generating facilities. Depending on the location of the facility, approval by state and/or local authorities may also be necessary. The action by TVA of entering into a long-term PPA is subject to the requirements of NEPA and other environmental laws and regulations, and TVA conducts comprehensive environmental reviews of generating facilities that independent power producers propose to construct in order to provide power to TVA under long-term PPAs.

## **5.2 Environmental Impacts of Supply-Side Resource Options**

Because the locations of most future generating facilities are not known during the Integrated Resource Planning process, this assessment focuses on general impact areas, i.e., it is not location specific. TVA will address the site-specific effects associated with specific projects that are proposed to implement the IRP in subsequent tiered environmental reviews. Impact areas are described generally below and in detail in the following subsections.



**Air Quality.** The potential impacts to air quality are described by the direct emissions of SO<sub>2</sub>, NO<sub>x</sub>, and mercury, and are quantified by the amounts emitted per unit of electricity generated and the total amounts emitted under each of the alternative strategies and portfolios during the 25-year planning period.

**Climate and Greenhouse Gases.** GHG emissions are assessed for both direct emissions of CO<sub>2</sub>, from the combustion of non-renewable carbon-based fuels, and life cycle GHG emissions, which include direct and indirect emissions of CO<sub>2</sub>, CH<sub>4</sub>, and N<sub>2</sub>O. Life cycle GHG emissions include emissions from the construction, operation, and decommissioning of generating facilities; the extraction or production, processing, and transportation of fuels; and the management of spent fuels and other wastes. Because life cycle GHG emissions have not been specifically determined for TVA's generating facilities, the estimates used in this assessment are based on technology-specific resource estimates provided to TVA by the NLR, based off its seminal Life Cycle Analysis (LCA) Harmonization Project (see Section 5.5.2 and Appendix D for additional information). GHG emissions are provided for all four life cycle phases and broken out by the three primary GHGs of concern (CO<sub>2</sub>, CH<sub>4</sub>, and N<sub>2</sub>O). Indirect emissions produced during the upstream, ongoing non-combustion, and downstream phases are calculated using emissions factors provided by NLR, which are based on either installed capacity (in kW) or per unit of electricity generated (in kWh). Where distinguishable and unless otherwise stated, the LCA values described below do not include impacts associated with the transmission and distribution of the electricity generated by the various facilities.

The 2026 IRP approach to evaluating life cycle GHG emissions for all generation resources discussed in this section, new or existing, is further detailed in Volume 2, Section 5.5.2. For coal- and natural gas-fired plants, the largest source of life cycle GHG emissions is CO<sub>2</sub> from the ongoing combustion phase. For nuclear, hydroelectric, wind, solar, biomass, pumped storage plants, and battery facilities, the largest source of life cycle GHG emissions is CO<sub>2</sub> from the upstream phase, representing emissions occurring during plant construction, including raw material extraction. For additional information, see Section 5.5.2 and Appendix D.

**Water Resources.** The impacts of water pollutants discharged from a generating facility are highly dependent on site- and facility-specific design features, including measures to control or eliminate the discharge of water pollutants, which are not addressed here. The impacts of the process water used and consumed by a thermal generating facility (primarily for cooling) depend on the characteristics of the source area of water withdrawals and of the water bodies where process water is discharged. The quantities of process water used and consumed are indicators of the magnitude of these impacts. Facilities with open-cycle cooling systems withdraw and discharge large quantities of water. Facilities with closed-cycle cooling systems use less water but consume (typically by evaporation) a large proportion of it. Water use and consumption are quantified by the volumes used and consumed per unit of

electricity generated and the total volumes used and consumed under each of the alternative strategies and portfolios. These water quantities are described for the TVA system, as well as by major river basin and whether from surface or groundwater sources.

**Land Resources.** Land requirements for the alternative strategies and portfolios are quantified by both the facility land requirements and life cycle land requirements. These land requirements are indicators of the potential for impacts to land-based resources such as vegetation, wildlife, endangered and threatened species, cultural resources (e.g., archaeological sites and historic structures), land use, prime farmland, visual/aesthetic resources, managed and natural areas, recreation, and aquatic resources. While this analysis assumes that the potential for impact increases with the land area affected, the kind of impact and its potential severity would vary depending on site-specific conditions and locations, as well as on the type of facility.

The facility land requirement is the land area permanently disturbed by the construction of the generating unit. It does not include adjacent lands that are part of the facility site and maintained in a natural or semi-natural state as buffers or exclusion zones. Facility land requirements were determined from a variety of sources, including characteristics of TVA facilities, both existing and under development; characteristics of comparable facilities recently constructed or proposed elsewhere in the country; and various published reports on this topic. The facility land requirement given for each strategy and portfolio is the total acreage permanently disturbed by the construction of new generating facilities during the planning period.

The life cycle land requirement is a measure of the land area transformed during the life cycle of a generating facility, expressed in terms of units of area per amount of electricity generated. This land includes the facility site; adjacent buffer areas; lands used for fuel extraction or production, processing, and transportation; and land used for managing spent fuels and other wastes. Some of the land areas, such as the facility site, are transformed for decades while others, such as some mine lands, are transformed for shorter time periods. These differing time periods are considered in the development of the LCA. The estimates used in the following descriptions are based on published LCAs (e.g., Fthenakis and Kim 2009, Jordaan et al. 2017). Published life cycle land requirement information is not available for some of the generating and storage facilities under consideration. For some other facilities, the available published information is based on facilities with substantial differences from current or proposed TVA facilities in important components such as the length of natural gas pipelines and therefore not readily applicable to TVA facilities.

Life cycle land requirements can also be expressed with a land-use metric that accounts for the total surface area occupied by the materials and products used by a facility, the time the land is occupied, and the total energy generated over the life of the facility (Spitzley and Keoleian 2005, AEFPERR 2009). The rank order by energy technology reported for a sample of U.S. facilities, from the smallest to the largest land requirements, is natural gas, nuclear,

coal, wind, solar PV, and conventional hydroelectric. The large land requirements for hydroelectric include the reservoirs, which typically have other uses; note that TVA is only considering uprates to its existing hydro facilities in the IRP, not new reservoirs. The topic of land intensity is further covered in Volume 1, Appendix J.

**Fuel Consumption.** The amount of fuel consumed relates to the potential impacts of the extraction or production, processing, and transportation of fuels. Fuel consumption is quantified by the amount consumed per unit of electricity generated and the total amount consumed under each of the alternative strategies and portfolios. In addition to coal, coal plants equipped with scrubbers or circulating fluidized bed boilers use limestone ( $\text{CaCO}_3$ ) or slaked lime ( $\text{Ca}[\text{OH}]_2$ ) as a reagent to reduce  $\text{SO}_2$  emissions. The quantity of limestone or lime consumed is a function of the quantity and the  $\text{SO}_2$  content of coal consumed. As with coal, the quarrying, processing, and transportation of limestone and lime affects air, water, and land resources.

**Solid and Hazardous Waste.** The potential for impacts from the generation and disposal of solid wastes are assessed by the quantities of coal ash, scrubber sludge (i.e., synthetic gypsum and related materials produced by flue gas desulfurization systems), and high-level radioactive waste (spent nuclear fuel). These are quantified by the amounts produced per unit of electricity generated and the total amounts under each of the alternative strategies and portfolios.

**Socioeconomics.** Generally, socioeconomics in the TVA PSA are impacted by larger trends throughout the U.S. Generally, new generating facilities have the potential to benefit the local communities through employment or tax equivalent payments. Conversely, as facilities reach end of life, this may result in the loss of local employment; however, due to anticipated growth of employment opportunities in the regional economy, employees may find alternative employment in other industries. Generally, while minimal impacts to socioeconomic resources are anticipated from TVA generation proposals, the potential adverse effects on all communities will be determined by a future site-specific analysis of impacts.

Following is a discussion of the environmental attributes of the generation options. Typical environmental characteristics of new supply-side resources selected in the capacity expansion plans are listed in Table 5-1. Some environmental characteristics listed in Table 5-1 are dependent on their location and on the detailed facility design and are difficult to quantify without more detailed engineering analyses. The various types of generating facilities are described in Volume 1, Section 2.6 and Volume 2, Section 2.1. It is important to note there are comprehensive environmental laws and regulations that address almost all activities associated with the construction and operation of new industrial facilities, particularly energy generation facilities. This regulatory umbrella ensures the environmental impacts associated with energy resources are acceptable and, in general, public health and the environment are adequately protected.

**Table 5-1: Environmental Characteristics of New Supply-Side Resources Included in Alternative Strategies**

| Resource Option <sup>1</sup> |                                                 | Summer NDC or Nameplate (MW) | Summer Full-Load Heat Rate (British thermal units [Btu]/kWh) | Storage Efficiency (%) | CO <sub>2</sub> Emissions (lbs/MWh) | SO <sub>2</sub> Emissions (lbs/MWh) <sup>3</sup> | NO <sub>x</sub> Emissions (lbs/MWh) | Hg Emissions (lbs/MWh) | Process Water Use (Gallons/MWh) | Process Water Consumption (Gallons/MWh) | Facility Land Requirements (Acres/MW) | Facility Land Requirements Permanently Disturbed (Acres) |
|------------------------------|-------------------------------------------------|------------------------------|--------------------------------------------------------------|------------------------|-------------------------------------|--------------------------------------------------|-------------------------------------|------------------------|---------------------------------|-----------------------------------------|---------------------------------------|----------------------------------------------------------|
| Nuclear                      | APWR                                            | 1,110                        | 10,132                                                       | -                      | -                                   | -                                                | -                                   | -                      | 1,289                           | 859                                     | 0.40                                  | 460                                                      |
|                              | SMR – Light Water (First-of-a-Kind)             | 285                          | 10,713                                                       | -                      | -                                   | -                                                | -                                   | -                      | 719                             | 539                                     | 0.63                                  | 180                                                      |
|                              | SMR – Light Water (Nth-of-a-Kind)               | 285                          | 10,713                                                       | -                      | -                                   | -                                                | -                                   | -                      | 719                             | 539                                     | 0.63                                  | 180                                                      |
|                              | SMR – Gen IV (reactor / with storage)           | 345/500                      | 8,308                                                        | -                      | -                                   | -                                                | -                                   | -                      | 719                             | 539                                     | 0.63/0.08                             | 229                                                      |
| Hydro                        | Hydro Uprates                                   | 200                          | -                                                            | -                      | -                                   | -                                                | -                                   | -                      | -                               | -                                       | -                                     | -                                                        |
| Coal                         | SCPC                                            | 650                          | 10,548                                                       | -                      | 1,160                               | 0.333                                            | 1.194                               | 2.98E-09               | 82,445                          | 329                                     | 0.69                                  | 449                                                      |
|                              | SCPC with CCS                                   | 650                          | 10,548                                                       | -                      | 116                                 | 0.333                                            | 1.194                               | 2.98E-09               | 82,445                          | 329                                     | 0.69                                  | 449                                                      |
| Gas                          | CC – 3x1x1                                      | 2,145                        | 6,665                                                        | -                      | 397                                 | -                                                | 0.081                               | -                      | 250                             | 195                                     | 0.08                                  | 114                                                      |
|                              | CC with CCS – 2x1x1                             | 1,430                        | 7,832                                                        | -                      | 40                                  | -                                                | 0.081                               | -                      | 250                             | 195                                     | 0.08                                  | 114                                                      |
|                              | Frame CT– 4x                                    | 884                          | 10,087                                                       | -                      | 590                                 | -                                                | 0.363                               | -                      | 130                             | 130                                     | 0.10                                  | 88                                                       |
|                              | Aero CT – 20x                                   | 1,060                        | 9,392                                                        | -                      | 548                                 | -                                                | 0.337                               | -                      | 130                             | 130                                     | 0.08                                  | 85                                                       |
|                              | RICE – 24x                                      | 426                          | 8,607                                                        | -                      | 504                                 | -                                                | 0.310                               | -                      | 130                             | 130                                     | 0.15                                  | 64                                                       |
| Solar                        | Solar Single-Axis Tracking (nameplate capacity) | 50                           | -                                                            | -                      | -                                   | -                                                | -                                   | -                      | -                               | -                                       | 7.30                                  | 365                                                      |
| Wind                         | Wind - Midwest                                  | 200                          | -                                                            | -                      | -                                   | -                                                | -                                   | -                      | -                               | -                                       | 0.80                                  | 160                                                      |
|                              | Wind – Southeast High-hub                       | 200                          | -                                                            | -                      | -                                   | -                                                | -                                   | -                      | -                               | -                                       | 1.00                                  | 200                                                      |
| Storage                      | Pumped Storage                                  | 1,212                        | -                                                            | 81                     | -                                   | -                                                | -                                   | -                      | -                               | -                                       | 0.88                                  | 1,067                                                    |
|                              | Battery – Lithium-ion (4-hour)                  | 50                           | -                                                            | 85                     | -                                   | -                                                | -                                   | -                      | -                               | -                                       | 0.08                                  | 4                                                        |
|                              | Battery – Advanced Chemistry (8-hour)           | 50                           | -                                                            | 85                     | -                                   | -                                                | -                                   | -                      | -                               | -                                       | 0.08                                  | 4                                                        |

<sup>1</sup> APWR – Advanced Pressurized Water Reactor; SMR – Small Modular Reactor; Hydro – Hydroelectric power sources; CCS – Carbon Capture and Sequestration; CC – Combined Cycle; CT – Combustion Turbine; RICE – Reciprocating Internal Combustion Engine; SCPC – Supercritical Pulverized Coal

<sup>2</sup> Solar, wind and storage are in nameplate.

<sup>3</sup> Trace amounts of SO<sub>2</sub> emissions (USEPA default emission rate of 0.0006 lb/million Btu [mmBtu] [40 CFR Part 75, Appendix D]) associated with sulfur-containing odorants added to pipeline-delivered natural gas not included.

## 5.2.1 Fossil-Fueled Generation

### 5.2.1.1 Coal – Existing Facilities

TVA currently operates 24 coal-fired generating units at 4 plant sites (see Section 2.3.1). FGD systems for SO<sub>2</sub> control and SCR systems for NO<sub>x</sub> emissions control have been installed at 17 of these units. The plants with these FGD and SCR systems include TVA's largest coal units and total about 6,000 MW of generating capacity. The remaining coal-fired units use other methods to reduce SO<sub>2</sub> and NO<sub>x</sub> emissions including the use of low sulfur coal (LSC), low-NO<sub>x</sub> burners (LNB), and selective non-catalytic NO<sub>x</sub> reduction systems.

While the life cycle GHG emissions for individual TVA coal plants have not been calculated, several studies have calculated these emissions for comparable coal plants. Spitzley and Keoleian (2005) found an emission rate of 1,060 tons CO<sub>2</sub> equivalent emissions (CO<sub>2</sub>e) per GWh (961 kg/MWh) for pulverized coal (PC) boilers without advanced emissions control systems, comparable to seven of the SHF units. The National Energy Technology Laboratory (NETL; NETL 2010b) calculated a life cycle GHG emissions rate of 1,226 tons CO<sub>2</sub>e/GWh (1,112 kg/MWh) for a PC plant equipped with an electrostatic precipitator, SCR, and scrubber, comparable to KIF, GAF, and two SHF units. NETL (2010c) calculated a life cycle GHG emissions rate of 1,045 tons CO<sub>2</sub>e/GWh (948 kg/MWh) for a supercritical pulverized coal plant (SCPC) equipped with an electrostatic precipitator, FGD and SCR, comparable to CUF.

For the 2026 IRP, TVA partnered with NLR to source life cycle GHG emissions factors for use in a system-wide GHG life cycle assessment (see Section 5.5.2). Existing coal resources were split between subcritical designation, including KIF, GAF, and SHF, and supercritical designation which included CUF (Table 5-2). The largest source of life cycle GHG emissions from these coal plants is CO<sub>2</sub> from coal combustion, accounting for more than 80 percent of GHG emissions across all life cycle phases. The ongoing non-combustion phase contains the second largest source of life cycle GHG emissions, accounting for emissions associated with coal mining, coal transportation, and other ongoing activities required to keep the plant fueled and operational. The two primary GHG emissions in the ongoing non-combustion phase are CO<sub>2</sub> and CH<sub>4</sub>. For additional information, see Section 5.5.2 and Appendix D.

**Table 5-2: Coal Emissions Factors by Phase**

| Electric Power Technology | One-Time Upstream GHG (CO <sub>2</sub> e), g/kW | Ongoing Annual Combustion GHG (CO <sub>2</sub> e), g/kW-hr | Ongoing Annual Non-Combustion GHG (CO <sub>2</sub> e), g/kW-hr | One-Time Downstream GHG (CO <sub>2</sub> e), g/kW |
|---------------------------|-------------------------------------------------|------------------------------------------------------------|----------------------------------------------------------------|---------------------------------------------------|
| Coal, Supercritical       | 867,240                                         | Emissions Calculated Separately <sup>1</sup>               | 10                                                             | 67,100                                            |
| Coal, Subcritical         | 708,246                                         | Emissions Calculated Separately <sup>1</sup>               | 4.9                                                            | 67,100                                            |

<sup>1</sup>Emissions are determined in the GHG LCA using individual plant heat rates and estimated carbon content of the fuel (~210 lbs/mmBtu for coal, depending on fuel basin)

The Red Hills plant in Mississippi, operated by a private entity under a long-term PPA with TVA, burns lignite coal from an adjacent surface mine. Relative to the average for TVA's coal plants, the Red Hills CO<sub>2</sub> emissions rate is high due to the low heat rate of the plant and low fuel energy content. Like the TVA coal plants with FGD systems, Red Hills uses limestone to reduce SO<sub>2</sub> emissions. The plant occupies about 320 acres, and its fuel cycle disturbs about 275 acres/year, equivalent to 0.09 acre/GWh of energy generated. It uses groundwater in a closed-cycle cooling system with no discharges to receiving water bodies.

Coal plants produce large quantities of ash and, if equipped with FGD systems, calcium-based residues (see Section 4.7). Although some of these CCR are recycled for a range of beneficial uses, large quantities are typically permanently stored in closed impoundments or landfills at or near coal plants. These facilities can occupy tens to hundreds of acres. TVA will continue to manage ash and other residues consistent with applicable law and regulatory requirements, including the USEPA’s CCR Rule.

### 5.2.1.2 Coal – New Facilities

No new coal facilities were selected in any of the IRP portfolios based on cost and portfolio fit.

### 5.2.1.3 Natural Gas – Existing Facilities

The construction and operational impacts of TVA’s recently constructed frame-type CT and CC plants are described in several EISs and EAs (see Appendix E). Natural gas-fired plants do not emit mercury and emit very little SO<sub>2</sub>. Per the USEPA’s *Compilation of Air Pollutant Emissions Factors from Stationary Sources* (AP-42) guidelines for natural gas combustion, “sulfur-containing odorants are added to natural gas for detecting leaks, leading to small amounts of SO<sub>2</sub> emissions (USEPA 2026b).” Direct emissions of NO<sub>x</sub> (usually controlled by water or steam injection and/or SCR systems) and CO<sub>2</sub> are low relative to other fossil plants. CT plants require minimal amounts of process water. TVA’s CC plants use closed-cycle cooling, as do most other CC plants.

In the system-wide GHG life cycle assessment conducted by TVA with support from NLR (Section 5.5.2), existing and new gas resources were split between CC, CC with carbon capture, and simple cycle Frame CT designations (including Frame CT, Aero CT, and RICE) (Table 5-3). The largest source of life cycle GHG emissions from gas plants without carbon capture is CO<sub>2</sub> from natural gas combustion. The ongoing non-combustion phase contains the second largest source of life cycle GHG emissions, accounting for emissions associated with gas extraction, gas transportation, methane leakage, and other ongoing activities required to keep the plant fueled and operational. The two primary GHG emissions in the ongoing non-combustion phase are CO<sub>2</sub> and CH<sub>4</sub>. For the 2026 IRP, NLR performed an updated literature review for natural gas plants utilizing CCS, and the results of this review are reflected in the emission factor values. For additional information, see Section 5.5.2 and Appendix D.

**Table 5-3: Natural Gas Emissions Factors by Phase**

| Electric Power Technology | One-Time Upstream GHG (CO <sub>2</sub> e), g/kW | Ongoing Annual Combustion GHG (CO <sub>2</sub> e), g/kW-hr | Ongoing Annual Non-Combustion GHG (CO <sub>2</sub> e), g/kW-hr | One-Time Downstream GHG (CO <sub>2</sub> e), g/kW |
|---------------------------|-------------------------------------------------|------------------------------------------------------------|----------------------------------------------------------------|---------------------------------------------------|
| CC                        | 100,000                                         | Emissions Calculated Separately <sup>1</sup>               | 62.00                                                          | 4,070                                             |
| CC with CCS               | 1,400,000                                       | Emissions Calculated Separately <sup>1</sup>               | 110                                                            | 4,300                                             |



| Electric Power Technology | One-Time Upstream GHG (CO <sub>2</sub> e), g/kW | Ongoing Annual Combustion GHG (CO <sub>2</sub> e), g/kW-hr | Ongoing Annual Non-Combustion GHG (CO <sub>2</sub> e), g/kW-hr | One-Time Downstream GHG (CO <sub>2</sub> e), g/kW |
|---------------------------|-------------------------------------------------|------------------------------------------------------------|----------------------------------------------------------------|---------------------------------------------------|
| CT                        | 64,790                                          | Emissions Calculated Separately <sup>1</sup>               | 70.00                                                          | 2,600                                             |

<sup>1</sup>Emissions are determined in the GHG LCA using individual plant heat rates and estimated carbon content of the fuel (~117 lbs/mmBtu for natural gas)

#### 5.2.1.4 Natural Gas – New Facilities

Natural gas resource options in the IRP include CC, CC with CCS, frame CT, Aero CT, and RICE.

Land area requirements for CT and CC plants are based on those of TVA's newest frame-type CT and CC plants, which show little correlation between land area and capacity. Land area requirements for RICE and Aero CT plants are based on published reports or calculated from aerial photographs of existing plants elsewhere in North America. Fthenakis and Kim (2009) estimated a life cycle land requirement of approximately 0.076 acres/GWh for a natural gas-fired plant using gas from conventional sources. Jordaan et al. (2017) found a life cycle land requirement of 0.153 acres/GWh in an analysis of several CC and CT plants in Texas fueled by natural gas from the Barnett Shale area in Texas. The largest contributor to the land requirement was the pipeline infrastructure, which accounted for about 74 percent of the land requirement. Gathering pipelines, which connect well sites with transmission pipelines, were the largest component of the pipeline infrastructure. The power plant was also a large contributor to the land requirement, with lower efficiency CT plants requiring more land than higher efficiency CC plants.

TVA is not responsible for the siting and operation of natural gas pipelines that may be built to serve new natural gas plants. Instead, TVA purchases natural gas service from pipeline companies that are responsible for constructing and operating the pipeline. Construction and operation of natural gas pipelines are subject to site specific environmental reviews and compliance with various state and federal environmental requirements, rules and laws depending on how and where constructed. TVA may be required to evaluate potential environmental impacts associated with the construction of pipelines that would serve TVA facilities.

TVA's experience with constructing natural gas generation plants is generally consistent with these studies. TVA has reviewed numerous environmental review documents that address the construction of new natural gas plants to provide additional information on potential impacts associated with new natural gas plants. Table 5-4 includes generic construction impacts data (averages) associated with NEPA reviews of nine TVA projects between 2010 and 2025 (ALF Emission Control Project; Paradise and Colbert CT Plants; CUF Retirement; John Sevier Fossil Plant; and Johnsonville Aero CT Project; KIF Retirement; New Caledonia Gas Project; and A CT Project). The data includes associated pipeline infrastructure but

excludes associated new transmission line construction. In each case, TVA constructed a new plant at or near an existing TVA facility; construction at previously disturbed sites typically reduces impacts to the environment. The actual effects of future projects may vary greatly, with greater or lesser effects based on the nature and size of a particular project.

The construction of these TVA plants directly affected an average of 244.9 acres or approximately 0.3 acre per MW. Of the nine projects, the land requirements varied greatly, with the smallest project affecting only 51 acres (0.07 acre per MW), including transmission and pipeline infrastructure areas. Many of the impacts were temporary in nature and/or were mitigated in some manner. These projects historically have impacted an average of about 17.6 acres of floodplains (0.01 acre per MW) and 79.2 acres of prime farmland (0.05 acres per MW) and have required the clearing of 157.4 acres of forest (0.1 acre per MW). Average aquatic impacts include 5.8 acres of wetlands and forested wetlands affected (0.0004 acre per MW). A third of the projects affected streams, with impacts to an average of 1,705 linear feet (0.002 linear foot per MW) of streams. Four of the nine projects affected migratory birds of concern, and five of the nine projects affected federally listed endangered or threatened species (e.g., bat habitat impacts). The cultural and social impacts affected five of the nine projects, with impacts to parks and public lands to some degree, with the same number of projects resulting in negative visual effect in the area. There were no reported impacts on historic properties.

**Table 5-4: Generic Construction Effects of Natural Gas Generation Plants (TVA Projects 2010-2025)**

| <b>Land Use Effects</b>     |                                                                                                                                                                                                             |
|-----------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Land Requirements           | Average of 244.9 acres per project<br>Range: 51 to 894 acres<br>Average of 0.3 acre per MW<br>Range 0.09 to 0.6 acre per MW                                                                                 |
| Floodplain Impacted (Acres) | Average of 17.6 acres per project<br>Range: 0 to 150 acres<br>Average of 0.01 acre per MW<br>Range: 0 to 0.1 acre per MW<br>22% (2 of 9) of natural gas projects resulted in floodplain impacts             |
| Prime Farmland Converted    | Average of 79.2 acres per project<br>Range: 0 to 586 acres<br>Average of 0.05 acre per project<br>Range: 0 to 0.4 acre per MW<br>33% (3 of 9) of natural gas projects resulted in prime farmland conversion |
| <b>Land Cover Impacts</b>   |                                                                                                                                                                                                             |
| Forest Cleared              | Average of 157.4 acres per project<br>Range: 0 to 696.2 acres<br>Average of 0.1 acre per MW<br>Range of 0 to 0.48 acre per MW<br>77% (7 of 9) of natural gas projects in forest clearing                    |

| <b>Wetland Effects</b>               |                                                                                                                                                                                                                  |
|--------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Wetland Area Affected                | Average of 5.5 acres per project<br>Range: 0 to 47.5 acres<br>Average of 0.003 acre per MW<br>Range: 0 to 0.03 acre per MW<br>66% (6 of 9) of natural gas projects affected wetlands                             |
| Forested Wetland Area Cleared        | Average of 0.3 acre per project<br>Range: 0 to 2.1 acres<br>Average of 0.0002 acre per MW<br>Range of 0 to 0.0014 acre per MW<br>33% (3 of 9) of natural gas projects resulted in forested wetland clearing      |
| <b>Stream Effects</b>                |                                                                                                                                                                                                                  |
| Stream Effects                       | Average of 1,705.6 linear feet per project<br>Range of 0 to 14,018 linear feet<br>Average of 0.002 linear foot per MW<br>Range of 0 to 9.7 acres per MW<br>44% (4 of 9) of natural gas projects affected streams |
| <b>Biological Effects</b>            |                                                                                                                                                                                                                  |
| Endangered and Threatened Species    | 66% (6 of 9) of natural gas projects affected federally listed endangered or threatened species or species proposed or candidates for listing                                                                    |
| Migratory Bird Effects               | 44% (4 of 9) of natural gas projects resulted in effects to migratory birds of conservation concern                                                                                                              |
| <b>Cultural &amp; Social Effects</b> |                                                                                                                                                                                                                  |
| Historic Properties                  | None of the natural gas projects affected eligible Historic Properties                                                                                                                                           |
| Parks and Public Lands               | 55% (5 of 9) of natural gas projects affected parks and public lands                                                                                                                                             |
| Visual Effects                       | 55% (5 of 9) of natural gas projects resulted in visual effects                                                                                                                                                  |
| Community Effects                    | May vary based on location                                                                                                                                                                                       |

## 5.2.2 Nuclear Generation

### 5.2.2.1 Nuclear – Existing Facilities

The impacts of operating TVA's existing nuclear plants are described in previous EISs and other reports (see Appendix E). Nuclear power generation does not directly emit regulated air pollutants or GHGs.

In the system-wide GHG life cycle assessment conducted by TVA with support from NLR (Section 5.5.2), existing and expansion nuclear resources were split between traditional, large-scale nuclear reactors and small modular reactor (SMR) designations (Table 5-5). For the 2026 IRP, NLR performed an updated literature review for nuclear SMR technology and the results of this review are reflected in the emission factor values. The largest source of life cycle GHG emission from these plants is CO<sub>2</sub> from the Upstream phase. The Downstream phase contains the second largest source of life cycle GHG emissions, accounting for emissions associated with plant decommissioning. For additional information, see Section 5.5.2 and Appendix D.

**Table 5-5: Nuclear Emissions Factors by Phase**

| Electric Power Technology | One-Time Upstream GHG (CO <sub>2</sub> e), g/kW | Ongoing Annual Combustion GHG (CO <sub>2</sub> e), g/kW-hr | Ongoing Annual Non-Combustion GHG (CO <sub>2</sub> e), g/kW-hr | One-Time Downstream GHG (CO <sub>2</sub> e), g/kW |
|---------------------------|-------------------------------------------------|------------------------------------------------------------|----------------------------------------------------------------|---------------------------------------------------|
| Nuclear                   | 483,552                                         | NA                                                         | 12                                                             | 175,000                                           |
| Nuclear SMR               | 810,000                                         | NA                                                         | 12                                                             | 190,000                                           |

NA - Not applicable

TVA's nuclear plants occupy an average of 1,114 acres each and about 80 percent of this area is developed. Life cycle land metrics have not been determined for TVA's nuclear plants. Fthenakis and Kim (2009) estimated a life cycle land transformation of 0.023 acres/GWh for nuclear power. About half of this transformed land is the power plant site. Due to the evolving approach to the long-term disposal of spent fuel, the land required for offsite spent fuel disposal is excluded from this estimate.

### 5.2.2.2 Nuclear – New Facilities

Nuclear resource options available for selection include advanced pressurized water reactors, as well as light water and generation IV SMRs. The impacts of constructing and operating a one- or two-unit pressurized water reactor nuclear plant at the Bellefonte site in northeast Alabama are described in a 1974 EIS (TVA 1974).

In 2008, TVA completed an environmental report (TVA 2008) for a combined license application to the NRC for the construction and operation of a two-unit AP1000 nuclear plant on the Bellefonte site adjacent to two partially built pressurized water reactors. Most operational impacts would be comparable to those of TVA's existing nuclear plants except for water use (water withdrawn for cooling or other uses and then returned to the source) and water consumption (water withdrawn but not returned to its source). A new advanced pressurized water reactor would operate with closed cycle cooling; water use would be relatively low and water consumption relatively high compared to TVA's other thermoelectric plants. The environmental impacts of constructing and operating similar advanced pressurized water reactors at other sites in the U.S. have been described in EISs issued by the NRC.

The impacts of constructing and operating a SMR plant would be generally like those of TVA's existing nuclear plants and the other new nuclear generation options, but proportionately less due to the lower capacity of the small modular reactor plant. These impacts are described by NRC in the April 2019 Final EIS (NRC 2019) and by TVA in its July 2022 final Programmatic EIS for a new SMR plant at TVA's CRN in Roane County (TVA 2022e; TVA supplemented its July 2022 Programmatic EIS in 2025 to consider impacts associated with constructing, operating, and decommissioning the GE Hitachi Nuclear Energy BWRX-300 SMR unit at CRN). The use of modular construction for major plant components would reduce construction impacts at the plant site compared to a conventional pressurized water or advanced pressurized water reactor.

Progress is accelerating on emerging technologies such as advanced nuclear and advanced storage. TVA is collaborating with the DOE, Oak Ridge National Laboratory, Electric Power Research Institute (EPRI), universities, startup accelerators, and other industry partners to advance the viability and cost-effectiveness of these emerging technologies.

### 5.2.3 Renewable Generation

TVA's current renewable energy portfolio is dominated by the hydroelectric facilities at its dams and with PPAs for wind and solar energy, with solar most focused on in Strategy C. The following sections provide an overview of the environmental impacts of renewable generation from hydroelectric, wind, solar, and biomass facilities. The renewable resource options available for selection in the IRP include hydroelectric uprates at existing facilities, utility scale solar, distributed solar, Midwest wind, and Southeast high-hub wind.

#### 5.2.3.1 Hydroelectric – Existing Facilities

Impacts of the operation of TVA's hydroelectric facilities are described in the *Reservoir Operations Study* (TVA 2004). Hydropower generation does not directly emit GHGs and its life cycle GHG emissions are among the lowest of the various types of generation.

In the system-wide GHG life cycle assessment conducted by TVA with support from NLR (Section 5.5.2), all existing and new hydro resources utilized the same emission factor estimates (Table 5-6).

**Table 5-6: Hydroelectric Emissions Factors by Phase**

| Electric Power Technology | One-Time Upstream GHG (CO <sub>2</sub> e), g/kW | Ongoing Annual Combustion GHG (CO <sub>2</sub> e), g/kW-hr | Ongoing Annual Non-Combustion GHG (CO <sub>2</sub> e), g/kW-hr | One-Time Downstream GHG (CO <sub>2</sub> e), g/kW |
|---------------------------|-------------------------------------------------|------------------------------------------------------------|----------------------------------------------------------------|---------------------------------------------------|
| Hydroelectric             | 1,100                                           | NA                                                         | 1.9                                                            | 0                                                 |

NA - Not applicable

The TVA hydroelectric generating system consists of 29 hydroelectric dams with 109 conventional hydroelectric generating units, the majority of which are on the Tennessee River and its tributaries. These 29 dams provide 3,783 MW of summer net capability. TVA manages the Tennessee River system via these dams in an integrated manner, which includes managing minimum river flows and minimum depths for navigation, reducing flood damage, generating low-cost hydroelectric power, maintaining flows that support habitat for fish and other aquatic species, maintaining water supply, and providing recreational opportunities for the Tennessee Valley. In addition, having cool water available helps TVA to meet thermal compliance and support normal operation of TVA's nuclear and fossil-fueled plants, while oxygenating water helps fish and other aquatic species remain healthy. TVA releases excess water (spills) through its dams to reduce flood damage to the Tennessee Valley. TVA typically spills only when all available hydroelectric generating turbines are operating at full capacity and water must still be released from a dam.

TVA's Hydro Life Extension Program, which replaced the Hydro Modernization Program, began in 2021 with a focus on recovering and preserving TVA's extensive hydroelectric fleet, improving efficiency and flexibility, and ensuring long-term reliability of these vital assets. Hydroelectric generation will continue to be an important part of TVA's energy supply in the future. It plays a vital role in providing low-cost power and enhances system flexibility which helps integrate other renewables into the power portfolio. These modernization efforts have been completed on 68 out of 109 conventional hydroelectric units, and allowed TVA to extend the operating life of its fleet and, in some cases, increase its MW output or increase overall unit efficiency without increasing footprint or releases.

#### **5.2.3.2 Hydroelectric – New Facilities**

Under all the alternatives, TVA would continue to modernize its hydroelectric units as part of its normal maintenance activities. The impacts of these upgrades have been described in EAs for many facilities (e.g., TVA 2005). While the upgrades generally do not change the volume of water used on a daily cycle, they can increase the rate of water passing through the turbines and result in small, periodic increases in downstream velocities. A potential consequence of the increased velocity is increased downstream bank erosion, which TVA mitigates as necessary by protecting stream banks with riprap or other techniques. Other environmental impacts of hydroelectric modernization are minimal, and there is typically no additional long-term conversion of land.

New hydroelectric pumped storage, which is partially discussed in Section 5.2.4, is one of several technologies that TVA is exploring to ensure the reliability and resiliency of the grid. TVA issued a Pumped Storage Hydroelectric EIS in November 2025 that evaluates a new pumped storage facility located near Pisgah, Alabama and expansion of the existing Raccoon Mountain facility. The Rorex Creek site near Pisgah would have a generation capacity of up to 1,600 MW. Completing the environmental review positions TVA to shorten the timeline for incremental pumped storage if the sites are included and approved in future plans. New pumped storage could be available by the mid-2030s.

While potential exists for hydropower generation in undeveloped stream reaches, this would be very expensive, disruptive, and have large environmental impacts. As a result, hydroelectric expansion options are limited to unit uprates as per Volume 1. The hydroelectric uprates expansion option was developed based on TVA's Hydro Life Extension Program assessments and is specific to opportunities across the TVA system. These expansions could involve major construction projects, although most construction activities would occur on the dam reservations.

#### **5.2.3.3 Wind – Existing Facilities**

A portion of TVA's renewable generation portfolio is wind generation from the upper Midwest and the Great Plains (Section 2.4). TVA currently purchases power from seven wind farms. TVA has completed EAs for wind farms in Tennessee and Kansas (TVA 2011b, TVA 2011c).



Impacts of wind farm construction include the clearing and grading of access roads and turbine sites and excavation for turbine foundations and electrical connections. Denholm et al. (2009) reported an average direct permanent impact area of 0.74 acre/MW, and a direct average temporary impact area of 1.73 acres/MW. These impact areas average somewhat smaller in mid-western croplands and somewhat larger in Great Plains grasslands/herbaceous areas and forested Appalachian ridges.

The total wind farm area tends to be much larger than the direct impact areas and nationwide averages 84 acres/MW or a capacity density of 1 MW/82 acres (Denholm et al. 2009). This density, while low relative to most other types of electrical generation, varies greatly due to different leasing practices by wind farm developers. Using a different analysis technique that incorporated capacity factor, Miller and Keith (2018) calculated an energy density of 1 MW/494 acres for windfarms constructed between 1998 and 2016. A very small proportion of this wind farm area is disturbed directly, and most land-use practices can continue on the remainder of the area. Land clearing and road and transmission line development for wind farms can, however, result in habitat fragmentation. Operational impacts include turbine noise, which can be audible for distances of a quarter mile or more, and the visual impacts of the turbines which can dominate the skyline. Operating turbines can also cause shadow flicker, the flickering effect caused when rotating wind turbine blades periodically cast shadows through constrained openings such as the windows on neighboring properties. The scale of the problem depends on several factors such as turbine height, wind speed and direction, position of the sun, distance from the turbine, local terrain, and amount of cloud cover. Modeling tools have been developed to quantify shadow flicker associated with existing and proposed windfarms. Shadow flicker has been reported to cause headaches and increase stress for some individuals.

Impacts to biological resources include habitat fragmentation, displacement of wildlife during and post- construction, and mortality of birds and bats from collision with turbines. The rates at which displacement or fatalities or injuries occur can be dependent on species (habitat requirements, typical flight path height, etc.). Injuries and collisions have been shown to be due to both the height of turbines as well as the motion. In addition to direct impacts to the immediate area impacted by the wind turbines, indirect effects can occur in the surrounding areas, such as habitat avoidance for bats and birds increasing in closer proximity to turbines, with measurable effects on birds up to 674 meters away (Barré et al. 2018, Marques et al. 2019). Bats can also die from trauma induced by air pressure changes caused by the rotating turbines (BLM 2005, Baerwald et al. 2008). Mortality and collision rates for both birds and bats are difficult to determine accurately, given limits to data accessibility and varying methods for data collection; therefore, impacts are likely underestimated (Allison et al. 2019, Schippers et al. 2020, Choi et al. 2020).

Loss et al. (2013) and Erickson et al. (2014) compiled information on bird collision mortality at wind farms across North America. Loss et al. (2013) estimated mean annual mortality

rates of 6.86 birds/turbine (3.86 birds/MW) for the eastern U.S. (including Tennessee and Illinois) and 2.92 birds/turbine (1.81 birds/MW) for the Great Plains (including Iowa and Kansas). This study also found an increase in mortality rate with turbine hub height. Erickson et al. (2014) estimated annual mortality rates for songbirds (passerines) of 2.58–3.83 birds/MW for the eastern U.S. (including Tennessee) and 2.15–3.96 birds/MW for the Plains region (including Illinois, Iowa, and Kansas). In comparing total estimated wind farm mortality of individual species of songbirds with their estimated continent-wide populations, Erickson et al. (2014) concluded less than 0.045 percent of the entire population of each species suffered mortality from collisions with turbines.

While the impacts of bird mortality are probably not significant in most areas, the impacts of bat mortality have greater potential for concern. The highest annual bat mortality rates, 20.8–69.6 bats/turbine (14.9–53.3 bats/MW) have been reported at wind farms on forested ridges in the eastern U.S. (Arnett et al. 2008, Hayes 2013). Annual rates at Midwest wind farms (i.e., much of the potential Midcontinent Independent System Operator [MISO] area) are lower, between 2.0 and 7.8 bats/turbine (2.7–8.7 bats/MW). Very limited bat mortality information is available from wind farms in the southern Great Plains (i.e., much of the potential Southwest Power Pool wind resource options), where one study found a mortality rate of 1.2 bats/turbine/year (0.8/MW) (Arnett et al. 2008). Common patterns detected in bat mortality studies include the following: (1) most fatalities occur in later summer and early fall; (2) most fatalities are of migratory, foliage- and tree-roosting species; and (3) most fatalities occur on nights with low wind speed (<6 meters/second) and 4) fatalities increase immediately before and after the passage of storm fronts (Arnett et al. 2008, Goldenberg et al. 2021).

The USFWS has developed guidelines (USFWS 2012) for the siting, development, and operation of wind farms. These voluntary guidelines include preliminary site screening, detailed site characterization studies, post-construction studies, and potential impact reduction and mitigation measures. Reducing the operation of wind turbines during periods of low wind speeds at night during seasons when bats are most active has been shown to be an effective measure for reducing bat mortality while having minimal effect on power generation (Arnett et al. 2011). Other mitigation measures for reducing collisions continue to be studied, including painting turbines, texturing them, using acoustic deterrents, and operational curtailment (May et al. 2020, TCU 2019, Romano et al. 2019, Smallwood and Bell 2020).

Wind turbines produce no direct emissions of air pollutants or GHGs. In the system-wide GHG life cycle assessment conducted by TVA with support from NLR (Section 5.5.2), all existing and new wind resources utilized the same emission factor estimates (Table 5-7).

**Table 5-7: Wind Emissions Factors by Phase**

| Electric Power Technology | One-Time Upstream GHG (CO <sub>2</sub> e), g/kW | Ongoing Annual Combustion GHG (CO <sub>2</sub> e), g/kW-hr | Ongoing Annual Non-Combustion GHG (CO <sub>2</sub> e), g/kW-hr | One-Time Downstream GHG (CO <sub>2</sub> e), g/kW |
|---------------------------|-------------------------------------------------|------------------------------------------------------------|----------------------------------------------------------------|---------------------------------------------------|
| Wind                      | 619,000                                         | NA                                                         | 0.74                                                           | 14,000                                            |

NA - Not applicable

**5.2.3.4 Wind – New Facilities**

Two options were modeled for possible expansion of wind energy generation, defined primarily where they are sited. The two wind resource options are Midwest and Southeast High-Hub. Midwest wind primarily comes from wind farms in the Midwest, although the IRP acknowledges that this resource option could be a proxy for other wind resources located out of the Tennessee Valley and transported via transmission agreements (e.g., from the Southwest Power Pool, or SPP). For the Southeast option, higher hub heights are necessary due to the relatively lower wind speeds in the region. These potential expansions are covered further in Volume 1, Appendix E.

TVA anticipates the developers of wind farms would follow USFWS guidelines (USFWS 2012). Land area requirements, based on the direct permanent impact area, are conservatively assumed to be 1 acre/MW for wind farms in the TVA PSA and 0.8 acre/MW for wind farms elsewhere. Larger areas are affected by the noise and visual impacts of wind turbines, as well as shadow flicker.

**5.2.3.5 Solar – Existing Facilities**

TVA owns approximately 1 MW of solar capability across nine operating solar installations. Through several programs, TVA purchases renewable power (primarily solar, some biomass) totaling 301 MW of capability. TVA has long-term PPAs for 1,438 MW of operating utility-scale solar nameplate capacity and has contracted for an additional 2,528 MW of solar nameplate capacity expected to come online over the next few years, including contracts signed in the latest procurement cycle. TVA obtains renewable energy credits from these sites, and the existing agreements extend through the late 2030s to early 2040s.

TVA assessed the potential impacts of small PV facilities in a programmatic EA (TVA 2014) and the impacts of larger solar facilities in other EAs listed in Appendix E. Most completed ground-mounted PV facilities have been constructed on previously cleared areas, frequently pasture, hayfield, or crop land, and most have required little grading to smooth or level the site. Several have been constructed on land classified under the Farmland Protection Policy Act as prime farmland. Although the construction and operation of the PV facility usually eliminates agricultural production on the area, it typically does not adversely affect long-term soil productivity or the ability to resume agricultural production once the PV facilities are removed when employing best practices (Cleveland and Sarkisian 2019). The construction of the PV facility frequently affects local scenery, but this effect is often minor because of the

low profile of the PV components and vegetative screening, either existing or planted as part of the PV facility development.

PV facilities produce no direct emissions of air pollutants or GHGs. In the system-wide GHG life cycle assessment conducted by TVA with support from NLR (Section 5.5.2), all existing and new solar resources utilized the same emission factor estimates (Table 5-8).

**Table 5-8: Solar Emissions Factors by Phase**

| Electric Power Technology | One-Time Upstream GHG (CO <sub>2e</sub> ), g/kW | Ongoing Annual Combustion GHG (CO <sub>2e</sub> ), g/kW-hr | Ongoing Annual Non-Combustion GHG (CO <sub>2e</sub> ), g/kW-hr | One-Time Downstream GHG (CO <sub>2e</sub> ), g/kW |
|---------------------------|-------------------------------------------------|------------------------------------------------------------|----------------------------------------------------------------|---------------------------------------------------|
| Solar                     | 1,630,000                                       | NA                                                         | 9.4                                                            | 37,800                                            |

NA - Not applicable

Land requirements and impacts for PV facilities vary greatly and depend on the type of installation and the type of land that would be impacted. Building-mounted systems require no additional land. Ground-mounted systems may be on canopies that provide shelter and thus, do not negatively impact land use. Land requirements for stand-alone ground-mounted systems vary with the type of mounting system. Fixed systems (with panels that do not move to track the movement of the sun) require less land than those with 1- or 2-axis tracking. The generation by tracking systems, however, is greater than from fixed systems. Ong et al. (2013) surveyed land requirements of U.S. PV projects between 1 and 20 MW capacity. Fixed-tilt systems required an average of 5.5 acres/MW<sub>AC</sub> and single-axis tracking systems required an average of 6.3 acres/MW<sub>AC</sub>. Based on the analysis of Ong et al. (2013), a review of 13 operating and proposed PV facilities in the TVA PSA, and 23 PV facilities elsewhere in the Southeast, new ground-mounted PV facilities are assumed to require 6.1 acres/MW<sub>DC</sub> (7.2 acres/MW<sub>AC</sub>) for fixed-tilt systems and 7.3 acres/MW<sub>DC</sub> (8.6 acres/MW<sub>AC</sub>) for single-axis tracking systems. As noted in Table 5-1, the facility land requirement assumed by TVA as an environmental characteristic was 7.3 acres/MW, which is consistent with these past studies and within the range of PV land use requirements identified in recent industry and academic literature. Bolinger and Bolinger (2022) estimated that 5.56 acres of land is required for each MW of solar power generation, and the Solar Energy Industries Association (2023) identified 10 acres/MW as a reasonable maximum for solar facilities.

### 5.2.3.6 Solar – New Facilities

New facilities for both utility-scale solar and distributed solar were considered in Volume 1. New utility-scale solar is increasing, in part driven by customers' demand through TVA's Green Invest Program. The impacts of new solar generating facilities included in the capacity expansion plans are expected to be like those described above for existing facilities. New building-mounted PV facilities, likely to be constructed as DER, would not require additional land and would have few other impacts. Future utility-scale PV facilities in the TVA region are likely to be multi-MW in size. An increasing proportion of recently constructed and proposed multi-MW solar facilities in the TVA region use single-axis tracking systems. These

systems require relatively flat ground and can be built on brownfield, cropland, or other greenfield sites. An increasing proportion of PV facilities have been and are expected to be constructed on cropland, where the amount of grading required to prepare the site is low relative to other land types. Expansion options for TVA include large single-axis tracking units.

Some of the impacts of developing solar facilities on agricultural and forested land could be reduced by developing solar facilities on sites that had been previously heavily disturbed, including brownfield sites. Numerous such potentially suitable sites occur across the TVA PSA. In 2019, TVA estimated that such sites comprise less than 3 percent of the land area occupied by TVA solar facilities. This proportion is unlikely to greatly increase as such sites infrequently provide the large, continuous area sought by developers of utility-scale solar facilities. Many brownfield sites also have restrictions on penetrating the ground surface, which increases solar construction costs.

The development of a solar facility on an agricultural site typically eliminates the agricultural production at least for the duration of facility operations, except in limited circumstances where the site is grazed by sheep or other livestock as a means of managing vegetation growth. Such grazing is, at present, rarely used in the TVA region. The conversion of the site to a solar facility, with a permanent grass and herbaceous vegetative cover, can reduce the runoff of silt and agricultural chemicals that often occurs from cropland. The maintenance of a permanent vegetative cover, particularly when composed of native plant species, can also increase local wildlife diversity (Beatty et al. 2017).

In 2024, TVA reviewed NEPA documents it has completed addressing solar construction projects between 2014 and 2023 (see Appendix E for the list of NEPA documents). Information gathered is generally consistent with these studies, with many TVA projects varying greater in size (from 2.0 to 12.2 acres per MW). Table 5-9 includes data from 44 NEPA documents addressing the average potential effects of 47 solar projects. These figures are associated with TVA's experience reviewing the potential effects of numerous past projects. As seen in the ranges included in the table, the effects of individual projects may vary greatly, with greater or lesser effects based on the nature and size of a particular project.

Over 80 percent of these projects resulted in effects to prime farmland and, on average, 104.9 acres of forests have been cleared (2.0 acres per MW). Aquatic impacts include 0.2 acres (0.007 acres per MW) of wetlands affected and an average of 2,433 linear feet (5.4 linear feet per MW) of streams affected. For almost all projects, TVA identified some effect to visual resources from the solar project.

Further discussion into the possible land use impacts of solar can be found in Section 5.5.4.

**Table 5-9: Generic Construction Effects of Solar Generation Facilities (TVA Projects 2014-2023)**

| <b>Land Use Effects</b>                                          |                                                                                                                                            |
|------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| Land Requirements<br>(Acres of Solar Installation within a Site) | Average of 7 acres per MW<br>Range 2.0-12.2 acres per MW<br>Total acreage of projects: 17,257 acres                                        |
| Floodplains filled per MW<br>(Acres)                             | Average of 0.07 acre per MW<br>Range: 0-1.5 acres per MW                                                                                   |
| Prime Farmland conversion                                        | 81% of solar projects resulted in non-permanent prime farmland conversion                                                                  |
| <b>Land Cover Effects</b>                                        |                                                                                                                                            |
| Forest cleared                                                   | Average of 104.9 acres per project<br>Range: 0-850 acres<br>Average of 2.0 acres per MW<br>Range of 1.0-13.2 acres per MW                  |
| <b>Wetland Effects</b>                                           |                                                                                                                                            |
| Area affected                                                    | Average of 0.21 acres per project<br>Range: 0-3.9 acres<br>Average of 0.007 acres per MW<br>Range: 0–0.25 acres per MW                     |
| Forested wetland area cleared                                    | Average of 0.33 acres per project<br>Range: 0-4.26 acres<br>Average of 0.01 acres per MW<br>Range of 0-0.25 acres per MW                   |
| <b>Stream Effects</b>                                            |                                                                                                                                            |
| Stream effects                                                   | Average of 873 linear feet per project<br>Range of 0-14,987 linear feet<br>Average of 5.4 linear feet per MW<br>Range of 0-41 acres per MW |
| <b>Biological Effects</b>                                        |                                                                                                                                            |
| Endangered and Threatened Species                                | 48% of solar projects affected federally listed endangered or threatened species or species proposed or candidates for listing             |
| State-Listed Species                                             | 48% of solar projects affected State-Listed endangered, threatened, or special concern species                                             |
| <b>Cultural and Social Effects</b>                               |                                                                                                                                            |
| Historic Properties <sup>1</sup>                                 | 3% of projects affected historic properties                                                                                                |
| Parks and Public Lands                                           | 7% of projects affected parks and public lands                                                                                             |
| Visual Effects                                                   | 99% of solar projects resulted in visual effects<br>(based on a review of 31 of the 45 projects)                                           |

<sup>1</sup>Additional consultation for individual projects would be required and additional consultation with State Historic Preservation Officers and Tribes would be completed for site-specific activities.

### 5.2.3.7 Biomass – Existing Facilities

TVA purchases electricity generated from landfill gas and wood waste (see Section 2). The environmental impacts of this generation are beneficial overall, due to the avoidance of methane emissions and utilization of residues at wood and grain processing plants. The generating facilities have typically been built on heavily disturbed landfill or other industrial sites and occupy small land areas.



Biomass facilities are also addressed in the system-wide GHG life cycle assessment conducted by TVA with support from NLR (Section 5.5.2) and results are included in Table 5-10.

**Table 5-10: Biomass Emissions Factors by Phase**

| Electric Power Technology | One-Time Upstream GHG (CO <sub>2</sub> e), g/kW | Ongoing Annual Combustion GHG (CO <sub>2</sub> e), g/kW-hr | Ongoing Annual Non-Combustion GHG (CO <sub>2</sub> e), g/kW-hr | One-Time Downstream GHG (CO <sub>2</sub> e), g/kW |
|---------------------------|-------------------------------------------------|------------------------------------------------------------|----------------------------------------------------------------|---------------------------------------------------|
| Biomass                   | 1,960                                           | NA                                                         | 6                                                              | 35                                                |

NA - Not applicable

#### 5.2.3.8 Biomass – New Facilities

The potential supply of biomass is greatly influenced by the price paid for biomass, which influences its profitability relative to the profitability of conventional crops. With higher prices, larger amounts of more productive farmland would likely be converted from food production to biomass production, and the western portion of the TVA region has the greatest potential for producing large energy crop supplies. Therefore, TVA is not further pursuing expansion via biomass at this time.

### 5.2.4 Energy Storage

#### 5.2.4.1 Energy Storage - Existing Facilities

TVA owns and operates one large storage facility. The Raccoon Mountain Pumped Storage Plant has four generating units with a generating capability of 1,715 MW. TVA's Raccoon Mountain facility occupies about 1,050 acres and utilizes approximately 386,470 gallons of water per MWh of generation. Although Raccoon Mountain uses a large volume of water, none of this water is consumed and the only loss is from evaporation. The Raccoon Mountain Pumped Storage Plant's four generating units provide critical flexibility to the TVA system by storing water at off-peak times for use when demand is high.

In conjunction with several solar contracts, TVA has contracted for 370 MW of battery storage with 100 MW currently operating and the remainder expected to come online in the next few years, including contracts signed in the latest procurement cycle. Also, TVA is constructing a 20-MW/40-MWh battery facility in Vonore, Tennessee, to gain direct operational experience with battery storage operation.

In the system-wide GHG life cycle assessment conducted by TVA with support from NLR (Section 5.5.2), all existing and new pumped storage resources utilized the same emission factor estimates (Table 5-11).

**Table 5-11: Pumped Storage Emissions Factors by Phase**

| Electric Power Technology | One-Time Upstream GHG (CO <sub>2</sub> e), g/kW | Ongoing Annual Combustion GHG (CO <sub>2</sub> e), g/kW-hr | Ongoing Annual Non-Combustion GHG (CO <sub>2</sub> e), g/kW-hr | One-Time Downstream GHG (CO <sub>2</sub> e), g/kW |
|---------------------------|-------------------------------------------------|------------------------------------------------------------|----------------------------------------------------------------|---------------------------------------------------|
| Pumped Hydroelectric      | 310                                             | NA                                                         | 1.8                                                            | 7                                                 |

NA - Not applicable

GHG emissions from generation are a function of the GHG intensity of the electricity used in the pumping mode. The IRP's LCA incorporates forecasted generation from other TVA plants stored by the pumped hydro facility as a part of the underlying energy production forecast for each portfolio. Based on the 80 percent efficiency of energy conversion at Raccoon Mountain and 5 percent transmission loss factor (a function of distance from the energy source and load center), GHG emissions are approximately 1.3 times the energy source emissions. At TVA's 2022 CO<sub>2</sub> intensity of 658 lbs/MWh, the operation of Raccoon Mountain, as well as that of a future pumped storage facility, would emit about 855 lbs. of CO<sub>2</sub>/MWh. This emissions rate would change over time as the system CO<sub>2</sub> intensity rate changes.

#### 5.2.4.2 Energy Storage - New Facilities

Storage resource options available for selection in the IRP include pumped storage, lithium-ion battery, advanced chemistry battery, and distributed storage (Volume 1, Appendix E.12). The pumped storage option would use reversible turbine generators to pump water into a higher altitude reservoir during periods of excess power or use water flowing from the upper to lower reservoir to power the turbines when energy is needed (Section 5.2.3.2). Two different types of battery storage technologies were modeled. Lithium-ion is the prevalent technology today, and it is best suited for shorter storage duration, so a four-hour, 50-MW version was modeled. Advanced chemistry battery storage technologies are developing that would enable longer durations of storage, so an 8-hour, 50-MW version was modeled. Storage efficiency is modeled for all options due to the energy losses inherent in the conversion process and, in the case of pumped storage, the loss of water during storage. Storage efficiency represents the efficiency of one cycle (i.e., pumping/releasing water, charging/releasing battery power). Compressed air energy storage was not considered for the 2026 IRP.

The operational impacts of a new 1,212-MW pumped storage plant are expected to be like those of the Raccoon Mountain plant. Construction impacts would include the construction of the upper reservoir, excavation of the powerhouse and the tunnel connecting the upper and lower reservoirs, and construction of the discharge structure in the lower reservoir. If the lower reservoir is an existing reservoir, dredging of the discharge area and construction of an enclosure around the discharge structure would likely be required. If a new lower reservoir is required, additional impacts would result from the construction of the dam and reservoir and diversion of existing streams around or into the reservoirs.

Utility-scale battery storage facilities are assumed to resemble current storage systems using lithium-ion batteries, which typically consist of batteries, supervisory and power management system, heating and air conditioning (HVAC) system, and fire prevention system in modular shipping-style containers on a concrete pad with spill containment. Other components include electrical switching equipment and transformers. They are often constructed in association with a wind or solar generating facility or adjacent to an existing substation.

The impacts of constructing and operating utility-scale lithium-ion battery storage facilities in association with southern California solar facilities have been described by County of Imperial (2016) and Bureau of Land Management (BLM 2018). The 2018 Final Generic EIS (NYSDPS and NYSERDA 2018) describes the environmental impacts of the State of New York's initiative to deploy at least 1,500 MW of energy storage by 2025. The New York EIS reviewed various types of battery storage, including lithium-ion, as well as thermal and flywheel storage technologies. The land area required for battery storage facilities is typically only a few acres and construction-related impacts are minimal. Operational impacts are also minimal with adherence to typical mitigation measures, including RCRA regulations and best management practices.

In the system-wide GHG life cycle assessment conducted by TVA with support from NLR (Section 5.5.2), all currently contracted and new battery storage resources utilized the same emissions factor estimates (Table 5-12).

**Table 5-12: Battery Emissions Factors by Phase**

| Electric Power Technology | One-Time Upstream GHG (CO <sub>2</sub> e), g/kW | Ongoing Annual Combustion GHG (CO <sub>2</sub> e), g/kW-hr | Ongoing Annual Non-Combustion GHG (CO <sub>2</sub> e), g/kW-hr | One-Time Downstream GHG (CO <sub>2</sub> e), g/kW |
|---------------------------|-------------------------------------------------|------------------------------------------------------------|----------------------------------------------------------------|---------------------------------------------------|
| Battery                   | 527,000                                         | NA                                                         | 0                                                              | 98,900                                            |

NA - Not applicable

Similar to pumped storage, GHG emissions from battery generation are a function of the GHG intensity of the electricity used when charging. The IRP's LCA incorporates forecasted generation from other TVA plants stored by the batteries as a part of the underlying energy production forecast for each portfolio.

### 5.3 Environmental Impacts of Energy Efficiency and Demand Response Resource Options

The sources of environmental impacts from the proposed expansion of TVA's EE and DR programs under the alternative strategies include the following:

- The reduction in or avoidance of generation resulting from EE measures. This reduction is highlighted in Volume 1, Appendix G.

- The change in the type of generation due to changes from on-peak to off-peak energy use resulting from DR programs. This change in load shape, and the resulting change in peak demand, is incorporated into the alternative strategies assessed in Section 5.5. Historically, most DR calls have been in emergency situations and shifted the time of electrical use with little net change in use and little environmental impact. More widespread employment of DR is likely to result in a small net reduction in electrical use and the associated impacts from its generation (Huber et al. 2011).
- The generation of solid waste resulting from building retrofits and the replacement of appliances, HVAC equipment, and other equipment to reduce energy use are addressed in Section 5.5.6.
- Adverse impacts to historic buildings from building retrofits that result in changes in their external appearance and associated historic integrity.

Programmatic environmental reviews of EE programs have been conducted by DOE (2015a) for the Hawai'i Clean Energy Initiative and by the Rural Utilities Service (USDA 2012) for its EE and Conservation loan program. DOE (2015a) concluded that EE programs would result in beneficial impacts from reduction of GHG emission and the potential for adverse impacts from EE actions is low with adherence to applicable regulations and best management practices. The Rural Utility Service (USDA 2012) identified a few areas of concern, including the potential presence of lead-based paint and asbestos containing material which would be mitigated with adherence to applicable regulations. The potential for adverse impacts to historic properties was low, but some EE activities resulting in the modification of the exterior of buildings would require additional project-specific reviews.

Most EE programs require that participating individuals and organizations pay a portion of the costs of their EE measures. Low-income residents frequently have a reduced ability to pay these costs and therefore are less likely to participate in such programs. TVA programs focused on investment in low-income communities, such as Home Uplift, can help mitigate these concerns. In addition, many low-income residents live in rental housing, and there are few EE programs targeting rental single-family and multi-family housing. Further information on these programs can be found in Volume 1, Appendix G.

#### **5.4 Environmental Impacts of Transmission Facility Construction and Operation**

As described in Volume 1, all the alternative strategies would require investments in transmission, which would result in the construction of new or upgraded transmission facilities. Table 5-13 provides a list of generic effects of these construction activities, based on TVA's past experience completing similar projects. This list was compiled by reviewing project planning documents for TVA transmission construction activities completed from 2005 through 2023. A total of 470 projects were included in this review (see Appendix E for a list of these projects). The actual effects of future projects are likely to vary greatly, with greater or lesser environmental effects based on the nature and size of a particular project.

TVA builds an average of 65 miles of new transmission lines per year along with several new substations and switching stations to increase capacity/reliability and serve new customers. The anticipated amount of construction for new or upgraded transmission facilities varies among the alternative strategies. All new generating facilities would require connections to the transmission system, either directly or through an interconnection with a LPC. The length of connecting transmission lines and the need for new substations and switching stations depend on the location and capacity of the facilities.

All strategies include timeline, technological, transmission, and/or market depth uncertainty and execution risks, which are amplified by load growth and regulatory impacts. Scenario 2 and the Supercharged Growth sensitivity included the highest level of forecasted load growth, which would drive the most extensive transmission upgrades (and associated environmental impacts) to both serve this additional load and interconnect new generation resources. Large resource additions like nuclear and natural gas plants typically require more robust transmission buildouts, including items like new substations and longer transmission lines for interconnection, along with significant upgrades to existing transmission assets in the local area. Localized environmental impacts associated with transmission would be expected to be greater for larger plants.

Inverter-based resources such as solar and battery storage (expected under all strategies but amplified in Strategy C) are typically more geographically dispersed and have a smaller capacity output per plant. These resources require relatively fewer traditional transmission upgrades per installation, typically resulting in fewer localized environmental impacts associated with transmission actions. However, the size and dispersed nature of these resources makes the scale of new and upgraded transmission projects more complex on a per MW basis compared to larger generating plants. Also, inverter-based resources typically require supplemental reactive resource transmission projects to ensure system stability and reliability that are not required for spinning generation. As the deployment of inverter-based solar and battery storage increases on the TVA system, the likelihood of more extensive network upgrades increases, given the growing interdependence of each system modification, thereby increasing the potential for associated environmental impacts.

The retirement or end of life of generating facilities can also result in the need for new or upgraded transmission facilities to maintain adequate power supply and reliability. The importation of wind energy from outside the TVA region would likely require transmission facility construction.

**Table 5-13: Generic Effects of Transmission System Construction and Maintenance Activities (TVA Projects 2005-2023)**

|                                   | Transmission Lines                                                                                                                                                                                                                         | Substations and Switching Stations                                                                    |
|-----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|
| <b>Land Use Impacts</b>           |                                                                                                                                                                                                                                            |                                                                                                       |
| Land requirements                 | Average of 14.6 acres/line mile, range 3.03 – 100                                                                                                                                                                                          | Average of 10.8 acres, range 1 – 73<br>Median for 500 kV: 49.5 acres<br>Median for <500 kV: 5.5 acres |
| Floodplain fill                   | 0                                                                                                                                                                                                                                          | Average of 0.1 acre; range 0 – 4; 1% affected floodplains                                             |
| Prime farmland converted          | 0                                                                                                                                                                                                                                          | Average of 7.9 acres; range 0 – 29.1; 2.3% affected prime farmland                                    |
| <b>Land Cover Impacts</b>         |                                                                                                                                                                                                                                            |                                                                                                       |
| Forest cleared                    | Average of 5.15 acres/line mile for new lines; range 0 – 46.15; 23% cleared forest                                                                                                                                                         | Average of 4.27 acres; range 0 – 50; 3% cleared forest                                                |
| <b>Wetland Impacts</b>            |                                                                                                                                                                                                                                            |                                                                                                       |
| Area affected                     | Average of 2.51 acres/line mile for new line; range 0 – 70.58; 29% affected wetlands<br>Average of 1 acre/line mile of existing line; range 0 – 18.3; 15% affected wetlands                                                                | Average of 0.6 acre; range 0 – 1.84; 1% affected wetlands                                             |
| Forested wetland area cleared     | Average of 1.78 acres line/mile; range 0 – 44.5; 19% affected forested wetlands<br>Average of 0.01 acre/line mile of existing line; range 0 – 18.3; 15% affected forest wetlands                                                           | -                                                                                                     |
| <b>Stream Impacts</b>             |                                                                                                                                                                                                                                            |                                                                                                       |
| Stream crossings                  | Average of 2.89 per mile of new line; range 0 – 50; 25% crossed streams<br>Average of 2.89 per mile of existing line; range 0 – 6.67; 11% crossed streams                                                                                  | Not Applicable                                                                                        |
| Forested stream crossings         | Average of 0.96 crossings per mile of new line; range 0 – 17.65 crossings per mile; 13% crossed forested streams<br>Average of 0.06 crossings per mile of existing line; range 0 – 2.5 crossings per mile; 1% crossed forested streams     | Not Applicable                                                                                        |
| Endangered and Threatened Species | 35 (7.8%) of 450 projects affected federally listed endangered or threatened species, or species proposed or candidates for listing<br>71 (15.7%) of 453 projects affected state-listed endangered, threatened, or special concern species |                                                                                                       |
| Historic Properties               | 45 (10%) of 451 projects affected historic properties                                                                                                                                                                                      |                                                                                                       |
| Parks and Public Lands            | 50 (12.3%) of 408 projects affected parks and public lands                                                                                                                                                                                 |                                                                                                       |

Note: Because some project planning documents did not contain all of the environmental data, the sample sizes for the various categories differ.



## 5.5 Environmental Impacts of Alternative Strategies and Associated Capacity Expansion Plans

Following is a discussion of the impacts of each alternative strategy on air quality, climate and GHGs, water resources, land resources, fuel consumption, solid and hazardous waste, and TVA-region socioeconomics over the 2026-2050 planning period. A full list of the environmental parameters of the nine portfolios can be found in Appendix C. The bar charts and time-series graphs in the following sections illustrate the average of the values for the three scenarios for each alternative strategy. The whisker bars on the bar charts show the range of the values of the three scenarios associated with each strategy. Where an “extended range” is indicated (box and whisker charts), the whisker bars on the charts represent the range of values included in other bar charts, with the additional range possible given the sensitivity analysis and Preferred Alternative. A full list and evaluation of the sensitivities can be found in Volume 1, Sections 3.9 and 3.10.

### Alternative Strategies:

A – Baseline Utility Planning

B – Innovation

C – Distributed

### Scenarios:

1 – Reference

2 – High Growth

3 – Carbon Legislation

The environmental impacts of all alternative strategies and scenarios include impacts of the planning assumptions regarding expected end of life dates for coal facilities, subject to further evaluation, environmental review, and TVA Board approval, which would lead to decreased emissions of air pollutants, intensity of GHG emissions, and generation of coal waste, with some achieving or approaching zero. For most environmental resources, the adverse impacts would be greatest in Scenario 2, Higher Growth, and sometimes Scenario 1, Reference Case, and would be lowest under Scenario 3, Carbon Legislation. Each of the Scenarios also did not have much variation in general over the three strategies. Overall, the impacts between strategies did not differ as much as between scenarios, with most strategies having similar impacts on average, though a greater range of impacts.

Environmental effects discussed in Section 5.5 subsections are summarized as follows:

**Air Quality, Climate, and Greenhouse Gases.** All alternative strategies would result in significant long-term reductions in emissions of SO<sub>2</sub>, NO<sub>x</sub>, and mercury, based on expected end of life for existing coal units. The overall reductions in emissions under each strategy, averaged across the associated scenarios, show relatively little variation. However, there is large variation among both strategies and scenarios for mercury emissions. Total and annual direct emissions of CO<sub>2</sub>, as well as CO<sub>2</sub> emission rates, also referred to as CO<sub>2</sub> intensity, would decrease under all alternative strategies. The variation among the strategies for both CO<sub>2</sub> emissions and emission rates is relatively small and much less than the variation among the scenarios associated with each strategy. All alternatives would result in the continued, significant, long-term reductions in CO<sub>2</sub> emissions from the generation of power

marketed by TVA. The reduction in CO<sub>2</sub> emissions would likely have small but beneficial impacts on the potential for associated climate change.

**Water Resources.** The volume of water withdrawn by thermal generating facilities, (i.e., nuclear, coal, and CC facilities) would decrease between 2026 and 2050 under all alternative strategies, based on expected end of life for existing coal units. There is a noticeable difference in water consumption between the strategies, with Strategy B, Innovation, requiring the most water, and Strategy C, Distributed, requiring the least. Water withdrawal remains similar among the strategies. The reductions in water consumption would have beneficial impacts; these impacts would generally be small and vary with the characteristics of the source area of the water withdrawal. The potential end of life of generating facilities, as described in Section 3.2.4, would result in minor, beneficial impacts to nearby rivers and waterways. However, the increases in water consumption could result in localized adverse impacts to aquatic ecosystems, that would likely be reduced through mitigation actions.

**Land Resources.** Land resources displayed a difference between strategies, with Strategy C, which focuses on distributed energy technologies such as solar, using more land than the remaining strategies. For all portfolios under Scenario 2 and 3, at least 90 percent of the land required for new generating and storage facilities is for utility-scale, single-axis tracking solar facilities. Only two sensitivities under Scenario 1, and under Case 1C, were over 90 percent. Relative to other types of generation, solar PV facilities have a high land requirement in relation to their generating capacity. Smaller land areas would be occupied by new natural gas-fired and battery storage facilities.

**Fuel Consumption.** All strategies lead to the eventual omission of coal as a fuel source, based on expected end of life for existing coal units. Fuel consumption changes little across strategies, though shows marked differences between scenarios, which may reflect changes in policy and investments. Slight differences between strategies can be seen for natural gas consumption, with Strategy A, Baseline Utility Planning, and Scenario 1 using the most natural gas resources. Among scenarios, decreases in natural gas and coal consumption are seen earlier and at a faster rate due to policy changes in Scenario 3.

**Solid and Hazardous Waste.** All alternative strategies would result in long-term reductions in the production of CCR, based on expected end of life for existing coal units. CCR production is eventually reduced to zero once the final coal unit reaches expected end of life. The quantity of CCR produced during the 2026-2050 planning period shows little variation between alternative strategies. It varies much more between the scenarios associated with each strategy and is greatest with Scenario 2 and lowest with Scenario 3. Full retirement or end of life for coal, CC, and CT plants (Section 3.2.3) would primarily result in a decrease in solid and hazardous waste produced. Concerning nuclear waste, while total nuclear consumption varies under all alternative strategies, TVA anticipates continuing to store spent fuel on the nuclear plant sites in spent fuel pools and dry casks until a centralized facility for long-term disposal and/or reprocessing is operating.

All strategies would lead to the eventual retirement of certain coal, gas or renewable energy facilities. Given that TVA would manage the removal and disposal of solid and hazardous wastes in accordance with local, state, and federal regulations, and recycle these wastes to the maximum extent possible, decommission of the end of life generation facilities would improve the overall quality of surrounding environmental resources.

**Socioeconomics.** Socioeconomic impacts, as quantified by the change to per capita income of TVA PSA residents that is attributable to the cost of operating of the TVA power system, are minimal across all strategies. The differences among the strategies in annual per capita income and employment of residents of the TVA PSA are small.

### 5.5.1 Air Quality

All alternative strategies, including sensitivities and the Preferred Alternative, would result in significant long-term reductions in total emissions and emission rates of SO<sub>2</sub>, NO<sub>x</sub>, and mercury (Table 5-14, Figure 5-2, Figure 5-3, Figure 5-4; Appendix C). A large portion of these reductions, especially for SO<sub>2</sub> and mercury, result from expected end of life for existing coal units, subject to further evaluation, environmental review, and TVA Board approval. These facilities reaching end of life account for the trends in emissions through 2040 portrayed in Figure 5-2, Figure 5-3, and Figure 5-4. After 2040, emissions of SO<sub>2</sub> and mercury generally cease with the expected end of life for coal facilities, with the exception of small amounts of SO<sub>2</sub> associated with sulfur-containing odorants added to natural gas for detecting leaks. Emission trends diverge after 2040 due to increased differences between the strategies. The effects on air quality from the partial and entire end of life at CT, CC, and coal facilities are included in the following discussion.

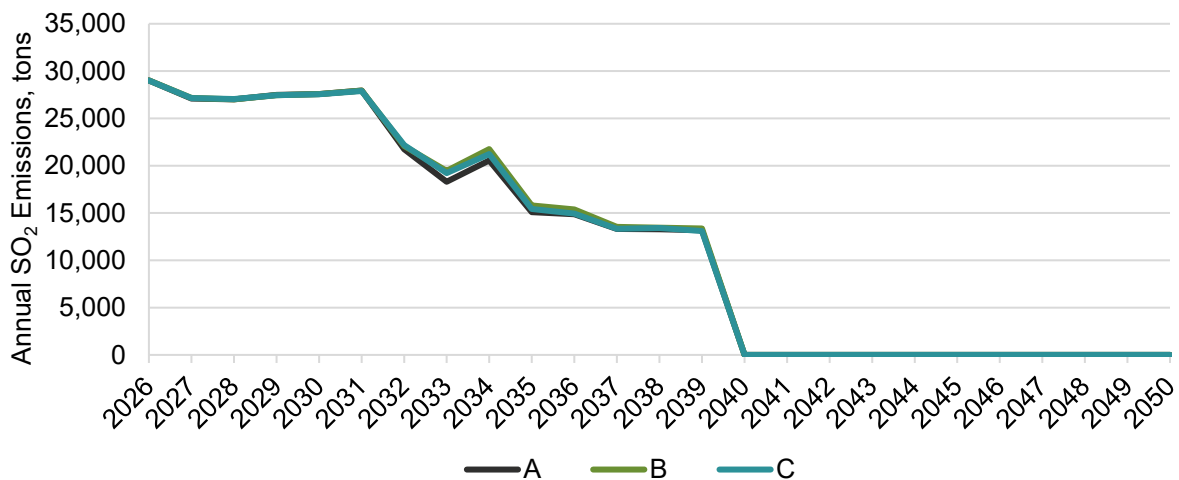
Variations in emissions of SO<sub>2</sub> and mercury between 2031 and 2039 are due to fewer regularly scheduled coal plant outages during this period. The variation is followed by the absence of emissions for 2040 in SO<sub>2</sub> and mercury, resulting from expected end of life for existing coal units. NO<sub>x</sub> emissions also decrease in 2040 due to expected end of life. There is some variation in emissions among the associated strategies; however, this variation is much smaller than the differences between the scenarios (Figure 5-5, Figure 5-6, Figure 5-7). Emissions are greatest under Scenario 2, except for NO<sub>x</sub> where Scenario 1 is greatest, and lowest under Scenario 3.

**Table 5-14: Average Total, Annual, and Percent Reduction of Emissions of SO<sub>2</sub>, NO<sub>x</sub>, and Mercury by Alternative Strategy**

|                                                            | Alternative Strategy |                    |                    |                               |                             |
|------------------------------------------------------------|----------------------|--------------------|--------------------|-------------------------------|-----------------------------|
|                                                            | A – Baseline         | B                  | C                  | Scenario 1 Range <sup>1</sup> | Extended Range <sup>2</sup> |
| <b>SO<sub>2</sub></b>                                      |                      |                    |                    |                               |                             |
| Total emissions 2026-2050, tons                            | 296,464              | 300,986            | 298,915            | 330,710 - 334,479             | 113,456 - 373,949           |
| Average Annual emissions (2026-2039 <sup>3</sup> ), tons   | 21,176               | 21,499             | 21,351             | 23,622 - 23,891               | 8,104 - 26,711              |
| Percent reduction 2026-2050                                | >99.0 <sup>3</sup>   | >99.0 <sup>3</sup> | >99.0 <sup>3</sup> | >99.0 <sup>3</sup>            | >99.0 <sup>3</sup>          |
| <b>NO<sub>x</sub></b>                                      |                      |                    |                    |                               |                             |
| Total emissions 2026-2050, tons                            | 248,958              | 243,329            | 240,541            | 277,078 - 289,891             | 175,357 - 332,119           |
| Average Annual emissions, tons                             | 9,958                | 9,733              | 9,622              | 11,083 - 11,596               | 7,014 - 13,285              |
| Percent reduction 2026-2050                                | 71.8                 | 75.3               | 75.3               | 53.6 - 61.7                   | 14.7 - 87.7                 |
| <b>Mercury</b>                                             |                      |                    |                    |                               |                             |
| Total emissions 2026-2050, pounds                          | 1,311                | 1,338              | 1,319              | 1,418 - 1,475                 | 200 - 1,864                 |
| Average Annual emissions (2026-2039 <sup>3</sup> ), pounds | 93.7                 | 95.5               | 94.2               | 101.3 - 105.3                 | 14.3 - 133.2                |
| Percent reduction 2026-2050                                | 100.0                | 100.0              | 100.0              | 100.0                         | 100.0                       |

Notes:

1. Scenario 1 Range is the minimum and maximum values for all alternative strategies.
2. Extended Range is the minimum and maximum values of all the scenarios across all alternatives and sensitivities, including the Preferred Alternative.
3. Average annual emissions for SO<sub>2</sub> and Mercury only calculated for the years prior to expected end of life for the coal units; trace amounts of SO<sub>2</sub> emissions (USEPA default emission rate of 0.0006 lb/mmBtu [40 CFR Part 75, Appendix D]) associated with sulfur-containing odorants added to pipeline-delivered natural gas not included



\*Trace amounts of SO<sub>2</sub> emissions (USEPA default emission rate of 0.0006 lb/mmBtu [40 CFR Part 75, Appendix D]) associated with sulfur-containing odorants added to pipeline-delivered natural gas not included.

**Figure 5-2: Trends in Emissions of SO<sub>2</sub> by Alternative Strategy Based on Averages of the Three Scenarios**

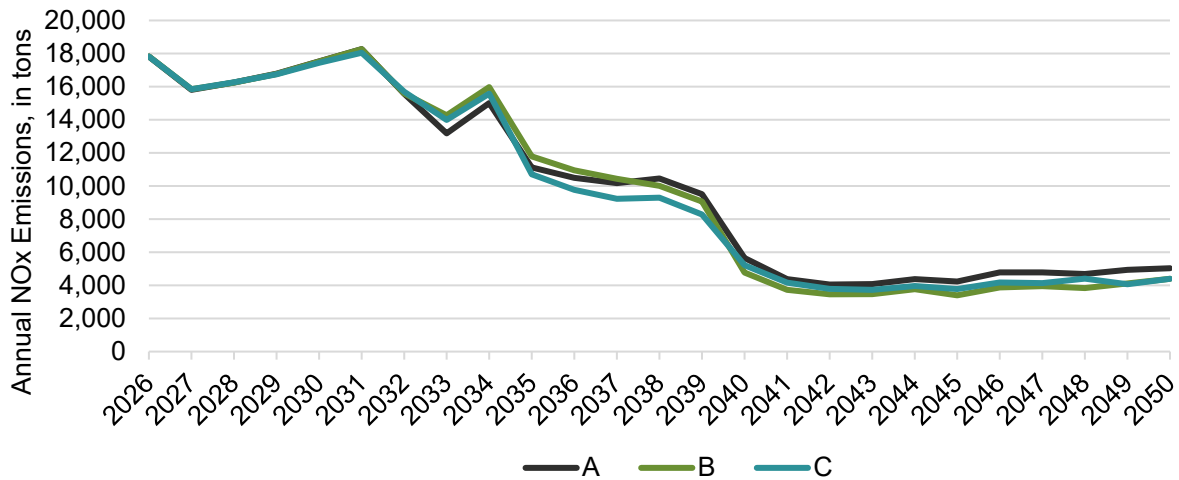


**Figure 5-3: Trends in Emissions of NOx by Alternative Strategy Based on Averages of the Three Scenarios**

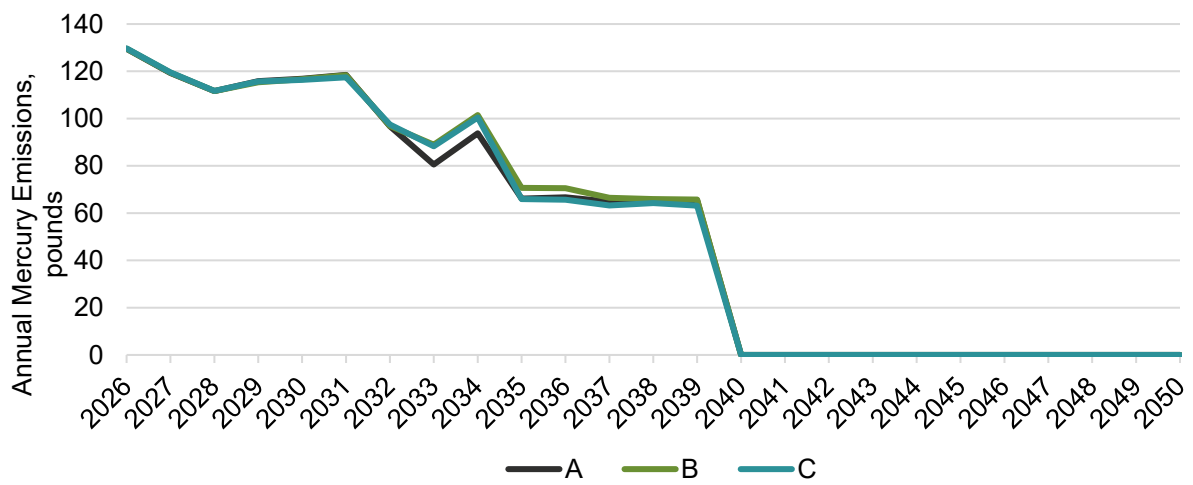
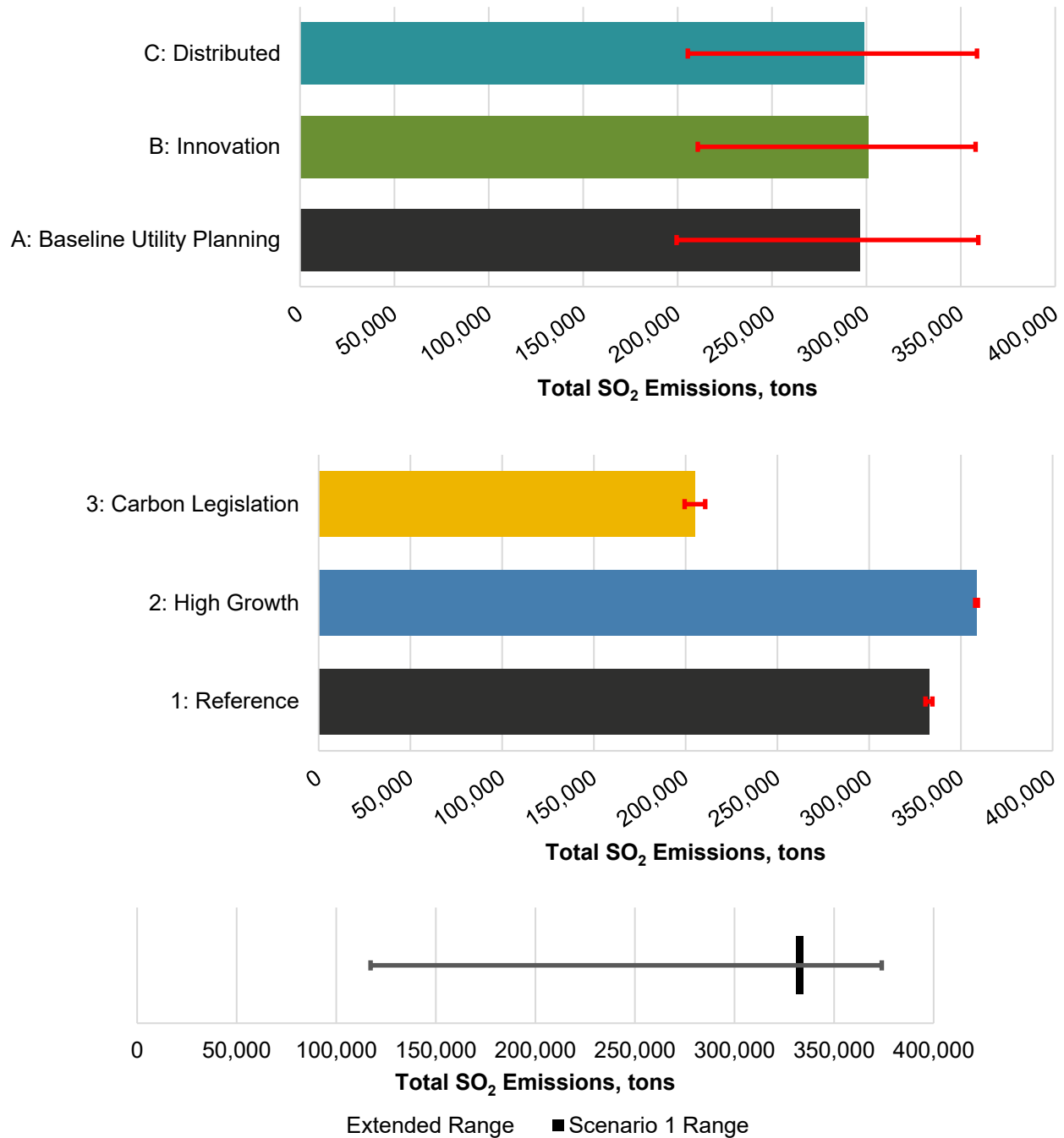


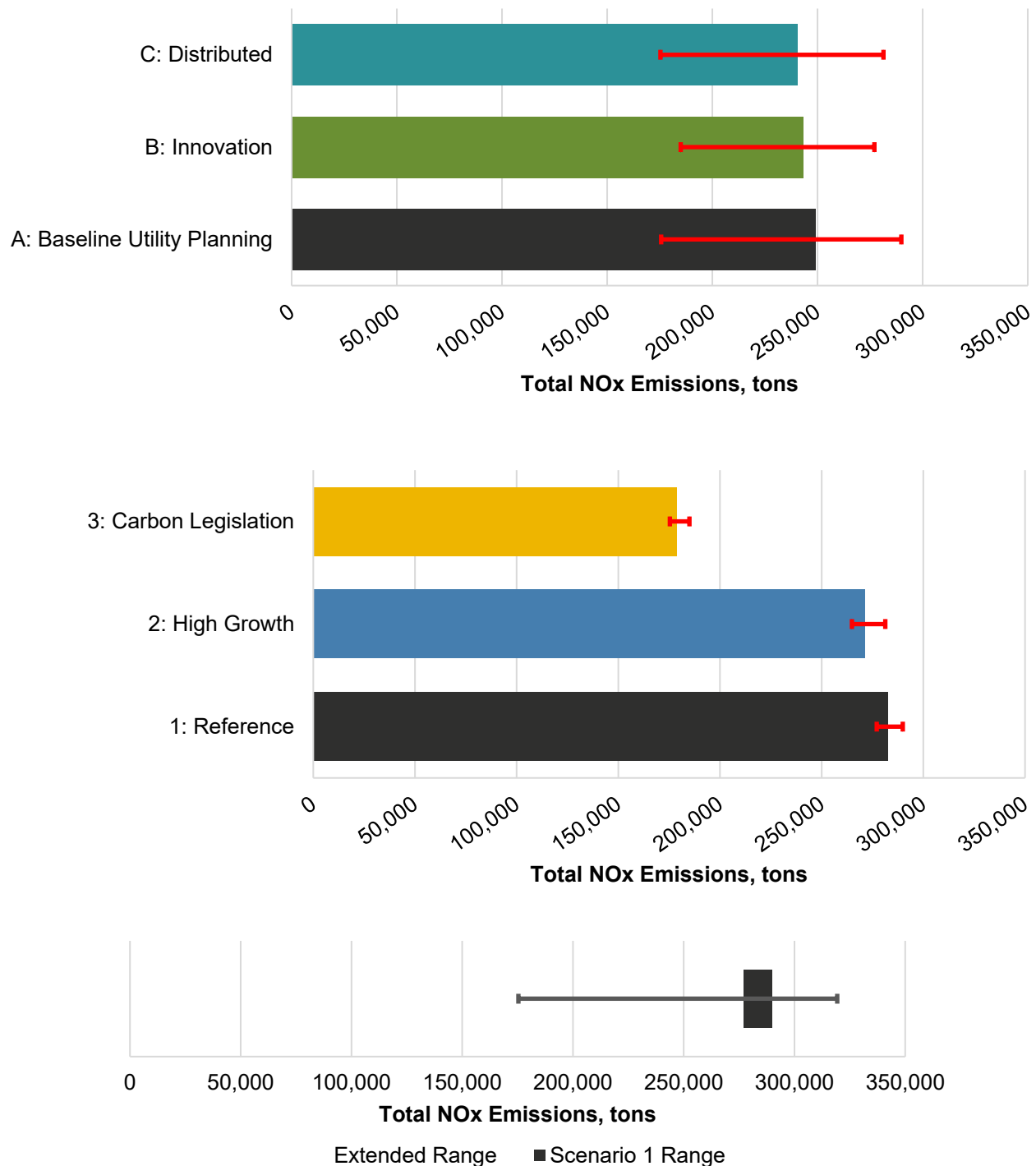
**Figure 5-4: Trends in Emissions of Mercury by Alternative Strategy Based on Averages of the Three Scenarios**



Note: The error bars in the top and middle charts indicate the maximum and minimum values for the scenarios associated with each alternative strategy, and the strategies associated with each scenario.

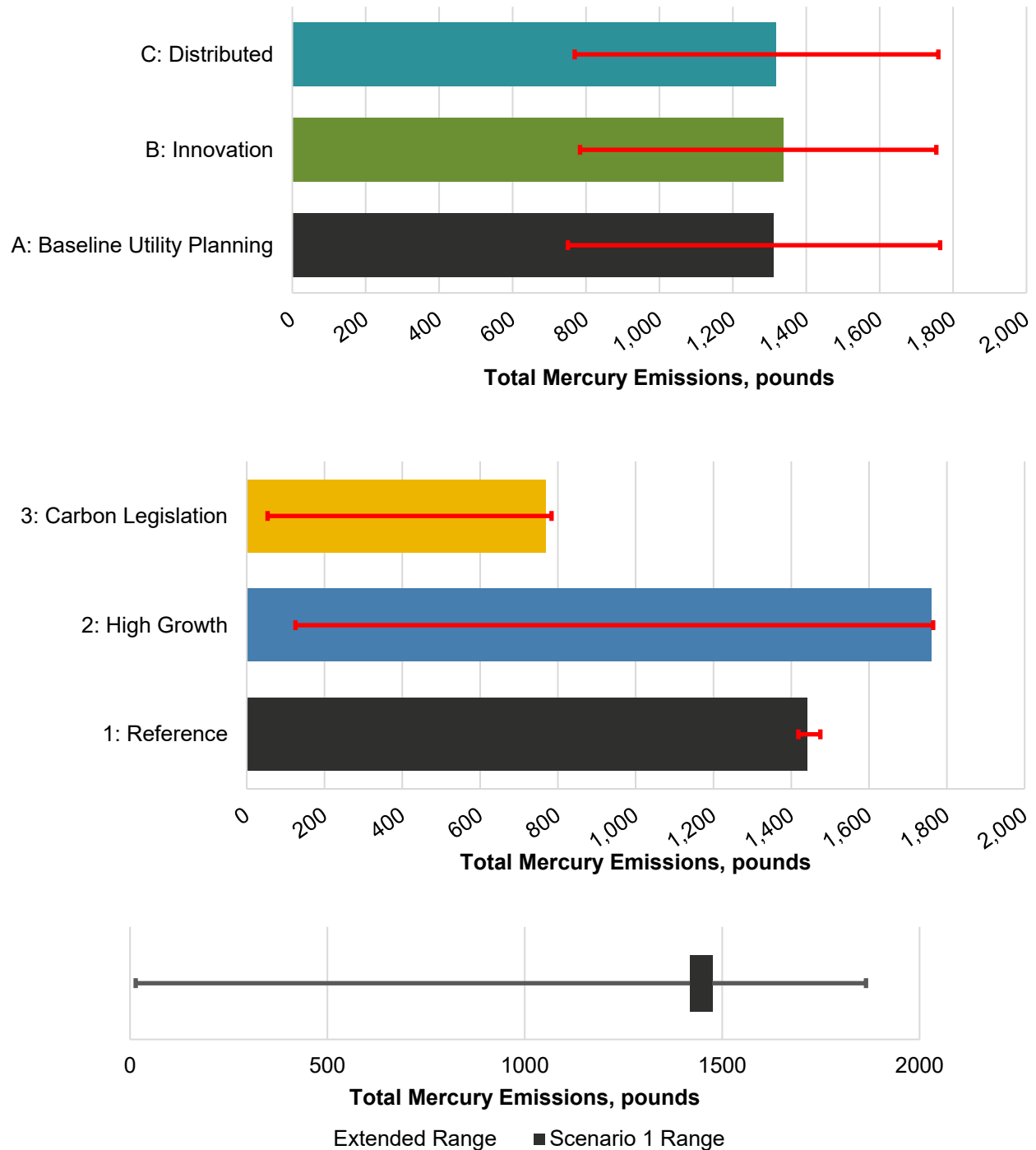
**Figure 5-5: Total 2026-2050 Emissions of SO<sub>2</sub> by Alternative Strategy (top), Scenario (middle), and the Range for Scenario 1 as well as the Extended Range to Encompass All Scenarios, Strategies, and Sensitivities, including the Preferred Alternative (bottom)**





Note: The error bars in the top and middle charts indicate the maximum and minimum values for the scenarios associated with each alternative strategy, and for the strategies associated with each scenario.

**Figure 5-6: Total 2026-2050 Emissions of NO<sub>x</sub> by Alternative Strategy (top), Scenario (middle), and the Range for Scenario 1 as well as the Extended Range to Encompass All Scenarios, Strategies, and Sensitivities, including the Preferred Alternative (bottom)**



Note: The error bars on the top and middle charts indicate the maximum and minimum values for the scenarios associated with each alternative strategy, and the strategies associated with each scenario.

**Figure 5-7: Total 2026-2050 Emissions of Mercury by Alternative Strategy (top), Scenario (middle), and the Range for Scenario 1 as well as the Extended Range to Encompass All Scenarios, Strategies, and Sensitivities, including the Preferred Alternative (bottom)**

The overall reductions in emissions under each strategy show relatively little variation (Table 5-14). Emissions reductions for SO<sub>2</sub> and mercury were greatest under Strategy C, Distributed, followed by Strategy A, Baseline Utility Planning. NO<sub>x</sub> reductions, are also greatest for under Strategy C, followed closely by Strategy B, Innovation, due to the resources emphasized in these strategies.

The reductions in SO<sub>2</sub>, NO<sub>x</sub> and mercury emissions would continue recent trends in emissions of these air pollutants under all alternative strategies. Although there is larger variation under different scenarios for mercury emissions reductions still occur. Reductions would result in further small decreases in regional ambient concentrations of SO<sub>2</sub> and SO<sub>4</sub> (a component of acid deposition), regional haze, and fine particulates. TVA emissions of NO<sub>x</sub> would also decrease by about 99 percent, since their 1995 peak, under all strategies. Although this continued decrease would likely result in reductions in regional NO<sub>x</sub> and ozone concentrations, the air quality effect may be small as TVA emissions make up an increasingly small proportion of regional NO<sub>x</sub> emissions.

## **5.5.2 Climate and Greenhouse Gases**

### **5.5.2.1 Direct Combustion GHG Emissions**

Total and annual direct combustion emissions of GHG in terms of CO<sub>2</sub>, as well as CO<sub>2</sub> emission rates – also referred to as CO<sub>2</sub> intensity – decrease under all alternative strategies, including the Preferred Alternative, (Table 5-15, Figure 5-8, Figure 5-9, Appendix C) in the future. The variation among the strategies for both CO<sub>2</sub> emissions and emissions rates are relatively small and much less than the variation among the scenarios associated with each strategy (Figure 5-10 and Figure 5-11).

Strategy A, Baseline Utility Planning (the No Action Alternative), has the highest CO<sub>2</sub> emissions and CO<sub>2</sub> emissions rate and the least reductions. Strategy B, Innovation, has the lowest CO<sub>2</sub> emissions and emissions rates, although Strategy C is very similar. Within each strategy, Scenario 1 has the highest CO<sub>2</sub> emissions and emissions rates, followed by Scenario 2. Scenario 3 has the lowest emissions and emissions rates. The overall trends for both CO<sub>2</sub> emissions and emissions rates are very similar, with the percent reductions somewhat greater for emissions rates. Long-term decreases are primarily due to expected end of life for existing coal units as well as increased generation from lower-carbon or carbon-free resources. As compared to the baseline condition, Strategies B and C would result in similar reductions of GHG emissions as shown in Table 5-15.

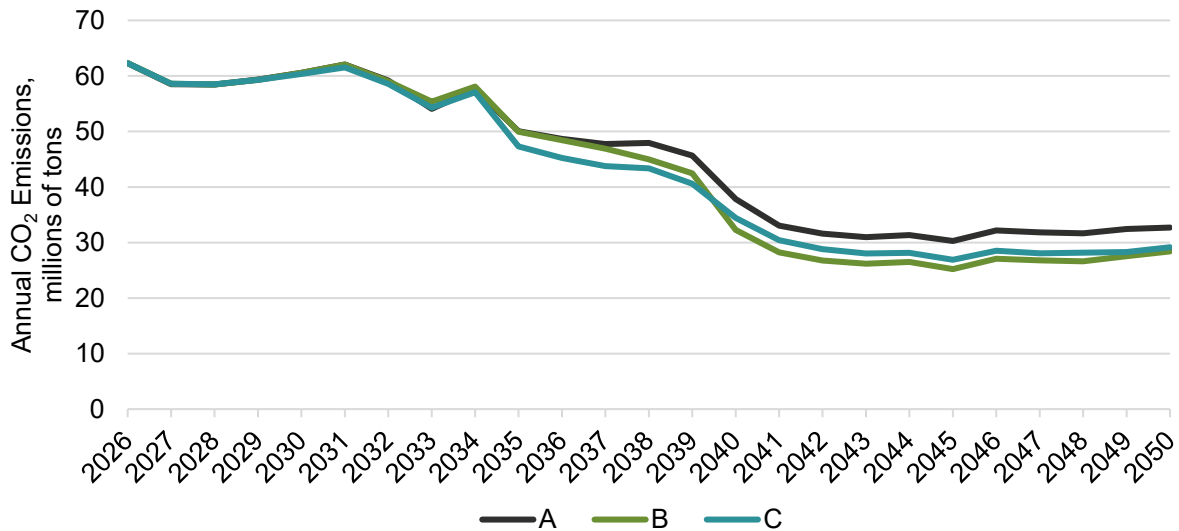
**Table 5-15: Average 2026-2050 CO<sub>2</sub> Emissions and Emissions Rates, and Percent Changes by Alternative Strategy**

|                                                                                   | Alternative Strategy |        |        |                               |                             |
|-----------------------------------------------------------------------------------|----------------------|--------|--------|-------------------------------|-----------------------------|
|                                                                                   | A – Baseline         | B      | C      | Scenario 1 Range <sup>1</sup> | Extended Range <sup>2</sup> |
| Total CO <sub>2</sub> emissions 2026-2050, million tons                           | 1,128                | 1,068  | 1,070  | 1,167 - 1,298                 | 837 - 1,298                 |
| Average Annual CO <sub>2</sub> emissions, thousand tons, 2026-2050                | 45,125               | 42,722 | 42,785 | 46,663 - 51,916               | 33,464 - 51,916             |
| Percent CO <sub>2</sub> emissions reduction, 2026-2050                            | 47.5                 | 54.4   | 53.2   | 20.3 - 37.3                   | +6.8 - 70.9                 |
| Average Annual CO <sub>2</sub> emissions rate, lbs/MWh, 2026-2050                 | 463                  | 440    | 443    | 489 - 542                     | 370 - 563                   |
| Percent CO <sub>2</sub> emissions rate reduction, 2026-2050                       | 57.3                 | 62.9   | 61.4   | 33.8 - 48.0                   | 11.5 - 73.2                 |
| Percent Total CO <sub>2</sub> emissions reduction compared to Baseline, 2026-2050 | --                   | 5.3    | 5.2    | --                            | --                          |

Notes:

1. Scenario 1 Range is the minimum and maximum values for all alternatives.

2. Extended Range is the minimum and maximum values of all the scenarios across all strategies, and sensitivities, including the Preferred Alternative.

**Figure 5-8: 2026-2050 Trends in Emissions of CO<sub>2</sub> by Alternative Strategy Based on Averages of the Three Scenarios**

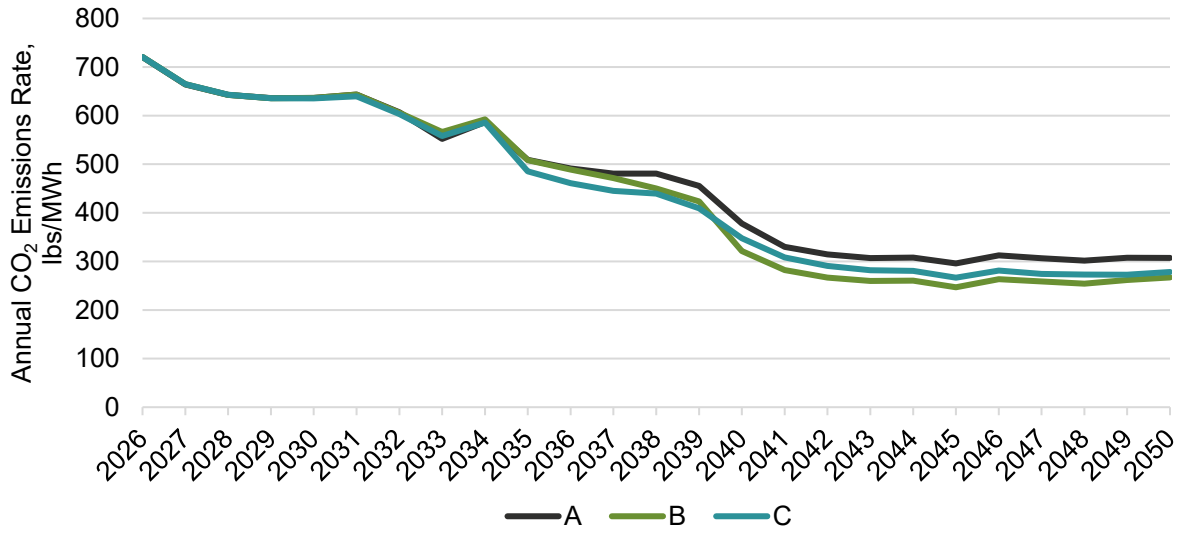
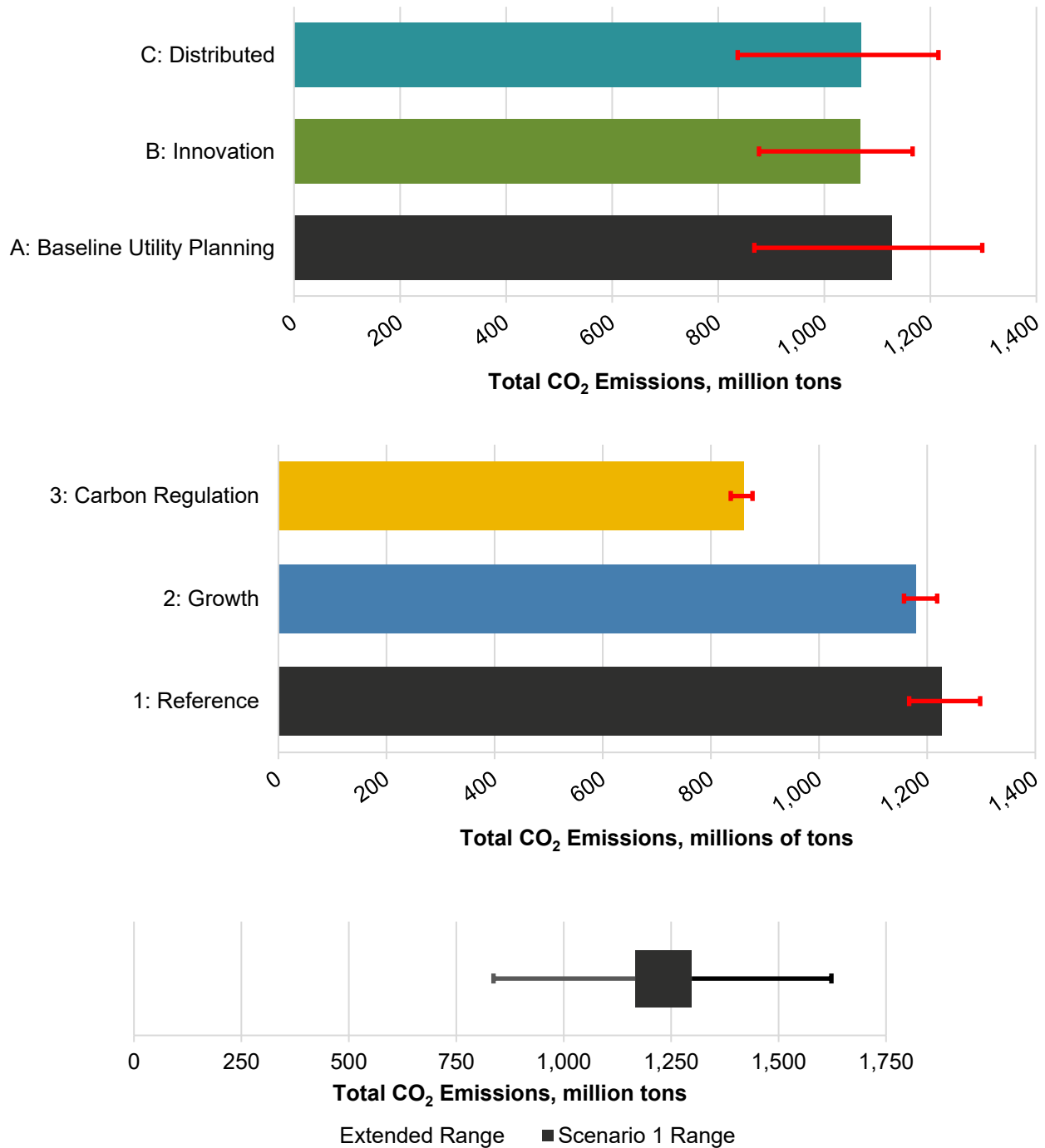


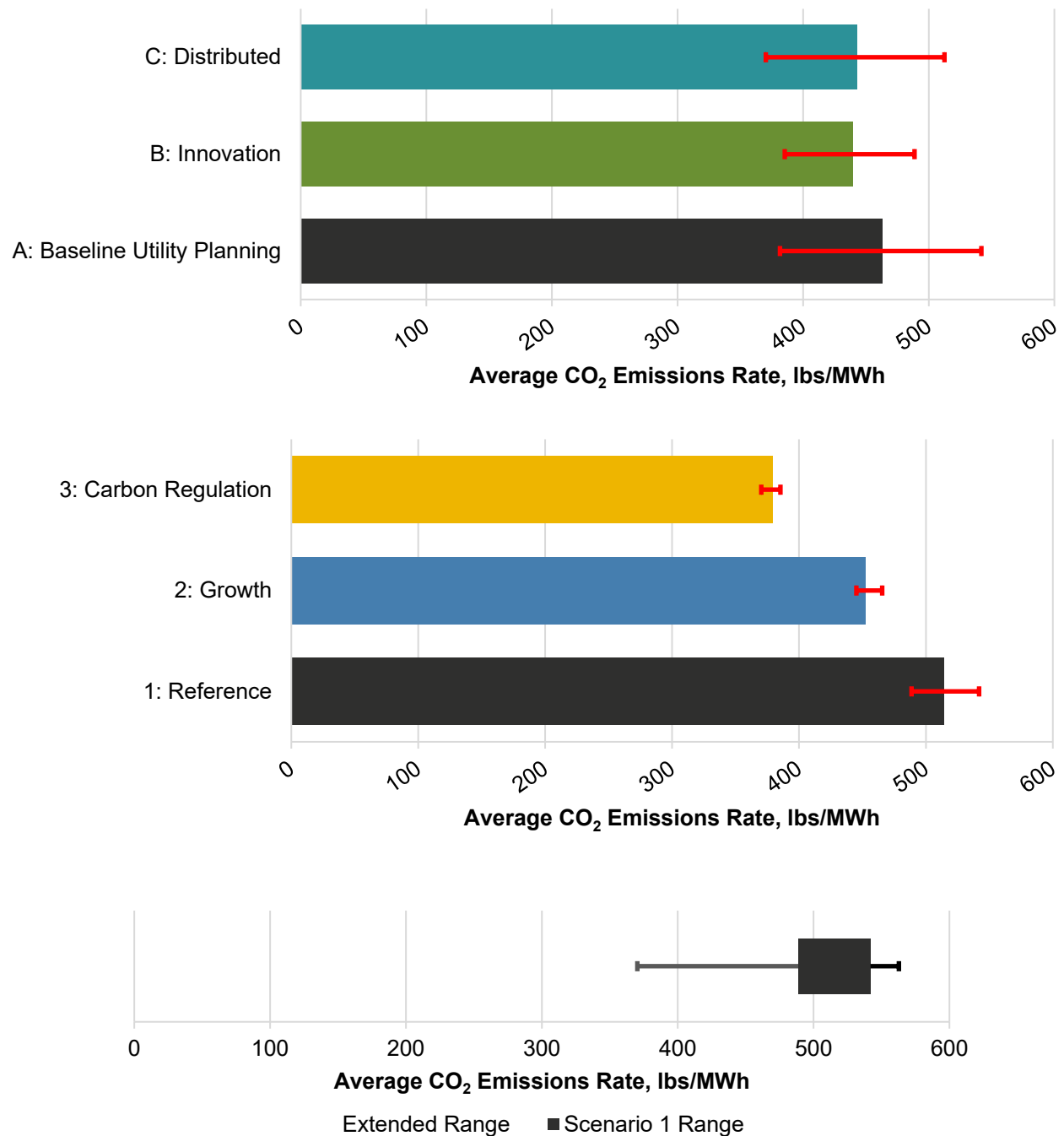
**Figure 5-9: 2026-2050 Trends in CO<sub>2</sub> Emissions Rate by Alternative Strategy Based on Averages of the Three Scenarios**



Note: The error bars in the top and middle charts indicate the maximum and minimum values for the scenarios associated with each alternative strategy, or strategies associated with each scenario. The error bar in the bottom chart indicates extended range.

**Figure 5-10: 2026-2050 Total Emissions of CO<sub>2</sub> by Alternative Strategy (top), Scenario (middle), and the Range for Scenario 1 as well as the Extended Range to Encompass All Scenarios, Strategies, and Sensitivities, including the Preferred Alternative (bottom)**





Note: The error bars in the top and middle charts indicate the maximum and minimum values for the scenarios associated with each alternative strategy, or strategies associated with each scenario. The error bar in the bottom chart indicates extended range.

**Figure 5-11: Average 2026-2050 CO<sub>2</sub> Emissions Rates by Alternative Strategy (top), Scenario (middle), and the Range for Scenario 1 as well as the Extended Range to Encompass All Scenarios, Strategies, and Sensitivities, including the Preferred Alternative (bottom)**

### **5.5.2.2 Direct GHG Emissions Reduction and GHG Emissions Impact on Climate Change**

Scope 1 GHG emissions are direct emissions from applicable sources owned, operated or controlled by TVA, including those emissions produced by energy generating facilities during operation (e.g., emissions associated with the generation of energy via fuel combustion in boilers, furnaces, etc. at natural gas, coal, and other facilities) and vehicles. Scope 2 GHG emissions are indirect emissions from the generation of power used by TVA, such as end use of electricity, steam, heating, and cooling from TVA buildings. Scope 3 GHG emissions are from sources not owned or controlled by TVA but related to TVA activities and include, among other things, business travel, employee commuting and contracted waste disposal (TVA 2020e). At the end of FY 2022, Scope 1 and 2 GHG emissions had been reduced by 64.1 percent, since 2008. Scope 3 emissions were reduced by 43.8 percent by the end of 2022 (TVA 2022f).

All alternative strategies, including the Preferred Alternative, would result in the continued, significant, long-term reductions in CO<sub>2</sub> emissions. By the end of 2050, averaged across scenarios, CO<sub>2</sub> emissions would be reduced by approximately 47.5 percent (Strategy A) to 54.4 percent (Strategy B), compared to 2026. However, under some sensitivities cases CO<sub>2</sub> emissions could be reduced by more than 70 percent or conversely increase by almost 7 percent.

The climate change impacts of GHG emissions, including CO<sub>2</sub> emissions, have been recently described in the Fifth NCA (USGCRP 2023). Chapter 22 of the assessment focuses on the Southeast, where there are predicted increases in climate stressors including extreme heat and precipitation events, and droughts. The Southeast frequently faces costly disasters related to weather and climate threats such as flooding, tropical storms, and hurricanes, which impact its infrastructure and agriculture. Health inequities are further exacerbated due to climate-related risks. Other issues include threats to the region's terrestrial and aquatic life, as land cover changes and urban development threaten unprotected biodiversity hotspots. Climate adaptation efforts also tend to be concentrated in wealthier communities, leaving under-resourced and more rural populations at a greater risk (USGCRP 2023). Other climate assessments, including the recent Intergovernmental Panel on Climate Change (IPCC) Special Report on Global Warming of 1.5°C (IPCC 2018), describe impacts worldwide.

While a reduction in CO<sub>2</sub> emissions reduce the potential for associated climate change, the full effects on climate in the TVA region and elsewhere would be difficult to quantify in the short term but may be seen over time.

### **5.5.2.3 Life Cycle GHG Emissions**

In addition to the forecasted direct combustion CO<sub>2</sub> emissions discussed previously, TVA also developed life cycle GHG emissions forecasts to include upstream, ongoing non-combustion, and downstream GHG emissions for each studied alternative and sensitivity

cases. Beyond direct combustion emissions, all power generating resources include additional life cycle GHG emissions associated with their construction, ongoing operations, and their decommissioning at the end of their useful life. The 2026 IRP EIS incorporates a GHG life cycle analysis (GHG LCA) in its evaluation to help quantify a full accounting of cradle-to-grave GHG emissions. For its GHG LCA, TVA partnered with the NLR, which provided technical assistance, verified and generated harmonized LCA emission factors for each resource technology, and validated TVA's results by running select TVA cases through its own GHG LCA model. NLR's 2021 Los Angeles 100 percent Renewable Energy Study (LA100) included a GHG LCA evaluation, and TVA used this evaluation as a guide in the development of its own GHG LCA model and approach. NLR provided TVA with a technical report which includes documentation of NLR's scope of work as well as documentation of emission factors for each resource type. This report was produced when the laboratory NREL. The laboratory is now the NLR. A copy of this report is available as a supporting document on TVA's 2026 IRP website ([www.tva.com/irp](http://www.tva.com/irp)).

#### **5.5.2.3.1 Overview of the Greenhouse Gas Life Cycle Analysis**

A GHG LCA incorporates emissions from four distinct life cycle phases: upstream, ongoing non-combustion, ongoing combustion, and downstream, as shown in Figure 5-12. Upstream emissions are primarily associated with activities required for construction and commissioning of a new power generating asset, including raw material extraction, supply chain, manufacturing, and assembly. Ongoing non-combustion emissions are the annual emissions associated with keeping a plant operational, including plant maintenance and related emissions within the supply chain and fuel cycle. In the case of natural gas-fired plants, the fuel cycle ongoing non-combustion emissions include upstream methane leakage. Ongoing combustion emissions are the annual emissions associated with direct combustion through the burning of fossil fuels at a power plant. Therefore, only power plants that burn fossil fuels or other combustible materials include direct combustion emissions. Finally, downstream emissions are associated with activities required for decommissioning at the end of a plant's useful life, including dismantling, disposal, and returning the site to a brownfield state.

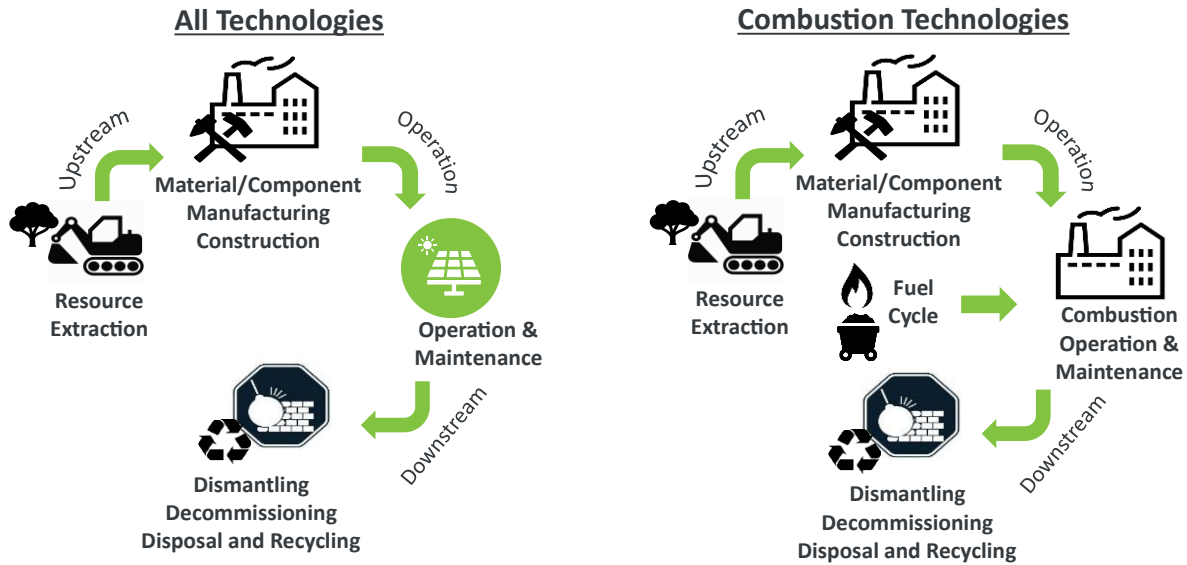


**Figure 5-12: Overview of Life Cycle Phases for which Emissions are Incorporated into GHG LCA (source: NLR)**

Emission factors are used to calculate the estimated emissions associated with upstream, ongoing non-combustion, and downstream activities. Emission factors represent the quantity of emissions (in grams) emitted on a unitized basis (either per installed kW or per kWh generated). Harmonized CO<sub>2</sub>e emission factors were sourced from NLR for all resource technologies included in the 2026 IRP analysis. For upstream and downstream emissions, the emission factors are provided in terms of grams per installed capacity (g/kW). Ongoing combustion CO<sub>2</sub> emissions are calculated by the EnCompass model licensed through Yes Energy as a part of the development of portfolio energy plans in the IRP. For ongoing non-combustion emissions emission factors are provided in terms of grams per unit of generation (g/kWh). The value of emission factors for each electric power technology resource can be found in Table 5-16.

**Table 5-16: CO<sub>2</sub>e Emission Factors for all Life Cycle Phases, by Resource Type**

| Electric Power Technology | One-Time Upstream GHG (CO <sub>2</sub> e), g/kW | Ongoing Annual Combustion GHG (CO <sub>2</sub> e), g/kW-hr | Ongoing Annual Non-Combustion GHG (CO <sub>2</sub> e), g/kW-hr | One-Time Downstream GHG (CO <sub>2</sub> e), g/kW |
|---------------------------|-------------------------------------------------|------------------------------------------------------------|----------------------------------------------------------------|---------------------------------------------------|
| Coal, Supercritical       | 867,240                                         | Emissions Calculated Separately <sup>1</sup>               | 10.00                                                          | 67,100                                            |
| Coal, Subcritical         | 708,246                                         | Emissions Calculated Separately <sup>1</sup>               | 4.90                                                           | 67,100                                            |
| CC                        | 100,000                                         | Emissions Calculated Separately <sup>1</sup>               | 62.00                                                          | 4,070                                             |
| CC with CCS               | 1,400,000                                       | Emissions Calculated Separately <sup>1</sup>               | 110                                                            | 4,300                                             |
| CT                        | 64,790                                          | Emissions Calculated Separately <sup>1</sup>               | 70.00                                                          | 2,600                                             |

| Electric Power Technology | One-Time Upstream GHG (CO <sub>2</sub> e), g/kW | Ongoing Annual Combustion GHG (CO <sub>2</sub> e), g/kW-hr | Ongoing Annual Non-Combustion GHG (CO <sub>2</sub> e), g/kW-hr | One-Time Downstream GHG (CO <sub>2</sub> e), g/kW |
|---------------------------|-------------------------------------------------|------------------------------------------------------------|----------------------------------------------------------------|---------------------------------------------------|
| Diesel                    | 1,021                                           | Emissions Calculated Separately <sup>1</sup>               | 97.17                                                          | 18                                                |
| Hydro                     | 1,100                                           | NA                                                         | 1.90                                                           | -                                                 |
| Nuclear                   | 483,552                                         | NA                                                         | 12.00                                                          | 175,000                                           |
| Nuclear SMR               | 810,000                                         | NA                                                         | 12.00                                                          | 190,000                                           |
| Pumped Hydro              | 310                                             | NA                                                         | 1.80                                                           | 7                                                 |
| Solar                     | 1,630,000                                       | NA                                                         | 9.40                                                           | 37,800                                            |
| Wind                      | 619,000                                         | NA                                                         | 0.74                                                           | 14,000                                            |
| Landfill Gas              | 64,790                                          | NA                                                         | 38.00                                                          | 2,600                                             |
| Biomass                   | 1,960                                           | NA                                                         | 6.02                                                           | 35                                                |
| Battery                   | 527,000                                         | NA                                                         | -                                                              | 98,900                                            |
| Market Purchases          | NA                                              | Emissions Calculated Separately <sup>1</sup>               | 62.00                                                          | NA                                                |

NA – Not applicable

1 – Emissions are determined in the GHG LCA using individual plant heat rates and estimated carbon content of the fuel

Upstream emissions are assumed to occur in the year prior to the start of operations while downstream emissions are assumed to occur in the year following the final year of operations. Ongoing non-combustion emissions are calculated on an annual basis based on the amount of total generation each resource type produces in that year. Figure 5-13 shows an example of annual impacts for different resources.

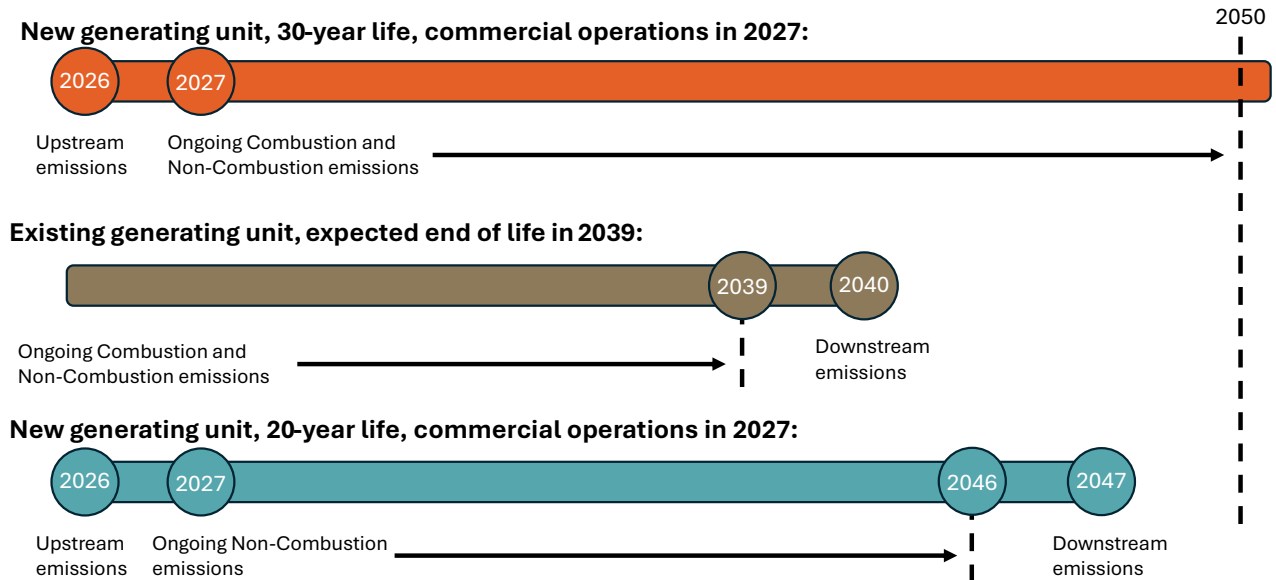


Figure 5-13: Life Cycle Phase Annual Impact Examples

### 5.5.2.3.2 2026 IRP Greenhouse Gas Life Cycle Analysis Approach

The results of the nine core portfolio and sensitivity cases from the 2026 IRP were pulled into TVA's GHG LCA model. These results included forecasted generation by unit, build and end of life schedules, and direct CO<sub>2</sub> emissions. The GHG LCA model utilized emission factors, provided by NLR, to calculate GHG emissions for each life cycle phase by year. GHGs included in the scope of the study included CO<sub>2</sub>, CH<sub>4</sub>, and N<sub>2</sub>O. An overview of the process can be found in Figure 5-14.

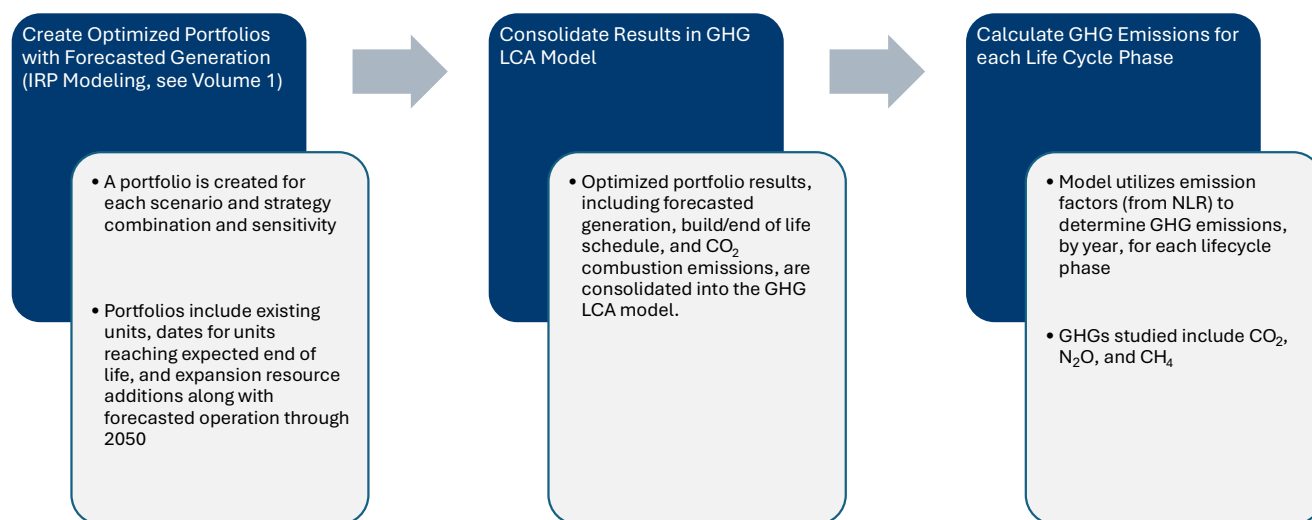


Figure 5-14: Overview of TVA's GHG LCA Approach

### 5.5.2.3.3 Key Assumptions

The scope of the 2026 IRP GHG LCA is calendar years 2026 through 2050. Emissions associated with activities occurring outside of this window are excluded from the study. Although many units will likely operate beyond 2050, there are too many unknown variables to account for their impacts beyond the study window of the IRP. Some of these unknown variables include changes in system load, unit generation, and other replacement assets elsewhere in the system beyond 2050.

A small number of resources included in the 2026 IRP study represent shorter-term PPAs where the asset was not built exclusively for TVA's use. An example of this could be a natural gas CC facility located outside the TVA region under a 2-year firm capacity contract. Since this facility was not built for the sole purpose of providing TVA with power and the facility is not likely to be retired at the end of the 2-year PPA, it would be incorrect for the GHG LCA to calculate and assign upstream and downstream emissions against the TVA system. As such, TVA identified and excluded these contracts from the upstream and downstream emissions calculations. However, the ongoing combustion and non-combustion emissions were calculated and assigned to the TVA system for the duration of these contracts.



TVA worked with NLR to disaggregate the CO<sub>2e</sub> emission factors, shown in a prior section, into the three primary GHGs of concern: CO<sub>2</sub>, N<sub>2</sub>O, and CH<sub>4</sub>. Disaggregation percentages were provided by NLR. TVA used these percentages, along with the latest 100-year global warming potential values for N<sub>2</sub>O (273) and CH<sub>4</sub> (27.9) from the IPCC Sixth Assessment Report, to generate the following emission factor tables for each GHG (Table 5-17, Table 5-18, Table 5-19). Additional information regarding the disaggregation process can be found in NLR's technical support documentation, which is available as a supporting document on TVA's 2026 IRP website ([www.tva.com/irp](http://www.tva.com/irp)).

**Table 5-17: CO<sub>2</sub> Emission Factors for all Life Cycle Phases, by Resource Type**

| Electric Power Technology | One-Time Upstream CO <sub>2</sub> , g/kW | Ongoing Annual Combustion CO <sub>2</sub> , g/kW-hr | Ongoing Annual Non-Combustion CO <sub>2</sub> , g/kW-hr | One-Time Downstream CO <sub>2</sub> , g/kW |
|---------------------------|------------------------------------------|-----------------------------------------------------|---------------------------------------------------------|--------------------------------------------|
| Coal, Supercritical       | 812,013                                  | Emissions Calculated Separately <sup>1</sup>        | 5.10                                                    | 65,134                                     |
| Coal, Subcritical         | 653,782                                  | Emissions Calculated Separately <sup>1</sup>        | 2.64                                                    | 65,134                                     |
| CC                        | 94,051                                   | Emissions Calculated Separately <sup>1</sup>        | 31.47                                                   | 3,951                                      |
| CC with CCS               | 1,356,197                                | Emissions Calculated Separately <sup>1</sup>        | 61.06                                                   | 4,174                                      |
| CT                        | 60,038                                   | Emissions Calculated Separately <sup>1</sup>        | 35.53                                                   | 2,524                                      |
| Diesel                    | 60,038                                   | Emissions Calculated Separately <sup>1</sup>        | 49.32                                                   | 18                                         |
| Hydro                     | 1,045                                    | NA                                                  | 1.81                                                    | -                                          |
| Nuclear                   | 478,319                                  | NA                                                  | 11.04                                                   | 167,065                                    |
| Nuclear SMR               | 801,234                                  | NA                                                  | 11.04                                                   | 181,385                                    |
| Pumped Hydro              | 294                                      | NA                                                  | 1.70                                                    | 7                                          |
| Solar                     | 1,455,198                                | NA                                                  | 8.47                                                    | 36,692                                     |
| Wind                      | 567,827                                  | NA                                                  | 0.71                                                    | 13,590                                     |
| Landfill Gas              | 59,787                                   | NA                                                  | 36.30                                                   | 2,524                                      |
| Biomass                   | 1,796                                    | NA                                                  | 5.78                                                    | 34                                         |
| Battery                   | 481,113                                  | NA                                                  | 0                                                       | 96,002                                     |
| Market Purchases          | NA                                       | Emissions Calculated Separately <sup>1</sup>        | 31.47                                                   | NA                                         |

NA – Not applicable

<sup>1</sup> Emissions are determined in the GHG LCA using individual plant heat rates and estimated carbon content of the fuel.

**Table 5-18: CH<sub>4</sub> Emission Factors for all Life Cycle Phases, by Resource Type**

| Electric Power Technology | One-Time Upstream CH <sub>4</sub> , g/kW | Ongoing Annual Combustion CH <sub>4</sub> , g/kW-hr | Ongoing Annual Non-Combustion CH <sub>4</sub> , g/kW-hr | One-Time Downstream CH <sub>4</sub> , g/kW |
|---------------------------|------------------------------------------|-----------------------------------------------------|---------------------------------------------------------|--------------------------------------------|
| Coal, Supercritical       | 1,794                                    | Emissions Calculated Separately <sup>1</sup>        | 0.17                                                    | 43                                         |
| Coal, Subcritical         | 1,810                                    | Emissions Calculated Separately <sup>1</sup>        | 0.08                                                    | 43                                         |
| CC                        | 188                                      | Emissions Calculated Separately <sup>1</sup>        | 1.08                                                    | 3                                          |
| CC with Carbon Capture    | 1,147                                    | Emissions Calculated Separately <sup>1</sup>        | 1.174                                                   | 3                                          |

| Electric Power Technology | One-Time Upstream CH <sub>4</sub> , g/kW | Ongoing Annual Combustion CH <sub>4</sub> , g/kW-hr | Ongoing Annual Non-Combustion CH <sub>4</sub> , g/kW-hr | One-Time Downstream CH <sub>4</sub> , g/kW |
|---------------------------|------------------------------------------|-----------------------------------------------------|---------------------------------------------------------|--------------------------------------------|
| CT                        | 150                                      | Emissions Calculated Separately <sup>1</sup>        | 1.22                                                    | 2                                          |
| Diesel                    | 150                                      | Emissions Calculated Separately <sup>1</sup>        | 1.70                                                    | 0                                          |
| Hydro                     | 2                                        | NA                                                  | 0.00                                                    | -                                          |
| Nuclear                   | 60                                       | NA                                                  | 0.03                                                    | 237                                        |
| Nuclear SMR               | 101                                      | NA                                                  | 0.03                                                    | 257                                        |
| Pumped Hydro              | 1                                        | NA                                                  | 0.00                                                    | 0                                          |
| Solar                     | 5,763                                    | NA                                                  | 0.02                                                    | 24                                         |
| Wind                      | 1,635                                    | NA                                                  | 0.00                                                    | 9                                          |
| Landfill Gas              | 151                                      | NA                                                  | 0.05                                                    | 2                                          |
| Biomass                   | 6                                        | NA                                                  | 0.01                                                    | 0                                          |
| Battery                   | 1,423                                    | NA                                                  | -                                                       | 63                                         |
| Market Purchases          | NA                                       | Emissions Calculated Separately <sup>1</sup>        | 1.08                                                    | NA                                         |

NA – Not applicable

<sup>1</sup> Emissions are determined in the GHG LCA using individual plant heat rates and estimated carbon content of the fuel.

**Table 5-19: N<sub>2</sub>O Emissions Factors for all Life Cycle Phases, by Resource Type**

| Electric Power Technology | One-Time Upstream N <sub>2</sub> O, g/kW | Ongoing Annual Combustion N <sub>2</sub> O, g/kW-hr | Ongoing Annual Non-Combustion N <sub>2</sub> O, g/kW-hr | One-Time Downstream N <sub>2</sub> O, g/kW |
|---------------------------|------------------------------------------|-----------------------------------------------------|---------------------------------------------------------|--------------------------------------------|
| Coal, Supercritical       | 19                                       | Emissions Calculated Separately <sup>1</sup>        | 0.000622                                                | 3                                          |
| Coal, Subcritical         | 15                                       | Emissions Calculated Separately <sup>1</sup>        | 0.000287                                                | 3                                          |
| CC                        | 3                                        | Emissions Calculated Separately <sup>1</sup>        | 0.001199                                                | 0                                          |
| CC with CCS               | 43                                       | Emissions Calculated Separately <sup>1</sup>        | 0.001348                                                | 0                                          |
| CT                        | 2                                        | Emissions Calculated Separately <sup>1</sup>        | 0.001353                                                | 0                                          |
| Diesel                    | 2                                        | Emissions Calculated Separately <sup>1</sup>        | 0.001878                                                | 0                                          |
| Hydro                     | 0                                        | NA                                                  | 0.000038                                                | -                                          |
| Nuclear                   | 13                                       | NA                                                  | 0.000755                                                | 5                                          |
| Nuclear SMR               | 22                                       | NA                                                  | 0.000755                                                | 5                                          |
| Pumped Hydro              | 0                                        | NA                                                  | 0.000045                                                | 0                                          |
| Solar                     | 51                                       | NA                                                  | 0.001872                                                | 2                                          |
| Wind                      | 20                                       | NA                                                  | 0.000015                                                | 1                                          |
| Landfill Gas              | 3                                        | NA                                                  | 0.000737                                                | 0                                          |
| Biomass                   | 0                                        | NA                                                  | 0.000177                                                | 0                                          |
| Battery                   | 23                                       | NA                                                  | -                                                       | 4                                          |
| Market Purchases          | NA                                       | Emissions Calculated Separately <sup>1</sup>        | 0.001199                                                | NA                                         |

NA – Not applicable

<sup>1</sup> Emissions are determined in the GHG LCA using individual plant heat rates and estimated carbon content of the fuel.

### 5.5.2.3.4 Greenhouse Gas Life Cycle Analysis Results

Annual total GHG emissions were calculated for all four life cycle phases and all three primary GHGs in each of the nine core portfolios and sensitivity cases. A summary overview of each strategy's average performance is shown in Table 5-20. The first three columns demonstrate average strategy performance across all three scenarios. The final two columns provide the upper and lower bounds of the three Scenario 1 portfolios and the upper and lower bounds across all core portfolios and sensitivity cases, including the Preferred Alternative.

**Table 5-20: Average Cumulative Life Cycle GHG Emissions (2026-2050, millions of short tons)**

|                                         | Strategy A<br>(Scenarios 1-3) | Strategy B<br>(Scenarios 1-3) | Strategy C<br>(Scenarios 1-3) |     | Scenario 1<br>Range<br>(Strategies A-C) | Extended<br>Range <sup>1</sup> |
|-----------------------------------------|-------------------------------|-------------------------------|-------------------------------|-----|-----------------------------------------|--------------------------------|
| <b>CO<sub>2</sub></b>                   |                               |                               |                               |     |                                         |                                |
| Average Cumulative Emissions, 2026-2050 | 1,248.860                     | 1,185.049                     | 1,197.300                     | Min | 1,271.279                               | 953.97                         |
|                                         |                               |                               |                               | Max | 1,410.719                               | 1,807.14                       |
| <b>CH<sub>4</sub></b>                   |                               |                               |                               |     |                                         |                                |
| Average Cumulative Emissions, 2026-2050 | 2.510                         | 2.300                         | 2.385                         | Min | 2.420                                   | 1.914                          |
|                                         |                               |                               |                               | Max | 2.887                                   | 3.882                          |
| <b>N<sub>2</sub>O</b>                   |                               |                               |                               |     |                                         |                                |
| Average Cumulative Emissions, 2026-2050 | 0.030                         | 0.029                         | 0.029                         | Min | 0.030                                   | 0.024                          |
|                                         |                               |                               |                               | Max | 0.033                                   | 0.044                          |

1. Extended Range is the minimum and maximum values of all the core portfolios and sensitivity cases, including the Preferred Alternative.

Average cumulative life cycle GHG emissions are highest for Strategy A, Baseline Utility Planning. Average cumulative life cycle GHG emissions are lowest for Strategy B, Innovation, followed closely by Strategy C, Distributed. Overall, the results from the LCA are directionally similar to combustion-only, direct emissions discussed in Section 5.5.2.1 because direct, combustion CO<sub>2</sub> emissions make up the largest share of overall life cycle GHG emissions for the overall TVA system in most years, for most cases.

As shown in the Extended Range column of Table 5-20, the lowest cases are approximately 24 percent lower than Strategy A averaged across all scenarios, with the carbon tax in Scenario 3 driving the lowest cumulative life cycle GHG emissions. Of the nine core portfolios, case 1A, Reference with Baseline Utility Planning, has the highest average cumulative life cycle GHG emissions, due to growing electric loads and moderate natural gas prices driving up the use of natural gas-fired generation. Meanwhile, case 3C, Carbon Legislation with Distributed, has the lowest average cumulative GHG emissions of the nine core portfolios, driven by the scenario's carbon tax and emphasis on distributed gas,

renewable, demand-side, and distributed generation resources which tend to have lower GHG emissions. The Extended Range includes the nine core portfolios and all sensitivities, including the Preferred Alternative. Of the sensitivities studied, Supercharged Growth has the highest average cumulative life cycle GHG emissions. The Higher Natural Gas Prices sensitivity has the lowest average cumulative life cycle GHG emissions.

### 5.5.2.3.5 Primary Life Cycle Phase Emissions by Greenhouse Gas

Of the three primary GHGs, CO<sub>2</sub> represents the largest volume of overall emissions. For CO<sub>2</sub>, the highest emissions occur during the Ongoing Combustion phase, primarily due to the burning of fossil fuels. Typically, the Ongoing Non-Combustion phase emissions the second largest volume of CO<sub>2</sub>, followed by Upstream and then Downstream emissions (Figure 5-15).

CH<sub>4</sub> accounts for significantly less volume of overall emissions compared to CO<sub>2</sub>, but more than N<sub>2</sub>O. In contrast to the other two GHGs, the highest emissions for CH<sub>4</sub> occur during the Ongoing Non-Combustion phase. This is due primarily to methane leakage, which occurs as a part of the natural gas supply chain and fuel procurement cycle. After Ongoing Non-Combustion, the highest emissions for CH<sub>4</sub> are produced in this order: Upstream, Ongoing Combustion, and Downstream (Figure 5-16).

N<sub>2</sub>O accounts for the least amount of GHG life cycle emissions by volume overall. Similar to CO<sub>2</sub>, the highest emissions are produced during Ongoing Combustion, followed by Ongoing Non-Combustion, Downstream, and Upstream (Figure 5-17).

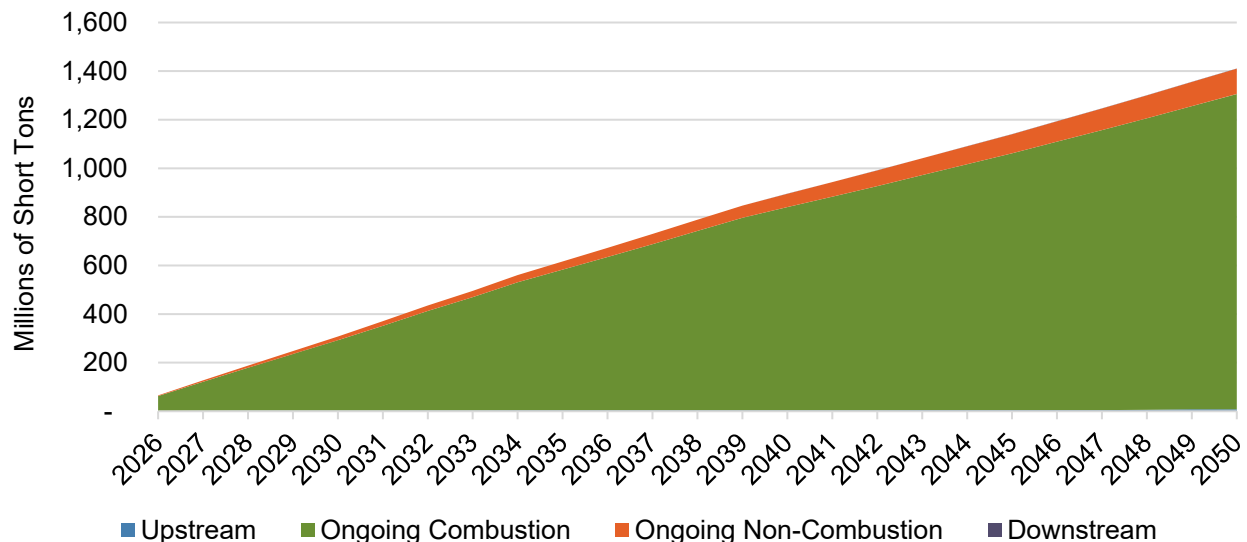


Figure 5-15: Cumulative CO<sub>2</sub> Emissions, Case 1A, 2026-2050

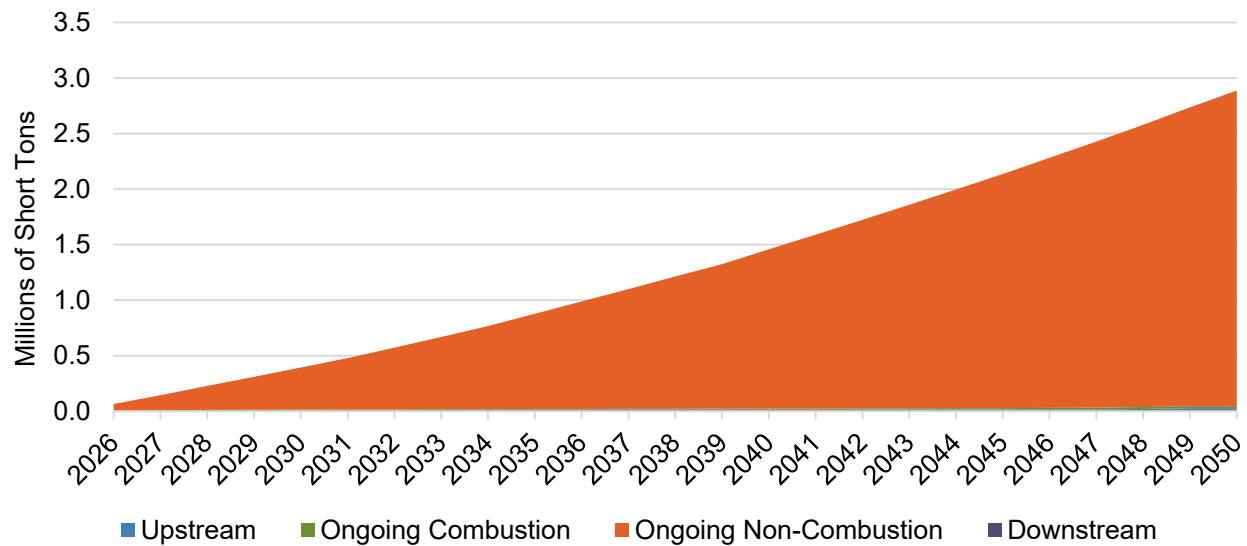


**Figure 5-16: Cumulative CH<sub>4</sub> Emissions, Case 1A, 2026-2050**

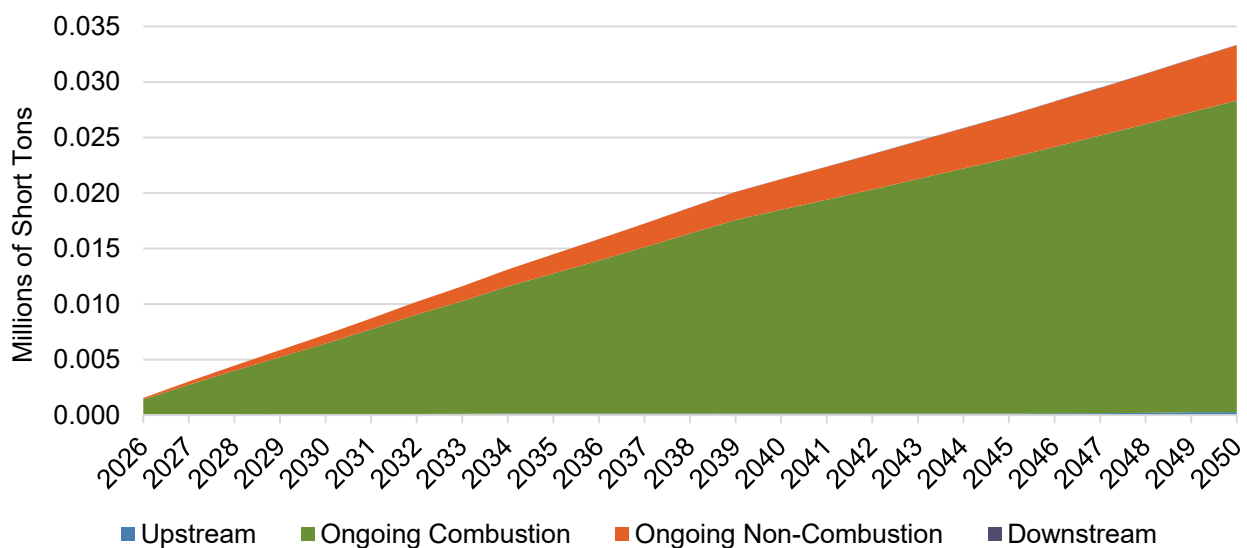


**Figure 5-17: Cumulative N<sub>2</sub>O Emissions, Case 1A, 2026-2050**

#### 5.5.2.4 Climate Change and Adaptation

TVA identified the following climate risks relevant to the TVA power system:

- Increased demand for cooling as the number of days over 95°F is expected to increase.
- Decreased efficiency of thermoelectric power plants due to higher temperatures.

- Increased instances of low DO levels, due to warmer waters.
- Drought and stresses on the water supply are expected to increase.
- Extreme weather can contribute to power outages and negatively impact energy infrastructure.
- Warmer air temperatures reduce transmission line capacity and may reduce the life expectancy of transformers.

Recent and projected trends in temperature and precipitation in the TVA region are described above in Section 4.3 and, for the larger Southeast, in the Fifth USGCRP (2023). Projected trends from climate change models include increases in average temperature, the number of days over 95°F, the number of nights over 75°F, and decreases in number of days below 32°F. Predicted trends in precipitation indicate that the Southeast has received more precipitation in the fall, but drier conditions in spring and summer, and is more drought prone due to increases in evapotranspiration (USGCRP 2023). The EPRI and TVA (2009) report described the effects of the forecast climate change based on the 2007 IPCC report in the TVA region. Potential effects due to climate change include more frequent and intense heat waves, increased damage from floods and major storm events, damage from thawing permafrost and sea ice, reduced freshwater availability during dry seasons, and harm to water resources, agriculture, wildlife, and ecosystems (TVA 2023d). The effects are likely to increase in magnitude by mid-century. Potential effects on water resources include increased water temperatures, increased stratification of reservoirs, reduced DO levels, and increased water demand for crop irrigation. Acidification of surface water through precipitation that deposits SO<sub>4</sub> and NO<sub>3</sub> aerosols can also cause adverse effects on aquatic life, especially in sensitive ecosystems (TVA 2023d). Potential effects on agriculture include increased plant evapotranspiration, altered pest and pathogen regimes, changes in the types of crops grown, and increased demand for electricity by confined livestock and poultry operations.

Potential effects on forest resources include increased tree growth, altered disturbance regimes, changes in forest community composition with declines in species currently at the southern limit of their ranges, and expansion of the oak-hickory and oak-pine forest types. Potential effects on fish and wildlife include range retractions and expansions, altered community composition, loss of cool to cold aquatic habitats and associated species such as brook trout, and increased threats to many endangered and threatened species.

The modeled higher air temperatures, the associated higher water temperatures, and the altered precipitation patterns that could result from climate change likely would affect the operation of TVA generating facilities. One likely effect is an increase in the demand for electricity. Warmer summer temperatures would result in more electricity used for air conditioning; this increase would likely be greater than the reduction in electricity used for space heating resulting from warmer winter temperatures. TVA's coal and nuclear plants predominantly use open-cycle cooling and discharge heated water to the river system (see Section 4.4.3). NPDES permits, required for the discharge of cooling water into rivers and



reservoirs, prescribe the maximum temperature of discharged water. Warmer gross river and reservoir temperatures would make meeting thermal discharge limits more difficult. For example, TVA had to reduce power generation at BFN in 2007, 2010, and 2011 because river temperatures were too high to receive discharge water from the plant without increasing ecological risk (GAO 2022). The NRC also sets safety limits at nuclear plants on the maximum temperature of intake water used in essential auxiliary and emergency cooling systems. When cooling water intake temperatures are high, power plants must reduce power production (derate) or use cooling towers (if available) to reduce the temperature of the discharged water and avoid non-compliance with thermal limits. If intake temperatures reach their limits, NRC requires the plants to shut down. Consequently, elevated water temperatures can reduce thermal generation by causing forced deratings, additional use of cooling towers (which reduces net generation), and/or nuclear plant shutdown.

Increased air and water temperatures also influence the operation of thermal power plants with cooling towers. TVA's CC plants and the Red Hills lignite-fueled plant use cooling towers as the primary cooling systems and its nuclear plants use cooling towers as auxiliary cooling systems. Increased condenser cooling water temperatures reduce the efficiency of power generation. Hotter, more humid air also reduces evaporation potential and the performance of cooling towers.

A 1993 TVA study (Miller et al. 1993) analyzed the relationships between extreme air and water temperatures and power plant operations based on historical meteorological and operational data. In the upper Tennessee River drainage, for each 1.0°F increase in air temperature from April through October, water temperatures increased by 0.25°F to almost 0.5°F, depending upon year and location in the TVA reservoir system. In general, air temperature effects cascade down the reservoir system. In the Tennessee River system, for both closed- and open-cycle plants in Tennessee (on or upstream of Chickamauga Reservoir) and in Alabama (on Wheeler Reservoir), this study found that the incremental impacts to operations from increased temperature were greatest during hot-dry years. Operation of most thermal power plants in the TVA power system was resilient to temperature increases during cold-wet and average meteorological years. The dominant meteorological variables affecting thermal plant performance were water temperature, and, for plants using cooling towers, humidity.

Changes in the operation of the Tennessee River system implemented in the Reservoir Operations Study (TVA 2004) provide TVA flexibility to adapt to some climate change impacts while minimizing the effects on thermal generation. The analyses in the Reservoir Operations Study were based on historical conditions and assume unusually high air temperatures and/or changes in precipitation last a relatively short time and are not long-term changes (Milly et al. 2008). TVA recently installed additional cooling capacity at BFN, and further adaptation, such as the installation of increased cooling capacity at other thermal

plants, may be necessary in the future given the forecast long-term increases in temperature.

While water resources are relatively abundant in the TVA PSA, climate stressors could change that abundance, either locally or regionally, leading to impacts and the need for adaptive measures by other sectors of the economy, as well as other aspects of the energy system (EPRI and TVA 2009). Increased precipitation during storms would increase flood risk, expand flood hazard areas, increase the variability of stream flows (i.e., higher high flows and lower low flows) and increase the velocity of water during high flow periods, thereby increasing erosion. On the other hand, intra-annual droughts, which are predicted to become more frequent and long-lasting in the Southeast, could reduce water availability for power plant operations that require water for cooling. During a drought from 2007 to 2008, coal prices doubled, forcing TVA to rely on additional natural gas to meet its needs, and even as the drought eased in 2008, hydroelectric generation was still only at 49 percent of normal operations (GAO 2022). These changes would have adverse effects on water quality and aquatic ecosystem health. Climate change also has the potential to affect outdoor recreation, including reservoir and stream-based recreation.

A 2014 Government Accountability Office report described a number of measures to help reduce climate-related risks and adapt the nation's energy systems to weather and climate-related impacts (GAO 2014). These measures generally fall into two categories — hardening and resiliency. Hardening involves making physical changes that improve the durability and stability of specific pieces of infrastructure; for example, elevating and sealing water-sensitive equipment, which makes it less susceptible to damage. In contrast, resiliency measures allow energy systems to continue operating after damage and allows them to recover more quickly; for example, installing back-up generators to restore electricity more quickly after severe weather events. TVA is continually evaluating the need for, and where necessary, implementing measures to increase the hardening and resiliency of its power system. According to a 2021 report, TVA has spent \$155 million since 2009 to protect certain nuclear assets from extreme flooding. After a flooding event in 2010, where it subsequently spent \$9 million to relocate a substation to higher ground, TVA then evaluated the vulnerability of all substations and switching stations (GAO 2022).

### 5.5.3 Water Resources

The coal-fired, nuclear, and natural gas-fired CC plants comprising a majority of TVA's energy supply require water to operate plant cooling systems and, particularly for coal plants, other plant processes. For each of these generating plants, the required quantity of water is directly proportional to the amount of power they generate (see Section 4.7). CT plants have very low water requirements, and wind and solar generating facilities require little to no water to operate. Potential impacts to water resources, except for discharges of cooling water, are generally greater from coal-fired generation than from other types of generation due to the various liquid waste streams from coal-fired plants and the potentially adverse water quality impacts from coal mining and processing. The impacts of water pollutants discharged from a

generating facility are highly dependent on site- and facility-specific design features, including measures to control or eliminate the discharge of water pollutants, which are not addressed here. Under all alternative strategies, TVA would continue to comply with the CWA by meeting state water quality standards and through compliance with NPDES permit requirements. A full list of average water resource requirements (withdrawals and consumption) for each of the nine core portfolios can be found in Appendix C.

Based on the model results, the volume of water withdrawn by thermal generating facilities, (i.e., nuclear, coal, and CC facilities) would decrease between 2026 and 2050 under all alternative strategies (Figure 5-18). As illustrated in Figure 5-18, the decrease value is similar for each strategy and ranges from 52.4 to 52.8 percent. All strategies result in a decrease of water withdrawal at roughly the same amounts. This is due primarily to expected end of life for existing coal units, making all strategies similar in their water withdrawal needs as these facilities come offline and future generation sources utilize less water withdrawal.

The annual average volume of water withdrawn varies by less than 1 percent among the strategies, whereas the annual average volume of water withdrawn varies around 9.6 percent among the scenarios associated with each strategy (Figure 5-19). The Sequoyah and Browns Ferry Nuclear Plants use the most cooling water, and the water use trends closely track the generation by these plants. Water use would generally decrease in the middle of the planning period then remain consistent due to expected end of life for existing coal units. In general, replacement generation has lower water use rates. Temporary spikes in water use for all strategies may occur due to projected timing of maintenance and refueling outages.

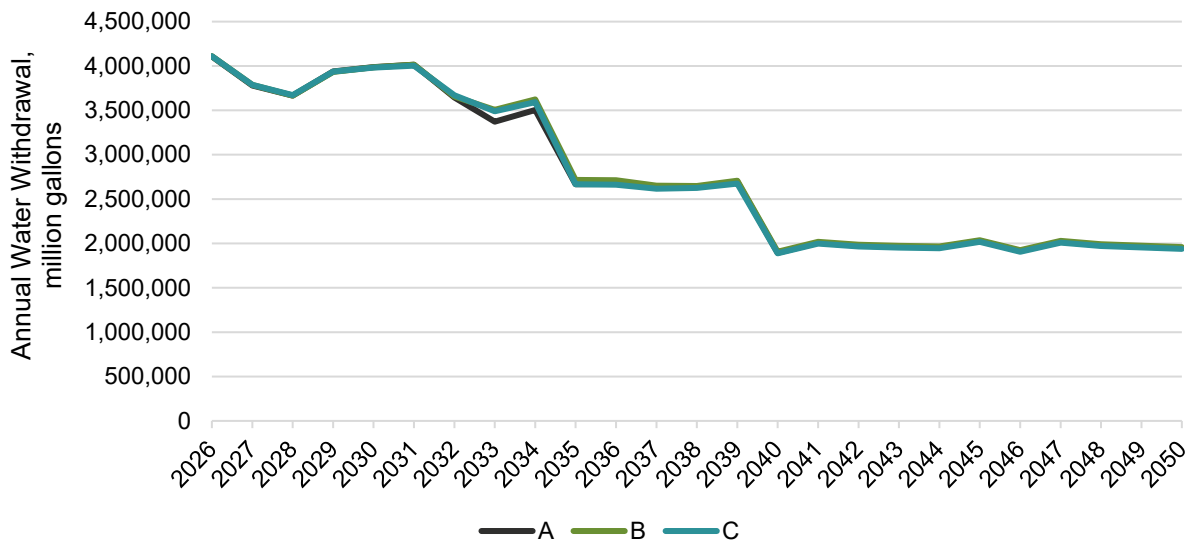
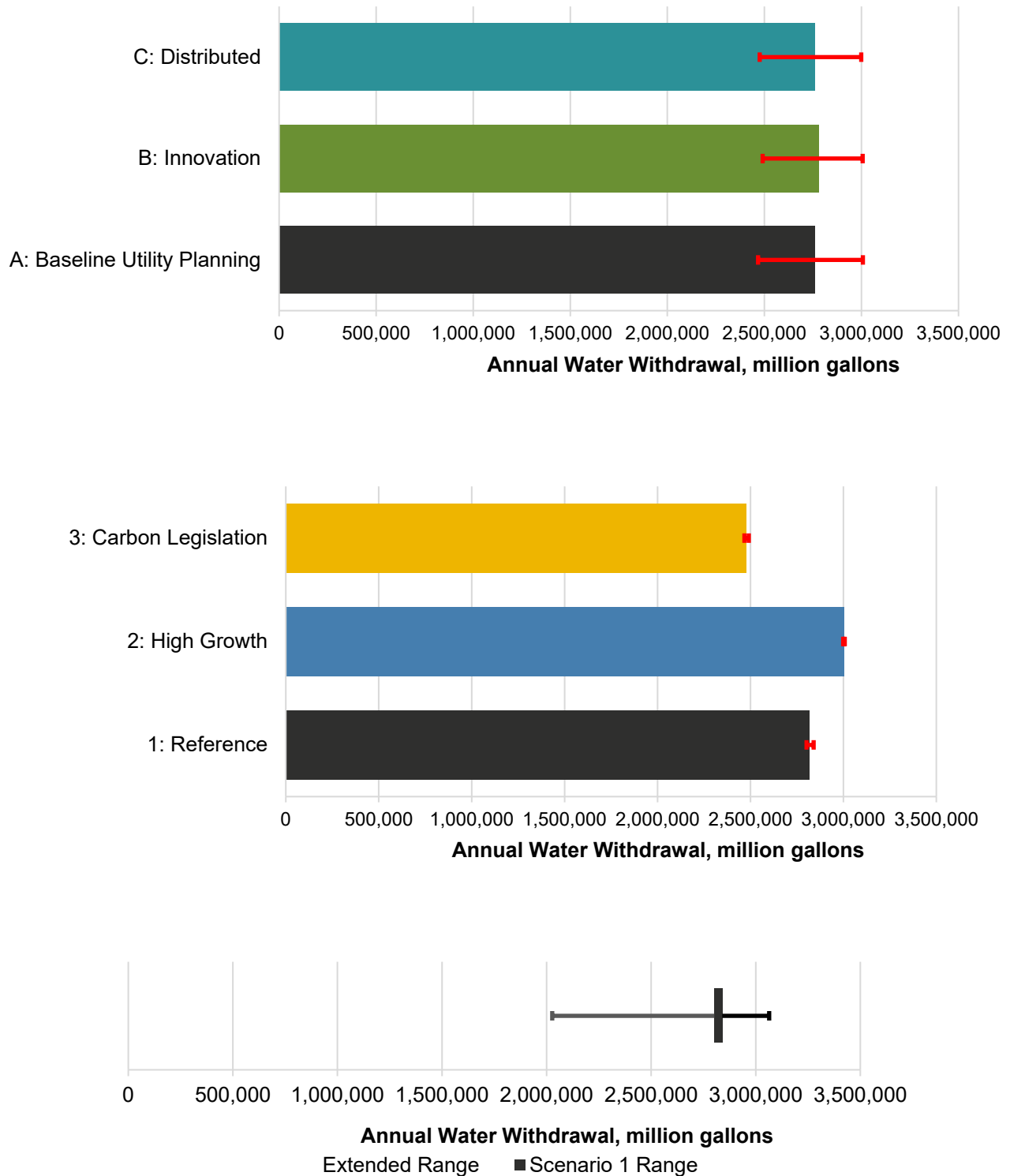


**Figure 5-18: Trends in Water Withdrawal by Alternative Strategy Based on Averages of the Three Scenarios**



Note: The error bars in the top chart indicate the maximum and minimum values for the scenarios associated with each alternative strategy.

**Figure 5-19: Average Annual 2026-2050 Water Withdrawal by the Alternative Strategy (top), Scenario (middle), and the Range for Scenario 1 as well as the Extended Range to Encompass All Scenarios, Strategies, and Sensitivities, including the Preferred Alternative (bottom)**

The reductions in water use would result in localized beneficial impacts to aquatic ecosystems. The volume of water used by hydroelectric facilities is not included in Figure 5-18 and Figure 5-19.

Figure 5-20 and Figure 5-21 show the 2026-2050 trends and annual averages of water consumption by alternative strategy. The volume of water consumed is the quantity of water withdrawn from a water body, including both surface and groundwater sources, and evaporated in the closed-cycle cooling systems of thermal generating facilities instead of being discharged to a water body. This volume is typically less than 4 percent of the total quantity of water used under each alternative strategy.

Water consumption increases from 2026 to 2050 in all strategies on average and three of the sensitivities, due primarily to nuclear expansion within each strategy, with levels of nuclear expansion in each strategy being driven by the scenario in which it was studied. Water consumption is lowest in Strategy C, which focuses on distributed energy, and highest in Strategies B, which focuses on innovation and emerging technologies, such as advanced nuclear. The increases, averaged across scenarios associated with each alternative strategy, were least under Strategy C (4.9 percent) and greatest under Strategy B (27.4 percent). The variation in average annual water consumption (Figure 5-21) among alternative strategies is around 5 percent, with more variation seen among the scenarios (around 12 percent). Scenario 2 has the highest water consumption and Scenarios 1 and 3 have similar, lower water consumption. Among sensitivities, the super-charged load (Scenario 2) case has the highest water consumption, driven by need to keep up with demand for energy. The increases in water consumption would have some adverse impacts; however, these impacts would generally be small and vary with the characteristics of the source area of the water withdrawal.

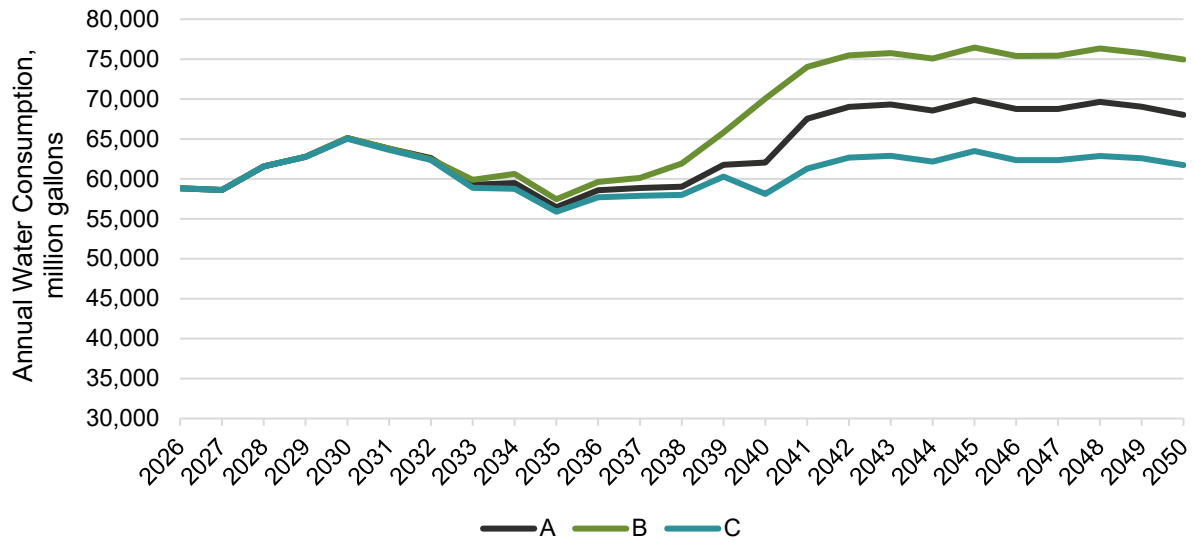
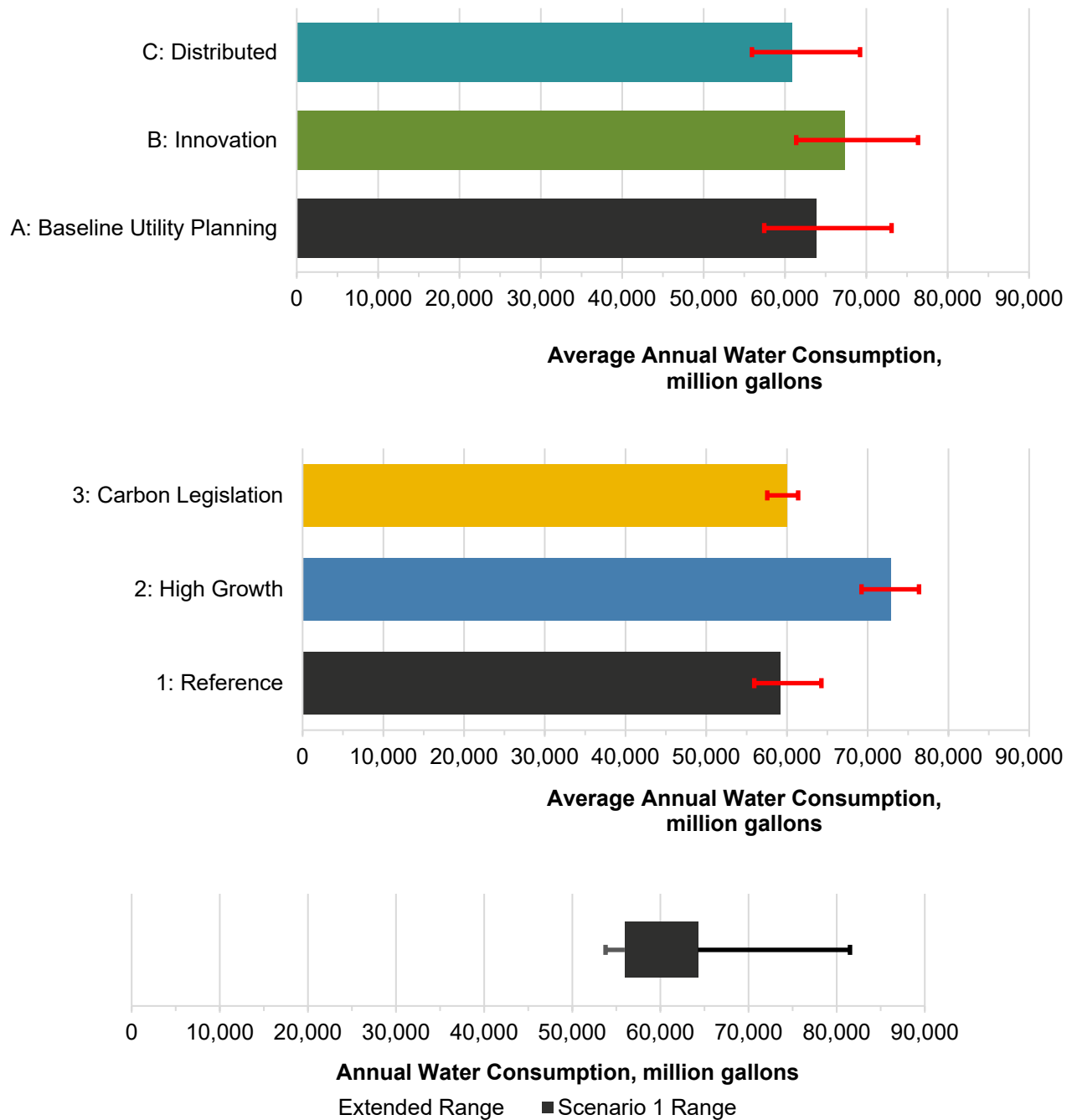


**Figure 5-20: Trends in Average Annual Water Consumption by Alternative Strategy Based on Averages of the Three Scenarios**

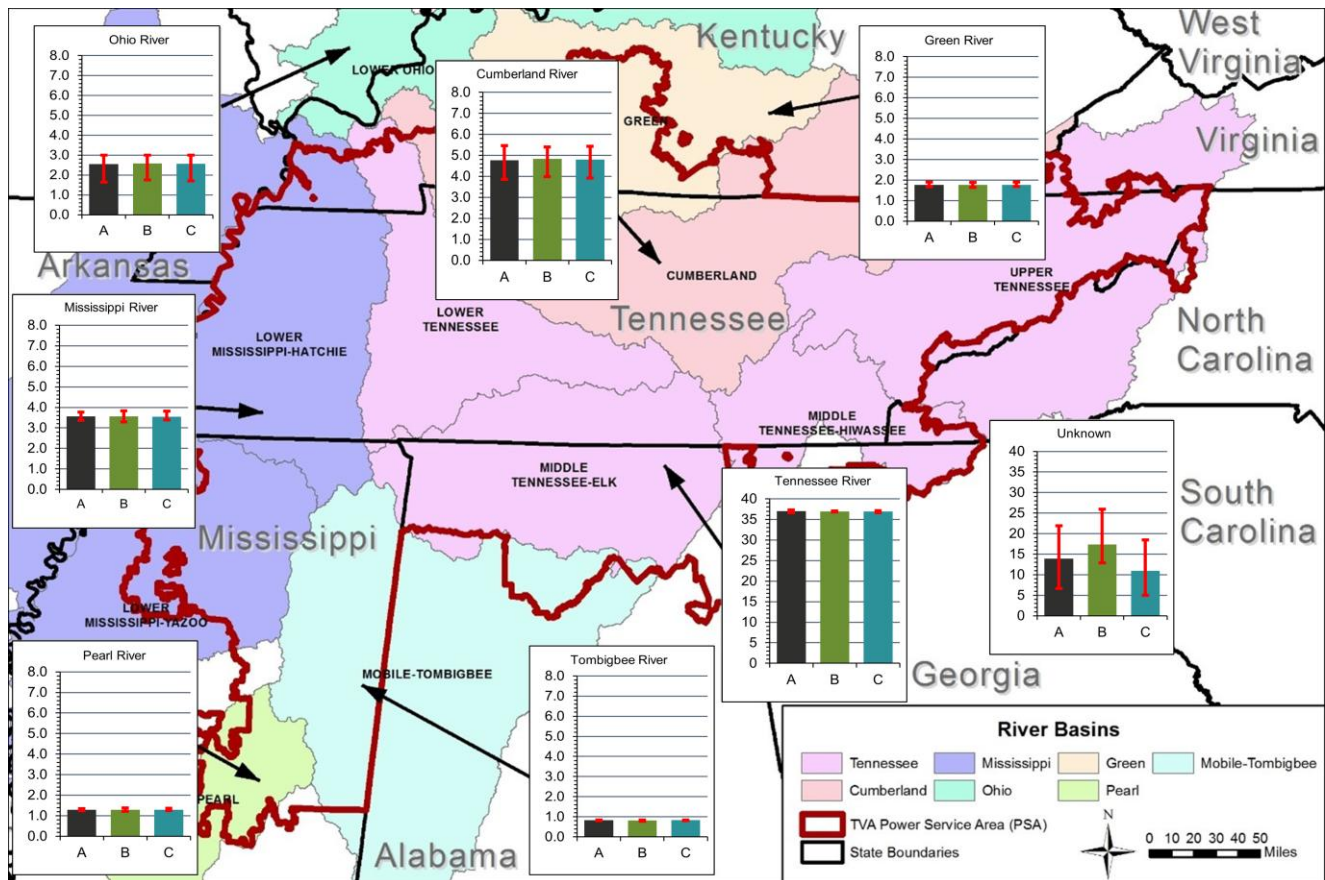




Note: The error bars in the top chart indicate the maximum and minimum values for the scenarios associated with each alternative strategy.

**Figure 5-21: Average Annual 2026-2050 Water Consumption by Alternative Strategy (top), Scenario (middle), and the Range for Scenario 1 as well as the Extended Range to Encompass All Scenarios, Strategies, and Sensitivities, including the Preferred Alternative (bottom).**

Figure 5-22 shows water consumption projected for 2026-2050 by major river basin. A majority of the thermal plants providing power to TVA and consuming water are located in the Tennessee River Basin, and this accounts for its high volume of water consumption. Almost all of the water consumed in the Tennessee, Cumberland, Ohio, and Green River Basins is from surface water sources. Groundwater sources are primarily used in the Mississippi, Pearl, and Tombigbee River Basins. Unknown River refers to future generating facilities whose locations are presently unknown.



Note: All basins are on the same scale except for the Tennessee River and Unknown rivers, wherein a significantly larger amount of water is taken in.

**Figure 5-22: Average Annual Water Consumption by Alternative Strategy and Major River Basin (in billion gallons)**

#### 5.5.4 Land Resources

TVA's existing power plant reservations have a total area of about 25,000 acres. This total does not include conventional hydroelectric plants, most of which are closely associated with multi-purpose dams and reservoirs. Many of the power plant reservations have large, relatively undisturbed areas and the actual area disturbed by facility construction and operation (the "facility footprint") totals about 18,000 acres. Much of the relatively undisturbed area on plant sites is forested and relatively little of it is considered prime farmland. The generating facilities from which TVA purchases power under PPAs (excluding hydroelectric plants and out-of-Valley wind farms) have a total area of about 20,900 acres; about 15,000 acres of this are occupied by solar facilities operating in late 2024. As noted

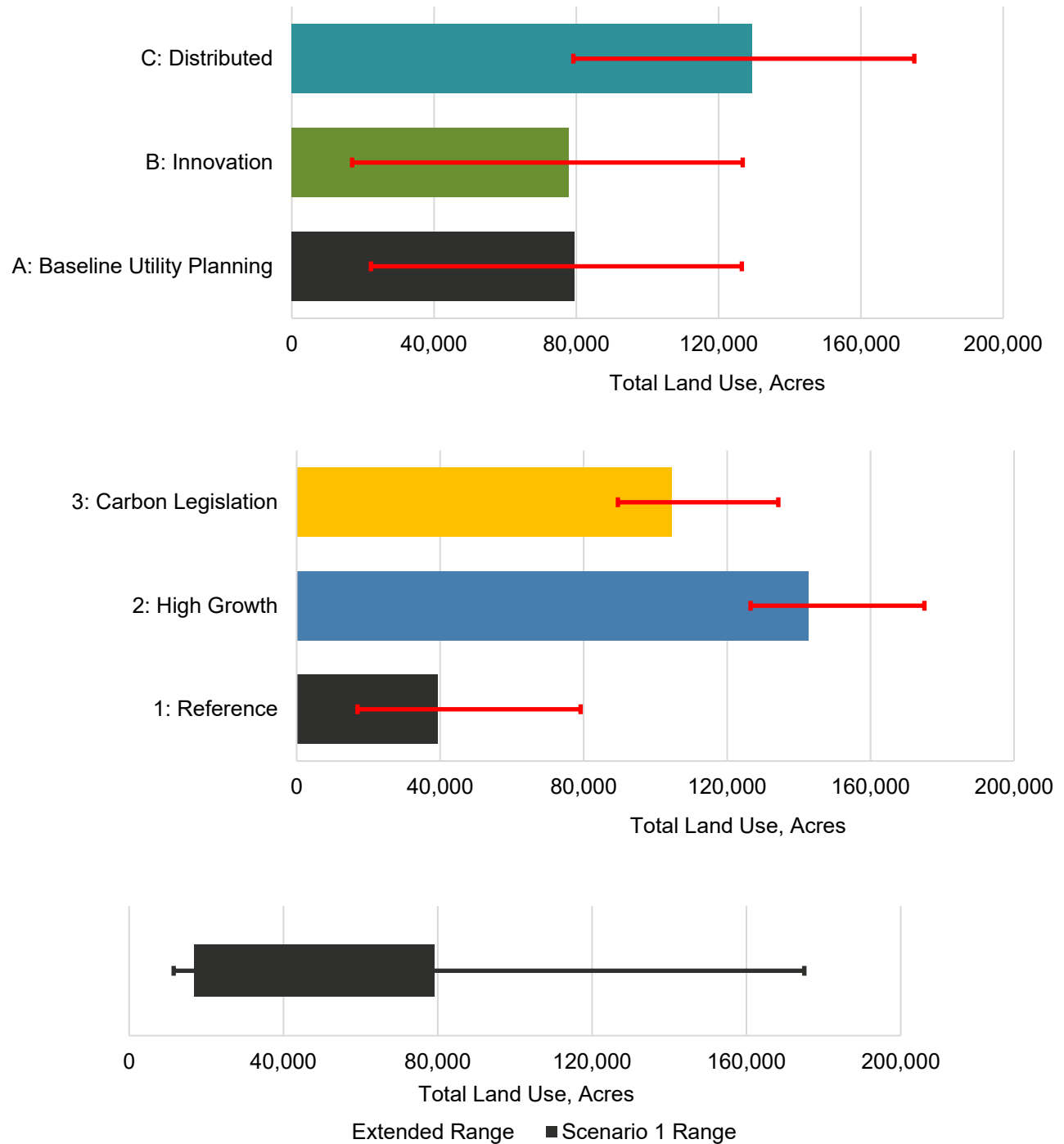
above, since 2014 to late 2024, TVA has reviewed and approved dozens of solar projects with facilities that affect or will affect over 17,000 acres (see Table 5-9).

Land requirements for new generating and storage facilities, excluding behind-the-meter DER, were determined from the capacity expansion plans and the resource type- and facility-specific land requirements given in Section 5.2. Where the indicated capacities translated to fractional facilities, the number of facilities was rounded up to the nearest whole number. Except for LPC flexible generation facilities, behind-the-meter solar facilities are assumed to be mostly building-mounted and would not result in additional land requirements. A small portion of these facilities could be ground-mounted; most of these are assumed to be on developed commercial or industrial sites and would result in minimal additional land requirements.

Expected end of life for existing CC and coal plants would not result in any immediate changes in land use. After facilities are retired, TVA would conduct a comprehensive review of the long-term management of the plant site, including the potential reuse or demolition of plant buildings and redevelopment of the site.

Land requirements for new generating and storage facilities, averaged across scenarios, range from about 129,484 acres for Strategy C to 77,964 acres for Strategy B (Figure 5-23). The land requirement for Strategy B and Strategy A are similar, although all strategies have large variation across scenarios. Scenarios have slightly less variation in land requirements across strategies, but differ greatly from each other, with the land requirement for Scenarios 2 being almost four times the land requirement for Scenario 1 (Figure 5-24). Across all scenarios, Scenario 2 has the largest land requirements for all strategies, followed by Scenario 3 then Scenario 1. Across all strategies, C has the largest requirements, with land requirements being similar for Strategies A and B. Incorporating sensitivity cases, land requirements for new facilities are highest under Scenario 2 (High Growth), Strategy C (Carbon Legislation) and lowest under Scenario 1 (Reference) and the Higher EE Availability and Deployment sensitivity.

Averages for all portfolios (Figure 5-24) indicate about 91 percent of the land required for new generating and storage facilities is for utility-scale, single-axis tracking solar facilities. For all portfolios under Scenario 2 and 3, at least 90 percent of the land required for new generating and storage facilities is for utility-scale, single-axis tracking solar facilities. Only two sensitivities under Scenario 1, and Case 1C, were over 90 percent, with the rest of the cases and sensitivities under Scenario 1 ranging from 71.3 to 86.7 percent solar land coverage. Relative to other types of generation, solar PV facilities have a high land requirement in relation to their generating capacity. Smaller land areas would be occupied by natural gas-fired and storage facilities. The selected storage facilities are utility-scale batteries, which have relatively small land requirements and are often located at existing power plants or substations. A full list of average land use requirements for each of the nine portfolios can be found in Appendix C.



Note: The error bars in the top and middle charts indicate the maximum and minimum values for the scenarios associated with each alternative strategy, or strategies associated with each scenario.

**Figure 5-23: Average Total Land Area for all New Generating Facilities by Alternative Strategy (top), Scenario (middle), and the Range for Scenario 1 as well as the Extended Range to Encompass All Scenarios, Strategies, and Sensitivities, including the Preferred Alternative (bottom)**

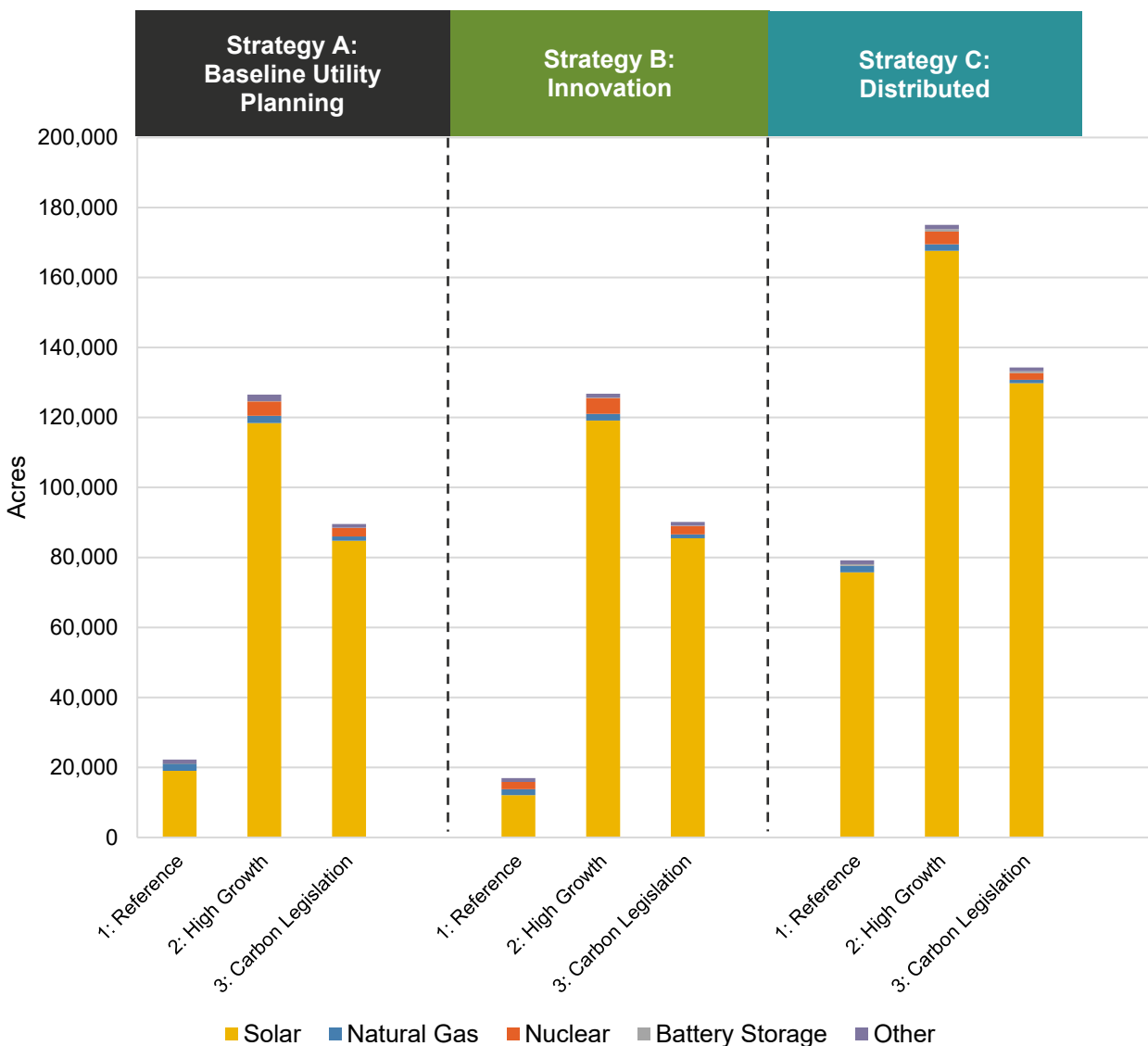


**Figure 5-24: Land Requirements for New Generating Facilities by Type of Generation, Alternative Strategy, and Scenario**

The majority of the land area occupied by utility-scale solar facilities constructed in the TVA PSA to date was previously in agricultural use as either cropland or pasture. Most of the remaining land area was previously forested. The majority of these solar facilities have been in the western portion of the TVA PSA, including western Tennessee, northern Mississippi, and northwest Alabama. There is a continued interest in developing solar facilities in these areas, primarily because of the presence of large tracts of relatively flat land in large ownerships and the region has the greatest solar generation potential in the TVA region (see Section 4.6.2).

Despite the large land requirements of utility-scale solar facilities, which typically displace agricultural operations, including grazing or, to a much smaller extent, forest, footprints occupy a proportionally small amount of land in the TVA PSA and the impacts of solar facilities on the land are low relative to other types of generating facilities. The construction of solar facilities typically does not require extensive excavation, and solar facilities have little associated permanent or semi-permanent infrastructure that hinders restoration of the site after the facility is dismantled. See Sections 5.2.3.5 and 5.2.3.6 for a more detailed discussion of the impacts of constructing and operating solar facilities.

The land requirements illustrated in Figure 5-24 only include those for the generating and storage facility footprints and associated access roads. They do not include undisturbed portions of the power plant reservations, or the land area needed for extraction (e.g., mining, drilling), processing, and transportation of fuels or long-term disposal of wastes.

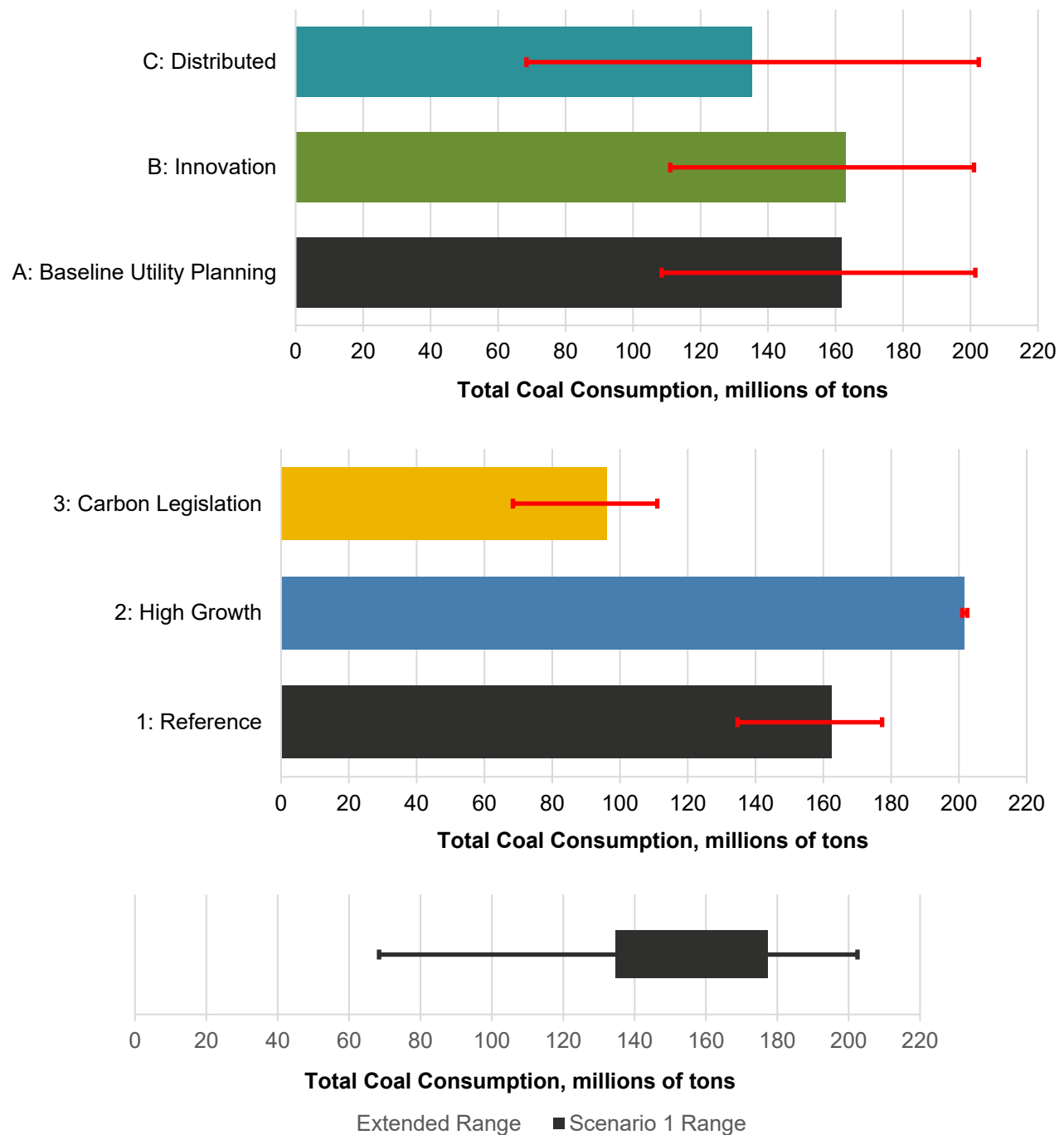
### **5.5.5 Fuel Consumption**

The major fuels used for generating electricity would continue to be enriched uranium and natural gas in all of the alternative strategies, with expected end of life for existing coal units negating the need for coal after 2040.

#### **5.5.5.1 Coal Consumption**

The variation in coal consumption among the alternative strategies is relatively small (Figure 5-25). Among sensitivities, coal consumption is highest under the Extended Coal Sensitivity, High Gas Price Sensitivity, and Supercharged Load Sensitivity cases; although, the consumption is similar to that under Scenario 2. A full list of average fuel consumption for coal in each of the nine core portfolios can be found in Appendix C.





Note: The error bars in the top and middle charts indicate the maximum and minimum values for the scenarios associated with each alternative strategy, or for the strategies associated with each scenario.

**Figure 5-25: Average Total 2026-2050 Coal Consumption by TVA Plants by Alternative Strategy (top), Scenario (middle), and the Range for Scenario 1 as well as the Extended Range to Encompass All Scenarios, Strategies, and Sensitivities, including the Preferred Alternative (bottom)**

### 5.5.5.2 Uranium Consumption

TVA presently uses about 195 tons/year of enriched uranium in its nuclear plants. Use of enriched uranium remains relatively constant throughout most of the planning period for all scenarios and strategies. Scenario 2, High Growth, incorporates the highest level of enriched uranium increases, due to the selection of many new nuclear plants driven by load growth and higher natural gas prices. Including sensitivities, uranium consumption is still highest under Scenario 2, with most consumption coming under Strategy B, which focuses on innovation and emphasizes advanced nuclear.

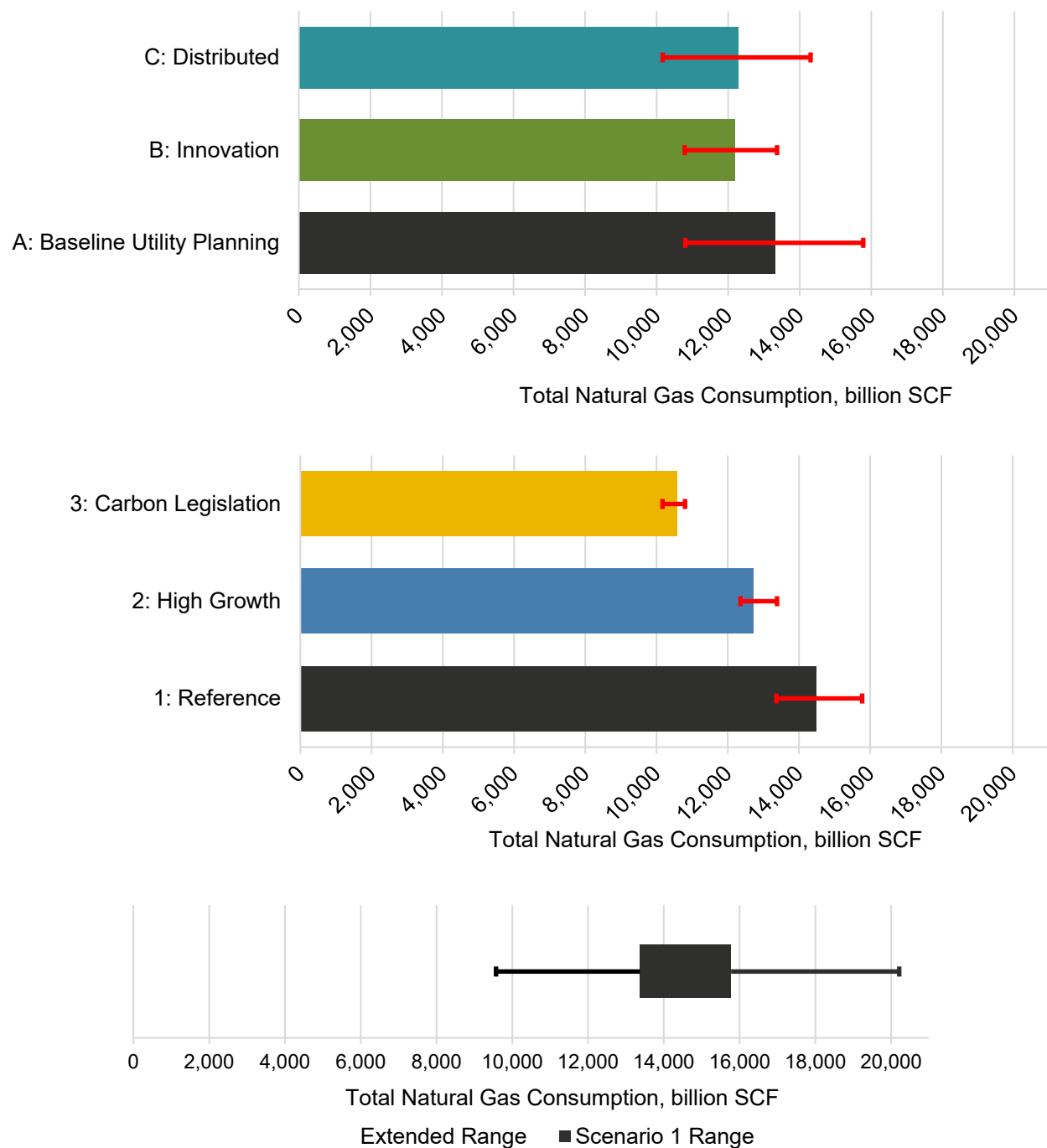
Environmental impacts from producing nuclear fuel include land disturbance, air emissions (including the emission of radioactive materials), and discharge of water pollutants from uranium mining, processing, tailings disposal, and fuel fabrication. The magnitude of these impacts is difficult to predict with certainty due to the great variability in potential sources for nuclear fuel. Any future use of surplus highly enriched uranium would also reduce overall uranium fuel cycle impacts as it would reduce the need for uranium mining and enrichment.

### 5.5.5.3 Natural Gas Consumption

About 336 billion standard cubic feet (SCF) of natural gas are planned for use in 2026 by TVA gas-fueled generating facilities and by gas facilities from which TVA purchased power under PPAs. Natural gas consumption during the 2026-2050 planning period varies between the alternative strategies and scenarios (Figure 5-26 and Figure 5-27). Across the strategies, gas consumption is highest under Scenario 1 and lowest under Scenario 3, with Scenario 3 volumes roughly 1.5 times those of Scenario 1. Among sensitivities, which are included in the Preferred Alternative, natural gas consumption is highest under Supercharged Load Sensitivity in Scenario 2 and lowest in under High Gas Price Sensitivity in Scenario 1. A full list of average fuel consumption for natural gas in each of the nine portfolios can be found in Appendix C.



**Figure 5-26: Trends in Average Annual Natural Gas Consumption by Alternative Strategy based on Averages of the Three Scenarios**



Note: The error bars in the top and middle charts indicate the maximum and minimum values for the scenarios associated with each alternative strategy, or strategies associated with each scenario.

**Figure 5-27: Average Total 2026-2050 Natural Gas Consumption by Alternative Strategy (top), Scenario (middle), and the Range for Scenario 1 as well as the Extended Range to Encompass All Scenarios, Strategies, and Sensitivities, including the Preferred Alternative (bottom)**

### 5.5.6 Solid and Hazardous Waste

The following sections describe the solid and hazardous waste impacts that could occur from operational facilities and from facilities as they reach expected end of life.

#### 5.5.6.1 Coal Combustion Solid Wastes

Forecast production of CCR is directly correlated with forecast electricity demand and tempered by alternative energy production methods. As shown in Figure 5-28, all alternative strategies forecast production of CCR to increase from 2028 through 2031, then again from 2033 to 2034, before declining to zero CCR production by 2040 based on expected end of life for existing coal units. These end of life expectations apply to TVA's four active fossil plants, including 24 active generating units with a total capacity of 5,800 MW, subject to TVA Board approval and further environmental review.

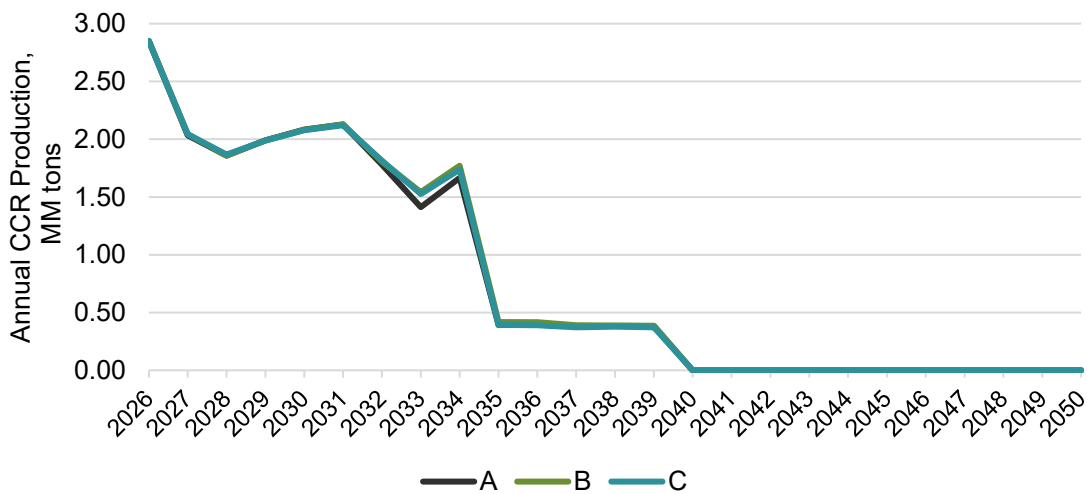
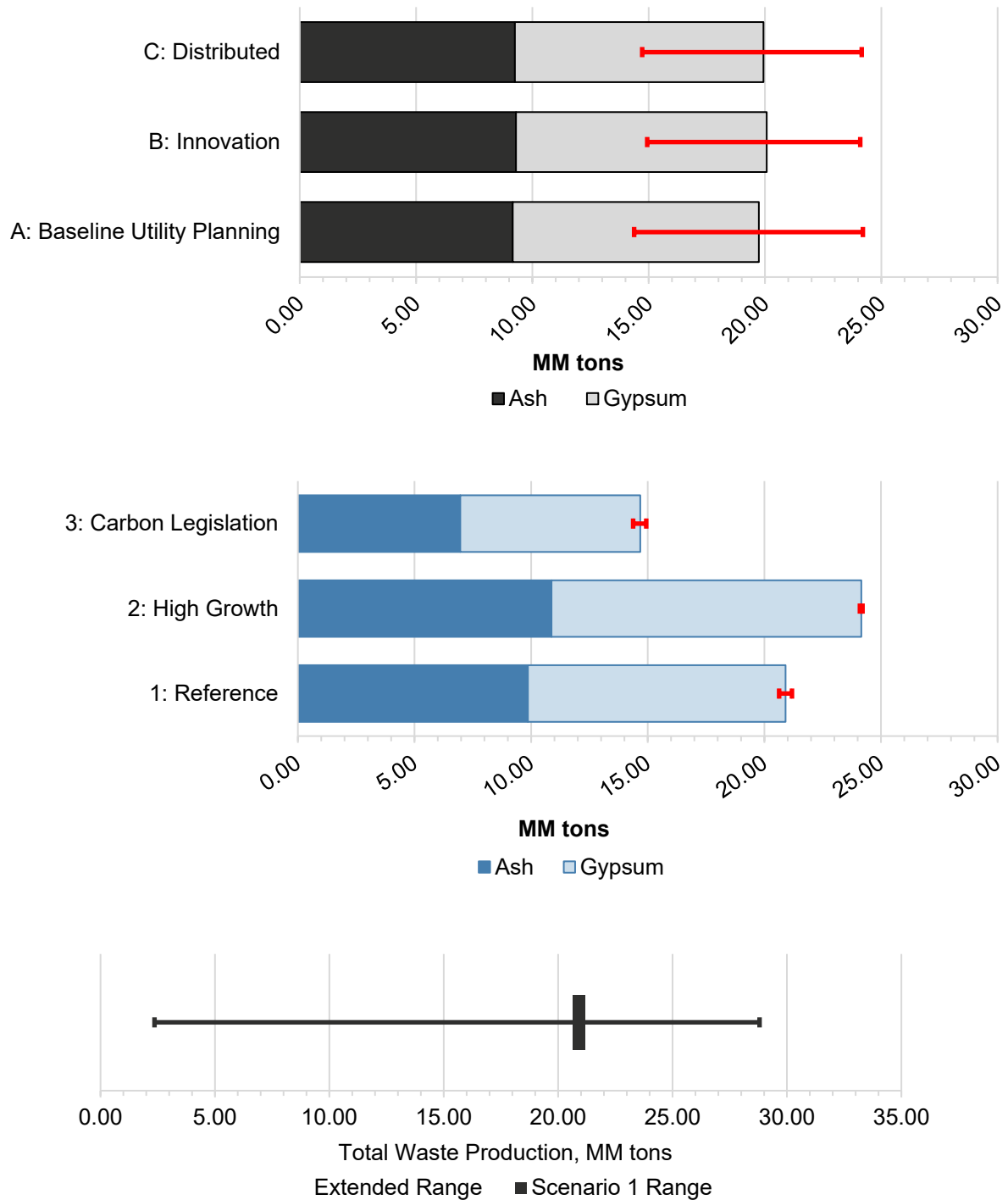


**Figure 5-28: Trends in Average Annual Coal Combustion Residual (Combined Ash and Gypsum) Alternative Strategy based on Averages of the Three Scenarios**

As shown in Figure 5-29, although the quantity of CCR produced during the 2026-2040 period shows little variation between alternative strategies on average, it varies markedly between the scenarios associated with each strategy. This variation among scenarios is greatest with Scenario 2 and lowest with Scenario 3. Energy demand in the High Growth scenario, Scenario 2, is driven by positive economic conditions and increasing electrification opportunities; thus, resulting in greater CCR production. Conversely the Carbon Legislation scenario, Scenario 3, features reductions in CCR production due to the carbon penalty reducing coal generation relative to the current Reference Case. Among sensitivities, which are included in the Preferred Alternative, CCR production is highest under the Later Coal End of Life and High Gas Price Sensitivities in Scenario 1, and lowest under the Low Gas Price and Earlier Coal End of Life Sensitivities in Scenario 1. The average CCR production, combined and split into ash and gypsum waste, for each of the nine portfolios can be found in Appendix C.



Note: The error bars in the top and middle charts indicate the maximum and minimum values for the scenarios associated with each alternative strategy, or strategies associated with each scenario, respectively.

**Figure 5-29: Total Average 2026-2050 Coal Combustion Residual Production by Alternative Strategy (top), Scenario (middle), and the Range for Scenario 1 as well as the Extended Range to Encompass All Scenarios, Strategies, and Sensitivities, including the Preferred Alternative (bottom)**

#### **5.5.6.2 Impacts of Coal Facility End of Life**

The end of life, or eventual retirement, of coal plants would cease coal burning operations and no additional CCR would be produced. Residual ash and coal dust would be washed from equipment and areas and would then be managed through the ash handling system. TVA would close the CCR units at sites as required pursuant to state and federal regulations, which could include groundwater monitoring, corrective measures, and post-closure care activities.

Any lighting ballasts containing PCBs would be removed and properly disposed of offsite during preliminary activities after power termination and during the early stages of demolition. Other materials that are removed and typically recycled in early end of life activities include used oils, glycols, and refrigerants. Consumer commodities (lubricants, aerosols, cleaners, etc.) are reused if possible, or sent for disposal if an outlet cannot be found. Laboratory chemicals would be evaluated for reuse or disposal on a case-by-case basis. Fuels would be used elsewhere or sent for recycling. Bulk chemicals/materials are typically recycled or disposed as applicable. Mercury devices, batteries, light bulbs, and e-waste are recycled.

Asbestos-containing materials in building structures and systems would be remediated as necessary to be protective of environment and worker health and safety, but full abatement would not occur until demolition activities are initiated.

Given that TVA would manage the removal and disposal of solid and hazardous wastes in accordance with local, state, and federal regulations, and recycle these wastes to the maximum extent possible, end of life of the coal facilities would improve the overall quality of surrounding environmental resources.

#### **5.5.6.3 Impacts of Natural Gas Facility End of Life**

Natural gas plants produce very small quantities of solid waste during normal operation and therefore the potential end of life of gas units would not affect solid and hazardous wastes. Facilities reaching end of life would only produce waste that would be created by any construction or demolition, similar to that of coal facility end of life.

#### **5.5.6.4 Impacts of Renewable Facility Decommissioning**

While solid waste is produced during construction of solar and wind generating facilities, very little solid waste results from normal operations of these facilities. At the end of their useful life, wind and solar generating facilities are decommissioned, dismantled, and sites are restored. Typically, during decommissioning the associated infrastructure (e.g., concrete pads and foundations, equipment, and electrical connections) would be removed, compacted areas would be scarified, and soils would be stabilized. The majority of decommissioned materials and equipment would be recycled, including the solar panels and the wind turbine tower and nacelles. The recycling of PV modules is anticipated to grow over the coming decades. Similarly, although composite materials comprising nacelle covers and turbine blades are currently challenging to recycle, anticipated advances in more readily recyclable



materials are anticipated to decrease waste. Alternative strategies considered by TVA that result in greater renewable generation would result in greater amounts of wastes with decommissioning.

#### **5.5.6.5 Nuclear Waste**

The trends in the production of high-level waste, which is primarily spent nuclear fuel and other fuel assembly components, parallel those of nuclear fuel requirements and differ some across strategies, although they differ more among scenarios. Beginning in 2034, all Strategies start to see an increase in nuclear consumption. By 2040, Strategy B and Scenario 2 have a larger increase in nuclear consumption while the trajectory of Strategies A, C, and Scenario 3 also increase, though not as markedly. Scenario 1 sees the least increase in nuclear consumption when averaged across strategies and is relatively steady. Variance in total nuclear consumption over the 2026 to 2050 period ranges from 2.0 percent (Cases 1A and 1C) up to 32.1 percent for the case with the highest consumption (Case 2B). TVA anticipates continuing to store spent fuel on the nuclear plant sites in spent fuel pools and dry casks until a centralized facility for long-term disposal and/or reprocessing is operating. TVA has constructed additional dry cask storage capacity to store more spent fuel on its nuclear plant sites. The production of low-level nuclear waste is expected to remain relatively constant.

#### **5.5.6.6 Building Retrofits due to Energy Efficiency Programs**

Building retrofits to reduce energy use, such as replacing windows and doors, produces solid wastes which are often disposed of in landfills. The disposition of old appliances, HVAC equipment, water heaters, and other equipment varies across the region with the local availability of recycling facilities. Old refrigerators and HVAC equipment may also contain hydrochlorofluorocarbon refrigerants (“freon”) whose use and disposal is regulated due to their harmful effects on stratospheric ozone (“the ozone layer”) and because of their high global warming potential. To reduce these harmful effects, HVAC contractors are required to reclaim and recycle these refrigerants from HVAC equipment being replaced.

#### **5.5.7 Socioeconomics**

The three scenarios evaluated in the IRP assume distinctly different economic conditions, as discussed in Chapter 2 and Appendix B of Volume 1. Generally, the largest influence on the TVA region economy are economic trends in the U.S. overall, as economic trends in the TVA region are highly correlated to the macroeconomic trends in the U.S. However, the large manufacturing base in the region tends to create potential for greater downward moves during periods of economic slowdown or recession. Similarly, demographic trends reflect this same volatility, where significant shifts in economic conditions directly influence population growth, household formation, and employment levels.

Within each scenario, the strategies evaluated would have varying but minor impacts on the TVA region economy for the reasons noted above. Differences are primarily due to the cost of electricity and impacts to the local economy related to building and contracting for new

generating resources. Often these impacts tend to be generally offsetting. As residents and businesses across the region use electricity, the difference in cost of electricity across the strategies would have the largest influence on regional income and employment. With respect to the System Average Cost metric, Strategy A is the lowest cost, Strategy C is the second lowest in cost, followed by Strategy B (Table 5-24). However, as mentioned previously, differences across the strategies would have minor impacts on the TVA region's economy as a whole.

**Table 5-21: System Average Cost (2026-2050) for each Portfolio (\$/MWh)**

| Strategy | Scenario |      |      |
|----------|----------|------|------|
|          | 1        | 2    | 3    |
| <b>A</b> | \$78     | \$96 | \$93 |
| <b>B</b> | \$83     | \$98 | \$94 |
| <b>C</b> | \$80     | \$98 | \$94 |

In TVA's 2019 IRP, the results for the Valley economics metrics (changes in real per capital income and non-farm employment) were very similar across the strategies. There were two main reasons for this lack of differentiation, which are still true today. The relationship of TVA revenues to the Valley region economy as a whole is relatively small (as noted in Section 4.8.3.1, TVA's revenues represent about 1.8 percent of the total TVA regional GDP), and the portfolios evaluated share common elements. Given these factors and with input from the IRP Working Group, TVA did not include a similar economic metric in the 2026 IRP.

The construction and/or acquisition of facilities by TVA as well as the impacts of facilities reaching end of life would affect employment levels within the vicinity of a project location. Generally, when facilities reach end of life it may result in the loss of local employment in the counties in which they are located, which may have direct and indirect adverse impacts to the surrounding areas. TVA would help offset this employment loss by placing some interested employees in available positions across the TVA PSA, pre-empting the need to relocate for work. Proximity to more urbanized areas such as Memphis and Nashville may help offset the need for employees and associated family members to relocate. Employees may find alternative employment in other industries due to the growth of employment opportunities in the regional economy discussed in Section 4.8.3.1.

In addition, the construction, acquisition, or retirement of generation facilities would likely increase or decrease TVA's tax equivalent payments, also known as payments in lieu of taxes, to states where the facilities are located. These tax equivalent payments represent beneficial or adverse effects to local communities. The construction of new solar facilities and other energy resources by independent power producers from which TVA purchases power would not affect tax equivalent payments; these facilities would, however, likely pay other taxes to the local communities and states.

Because the IRP is programmatic and does not address the future siting and construction of generating facilities, site-specific analyses of socioeconomic impacts, including those affecting minority and low-income populations, are not possible at this time. However, before implementing a specific resource option, TVA will conduct a review of its potential socioeconomic impacts. This review will, as appropriate, address resource- and/or site-specific socioeconomic issues such as impacts on employment rates, housing, health and safety, schools, emergency services, water supply, wastewater treatment capacity, and local government revenues including TVA tax equivalent payments.

For facilities reaching end of life, beneficial impacts resulting from an increase in employment opportunities due to the short-term generation of jobs needed for deconstruction activities may benefit local populations. This would temporarily offset direct and indirect economic impacts caused by loss of employment due to the closing of the facility. As described above, TVA would help offset employment loss by placing some interested employees in available positions across the TVA PSA.

Activities associated with building retrofits and other residential, commercial, and industrial EE measures are likely to result in minor beneficial socioeconomic impacts to communities and individuals. For instance, residential EE efforts can result in reductions of cold-related illnesses and associated stress by making it easier for residents to heat their homes. However, reduced ventilation rates can adversely affect indoor air quality. In a review of this topic, Maidment et al. (2014) concluded that household EE measures have a net positive impact on health and the benefits are greatest for low-income populations.

Future rate increases could affect low-income populations more than other populations. Low-income populations also have limited ability to participate in EE programs that could reduce their future power bills.

## **5.6 Potential Mitigation Measures**

As previously described, TVA's siting processes for generation and transmission facilities, as well as practices for modifying these facilities, are designed to avoid and/or minimize potential adverse environmental impacts. Potential impacts are also reduced through pollution prevention measures and environmental controls such as air pollution control systems, wastewater treatment systems, and thermal generating plant cooling systems. Based on the evolution of current and future policy or regulatory requirements, it may become necessary to evaluate additional environmental controls at existing or future generation facilities, particularly for coal and gas units. Options to meet future regulatory requirements could include technologies such as CCS, alternative fuel co-firing (such as hydrogen), or natural gas co- or re-firing of existing coal burners. TVA should continue to monitor advancements in these technologies and evaluate their potential future use if needed to meet regulatory requirements or as a cost-effective method of preserving existing infrastructure (i.e., co- or re-firing of existing coal burners with natural gas).

Other potentially adverse impacts can be mitigated by measures such as compensatory wetlands mitigation, payments to in-lieu stream mitigation programs and related conservation initiatives, enhanced management of other properties, documentation and recovery of cultural resources, and infrastructure improvement assistance to local communities.

TVA has developed standards for environmental protection and best management practices for construction, modification, and maintenance of generation and transmission facilities developed with consideration of state and federal permit requirements, and adherence to erosion and sediment control plans. TVA's best management practices are described in *A Guide for Environmental Protection and Best Management Practices for TVA Construction and Maintenance Activities – Revision 4* (TVA 2022g). TVA follows this and other related guidelines and specifications for implementation of site-specific projects available at <https://www.tva.com/energy/transmission/transmission-system-projects> that would implement the IRP's Preferred Alternative. The site-specific environmental reviews for future projects would include analysis of potential impacts, best management practices and mitigation measures required to reduce or avoid adverse effects.

## **5.7 Unavoidable Adverse Environmental Impacts**

The adoption of an alternative strategy, including the Preferred Alternative, for meeting the long-term electrical needs of the TVA region has no direct environmental impacts. The implementation of the strategy; however, would result in unavoidable adverse environmental impacts. The nature and potential significance of the impacts would depend on the energy resource options eventually implemented under the strategy. Resource options in each strategy have associated adverse impacts that cannot be realistically avoided but which can often be minimized.

Under every alternative strategy, including the Preferred Alternative, TVA would continue to operate most of its existing generating units for the duration of the 25-year planning period. The exceptions are the coal units and a few of the older natural gas units which are expected to reach end of life during the planning period, subject to TVA Board approval and further environmental review. The exceptions are the coal units and a few of the older natural gas units which are expected to reach end of life during the planning period, subject to TVA Board approval and further environmental review. The operation of the generating units would continue to result in emissions of various air pollutants, water consumption, and waste generation, as applicable to each unit type.

The construction and operation of new generating facilities would unavoidably result in changes in land use unless new facilities are sited at existing plant sites. The conversion of land from a non-industrial use to an industrial use would unavoidably affect land resources such as farmland, wildlife habitat and scenery. All new facilities proposed by TVA would be subject to a site-specific NEPA review to analyze the potential adverse impacts of the proposed action.

## **5.8 Relationship Between Short-Term Uses and Long-Term Productivity of the Human Environment**

The adoption and implementation of a long-term energy resource strategy, including the Preferred Alternative, would have various short- and long-term consequences. These depend, in part, on the actual energy resource options implemented. Option-specific and/or site-specific environmental reviews would be conducted before final implementation decisions are made to use certain energy resources and would examine potential environmental consequences in more detail.

In both the short and long term, TVA would continue to generate electrical energy to serve its customers and the public. The availability of adequate, reliable, and low-cost electricity is recognized as enhancing public health and welfare and will continue to sustain and increase the economic well-being of the TVA region.

The generation of electricity has both short- and long-term environmental impacts. Short-term impacts include those associated with facility construction and operational impacts, such as the consequences of exposure to the emission of air pollutants and consequences of thermal discharges. Potential long-term impacts include land alterations for facility construction and fuel extraction, the generation of nuclear waste that requires safe storage for an indefinite period, and the emission of GHGs that has potential climate change affects.

## **5.9 Irreversible and Irretrievable Commitments of Resources**

The continued generation of electricity by TVA will irreversibly consume various amounts of non-renewable fuels (coal, natural gas, diesel, fuel oil, and uranium). The continued maintenance of TVA's existing generating facilities and the construction of new generating facilities will irreversibly consume energy and materials. The siting of most new energy facilities, except for wind and PV facilities, will irretrievably commit the sites to industrial use because of the substantial alterations of the sites and the relative permanence of the disturbances. The continued generation of nuclear power will produce nuclear wastes; therefore, a site or sites will have to be devoted to the safe storage of these wastes. Any such site would essentially be irretrievably committed to long-term storage of nuclear waste.

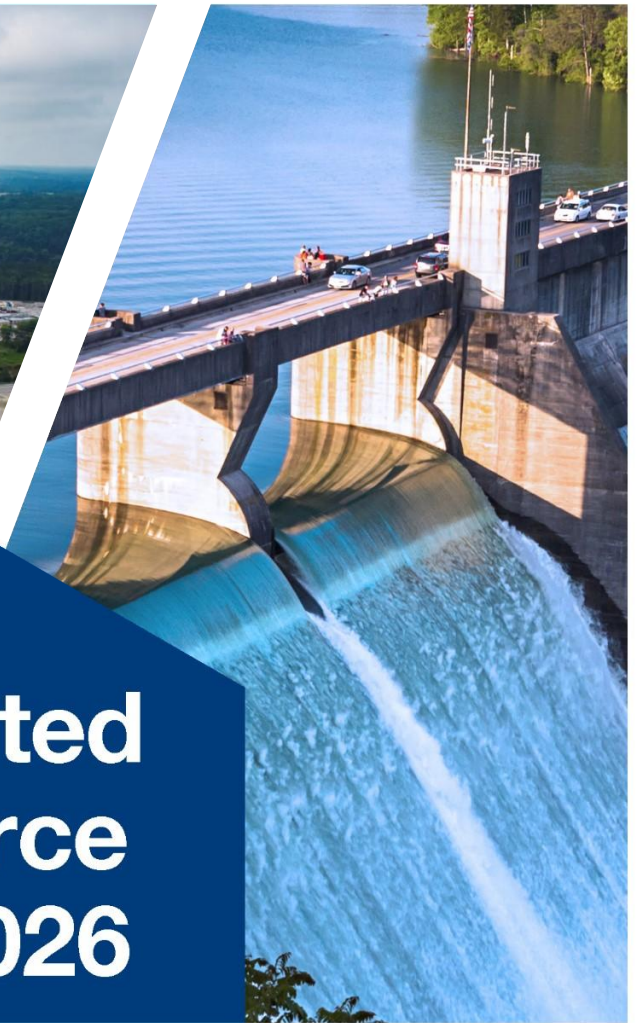
The alternative strategies, including the Preferred Alternative, contain varying amounts of EE and DR and renewable generation. Reliance on these resources lessens the irreversible commitment of non-renewable fuel resources but would still involve the irreversible commitment of energy and materials and, depending on the type of renewable generation, the irreversible commitment of generating sites.

## **5.10 NEPA Compliance Certification**

Consistent with TVA NEPA procedures, TVA certifies that this document represents TVA's good-faith effort to fulfill the requirements of NEPA within the Congressional timeline

established at NEPA Section 107(g) and according to page limits established at NEPA Section 107(e) and that the NEPA process is substantially complete. In this document, TVA prioritizes documentation of the most important considerations required by NEPA within the Congressionally mandated page limits based on its expert judgement. Any considerations addressed briefly or unaddressed are, in TVA's judgment, comparatively not of a substantive nature that meaningfully inform the consideration of environmental effects and the resulting decision on how to proceed. In TVA's expert opinion, the factors mandated by NEPA have been thoroughly considered, and in TVA's judgement, the analysis contained in this document is adequate to inform and reasonably explain TVA's final decision regarding the proposed federal action.





# Integrated Resource Plan 2026

VOLUME 2 / APPENDIX

AUGUST 2026



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# A

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## **Appendix A – Federally Listed Species near TVA Generation Facilities**

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## Appendix A - Federally Listed Species near TVA Generation Facilities

Source: TVA Regional Natural Heritage Database, March 2026

| Facility  | Scientific Name                                   | Common Name             | State | State Rank | State Status | Federal Status |
|-----------|---------------------------------------------------|-------------------------|-------|------------|--------------|----------------|
| Allen     |                                                   |                         |       |            |              |                |
|           | <i>Charadrius melodus</i>                         | piping plover           | TN    | -          | -            | E, T           |
|           | <i>Sterna antillarum athalassos</i>               | interior least tern     | TN    | -          | E            | DL             |
| Apalachia |                                                   |                         |       |            |              |                |
|           | <i>Cryptobranchus alleganiensis</i>               | hellbender              | TN    | S3         | E            | PS             |
|           | <i>Cryptobranchus alleganiensis alleganiensis</i> | eastern hellbender      | NC    | S3         | SC           | E, PE          |
|           | <i>Desmognathus aeneus</i>                        | seepage salamander      | TN    | S2         | D            | UR             |
|           | <i>Epioblasma florentina walkeri</i>              | tan riffleshell         | TN    | S1         | E            | E              |
|           | <i>Myotis lucifugus</i>                           | little brown bat        | NC    | S3         | SR           | UR             |
|           | <i>Myotis septentrionalis</i>                     | northern long-eared bat | NC    | S2         | T            | E              |
|           | <i>Myotis sodalis</i>                             | Indiana bat             | NC    | S1S2       | E            | E              |
|           | <i>Percina tanasi</i>                             | snail darter            | TN    | S2S3       | T            | DL             |
|           | <i>Perimyotis subflavus</i>                       | tricolored bat          | NC    | S3         | SR           | PE             |
|           | <i>Pityopsis ruthii</i>                           | Ruth's golden aster     | TN    | S1         | E            | E              |
|           | <i>Platanthera integrilabia</i>                   | white fringeless orchid | TN    | S2S3       | E            | T              |
|           | <i>Pleurobema oviforme</i>                        | Tennessee clubshell     | TN    | S2S3       | -            | PE             |
|           | <i>Pleuroaia barnesiana</i>                       | Tennessee pigtoe        | NC    | S1         | E            | PE             |
|           | <i>Pleuroaia dolabelloides</i>                    | slabside pearlymussel   | TN    | S2         | E            | E              |
|           | <i>Potamogeton tennesseensis</i>                  | Tennessee pondweed      | TN    | S2         | T            | UR             |
|           | <i>Venustaconcha trabalis</i>                     | Tennessee bean          | TN    | S1         | -            | E              |

| Facility              | Scientific Name                     | Common Name              | State | State Rank | State Status | Federal Status |
|-----------------------|-------------------------------------|--------------------------|-------|------------|--------------|----------------|
| <b>Blue Ridge Dam</b> |                                     |                          |       |            |              |                |
|                       | <i>Bombus affinis</i>               | rusty-patched bumble bee | GA    | SH         | E            | E              |
|                       | <i>Bombus pensylvanicus</i>         | American bumblebee       | GA    | SNR        | -            | UR             |
|                       | <i>Cryptobranchus alleganiensis</i> | hellbender               | GA    | T          | R            | PS             |
|                       | <i>Desmognathus aeneus</i>          | seepage salamander       | TN    | S2         | D            | UR             |
|                       | <i>Glyptemys muhlenbergii</i>       | bog turtle               | GA    | S2         | E            | T              |
|                       | <i>Haliaeetus leucocephalus</i>     | bald eagle               | GA    | S3         | T            | DL             |
|                       | <i>Helonias bullata</i>             | swamp-pink               | GA    | S1         | T            | T              |
|                       | <i>Isotria medeoloides</i>          | small whorled pogonia    | GA    | S2         | T            | T              |
|                       | <i>Myotis grisescens</i>            | gray bat                 | TN    | S2         | E            | E              |
|                       | <i>Myotis lucifugus</i>             | little brown bat         | TN    | S3         | SR           | UR             |
|                       | <i>Myotis septentrionalis</i>       | northern long-eared bat  | TN    | S1S2       | T            | E              |
|                       | <i>Percina tanasi</i>               | snail darter             | TN    | S2S3       | T            | DL             |
|                       | <i>Pityopsis ruthii</i>             | Ruth's golden aster      | TN    | S1         | E            | E              |
|                       | <i>Vermivora chrysoptera</i>        | golden-winged warbler    | GA    | S1S2       | E            | UR             |
| <b>Boone</b>          |                                     |                          |       |            |              |                |
|                       | <i>Myotis grisescens</i>            | gray bat                 | TN    | S2         | E            | E              |
|                       | <i>Myotis septentrionalis</i>       | northern long-eared bat  | TN    | S1S2       | T            | E              |
|                       | <i>Percina williamsi</i>            | sickle darter            | TN    | S2         | T            | T              |
|                       | <i>Perimyotis subflavus</i>         | tricolored bat           | TN    | S2S3       | T            | PE             |
|                       | <i>Tsuga caroliniana</i>            | Carolina hemlock         | TN    | S3         | T            | UR             |
| <b>Browns Ferry</b>   |                                     |                          |       |            |              |                |
|                       | <i>Campeloma decampi</i>            | slender campeloma        | AL    | S1         | SP           | E              |
|                       | <i>Cumberlandia monodonta</i>       | spectaclecase            | AL    | S1         | SP           | E              |
|                       | <i>Elassoma alabamae</i>            | spring pygmy sunfish     | AL    | S1         | SP           | T              |
|                       | <i>Etheostoma boschungii</i>        | slackwater darter        | AL    | S1         | SP           | T              |
|                       | <i>Haliaeetus leucocephalus</i>     | bald eagle               | AL    | S4B        | SP           | DL             |
|                       | <i>Lampsilis abrupta</i>            | pink mucket              | AL    | S1         | SP           | E              |
|                       | <i>Plethobasus cooperianus</i>      | orange-foot pimpleback   | AL    | SX         | SP           | E, XN          |
|                       | <i>Plethobasus cyphus</i>           | sheepnose                | AL    | S1         | SP           | E              |
|                       | <i>Pleurobema plenum</i>            | rough pigtoe             | AL    | S1         | SP           | E, XN          |
|                       | <i>Pleuroaia barnesiana</i>         | Tennessee pigtoe         | AL    | S1         | PSM          | PE             |
| <b>Brownsville</b>    |                                     |                          |       |            |              |                |
|                       | <i>Noturus gladiator</i>            | piebald madtom           | TN    | S3         | D            | UR             |
|                       | <i>Perimyotis subflavus</i>         | tricolored bat           | TN    | S2S3       | T            | PE             |



| Facility            | Scientific Name                                   | Common Name             | State | State Rank | State Status | Federal Status |
|---------------------|---------------------------------------------------|-------------------------|-------|------------|--------------|----------------|
| <b>Caledonia</b>    |                                                   |                         |       |            |              |                |
|                     | <i>Elliptio arca</i>                              | Alabama spike           | MS    | S1S2       | -            | UR             |
|                     | <i>Lampsilis perovalis</i>                        | orange-nacre mucket     | MS    | S1         | LE           | T              |
|                     | <i>Medionidus acutissimus</i>                     | Alabama moccasinshell   | MS    | S1         | LE           | T              |
|                     | <i>Noturus munitus</i>                            | frecklebelly madtom     | MS    | S3         | LE           | PS:T           |
|                     | <i>Obovaria unicolor</i>                          | Alabama hickorynut      | MS    | S1S2       | -            | UR             |
|                     | <i>Pleurobema decisum</i>                         | southern clubshell      | MS    | S1         | -            | E              |
|                     | <i>Pleurobema perovatum</i>                       | ovate clubshell         | MS    | S1         | LE           | E              |
| <b>Chatuge Dam</b>  |                                                   |                         |       |            |              |                |
|                     | <i>Cryptobranchus alleganiensis alleganiensis</i> | eastern hellbender      | NC    | S3         | SC           | E, PE          |
|                     | <i>Fusconaia subrotunda</i>                       | longsolid               | NC    | S1         | E            | T              |
|                     | <i>Haliaeetus leucocephalus</i>                   | bald eagle              | NC    | S3B,S3N    | T            | DL             |
|                     | <i>Moxostoma sp. 2</i>                            | sicklefin redbhorse     | NC    | S2         | T            | UR             |
|                     | <i>Myotis lucifugus</i>                           | little brown bat        | NC    | S3         | SR           | UR             |
|                     | <i>Myotis septentrionalis</i>                     | northern long-eared bat | NC    | S2         | T            | E              |
|                     | <i>Perimyotis subflavus</i>                       | tricolored bat          | NC    | S3         | SR           | PE             |
|                     | <i>Pleurobema oviforme</i>                        | Tennessee clubshell     | NC    | S1         | E            | PE             |
|                     | <i>Sarracenia oreophila</i>                       | green pitcher plant     | NC    | S1         | E            | E              |
|                     | <i>Vermivora chrysoptera</i>                      | golden-winged warbler   | NC    | S2S3B      | SC           | UR             |
| <b>Cherokee Dam</b> |                                                   |                         |       |            |              |                |
|                     | <i>Cumberlandia monodonta</i>                     | spectaclecase           | TN    | S2S3       | E            | E              |
|                     | <i>Epioblasma florentina walkeri</i>              | tan riffleshell         | TN    | S1         | E            | E              |
|                     | <i>Haliaeetus leucocephalus</i>                   | bald eagle              | TN    | -          | D            | DL             |
|                     | <i>Io fluviialis</i>                              | spiny riversnail        | TN    | S2         | -            | UR             |
|                     | <i>Lampsilis abrupta</i>                          | pink mucket             | TN    | S2         | E            | E              |
|                     | <i>Lemiox rimosus</i>                             | birdwing pearlymussel   | TN    | S1         | E            | E, XN          |
|                     | <i>Myotis grisescens</i>                          | gray bat                | TN    | S2         | E            | E              |
|                     | <i>Myotis septentrionalis</i>                     | northern long-eared bat | TN    | S1S2       | T            | E              |
|                     | <i>Myotis sodalis</i>                             | Indiana bat             | NC    | S1S2       | E            | E              |
|                     | <i>Percina tanasi</i>                             | snail darter            | TN    | S2S3       | T            | DL             |
|                     | <i>Perimyotis subflavus</i>                       | tricolored bat          | TN    | S2S3       | T            | PE             |
|                     | <i>Plethobasus cicatricosus</i>                   | white wartyback         | TN    | S1         | E            | E, XN          |
|                     | <i>Plethobasus cyphus</i>                         | sheepnose               | TN    | S2S3       | E            | E              |

| Facility               | Scientific Name                 | Common Name               | State | State Rank | State Status | Federal Status |
|------------------------|---------------------------------|---------------------------|-------|------------|--------------|----------------|
| <b>Chickamauga Dam</b> |                                 |                           |       |            |              |                |
|                        | <i>Chrosomus saylora</i>        | laurel dace               | TN    | S1         | E            | E              |
|                        | <i>Cyprogenia stegaria</i>      | fanshell                  | TN    | S1         | E            | E, XN          |
|                        | <i>Falco peregrinus</i>         | peregrine falcon          | TN    | S1B        | -            | PS:LE          |
|                        | <i>Fusconaia cor</i>            | shiny pigtoe pearlymussel | TN    | S1         | E            | E, XN          |
|                        | <i>Isotria medeoloides</i>      | small whorled pogonia     | TN    | S1         | E            | T              |
|                        | <i>Lampsilis abrupta</i>        | pink mucket               | TN    | S2         | E            | E              |
|                        | <i>Myotis grisescens</i>        | gray bat                  | TN    | S2         | E            | E              |
|                        | <i>Myotis lucifugus</i>         | little brown bat          | TN    | S3         | T            | UR             |
|                        | <i>Myotis septentrionalis</i>   | northern long-eared bat   | TN    | S1S2       | T            | E              |
|                        | <i>Myotis sodalis</i>           | Indiana bat               | TN    | S1         | E            | E              |
|                        | <i>Percina tanasi</i>           | snail darter              | TN    | S2S3       | T            | DL             |
|                        | <i>Perimyotis subflavus</i>     | tricolored bat            | TN    | S2S3       | T            | PE             |
|                        | <i>Platanthera integrilabia</i> | white fringeless orchid   | TN    | S2S3       | E            | T              |
|                        | <i>Plethobasus cooperianus</i>  | orange-foot pimpleback    | TN    | S1         | E            | E, XN          |
|                        | <i>Plethobasus cyphus</i>       | sheepnose                 | TN    | S2S3       | E            | E              |
|                        | <i>Pleurobema plenum</i>        | rough pigtoe              | TN    | S1         | E            | E, XN          |
|                        | <i>Vermivora chrysoptera</i>    | golden-winged warbler     | TN    | S3B        | T            | UR             |

| Facility       | Scientific Name                       | Common Name               | State | State Rank | State Status | Federal Status |
|----------------|---------------------------------------|---------------------------|-------|------------|--------------|----------------|
| <b>Colbert</b> |                                       |                           |       |            |              |                |
|                | <i>Cumberlandia monodonta</i>         | spectaclecase             | AL    | S1         | SP           | E              |
|                | <i>Cyprogenia stegaria</i>            | fanshell                  | AL    | S1         | SP           | E, XN          |
|                | <i>Dromus dromas</i>                  | dromedary pearlymussel    | AL    | SX         | SP           | E, XN          |
|                | <i>Epioblasma brevidens</i>           | cumberlandian combshell   | AL    | S1         | SP           | E, XN          |
|                | <i>Epioblasma capsaeformis</i>        | oyster mussel             | AL    | SX         | SP           | E, XN          |
|                | <i>Epioblasma obliquata obliquata</i> | purple catspaw            | AL    | SX         | SP           | E, XN          |
|                | <i>Epioblasma triquetra</i>           | snuffbox                  | AL    | S1         | PSM          | E              |
|                | <i>Fusconaia cuneolus</i>             | fine-rayed pigtoe         | AL    | S1         | SP           | E, XN          |
|                | <i>Fusconaia subrotunda</i>           | longsolid                 | AL    | S1         | PSM          | T              |
|                | <i>Haliaeetus leucocephalus</i>       | bald eagle                | AL    | S4B        | SP           | DL             |
|                | <i>Hemistena lata</i>                 | cracking pearlymussel     | AL    | S1         | SP,P1        | E, XN          |
|                | <i>Lampsilis abrupta</i>              | pink mucket               | AL    | S1         | SP           | E              |
|                | <i>Lemiox rimosus</i>                 | Birdwing Pearlymussel     | AL    | S1         | SP           | E, XN          |
|                | <i>Leptodea leptodon</i>              | scaleshell                | AL    | SX         | SP           | E              |
|                | <i>Macrochelys temminckii</i>         | alligator snapping turtle | AL    | S3         | SP           | PT             |
|                | <i>Medionidus conradicus</i>          | Cumberland moccasinshell  | AL    | S1         | SP           | PE             |
|                | <i>Myotis grisescens</i>              | gray bat                  | AL    | S2         | SP           | E              |
|                | <i>Myotis septentrionalis</i>         | northern long-eared bat   | AL    | S2         | SP           | E              |
|                | <i>Myotis sodalis</i>                 | Indiana bat               | AL    | S2         | SP           | E              |
|                | <i>Obovaria retusa</i>                | ring pink                 | AL    | SH         | SP           | E, XN          |
|                | <i>Obovaria subrotunda</i>            | round hickorynut          | AL    | S2         | PSM          | T              |
|                | <i>Palaemonias alabamiae</i>          | Alabama blind cave shrimp | AL    | S1         | SP           | E              |
|                | <i>Percina tanasi</i>                 | snail darter              | AL    | S1         | SP           | DL             |
|                | <i>Plethobasus cicatricosus</i>       | white wartyback           | AL    | S1         | SP           | E, XN          |
|                | <i>Plethobasus cooperianus</i>        | orange-foot pimpleback    | AL    | SX         | SP           | E, XN          |
|                | <i>Plethobasus cyphus</i>             | sheepnose                 | AL    | S1         | SP           | E              |
|                | <i>Pleurobema oviforme</i>            | Tennessee clubshell       | AL    | S1         | PSM          | PE             |
|                | <i>Pleurobema plenum</i>              | rough pigtoe              | AL    | S1         | SP           | E, XN          |
|                | <i>Pleurobema rubrum</i>              | pyramid pigtoe            | AL    | S1         | SP           | PT             |
|                | <i>Pleuonaia barnesiana</i>           | Tennessee pigtoe          | AL    | S1         | PSM          | PE             |
|                | <i>Pleuonaia dolabelloides</i>        | slabside pearlymussel     | AL    | S1         | SP           | E              |
|                | <i>Ptychobranhus subtentum</i>        | fluted kidneyshell        | AL    | SX         | SP           | E              |
|                | <i>Speoplatyrhinus poulsoni</i>       | Alabama cavefish          | AL    | S1         | SP           | E              |

| Facility                | Scientific Name                     | Common Name               | State | State Rank | State Status | Federal Status |
|-------------------------|-------------------------------------|---------------------------|-------|------------|--------------|----------------|
| <b>Cumberland</b>       |                                     |                           |       |            |              |                |
|                         | <i>Acipenser fulvescens</i>         | lake sturgeon             | TN    | S1         | E            | UR             |
|                         | <i>Apios priceana</i>               | Price's potato-bean       | KY    | S1         | E            | T              |
|                         | <i>Haliaeetus leucocephalus</i>     | bald eagle                | TN    | -          | D            | DL             |
|                         | <i>Macrochelys temminckii</i>       | alligator snapping turtle | TN    | S2S3       | T            | PT             |
|                         | <i>Myotis grisescens</i>            | gray bat                  | TN    | S2         | E            | E              |
|                         | <i>Myotis lucifugus</i>             | little brown bat          | TN    | S3         | T            | UR             |
|                         | <i>Myotis septentrionalis</i>       | northern long-eared bat   | TN    | S1S2       | T            | E              |
|                         | <i>Myotis sodalis</i>               | Indiana bat               | TN    | S1         | E            | E              |
|                         | <i>Perimyotis subflavus</i>         | tricolored bat            | KY    | S2         | T            | PE             |
|                         | <i>Pleurobema clava</i>             | clubshell                 | TN    | SH         | E            | E, XN          |
|                         | <i>Quadrula cylindrica</i>          | rabbitsfoot               | TN    | -          | -            | T              |
|                         | <i>Vireo bellii</i>                 | Bell's vireo              | KY    | S2S3B      | S            | PS             |
| <b>Fort Loudoun Dam</b> |                                     |                           |       |            |              |                |
|                         | <i>Cryptobranchus alleganiensis</i> | hellbender                | TN    | S3         | E            | PS             |
|                         | <i>Lampsilis abrupta</i>            | pink mucket               | TN    | S2         | E            | E              |
|                         | <i>Myotis grisescens</i>            | gray bat                  | TN    | S2         | E            | E              |
|                         | <i>Myotis lucifugus</i>             | little brown bat          | TN    | S3         | T            | UR             |
|                         | <i>Myotis septentrionalis</i>       | northern long-eared bat   | TN    | S1S2       | T            | E              |
|                         | <i>Percina tanasi</i>               | snail darter              | TN    | S2S3       | T            | DL             |
|                         | <i>Perimyotis subflavus</i>         | tricolored bat            | TN    | S2S3       | T            | PE             |
| <b>Gallatin</b>         |                                     |                           |       |            |              |                |
|                         | <i>Acipenser fulvescens</i>         | lake sturgeon             | TN    | S1         | E            | UR             |
|                         | <i>Ambystoma barbouri</i>           | streamside salamander     | TN    | S2         | E            | UR             |
|                         | <i>Dalea foliosa</i>                | leafy prairie-clover      | TN    | S2S3       | E            | E              |
|                         | <i>Haliaeetus leucocephalus</i>     | bald eagle                | TN    | -          | D            | DL             |
|                         | <i>Lesquerella perforata</i>        | spring creek bladderpod   | TN    | S1         | E            | E              |
|                         | <i>Macrochelys temminckii</i>       | alligator snapping turtle | TN    | S2S3       | T            | PT             |
|                         | <i>Myotis grisescens</i>            | gray bat                  | TN    | S2         | E            | E              |
|                         | <i>Myotis sodalis</i>               | Indiana bat               | TN    | S1         | E            | E              |
| <b>Gleason</b>          |                                     |                           |       |            |              |                |
|                         | <i>Noturus gladiator</i>            | piebald madtom            | TN    | S3         | D            | UR             |

| Facility                | Scientific Name                     | Common Name               | State | State Rank | State Status | Federal Status |
|-------------------------|-------------------------------------|---------------------------|-------|------------|--------------|----------------|
| <b>Great Falls Dam</b>  |                                     |                           |       |            |              |                |
|                         | <i>Cryptobranchus alleganiensis</i> | hellbender                | TN    | S3         | E            | PS             |
|                         | <i>Etheostoma akatulo</i>           | bluemask darter           | TN    | S1         | E            | E              |
|                         | <i>Fundulus julisia</i>             | barrens topminnow         | TN    | S1         | E            | E              |
|                         | <i>Myotis grisescens</i>            | gray bat                  | TN    | S2         | E            | E              |
|                         | <i>Myotis lucifugus</i>             | little brown bat          | TN    | S3         | T            | UR             |
|                         | <i>Myotis septentrionalis</i>       | northern long-eared bat   | TN    | S1S2       | T            | E              |
|                         | <i>Myotis sodalis</i>               | Indiana bat               | TN    | S1         | E            | E              |
|                         | <i>Perimyotis subflavus</i>         | tricolored bat            | TN    | S2S3       | T            | PE             |
|                         | <i>Pleurobema gibberum</i>          | Cumberland pigtoe         | TN    | S1         | E            | E              |
| <b>Guntersville Dam</b> |                                     |                           |       |            |              |                |
|                         | <i>Campeloma decampi</i>            | slender campeloma         | AL    | S1         | SP           | E              |
|                         | <i>Cryptobranchus alleganiensis</i> | hellbender                | AL    | S1S2       | SP           | PS             |
|                         | <i>Cumberlandia monodonta</i>       | spectaclecase             | AL    | S1         | SP           | E              |
|                         | <i>Cyprogenia stegaria</i>          | fanshell                  | AL    | S1         | SP           | E, XN          |
|                         | <i>Elassoma alabamae</i>            | spring pygmy sunfish      | AL    | S1         | SP           | T              |
|                         | <i>Epioblasma triquetra</i>         | snuffbox                  | AL    | S1         | PSM          | E              |
|                         | <i>Etheostoma tuscumbia</i>         | Tuscumbia darter          | AL    | S2         | SP           | UR             |
|                         | <i>Falco peregrinus</i>             | peregrine falcon          | AL    | SHB,S3N    | SP           | PS:LE          |
|                         | <i>Fusconaia subrotunda</i>         | longsolid                 | AL    | S1         | PSM          | T              |
|                         | <i>Haliaeetus leucocephalus</i>     | bald eagle                | AL    | S4B        | SP           | DL             |
|                         | <i>Lampsilis abrupta</i>            | pink mucket               | AL    | S1         | SP           | E              |
|                         | <i>Macrochelys temminckii</i>       | alligator snapping turtle | AL    | S3         | SP           | PT             |
|                         | <i>Myotis grisescens</i>            | gray bat                  | AL    | S2         | SP           | E              |
|                         | <i>Myotis lucifugus</i>             | little brown bat          | AL    | S3         | SP           | UR             |
|                         | <i>Myotis septentrionalis</i>       | northern long-eared bat   | AL    | S2         | SP           | E              |
|                         | <i>Myotis sodalis</i>               | Indiana bat               | AL    | S2         | SP           | E              |
|                         | <i>Percina tanasi</i>               | snail darter              | AL    | S1         | SP           | DL             |
|                         | <i>Perimyotis subflavus</i>         | tricolored bat            | AL    | S3         | -            | PE             |
|                         | <i>Plethobasus cooperianus</i>      | orange-foot pimpleback    | AL    | SX         | SP           | E, XN          |
|                         | <i>Plethobasus cyphus</i>           | sheepnose                 | AL    | S1         | SP           | E              |
|                         | <i>Pleurobema oviforme</i>          | Tennessee clubshell       | AL    | S1         | PSM          | PE             |
|                         | <i>Pleurobema plenum</i>            | rough pigtoe              | AL    | S1         | SP           | E, XN          |
|                         | <i>Pleurocera curta</i>             | shortspire hornsnail      | AL    | S1S2       | -            | UR             |
|                         | <i>Pleuonaia dolabelloides</i>      | slabside pearlymussel     | AL    | S1         | SP           | E              |

| Facility            | Scientific Name                                   | Common Name               | State | State Rank | State Status | Federal Status |
|---------------------|---------------------------------------------------|---------------------------|-------|------------|--------------|----------------|
| <b>Hiwassee Dam</b> |                                                   |                           |       |            |              |                |
|                     | <i>Cryptobranchus alleganiensis alleganiensis</i> | eastern hellbender        | NC    | S3         | SC           | E, PE          |
|                     | <i>Desmognathus aeneus</i>                        | seepage salamander        | TN    | S2         | D            | UR             |
|                     | <i>Epioblasma florentina walkeri</i>              | tan riffleshell           | TN    | S1         | E            | E              |
|                     | <i>Fusconaia subrotunda</i>                       | longsolid                 | NC    | S1         | E            | T              |
|                     | <i>Haliaeetus leucocephalus</i>                   | bald eagle                | NC    | S3B,S3N    | T            | DL             |
|                     | <i>Moxostoma sp. 2</i>                            | sicklefin redhorse        | NC    | S2         | T            | UR             |
|                     | <i>Myotis lucifugus</i>                           | little brown bat          | NC    | S3         | SR           | UR             |
|                     | <i>Myotis septentrionalis</i>                     | northern long-eared bat   | NC    | S2         | T            | E              |
|                     | <i>Myotis sodalis</i>                             | Indiana bat               | NC    | S1S2       | E            | E              |
|                     | <i>Percina tanasi</i>                             | snail darter              | TN    | S2S3       | T            | DL             |
|                     | <i>Perimyotis subflavus</i>                       | tricolored bat            | NC    | S3         | SR           | PE             |
|                     | <i>Pityopsis ruthii</i>                           | Ruth's golden aster       | TN    | S1         | E            | E              |
|                     | <i>Platanthera integrilabia</i>                   | white fringeless orchid   | NC    | SH         | SC-H         | T              |
|                     | <i>Pleurobema oviforme</i>                        | Tennessee clubshell       | TN    | S2S3       | -            | PE             |
|                     | <i>Pleuroaia barnesiana</i>                       | Tennessee pigtoe          | NC    | S1         | E            | PE             |
|                     | <i>Pleuroaia dolabelloides</i>                    | slabside pearlymussel     | TN    | S2         | E            | E              |
|                     | <i>Potamogeton tennesseensis</i>                  | Tennessee pondweed        | TN    | S2         | T            | UR             |
|                     | <i>Venustaconcha trabalis</i>                     | Tennessee bean            | TN    | S1         | -            | E              |
|                     | <i>Zapus hudsonius</i>                            | meadow jumping mouse      | NC    | S3         | WL           | PS             |
| <b>John Sevier</b>  |                                                   |                           |       |            |              |                |
|                     | <i>Erimonax monachus</i>                          | spotfin chub              | TN    | S2         | T            | T, XN          |
|                     | <i>Haliaeetus leucocephalus</i>                   | bald eagle                | TN    | -          | D            | DL             |
|                     | <i>Lemiox rimosus</i>                             | birdwing pearlymussel     | TN    | S1         | E            | E, XN          |
|                     | <i>Myotis grisescens</i>                          | gray bat                  | TN    | S2         | E            | E              |
|                     | <i>Myotis septentrionalis</i>                     | northern long-eared bat   | TN    | S1S2       | T            | E              |
|                     | <i>Perimyotis subflavus</i>                       | tricolored bat            | TN    | S2S3       | T            | PE             |
|                     | <i>Venustaconcha trabalis</i>                     | Tennessee bean            | TN    | S1         | -            | E              |
| <b>Johnsonville</b> |                                                   |                           |       |            |              |                |
|                     | <i>Charadrius melodus</i>                         | pipin plover              | TN    | -          | -            | E, T           |
|                     | <i>Fimbristylis perpusilla</i>                    | Harper's fimbriatylis     | TN    | S1         | E            | UR             |
|                     | <i>Lampsilis abrupta</i>                          | pink mucket               | TN    | S2         | E            | E              |
|                     | <i>Macrochelys temminckii</i>                     | alligator snapping turtle | TN    | S2S3       | T            | PT             |
|                     | <i>Myotis grisescens</i>                          | gray bat                  | TN    | S2         | E            | E              |
|                     | <i>Myotis lucifugus</i>                           | little brown bat          | TN    | S3         | T            | UR             |
|                     | <i>Perimyotis subflavus</i>                       | tricolored bat            | TN    | S2S3       | T            | PE             |
|                     | <i>Plethobasus cooperianus</i>                    | orange-foot pimpleback    | TN    | S1         | E            | E, XN          |



| Facility             | Scientific Name                       | Common Name             | State | State Rank    | State Status | Federal Status |
|----------------------|---------------------------------------|-------------------------|-------|---------------|--------------|----------------|
| <b>Kemper County</b> |                                       |                         |       |               |              |                |
|                      | <i>Strophitus radiatus</i>            | rayed creekshell        | MS    | S2            | -            | UR             |
| <b>Kentucky Dam</b>  |                                       |                         |       |               |              |                |
|                      | <i>Alosa alabamae</i>                 | Alabama shad            | KY    | S1            | E            | UR             |
|                      | <i>Apios priceana</i>                 | Price's potato-bean     | KY    | S1            | E            | T              |
|                      | <i>Cumberlandia monodonta</i>         | spectaclecase           | KY    | S1            | E            | E              |
|                      | <i>Cyprogenia stegaria</i>            | fanshell                | KY    | S1            | E            | E, XN          |
|                      | <i>Falco peregrinus</i>               | peregrine falcon        | KY    | S1B           | E            | PS:LE          |
|                      | <i>Fusconaia subrotunda</i>           | longsolid               | KY    | S3            | S            | T              |
|                      | <i>Haliaeetus leucocephalus</i>       | bald eagle              | KY    | S3B,S3S<br>4N | S            | DL             |
|                      | <i>Lampsilis abrupta</i>              | pink mucket             | KY    | S1            | E            | E              |
|                      | <i>Myotis grisescens</i>              | gray bat                | KY    | S2            | T            | E              |
|                      | <i>Myotis lucifugus</i>               | little brown bat        | KY    | S2            | T            | UR             |
|                      | <i>Myotis septentrionalis</i>         | northern long-eared bat | KY    | S1            | E            | E              |
|                      | <i>Perimyotis subflavus</i>           | tricolored bat          | KY    | S2            | T            | PE             |
|                      | <i>Plethobasus cooperianus</i>        | orange-foot pimpleback  | KY    | S1            | E            | E, XN          |
|                      | <i>Pleurobema oviforme</i>            | Tennessee clubshell     | KY    | S1            | E            | PE             |
|                      | <i>Pleurocera curta</i>               | shortspire hornsnail    | KY    | S2            | S            | UR             |
|                      | <i>Quadrula cylindrica cylindrica</i> | smooth rabbitsfoot      | KY    | S2            | T            | T              |
|                      | <i>Vireo bellii</i>                   | Bell's vireo            | KY    | S2S3B         | S            | PS             |

| Facility        | Scientific Name                  | Common Name             | State | State Rank | State Status | Federal Status |
|-----------------|----------------------------------|-------------------------|-------|------------|--------------|----------------|
| <b>Kingston</b> |                                  |                         |       |            |              |                |
|                 | <i>Acipenser fulvescens</i>      | lake sturgeon           | TN    | S1         | E            | UR             |
|                 | <i>Conradina verticillata</i>    | Cumberland rosemary     | TN    | S3         | T            | T              |
|                 | <i>Cumberlandia monodonta</i>    | spectaclecase           | TN    | S2S3       | E            | E              |
|                 | <i>Epioblasma capsaeformis</i>   | oyster mussel           | TN    | S1         | E            | E, XN          |
|                 | <i>Erimonax monachus</i>         | spotfin chub            | TN    | S2         | T            | T, XN          |
|                 | <i>Fusconaia cuneolus</i>        | fine-rayed pigtoe       | TN    | S1         | E            | E, XN          |
|                 | <i>Haliaeetus leucocephalus</i>  | bald eagle              | TN    | -          | D            | DL             |
|                 | <i>Io fluviatilis</i>            | spiny riversnail        | TN    | S2         | -            | UR             |
|                 | <i>Lampsilis abrupta</i>         | pink mucket             | TN    | S2         | E            | E              |
|                 | <i>Lampsilis virescens</i>       | Alabama lampmussel      | TN    | S1         | E            | E, XN          |
|                 | <i>Myotis grisescens</i>         | gray bat                | TN    | S2         | E            | E              |
|                 | <i>Myotis lucifugus</i>          | little brown bat        | TN    | S3         | T            | UR             |
|                 | <i>Myotis septentrionalis</i>    | northern long-eared bat | TN    | S1S2       | T            | E              |
|                 | <i>Myotis sodalis</i>            | Indiana bat             | TN    | S1         | E            | E              |
|                 | <i>Obovaria retusa</i>           | ring pink               | TN    | S1         | E            | E, XN          |
|                 | <i>Plethobasus cicatricosus</i>  | white wartyback         | TN    | S1         | E            | E, XN          |
|                 | <i>Plethobasus cooperianus</i>   | orange-foot pimpleback  | TN    | S1         | E            | E, XN          |
|                 | <i>Plethobasus cyphus</i>        | sheepnose               | TN    | S2S3       | E            | E              |
|                 | <i>Pleuroaia dolabelloides</i>   | slabside pearlymussel   | TN    | S2         | E            | E              |
|                 | <i>Potamogeton tennesseensis</i> | Tennessee pondweed      | TN    | S2         | T            | UR             |
|                 | <i>Spiraea virginiana</i>        | Virginia spiraea        | TN    | S2         | E            | T              |
|                 | <i>Venustaconcha trabalis</i>    | Tennessee bean          | TN    | S1         | -            | E              |
|                 | <i>Vermivora chrysoptera</i>     | golden-winged warbler   | TN    | S3B        | T            | UR             |

| Facility               | Scientific Name                       | Common Name               | State | State Rank | State Status | Federal Status |
|------------------------|---------------------------------------|---------------------------|-------|------------|--------------|----------------|
| <b>Marshall</b>        |                                       |                           |       |            |              |                |
|                        | <i>Acipenser fulvescens</i>           | lake sturgeon             | KY    | S1         | E            | UR             |
|                        | <i>Cyprogenia stegaria</i>            | fanshell                  | KY    | S1         | E            | E, XN          |
|                        | <i>Fusconaia subrotunda</i>           | longsolid                 | KY    | S3         | S            | T              |
|                        | <i>Lampsilis abrupta</i>              | pink mucket               | KY    | S1         | E            | E              |
|                        | <i>Macrochelys temminckii</i>         | alligator snapping turtle | KY    | S1         | E            | PT             |
|                        | <i>Obovaria retusa</i>                | ring pink                 | KY    | S1         | E            | E, XN          |
|                        | <i>Plethobasus cooperianus</i>        | orange-foot pimpleback    | KY    | S1         | E            | E, XN          |
|                        | <i>Plethobasus cyphus</i>             | sheepnose                 | KY    | S1         | E            | E              |
|                        | <i>Pleurobema rubrum</i>              | pyramid pigtoe            | KY    | S1         | E            | PT             |
|                        | <i>Pleurocera curta</i>               | shortspire hornsnail      | KY    | S2         | S            | UR             |
|                        | <i>Potamilus capax</i>                | fat pocketbook            | KY    | S2         | T            | E              |
|                        | <i>Quadrula cylindrica</i>            | rabbitsfoot               | KY    | S2         | E            | T              |
|                        | <i>Quadrula cylindrica cylindrica</i> | smooth rabbitsfoot        | KY    | S2         | T            | T              |
|                        | <i>Sterna antillarum athalassos</i>   | interior least tern       | KY    | S1S2B      | E            | DL             |
| <b>Melton Hill Dam</b> |                                       |                           |       |            |              |                |
|                        | <i>Accipiter striatus</i>             | sharp-shinned hawk        | TN    | S3B        | -            | PS             |
|                        | <i>Cryptobranchus alleganiensis</i>   | hellbender                | TN    | S3         | E            | PS             |
|                        | <i>Cumberlandia monodonta</i>         | spectaclecase             | TN    | S2S3       | E            | E              |
|                        | <i>Cyprogenia stegaria</i>            | fanshell                  | TN    | S1         | E            | E, XN          |
|                        | <i>Fusconaia cor</i>                  | shiny pigtoe pearlymussel | TN    | S1         | E            | E, XN          |
|                        | <i>Fusconaia cuneolus</i>             | fine-rayed pigtoe         | TN    | S1         | E            | E, XN          |
|                        | <i>Lampsilis abrupta</i>              | pink mucket               | TN    | S2         | E            | E              |
|                        | <i>Myotis grisescens</i>              | gray bat                  | TN    | S2         | E            | E              |
|                        | <i>Myotis lucifugus</i>               | little brown bat          | TN    | S3         | T            | UR             |
|                        | <i>Myotis septentrionalis</i>         | northern long-eared bat   | TN    | S1S2       | T            | E              |
|                        | <i>Myotis sodalis</i>                 | Indiana bat               | TN    | S1         | E            | E              |
|                        | <i>Obovaria retusa</i>                | ring pink                 | TN    | S1         | E            | E, XN          |
|                        | <i>Perimyotis subflavus</i>           | tricolored bat            | TN    | S2S3       | T            | PE             |
|                        | <i>Plethobasus cicatricosus</i>       | white wartyback           | TN    | S1         | E            | E, XN          |
|                        | <i>Plethobasus cooperianus</i>        | orange-foot pimpleback    | TN    | S1         | E            | E, XN          |
|                        | <i>Plethobasus cyphus</i>             | sheepnose                 | TN    | S2S3       | E            | E              |
|                        | <i>Pleuroaia dolabellodes</i>         | slabside pearlymussel     | TN    | S2         | E            | E              |
|                        | <i>Vermivora chrysoptera</i>          | golden-winged warbler     | TN    | S3B        | T            | UR             |

| Facility             | Scientific Name                                       | Common Name                 | State | State Rank | State Status | Federal Status |
|----------------------|-------------------------------------------------------|-----------------------------|-------|------------|--------------|----------------|
| <b>Nickajack Dam</b> |                                                       |                             |       |            |              |                |
|                      | <i>Asplenium scolopendrium</i> var. <i>americanum</i> | American hart's-tongue fern | TN    | S1         | E            | T              |
|                      | <i>Athearnia anthonyi</i>                             | Anthony's river snail       | AL    | S1         | SP           | E, XN          |
|                      | <i>Cyprogenia stegaria</i>                            | fanshell                    | TN    | S1         | E            | E, XN          |
|                      | <i>Epioblasma triquetra</i>                           | snuffbox                    | AL    | S1         | PSM          | E              |
|                      | <i>Haliaeetus leucocephalus</i>                       | bald eagle                  | TN    | -          | D            | DL             |
|                      | <i>Lampsilis abrupta</i>                              | pink mucket                 | TN    | S2         | E            | E              |
|                      | <i>Myotis grisescens</i>                              | gray bat                    | TN    | S2         | E            | E              |
|                      | <i>Myotis septentrionalis</i>                         | northern long-eared bat     | AL    | S2         | SP           | E              |
|                      | <i>Myotis sodalis</i>                                 | Indiana bat                 | TN    | S1         | E            | E              |
|                      | <i>Percina tanasi</i>                                 | snail darter                | TN    | S2S3       | T            | DL             |
|                      | <i>Perimyotis subflavus</i>                           | tricolored bat              | TN    | S2S3       | T            | PE             |
|                      | <i>Platanthera integrilabia</i>                       | white fringeless orchid     | AL    | S2         | -            | T              |
|                      | <i>Plethobasus cooperianus</i>                        | orange-foot pimpleback      | AL    | SX         | SP           | E, XN          |
|                      | <i>Pleuroaia dolabelloides</i>                        | slabside pearlymussel       | AL    | S1         | SP           | E              |
|                      | <i>Scutellaria montana</i>                            | large-flowered skullcap     | TN    | S4         | T            | T              |
| <b>Norris Dam</b>    |                                                       |                             |       |            |              |                |
|                      | <i>Cryptobranchus alleganiensis</i>                   | hellbender                  | TN    | S3         | E            | PS             |
|                      | <i>Cumberlandia monodonta</i>                         | spectaclecase               | TN    | S2S3       | E            | E              |
|                      | <i>Myotis grisescens</i>                              | gray bat                    | TN    | S2         | E            | E              |
|                      | <i>Myotis lucifugus</i>                               | little brown bat            | TN    | S3         | T            | UR             |
|                      | <i>Myotis septentrionalis</i>                         | northern long-eared bat     | TN    | S1S2       | T            | E              |
|                      | <i>Myotis sodalis</i>                                 | Indiana bat                 | TN    | S1         | E            | E              |
|                      | <i>Obovaria retusa</i>                                | ring pink                   | TN    | S1         | E            | E, XN          |
|                      | <i>Perimyotis subflavus</i>                           | tricolored bat              | TN    | S2S3       | T            | PE             |
|                      | <i>Plethobasus cicatricosus</i>                       | white wartyback             | TN    | S1         | E            | E, XN          |
|                      | <i>Plethobasus cooperianus</i>                        | orange-foot pimpleback      | TN    | S1         | E            | E, XN          |
|                      | <i>Plethobasus cyphus</i>                             | sheepnose                   | TN    | S2S3       | E            | E              |
|                      | <i>Pleuroaia dolabelloides</i>                        | slabside pearlymussel       | TN    | S2         | E            | E              |
|                      | <i>Vermivora chrysoptera</i>                          | golden-winged warbler       | TN    | S3B        | T            | UR             |

| Facility                   | Scientific Name                                  | Common Name             | State | State Rank    | State Status | Federal Status |
|----------------------------|--------------------------------------------------|-------------------------|-------|---------------|--------------|----------------|
| <b>North Alabama Solar</b> |                                                  |                         |       |               |              |                |
|                            | <i>Elimia nassula</i>                            | round-rib elimia        | AL    | S1            | -            | UR             |
|                            | <i>Epioblasma brevidens</i>                      | Cumberlandian combshell | AL    | S1            | SP           | E, XN          |
|                            | <i>Etheostoma tuscumbia</i>                      | Tuscumbia darter        | AL    | S2            | SP           | UR             |
|                            | <i>Haliaeetus leucocephalus</i>                  | bald eagle              | AL    | S4B           | SP           | DL             |
|                            | <i>Helianthus eggertii</i>                       | Eggert's sunflower      | AL    | S3            | S            | DL             |
|                            | <i>Lampsilis abrupta</i>                         | pink mucket             | AL    | S1            | SP           | E              |
|                            | <i>Leavenworthia crassa</i>                      | fleshy-fruit gladeceess | AL    | S2            | -            | E              |
|                            | <i>Myotis grisescens</i>                         | gray bat                | AL    | S2            | SP           | E              |
|                            | <i>Pleuonaia barnesiana</i>                      | Tennessee pigtoe        | AL    | S1            | PSM          | PE             |
|                            | <i>Ptychobranhus subtentum</i>                   | fluted kidneyshell      | AL    | SX            | SP           | E              |
| <b>Nottely Dam</b>         |                                                  |                         |       |               |              |                |
|                            | <i>Cryptobranhus alleganiensis alleganiensis</i> | eastern hellbender      | GA    | -             | -            | PS:E,UR        |
|                            | <i>Desmognathus aeneus</i>                       | seepage salamander      | NC    | S3            | WL           | UR             |
|                            | <i>Glyptemys muhlenbergii</i>                    | bog turtle              | GA    | S2            | E            | T              |
|                            | <i>Haliaeetus leucocephalus</i>                  | bald eagle              | GA    | S3            | T            | DL             |
|                            | <i>Moxostoma sp. 2</i>                           | sicklefin redhorse      | NC    | S2            | T            | UR             |
|                            | <i>Myotis septentrionalis</i>                    | northern long-eared bat | GA    | E             | T            | E              |
|                            | <i>Perimyotis subflavus</i>                      | tricolored bat          | NC    | S3            | SR           | PE             |
|                            | <i>Torreya taxifolia</i>                         | Florida torreya         | GA    | S1            | E            | E              |
| <b>Paradise</b>            |                                                  |                         |       |               |              |                |
|                            | <i>Cryptobranhus alleganiensis alleganiensis</i> | eastern hellbender      | KY    | S2S3          | S            | E, PE          |
|                            | <i>Cyprogenia stegaria</i>                       | fanshell                | KY    | S1            | E            | E, XN          |
|                            | <i>Falco peregrinus</i>                          | peregrin falcon         | KY    | S1B           | E            | PS:LE          |
|                            | <i>Fusconaia subrotunda</i>                      | longsolid               | KY    | S3            | S            | T              |
|                            | <i>Gallinula galeata</i>                         | common gallinule        | KY    | S1S2B         | T            | PS             |
|                            | <i>Haliaeetus leucocephalus</i>                  | bald eagle              | KY    | S3B,S3S<br>4N | S            | DL             |
|                            | <i>Lampsilis abrupta</i>                         | pink mucket             | KY    | S1            | E            | E              |
|                            | <i>Perimyotis subflavus</i>                      | tricolored bat          | KY    | S2            | T            | PE             |
|                            | <i>Pleurobema plenum</i>                         | rough pigtoe            | KY    | S1            | E            | E, XN          |
|                            | <i>Pleurobema rubrum</i>                         | pyramid pigtoe          | KY    | S1            | E            | PT             |
|                            | <i>Vireo bellii</i>                              | Bell's vireo            | KY    | S2S3B         | S            | PS             |

| Facility                    | Scientific Name                         | Common Name                     | State | State Rank | State Status | Federal Status |
|-----------------------------|-----------------------------------------|---------------------------------|-------|------------|--------------|----------------|
| <b>Pickwick Landing Dam</b> |                                         |                                 |       |            |              |                |
|                             | <i>Athearnia anthonyi</i>               | Anthony's river snail           | AL    | S1         | SP           | E, XN          |
|                             | <i>Cryptobranchus alleganiensis</i>     | hellbender                      | TN    | S3         | E            | PS             |
|                             | <i>Cumberlandia monodonta</i>           | spectaclecase                   | TN    | S2S3       | E            | E              |
|                             | <i>Cyprogenia stegaria</i>              | fanshell                        | AL    | S1         | SP           | E, XN          |
|                             | <i>Dromus dromas</i>                    | dromedary pearlymussel          | AL    | SX         | SP           | E, XN          |
|                             | <i>Epioblasma brevidens</i>             | Cumberlandian combshell         | AL    | S1         | SP           | E, XN          |
|                             | <i>Epioblasma capsaeformis</i>          | oyster mussel                   | AL    | SX         | SP           | E, XN          |
|                             | <i>Epioblasma florentina florentina</i> | yellow-blossom pearlymussel     | AL    | SX         | SP           | DL             |
|                             | <i>Epioblasma torulosa torulosa</i>     | tuberculed blossom pearlymussel | AL    | SX         | SP           | DL             |
|                             | <i>Fusconaia cor</i>                    | shiny pigtoe pearlymussel       | AL    | S1         | SP           | E, XN          |
|                             | <i>Fusconaia subrotunda</i>             | longsolid                       | AL    | S1         | PSM          | T              |
|                             | <i>Haliaeetus leucocephalus</i>         | bald eagle                      | TN    | -          | D            | DL             |
|                             | <i>Hemistena lata</i>                   | cracking pearlymussel           | TN    | S1         | E            | E, XN          |
|                             | <i>Lampsilis abrupta</i>                | pink mucket                     | TN    | S2         | E            | E              |
|                             | <i>Lemiox rimosus</i>                   | birdwing pearlymussel           | AL    | S1         | SP           | E, XN          |
|                             | <i>Myotis grisescens</i>                | gray bat                        | TN    | S2         | E            | E              |
|                             | <i>Obovaria retusa</i>                  | ring pink                       | AL    | SH         | SP           | E, XN          |
|                             | <i>Obovaria subrotunda</i>              | round hickorynut                | AL    | S2         | PSM          | T              |
|                             | <i>Orconectes wrighti</i>               | Hardin crayfish                 | TN    | S2         | E            | UR             |
|                             | <i>Perimyotis subflavus</i>             | tricolored bat                  | TN    | S2S3       | T            | PE             |
|                             | <i>Plethobasus cicatricosus</i>         | white wartyback                 | TN    | S1         | E            | E, XN          |
|                             | <i>Plethobasus cooperianus</i>          | orange-foot pimpleback          | TN    | S1         | E            | E, XN          |
|                             | <i>Plethobasus cyphus</i>               | sheepnose                       | TN    | S2S3       | E            | E              |
|                             | <i>Pleurobema clava</i>                 | clubshell                       | TN    | SH         | E            | E, XN          |
|                             | <i>Pleurobema oviforme</i>              | Tennessee clubshell             | AL    | S1         | PSM          | PE             |
|                             | <i>Pleurobema plenum</i>                | rough pigtoe                    | TN    | S1         | E            | E, XN          |
|                             | <i>Pleurobema rubrum</i>                | pyramid pigtoe                  | AL    | S1         | SP           | PT             |
|                             | <i>Pleuonaia dolabelloides</i>          | slabside pearlymussel           | AL    | S1         | SP           | E              |
|                             | <i>Ptychobranchus subtentum</i>         | fluted kidneyshell              | AL    | SX         | SP           | E              |
|                             | <i>Quadrula cylindrica cylindrica</i>   | smooth rabbitsfoot              | AL    | S1         | SP           | T              |
|                             | <i>Quadrula intermedia</i>              | Cumberland monkeyface           | AL    | SX         | SP           | E, XN          |
|                             | <i>Toxolasma cylindrellus</i>           | pale lilliput                   | AL    | S1         | SP           | E              |



| Facility                | Scientific Name                 | Common Name               | State | State Rank | State Status | Federal Status |
|-------------------------|---------------------------------|---------------------------|-------|------------|--------------|----------------|
| <b>Raccoon Mountain</b> |                                 |                           |       |            |              |                |
|                         | <i>Haliaeetus leucocephalus</i> | bald eagle                | TN    | -          | D            | DL             |
|                         | <i>Isotria medeoloides</i>      | small whorled pogonia     | TN    | S1         | E            | T              |
|                         | <i>Lampsilis abrupta</i>        | pink mucket               | TN    | S2         | E            | E              |
|                         | <i>Myotis grisescens</i>        | gray bat                  | TN    | S2         | E            | E              |
|                         | <i>Myotis septentrionalis</i>   | northern long-eared bat   | TN    | S1S2       | T            | E              |
|                         | <i>Percina tanasi</i>           | snail darter              | TN    | S2S3       | T            | DL             |
|                         | <i>Platanthera integrilabia</i> | white fringeless orchid   | TN    | S2S3       | E            | T              |
|                         | <i>Plethobasus cooperianus</i>  | orange-foot pimpleback    | TN    | S1         | E            | E, XN          |
|                         | <i>Pleurobema plenum</i>        | rough pigtoe              | TN    | S1         | E            | E, XN          |
|                         | <i>Scutellaria montana</i>      | large-flowered skullcap   | TN    | S4         | T            | T              |
| <b>Sequoyah</b>         |                                 |                           |       |            |              |                |
|                         | <i>Chrosomus saylori</i>        | laurel dace               | TN    | S1         | E            | E              |
|                         | <i>Cyprogenia stegaria</i>      | fanshell                  | TN    | S1         | E            | E, XN          |
|                         | <i>Dromus dromas</i>            | dromedary pearlymussel    | TN    | S1         | E            | E, XN          |
|                         | <i>Fusconaia cor</i>            | shiny pigtoe pearlymussel | TN    | S1         | E            | E, XN          |
|                         | <i>Haliaeetus leucocephalus</i> | bald eagle                | TN    | -          | D            | DL             |
|                         | <i>Lampsilis abrupta</i>        | pink mucket               | TN    | S2         | E            | E              |
|                         | <i>Myotis grisescens</i>        | gray bat                  | TN    | S2         | E            | E              |
|                         | <i>Myotis lucifugus</i>         | little brown bat          | TN    | S3         | T            | UR             |
|                         | <i>Myotis septentrionalis</i>   | northern long-eared bat   | TN    | S1S2       | T            | E              |
|                         | <i>Myotis sodalis</i>           | Indiana bat               | TN    | S1         | E            | E              |
|                         | <i>Percina tanasi</i>           | snail darter              | TN    | S2S3       | T            | DL             |
|                         | <i>Perimyotis subflavus</i>     | tricolored bat            | TN    | S2S3       | T            | PE             |
|                         | <i>Plethobasus cooperianus</i>  | orange-foot pimpleback    | TN    | S1         | E            | E, XN          |
|                         | <i>Plethobasus cyphus</i>       | sheepnose                 | TN    | S2S3       | E            | E              |
|                         | <i>Pleurobema plenum</i>        | rough pigtoe              | TN    | S1         | E            | E, XN          |
|                         | <i>Scutellaria montana</i>      | large-flowered skullcap   | TN    | S4         | T            | T              |
|                         | <i>Vermivora chrysoptera</i>    | golden-winged warbler     | TN    | S3B        | T            | UR             |

| Facility             | Scientific Name                       | Common Name             | State | State Rank    | State Status | Federal Status |
|----------------------|---------------------------------------|-------------------------|-------|---------------|--------------|----------------|
| <b>Shawnee</b>       |                                       |                         |       |               |              |                |
|                      | <i>Haliaeetus leucocephalus</i>       | bald eagle              | KY    | S3B,S3S<br>4N | S            | DL             |
|                      | <i>Lampsilis abrupta</i>              | pink mucket             | KY    | S1            | E            | E              |
|                      | <i>Myotis lucifugus</i>               | little brown bat        | KY    | -             | -            | UR             |
|                      | <i>Myotis septentrionalis</i>         | northern long-eared bat | KY    | S1            | E            | E              |
|                      | <i>Myotis sodalis</i>                 | Indiana bat             | KY    | S1S2          | E            | E              |
|                      | <i>Perimyotis subflavus</i>           | tricolored bat          | KY    | S2            | T            | PE             |
|                      | <i>Plethobasus cooperianus</i>        | orange-foot pimpleback  | KY    | S1            | E            | E, XN          |
|                      | <i>Plethobasus cyphus</i>             | sheepnose               | KY    | S1            | E            | E              |
|                      | <i>Potamilus capax</i>                | fat pocketbook          | KY    | S2            | T            | E              |
|                      | <i>Quadrula cylindrica cylindrica</i> | smooth rabbitsfoot      | KY    | S2            | T            | T              |
|                      | <i>Sterna antillarum athalassos</i>   | interior least tern     | KY    | S1S2B         | E            | DL             |
|                      | <i>Vireo bellii</i>                   | Bell's vireo            | KY    | S2S3B         | S            | PS             |
| <b>S Holston Dam</b> |                                       |                         |       |               |              |                |
|                      | <i>Haliaeetus leucocephalus</i>       | bald eagle              | TN    | -             | D            | DL             |
|                      | <i>Laterallus jamaicensis</i>         | black rail              | VA    | S1B,S1N       | LE           | T              |
|                      | <i>Myotis grisescens</i>              | gray bat                | TN    | S2            | E            | E              |
|                      | <i>Myotis lucifugus</i>               | little brown bat        | TN    | S3            | T            | UR             |
|                      | <i>Myotis septentrionalis</i>         | northern long-eared bat | TN    | S1S2          | T            | E              |
|                      | <i>Percina williamsi</i>              | sickle darter           | TN    | S2            | T            | T              |
|                      | <i>Perimyotis subflavus</i>           | tricolored bat          | TN    | S2S3          | T            | PE             |
|                      | <i>Tsuga caroliniana</i>              | Carolina hemlock        | TN    | S3            | T            | UR             |
| <b>Tellico Dam</b>   |                                       |                         |       |               |              |                |
|                      | <i>Cryptobranchus alleganiensis</i>   | hellbender              | TN    | S3            | E            | PS             |
|                      | <i>Haliaeetus leucocephalus</i>       | bald eagle              | TN    | -             | D            | DL             |
|                      | <i>Lampsilis abrupta</i>              | pink mucket             | TN    | S2            | E            | E              |
|                      | <i>Myotis grisescens</i>              | gray bat                | TN    | S2            | E            | E              |
|                      | <i>Myotis lucifugus</i>               | little brown bat        | TN    | S3            | T            | UR             |
|                      | <i>Myotis septentrionalis</i>         | northern long-eared bat | TN    | S1S2          | T            | E              |
|                      | <i>Percina tanasi</i>                 | snail darter            | TN    | S2S3          | T            | DL             |
|                      | <i>Perimyotis subflavus</i>           | tricolored bat          | TN    | S2S3          | T            | PE             |
|                      | <i>Plethobasus cooperianus</i>        | orange-foot pimpleback  | TN    | S1            | E            | E, XN          |

| Facility                      | Scientific Name                       | Common Name             | State | State Rank | State Status | Federal Status |
|-------------------------------|---------------------------------------|-------------------------|-------|------------|--------------|----------------|
| <b>Tims Ford Dam</b>          |                                       |                         |       |            |              |                |
|                               | <i>Epioblasma brevidens</i>           | Cumberlandian combshell | TN    | S1         | E            | E, XN          |
|                               | <i>Etheostoma wapiti</i>              | boulder darter          | TN    | S1         | E            | E, XN          |
|                               | <i>Helianthus eggertii</i>            | Eggert's sunflower      | TN    | S3         | S            | DL             |
|                               | <i>Hemistena lata</i>                 | cracking pearlymussel   | TN    | S1         | E            | E, XN          |
|                               | <i>Myotis grisescens</i>              | gray bat                | TN    | S2         | E            | E              |
|                               | <i>Myotis lucifugus</i>               | little brown bat        | TN    | S3         | T            | UR             |
|                               | <i>Myotis septentrionalis</i>         | northern long-eared bat | TN    | S1S2       | T            | E              |
|                               | <i>Myotis sodalis</i>                 | Indiana bat             | TN    | S1         | E            | E              |
|                               | <i>Perimyotis subflavus</i>           | tricolored bat          | TN    | S2S3       | T            | PE             |
|                               | <i>Quadrula cylindrica cylindrica</i> | smooth rabbitsfoot      | TN    | S3         | T            | T              |
|                               | <i>Villosa fabalis</i>                | rayed bean              | TN    | S1         | E            | E              |
| <b>Vonore Battery Storage</b> |                                       |                         |       |            |              |                |
|                               | <i>Acipenser fulvescens</i>           | lake sturgeon           | TN    | S1         | E            | UR             |
|                               | <i>Haliaeetus leucocephalus</i>       | bald eagle              | TN    | -          | D            | DL             |
|                               | <i>Percina tanasi</i>                 | snail darter            | TN    | S2S3       | T            | DL             |
|                               | <i>Perimyotis subflavus</i>           | tricolored bat          | TN    | S2S3       | T            | PE             |
| <b>Watauga Dam</b>            |                                       |                         |       |            |              |                |
|                               | <i>Haliaeetus leucocephalus</i>       | bald eagle              | TN    | -          | D            | DL             |
|                               | <i>Isotria medeoloides</i>            | small whorled pogonia   | TN    | S1         | E            | T              |
|                               | <i>Minuartia godfreyi</i>             | Godfrey's stitchwort    | TN    | S1         | E            | UR             |
|                               | <i>Myotis grisescens</i>              | gray bat                | TN    | S2         | E            | E              |
|                               | <i>Myotis septentrionalis</i>         | northern long-eared bat | TN    | S1S2       | T            | E              |
|                               | <i>Perimyotis subflavus</i>           | tricolored bat          | TN    | S2S3       | T            | PE             |
|                               | <i>Tsuga caroliniana</i>              | Carolina hemlock        | TN    | S3         | T            | UR             |

| Facility                 | Scientific Name                     | Common Name               | State | State Rank | State Status | Federal Status |
|--------------------------|-------------------------------------|---------------------------|-------|------------|--------------|----------------|
| <b>Watts Bar Nuclear</b> |                                     |                           |       |            |              |                |
|                          | <i>Chrosomus saylori</i>            | laurel dace               | TN    | S1         | E            | E              |
|                          | <i>Cryptobranchus alleganiensis</i> | hellbender                | TN    | S3         | E            | PS             |
|                          | <i>Cyprogenia stegaria</i>          | fanshell                  | TN    | S1         | E            | E, XN          |
|                          | <i>Dromus dromas</i>                | dromedary pearlymussel    | TN    | S1         | E            | E, XN          |
|                          | <i>Fusconaia cor</i>                | shiny pigtoe pearlymussel | TN    | S1         | E            | E, XN          |
|                          | <i>Haliaeetus leucocephalus</i>     | bald eagle                | TN    | -          | D            | DL             |
|                          | <i>Lampsilis abrupta</i>            | pink mucket               | TN    | S2         | E            | E              |
|                          | <i>Myotis grisescens</i>            | gray bat                  | TN    | S2         | E            | E              |
|                          | <i>Myotis lucifugus</i>             | little brown bat          | TN    | S3         | T            | UR             |
|                          | <i>Myotis septentrionalis</i>       | northern long-eared bat   | TN    | S1S2       | T            | E              |
|                          | <i>Myotis sodalis</i>               | Indiana bat               | TN    | S1         | E            | E              |
|                          | <i>Percina tanasi</i>               | snail darter              | TN    | S2S3       | T            | DL             |
|                          | <i>Perimyotis subflavus</i>         | tricolored bat            | TN    | S2S3       | T            | PE             |
|                          | <i>Plethobasus cooperianus</i>      | orange-foot pimpleback    | TN    | S1         | E            | E, XN          |
|                          | <i>Plethobasus cyphus</i>           | sheepnose                 | TN    | S2S3       | E            | E              |
|                          | <i>Pleurobema oviforme</i>          | Tennessee clubshell       | TN    | S2S3       | -            | PE             |
|                          | <i>Pleurobema plenum</i>            | rough pigtoe              | TN    | S1         | E            | E, XN          |
|                          | <i>Pleurobema rubrum</i>            | pyramid pigtoe            | TN    | S1S2       | -            | PT             |
|                          | <i>Scutellaria montana</i>          | large-flowered skullcap   | TN    | S4         | T            | T              |
|                          | <i>Vermivora chrysoptera</i>        | golden-winged warbler     | TN    | S3B        | T            | UR             |

| Facility             | Scientific Name                     | Common Name               | State | State Rank | State Status | Federal Status |
|----------------------|-------------------------------------|---------------------------|-------|------------|--------------|----------------|
| <b>Watts Bar Dam</b> |                                     |                           |       |            |              |                |
|                      | <i>Acipenser fulvescens</i>         | lake sturgeon             | TN    | S1         | E            | UR             |
|                      | <i>Chrosomus saylori</i>            | laurel dace               | TN    | S1         | E            | E              |
|                      | <i>Cryptobranchus alleganiensis</i> | hellbender                | TN    | S3         | E            | PS             |
|                      | <i>Cyprogenia stegaria</i>          | fanshell                  | TN    | S1         | E            | E, XN          |
|                      | <i>Dromus dromas</i>                | dromedary pearlymussel    | TN    | S1         | E            | E, XN          |
|                      | <i>Fusconaia cor</i>                | shiny pigtoe pearlymussel | TN    | S1         | E            | E, XN          |
|                      | <i>Haliaeetus leucocephalus</i>     | bald eagle                | TN    | -          | D            | DL             |
|                      | <i>Lampsilis abrupta</i>            | pink mucket               | TN    | S2         | E            | E              |
|                      | <i>Myotis grisescens</i>            | gray bat                  | TN    | S2         | E            | E              |
|                      | <i>Myotis lucifugus</i>             | little brown bat          | TN    | S3         | T            | UR             |
|                      | <i>Myotis septentrionalis</i>       | northern long-eared bat   | TN    | S1S2       | T            | E              |
|                      | <i>Myotis sodalis</i>               | Indiana bat               | TN    | S1         | E            | E              |
|                      | <i>Percina tanasi</i>               | snail darter              | TN    | S2S3       | T            | DL             |
|                      | <i>Perimyotis subflavus</i>         | tricolored bat            | TN    | S2S3       | T            | PE             |
|                      | <i>Plethobasus cooperianus</i>      | orange-foot pimpleback    | TN    | S1         | E            | E, XN          |
|                      | <i>Plethobasus cyphus</i>           | sheepnose                 | TN    | S2S3       | E            | E              |
|                      | <i>Pleurobema plenum</i>            | rough pigtoe              | TN    | S1         | E            | E, XN          |
|                      | <i>Pleurobema rubrum</i>            | pyramid pigtoe            | TN    | S1S2       | -            | PT             |
|                      | <i>Scutellaria montana</i>          | large-flowered skullcap   | TN    | S4         | T            | T              |
|                      | <i>Vermivora chrysoptera</i>        | golden-winged warbler     | TN    | S3B        | T            | UR             |

| Facility           | Scientific Name                       | Common Name               | State | State Rank | State Status | Federal Status |
|--------------------|---------------------------------------|---------------------------|-------|------------|--------------|----------------|
| <b>Wheeler Dam</b> |                                       |                           |       |            |              |                |
|                    | <i>Cumberlandia monodonta</i>         | spectaclecase             | AL    | S1         | SP           | E              |
|                    | <i>Cyprogenia stegaria</i>            | fanshell                  | AL    | S1         | SP           | E, XN          |
|                    | <i>Epioblasma brevidens</i>           | Cumberlandian combshell   | AL    | S1         | SP           | E, XN          |
|                    | <i>Epioblasma capsaeformis</i>        | oyster mussel             | AL    | SX         | SP           | E, XN          |
|                    | <i>Epioblasma obliquata obliquata</i> | purple catspaw            | AL    | SX         | SP           | E, XN          |
|                    | <i>Epioblasma triquetra</i>           | snuffbox                  | AL    | S1         | PSM          | E              |
|                    | <i>Etheostoma tuscumbia</i>           | Tuscumbia darter          | AL    | S2         | SP           | UR             |
|                    | <i>Fusconaia cuneolus</i>             | fine-rayed pigtoe         | AL    | S1         | SP           | E, XN          |
|                    | <i>Fusconaia subrotunda</i>           | longsolid                 | AL    | S1         | PSM          | T              |
|                    | <i>Haliaeetus leucocephalus</i>       | bald eagle                | AL    | S4B        | SP           | DL             |
|                    | <i>Helianthus eggertii</i>            | Eggert's sunflower        | AL    | S3         | S            | DL             |
|                    | <i>Lampsilis abrupta</i>              | pink mucket               | AL    | S1         | SP           | E              |
|                    | <i>Leptodea leptodon</i>              | scaleshell                | AL    | SX         | SP           | E              |
|                    | <i>Macrochelys temminckii</i>         | alligator snapping turtle | AL    | S3         | SP           | PT             |
|                    | <i>Medionidus conradicus</i>          | Cumberland moccasinshell  | AL    | S1         | SP           | PE             |
|                    | <i>Myotis grisescens</i>              | gray bat                  | AL    | S2         | SP           | E              |
|                    | <i>Myotis septentrionalis</i>         | northern long-eared bat   | AL    | S2         | SP           | E              |
|                    | <i>Myotis sodalis</i>                 | Indiana bat               | AL    | S2         | SP           | E              |
|                    | <i>Obovaria retusa</i>                | ring pink                 | AL    | SH         | SP           | E, XN          |
|                    | <i>Obovaria subrotunda</i>            | round hickorynut          | AL    | S2         | PSM          | T              |
|                    | <i>Palaemonias alabamiae</i>          | Alabama blind cave shrimp | AL    | S1         | SP           | E              |
|                    | <i>Percina tanasi</i>                 | snail darter              | AL    | S1         | SP           | DL             |
|                    | <i>Plethobasus cicatricosus</i>       | white wartyback           | AL    | S1         | SP           | E, XN          |
|                    | <i>Plethobasus cooperianus</i>        | orange-foot pimpleback    | AL    | SX         | SP           | E, XN          |
|                    | <i>Plethobasus cyphus</i>             | sheepnose                 | AL    | S1         | SP           | E              |
|                    | <i>Pleurobema oviforme</i>            | Tennessee clubshell       | AL    | S1         | PSM          | PE             |
|                    | <i>Pleurobema plenum</i>              | rough pigtoe              | AL    | S1         | SP           | E, XN          |
|                    | <i>Pleuroaia barnesiana</i>           | Tennessee pigtoe          | AL    | S1         | PSM          | PE             |
|                    | <i>Pleuroaia dolabelloides</i>        | slabside pearlymussel     | AL    | S1         | SP           | E              |
|                    | <i>Ptychobranhus subtentum</i>        | fluted kidneyshell        | AL    | SX         | SP           | E              |
|                    | <i>Speoplatyrhinus poulsoni</i>       | Alabama cavefish          | AL    | S1         | SP           | E              |
| <b>Wilbur Dam</b>  |                                       |                           |       |            |              |                |
|                    | <i>Cryptobranchus alleganiensis</i>   | hellbender                | TN    | S3         | E            | PS             |
|                    | <i>Haliaeetus leucocephalus</i>       | bald eagle                | TN    | -          | D            | DL             |
|                    | <i>Minuartia godfreyi</i>             | Godfrey's stitchwort      | TN    | S1         | E            | UR             |
|                    | <i>Myotis septentrionalis</i>         | northern long-eared bat   | TN    | S1S2       | T            | E              |
|                    | <i>Tsuga caroliniana</i>              | Carolina hemlock          | TN    | S3         | T            | UR             |



| Facility          | Scientific Name                       | Common Name               | State | State Rank | State Status | Federal Status |
|-------------------|---------------------------------------|---------------------------|-------|------------|--------------|----------------|
| <b>Wilson Dam</b> |                                       |                           |       |            |              |                |
|                   | <i>Cumberlandia monodonta</i>         | spectaclecase             | AL    | S1         | SP           | E              |
|                   | <i>Cyprogenia stegaria</i>            | fanshell                  | AL    | S1         | SP           | E, XN          |
|                   | <i>Epioblasma brevidens</i>           | Cumberlandian combshell   | AL    | S1         | SP           | E, XN          |
|                   | <i>Epioblasma capsaeformis</i>        | oyster mussel             | AL    | SX         | SP           | E, XN          |
|                   | <i>Epioblasma obliquata obliquata</i> | purple catspaw            | AL    | SX         | SP           | E, XN          |
|                   | <i>Epioblasma triquetra</i>           | snuffbox                  | AL    | S1         | PSM          | E              |
|                   | <i>Fusconaia cuneolus</i>             | fine-rayed pigtoe         | AL    | S1         | SP           | E, XN          |
|                   | <i>Fusconaia subrotunda</i>           | longsolid                 | AL    | S1         | PSM          | T              |
|                   | <i>Haliaeetus leucocephalus</i>       | bald eagle                | AL    | S4B        | SP           | DL             |
|                   | <i>Hemistena lata</i>                 | cracking pearlymussel     | AL    | S1         | SP,P1        | E, XN          |
|                   | <i>Lampsilis abrupta</i>              | pink mucket               | AL    | S1         | SP           | E              |
|                   | <i>Lemiox rimosus</i>                 | birdwing pearlymussel     | AL    | S1         | SP           | E, XN          |
|                   | <i>Leptodea leptodon</i>              | scaleshell                | AL    | SX         | SP           | E              |
|                   | <i>Macrochelys temminckii</i>         | alligator snapping turtle | AL    | S3         | SP           | PT             |
|                   | <i>Medionidus conradicus</i>          | Cumberland moccasinshell  | AL    | S1         | SP           | PE             |
|                   | <i>Myotis grisescens</i>              | gray bat                  | AL    | S2         | SP           | E              |
|                   | <i>Myotis septentrionalis</i>         | northern long-eared bat   | AL    | S2         | SP           | E              |
|                   | <i>Myotis sodalis</i>                 | Indiana bat               | AL    | S2         | SP           | E              |
|                   | <i>Obovaria retusa</i>                | ring pink                 | AL    | SH         | SP           | E, XN          |
|                   | <i>Obovaria subrotunda</i>            | round hickorynut          | AL    | S2         | PSM          | T              |
|                   | <i>Palaemonias alabamiae</i>          | Alabama blind cave shrimp | AL    | S1         | SP           | E              |
|                   | <i>Percina tanasi</i>                 | snail darter              | AL    | S1         | SP           | DL             |
|                   | <i>Plethobasus cicatricosus</i>       | white wartyback           | AL    | S1         | SP           | E, XN          |
|                   | <i>Plethobasus cooperianus</i>        | orange-foot pimpleback    | AL    | SX         | SP           | E, XN          |
|                   | <i>Plethobasus cyphus</i>             | sheepnose                 | AL    | S1         | SP           | E              |
|                   | <i>Pleurobema clava</i>               | clubshell                 | AL    | SX         | SP           | E, XN          |
|                   | <i>Pleurobema oviforme</i>            | Tennessee clubshell       | AL    | S1         | PSM          | PE             |
|                   | <i>Pleurobema plenum</i>              | rough pigtoe              | AL    | S1         | SP           | E, XN          |
|                   | <i>Pleurobema rubrum</i>              | pyramid pigtoe            | AL    | S1         | SP           | PT             |
|                   | <i>Pleurocera corpulenta</i>          | corpulent hornsnail       | AL    | S1         | -            | UR             |
|                   | <i>Pleurocera curta</i>               | shortspire hornsnail      | AL    | S1S2       | -            | UR             |
|                   | <i>Pleuonaia barnesiana</i>           | Tennessee pigtoe          | AL    | S1         | PSM          | PE             |
|                   | <i>Pleuonaia dolabelloides</i>        | slabside pearlymussel     | AL    | S1         | SP           | E              |
|                   | <i>Ptychobranchus subtentum</i>       | fluted kidneyshell        | AL    | SX         | SP           | E              |
|                   | <i>Quadrula cylindrica cylindrica</i> | smooth rabbitsfoot        | AL    | S1         | SP           | T              |
|                   | <i>Speoplatyrhinus poulsoni</i>       | Alabama cavefish          | AL    | S1         | SP           | E              |
|                   | <i>Villosa fabalis</i>                | rayed bean                | AL    | SX         | -            | E              |

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# B

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## Appendix B – Socioeconomics

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## Appendix B - Socioeconomics

### B.1 Counties within the TVA PSA

| State          | County                                                                                                                                                                                           |                                                                                                                                                                              |                                                                                                                                                                                     |
|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Alabama        | Blount County<br>Cherokee County<br>Colbert County<br>Cullman County<br>DeKalb County                                                                                                            | Etowah County<br>Franklin County<br>Jackson County<br>Lauderdale County<br>Lawrence County                                                                                   | Limestone County<br>Madison County<br>Marshall County<br>Morgan County<br>Winston County                                                                                            |
| Georgia        | Catoosa County<br>Chattooga County<br>Dade County<br>Fannin County                                                                                                                               | Gilmer County<br>Gordon County<br>Murray County<br>Townsend County                                                                                                           | Union County<br>Walker County<br>Whitfield County                                                                                                                                   |
| Kentucky       | Allen County<br>Butler County<br>Calloway County<br>Carlisle County<br>Christian County<br>Cumberland County<br>Edmonson County                                                                  | Fulton County<br>Graves County<br>Grayson County<br>Hickman County<br>Livingston County<br>Logan County<br>Lyon County                                                       | Marshall County<br>Monroe County<br>Simpson County<br>Todd County<br>Trigg County<br>Warren County                                                                                  |
| Mississippi    | Alcorn County<br>Attala County<br>Benton County<br>Calhoun County<br>Chickasaw County<br>Choctaw County<br>Clay County<br>De Soto County<br>Itawamba County<br>Kemper County<br>Lafayette County | Leake County<br>Lee County<br>Lowndes County<br>Marshall County<br>Monroe County<br>Neshoba County<br>Noxubee County<br>Oktibbeha County<br>Panola County<br>Pontotoc County | Prentiss County<br>Scott County<br>Tallahatchie County<br>Tate County<br>Tippah County<br>Tishomingo County<br>Union County<br>Webster County<br>Winston County<br>Yalobusha County |
| North Carolina | Avery County<br>Cherokee County                                                                                                                                                                  | Clay County<br>Watauga County                                                                                                                                                |                                                                                                                                                                                     |

| State                                       | County            |                   |                   |
|---------------------------------------------|-------------------|-------------------|-------------------|
| Tennessee                                   | Anderson County   | Hamilton County   | Morgan County     |
|                                             | Bedford County    | Hancock County    | Obion County      |
|                                             | Benton County     | Hardeman County   | Overton County    |
|                                             | Bledsoe County    | Hardin County     | Perry County      |
|                                             | Blount County     | Hawkins County    | Pickett County    |
|                                             | Bradley County    | Haywood County    | Polk County       |
|                                             | Campbell County   | Henderson County  | Putnam County     |
|                                             | Cannon County     | Henry County      | Rhea County       |
|                                             | Carroll County    | Hickman County    | Roane County      |
|                                             | Carter County     | Houston County    | Robertson County  |
|                                             | Cheatham County   | Humphreys County  | Rutherford County |
|                                             | Chester County    | Jackson County    | Scott County      |
|                                             | Claiborne County  | Jefferson County  | Sequatchie County |
|                                             | Clay County       | Johnson County    | Sevier County     |
|                                             | Cocke County      | Knox County       | Shelby County     |
|                                             | Coffee County     | Lake County       | Smith County      |
|                                             | Crockett County   | Lauderdale County | Stewart County    |
|                                             | Cumberland County | Lawrence County   | Sullivan County   |
|                                             | Davidson County   | Lewis County      | Sumner County     |
|                                             | Decatur County    | Lincoln County    | Tipton County     |
|                                             | DeKalb County     | Loudon County     | Trousdale County  |
|                                             | Dickson County    | McMinn County     | Unicoi County     |
|                                             | Dyer County       | McNairy County    | Union County      |
|                                             | Fayette County    | Macon County      | Van Buren County  |
|                                             | Fentress County   | Madison County    | Warren County     |
|                                             | Franklin County   | Marion County     | Washington County |
|                                             | Gibson County     | Marshall County   | Wayne County      |
|                                             | Giles County      | Maury County      | Weakley County    |
|                                             | Grainger County   | Meigs County      | White County      |
|                                             | Greene County     | Monroe County     | Williamson County |
|                                             | Grundy County     | Montgomery County | Wilson County     |
|                                             | Hamblen County    | Moore County      |                   |
| Virginia Counties and<br>Independent Cities | Lee County        | Washington County | Bristol City      |
|                                             | Scott County      | Wise County       | Norton City       |

## B.2 Limited-Income Counties in the TVA PSA

| Geography                      | Population 16 years and Over | Per Capita Income (\$) | Poverty (%) |
|--------------------------------|------------------------------|------------------------|-------------|
| Lawrence County, Alabama       | 26,784                       | 29,486                 | 15.8        |
| Colbert County, Alabama        | 46,692                       | 30,724                 | 15.9        |
| Etowah County, Alabama         | 83,569                       | 28,479                 | 15.9        |
| Franklin County, Alabama       | 24,985                       | 24,874                 | 16.6        |
| Marshall County, Alabama       | 75,849                       | 29,509                 | 16.6        |
| Winston County, Alabama        | 19,441                       | 26,933                 | 18.2        |
| Jackson County, Alabama        | 43,027                       | 27,695                 | 18.6        |
| DeKalb County, Alabama         | 56,883                       | 24,915                 | 20.2        |
| Gilmer County, Georgia         | 26,144                       | 34,412                 | 14.8        |
| Towns County, Georgia          | 11,180                       | 33,443                 | 15.3        |
| Chattooga County, Georgia      | 19,821                       | 21,576                 | 19.9        |
| Logan County, Kentucky         | 21,629                       | 27,741                 | 15.7        |
| Muhlenberg County, Kentucky    | 25,111                       | 31,621                 | 16.3        |
| Allen County, Kentucky         | 16,412                       | 28,307                 | 16.5        |
| Christian County, Kentucky     | 54,414                       | 25,973                 | 16.7        |
| Hickman County, Kentucky       | 3,724                        | 38,895                 | 16.7        |
| Livingston County, Kentucky    | 7,432                        | 31,024                 | 16.8        |
| Edmonson County, Kentucky      | 10,186                       | 26,781                 | 17.0        |
| Warren County, Kentucky        | 107,619                      | 34,201                 | 17.2        |
| Trigg County, Kentucky         | 11,426                       | 30,172                 | 18.2        |
| Calloway County, Kentucky      | 31,421                       | 27,850                 | 18.7        |
| Butler County, Kentucky        | 9,872                        | 23,862                 | 19.8        |
| Graves County, Kentucky        | 28,886                       | 28,978                 | 19.8        |
| Carlisle County, Kentucky      | 3,790                        | 31,403                 | 20.1        |
| Monroe County, Kentucky        | 9,035                        | 26,549                 | 20.9        |
| Grayson County, Kentucky       | 20,959                       | 25,565                 | 21.1        |
| Todd County, Kentucky          | 9,432                        | 30,252                 | 21.1        |
| Fulton County, Kentucky        | 5,273                        | 19,960                 | 27.4        |
| Cumberland County, Kentucky    | 4,784                        | 22,668                 | 28.3        |
| Webster County, Mississippi    | 7,802                        | 27,836                 | 15.8        |
| Prentiss County, Mississippi   | 20,085                       | 27,979                 | 16.3        |
| Monroe County, Mississippi     | 27,302                       | 27,619                 | 16.7        |
| Pontotoc County, Mississippi   | 23,824                       | 26,359                 | 16.7        |
| Tate County, Mississippi       | 22,445                       | 28,306                 | 16.7        |
| Alcorn County, Mississippi     | 27,882                       | 27,320                 | 17.1        |
| Benton County, Mississippi     | 6,299                        | 24,690                 | 17.6        |
| Lowndes County, Mississippi    | 46,255                       | 29,750                 | 18.1        |
| Calhoun County, Mississippi    | 10,644                       | 24,192                 | 18.8        |
| Tippah County, Mississippi     | 17,150                       | 27,762                 | 18.9        |
| Choctaw County, Mississippi    | 6,615                        | 27,628                 | 19.1        |
| Tishomingo County, Mississippi | 15,268                       | 26,896                 | 19.2        |
| Marshall County, Mississippi   | 27,768                       | 27,680                 | 19.5        |
| Lafayette County, Mississippi  | 46,935                       | 32,536                 | 19.6        |
| Panola County, Mississippi     | 25,797                       | 25,822                 | 20.4        |
| Yalobusha County, Mississippi  | 10,171                       | 24,719                 | 20.5        |

| Geography                        | Population 16 years and Over | Per Capita Income (\$) | Poverty (%) |
|----------------------------------|------------------------------|------------------------|-------------|
| Leake County, Mississippi        | 17,041                       | 25,662                 | 21.0        |
| Scott County, Mississippi        | 21,373                       | 23,043                 | 21.9        |
| Kemper County, Mississippi       | 7,547                        | 22,046                 | 22.0        |
| Clay County, Mississippi         | 14,892                       | 24,702                 | 23.0        |
| Noxubee County, Mississippi      | 7,996                        | 19,804                 | 23.2        |
| Attala County, Mississippi       | 13,759                       | 27,625                 | 23.6        |
| Tallahatchie County, Mississippi | 10,281                       | 20,348                 | 25.7        |
| Winston County, Mississippi      | 14,208                       | 27,743                 | 26.0        |
| Chickasaw County, Mississippi    | 13,269                       | 21,968                 | 26.6        |
| Neshoba County, Mississippi      | 22,051                       | 23,538                 | 28.0        |
| Oktibbeha County, Mississippi    | 43,626                       | 28,221                 | 28.5        |
| Cherokee County, North Carolina  | 24,817                       | 28,752                 | 16.7        |
| Watauga County, North Carolina   | 48,773                       | 30,807                 | 24.9        |
| Smith County, Tennessee          | 16,117                       | 31,446                 | 14.9        |
| Cannon County, Tennessee         | 11,799                       | 30,234                 | 15.1        |
| Sullivan County, Tennessee       | 132,231                      | 33,934                 | 15.2        |
| Anderson County, Tennessee       | 62,800                       | 32,803                 | 15.4        |
| Meigs County, Tennessee          | 10,544                       | 26,843                 | 15.4        |
| Crockett County, Tennessee       | 10,987                       | 30,362                 | 15.6        |
| Greene County, Tennessee         | 58,501                       | 28,237                 | 15.6        |
| Marshall County, Tennessee       | 27,611                       | 32,225                 | 15.6        |
| Rhea County, Tennessee           | 26,860                       | 26,678                 | 15.7        |
| Washington County, Tennessee     | 111,727                      | 35,562                 | 15.7        |
| Chester County, Tennessee        | 14,082                       | 24,788                 | 15.8        |
| Union County, Tennessee          | 16,123                       | 28,174                 | 15.9        |
| Monroe County, Tennessee         | 38,029                       | 27,356                 | 16.0        |
| Hardeman County, Tennessee       | 21,321                       | 22,098                 | 16.1        |
| Lawrence County, Tennessee       | 34,372                       | 26,865                 | 16.1        |
| Obion County, Tennessee          | 24,703                       | 28,782                 | 16.1        |
| Dyer County, Tennessee           | 28,929                       | 37,415                 | 16.3        |
| Marion County, Tennessee         | 23,698                       | 29,314                 | 16.3        |
| Putnam County, Tennessee         | 65,684                       | 29,419                 | 16.3        |
| Carroll County, Tennessee        | 22,845                       | 26,818                 | 16.4        |
| Macon County, Tennessee          | 19,914                       | 24,979                 | 16.5        |
| McNairy County, Tennessee        | 21,082                       | 25,004                 | 16.7        |
| Unicoi County, Tennessee         | 14,956                       | 27,930                 | 16.7        |
| Warren County, Tennessee         | 32,671                       | 27,059                 | 16.8        |
| Coffee County, Tennessee         | 45,845                       | 29,277                 | 16.9        |
| Hawkins County, Tennessee        | 47,568                       | 28,648                 | 16.9        |
| Van Buren County, Tennessee      | 5,156                        | 24,099                 | 17.0        |
| Hamblen County, Tennessee        | 51,238                       | 27,845                 | 17.1        |
| White County, Tennessee          | 21,993                       | 26,213                 | 17.1        |
| Overton County, Tennessee        | 18,398                       | 29,556                 | 17.3        |
| Grainger County, Tennessee       | 19,744                       | 26,545                 | 17.6        |
| Benton County, Tennessee         | 13,164                       | 27,185                 | 18.0        |
| Henderson County, Tennessee      | 22,415                       | 25,873                 | 18.0        |
| Lauderdale County, Tennessee     | 20,161                       | 24,358                 | 18.0        |



| Geography                    | Population 16 years and Over | Per Capita Income (\$) | Poverty (%) |
|------------------------------|------------------------------|------------------------|-------------|
| Carter County, Tennessee     | 47,403                       | 28,321                 | 18.1        |
| Henry County, Tennessee      | 26,438                       | 28,098                 | 18.1        |
| Shelby County, Tennessee     | 721,643                      | 36,230                 | 18.1        |
| Grundy County, Tennessee     | 11,124                       | 25,075                 | 18.2        |
| Madison County, Tennessee    | 79,529                       | 31,380                 | 18.2        |
| Claiborne County, Tennessee  | 26,655                       | 25,408                 | 18.3        |
| Lewis County, Tennessee      | 10,232                       | 26,873                 | 18.9        |
| Weakley County, Tennessee    | 27,581                       | 26,820                 | 18.9        |
| Decatur County, Tennessee    | 9,438                        | 27,578                 | 19.2        |
| Campbell County, Tennessee   | 32,109                       | 26,791                 | 19.4        |
| Hardin County, Tennessee     | 22,102                       | 26,068                 | 19.4        |
| Wayne County, Tennessee      | 13,806                       | 26,538                 | 19.6        |
| Jackson County, Tennessee    | 9,973                        | 25,534                 | 19.7        |
| Cocke County, Tennessee      | 29,708                       | 25,864                 | 20.1        |
| DeKalb County, Tennessee     | 16,416                       | 27,684                 | 20.2        |
| Fentress County, Tennessee   | 15,403                       | 24,595                 | 20.2        |
| Morgan County, Tennessee     | 17,542                       | 27,320                 | 20.9        |
| Pickett County, Tennessee    | 4,201                        | 27,259                 | 21.0        |
| Johnson County, Tennessee    | 15,396                       | 26,627                 | 21.6        |
| Haywood County, Tennessee    | 14,396                       | 26,031                 | 21.9        |
| Clay County, Tennessee       | 6,208                        | 22,931                 | 22.3        |
| Sequatchie County, Tennessee | 13,212                       | 25,954                 | 22.3        |
| Scott County, Tennessee      | 17,387                       | 22,273                 | 25.7        |
| Bledsoe County, Tennessee    | 12,644                       | 24,241                 | 26.0        |
| Lake County, Tennessee       | 6,018                        | 19,695                 | 27.9        |
| Hancock County, Tennessee    | 5,417                        | 24,120                 | 32.3        |
| Bristol city, Virginia       | 13,904                       | 30,419                 | 17.0        |
| Scott County, Virginia       | 18,094                       | 26,681                 | 17.0        |
| Wise County, Virginia        | 30,055                       | 23,702                 | 19.9        |
| Lee County, Virginia         | 18,676                       | 23,257                 | 26.0        |
| Norton city, Virginia        | 3,138                        | 27,666                 | 29.1        |

Source: USCB 2023f

### B.3 Low-Income Census Tracts in the TVA PSA

| Geography                                       | Population<br>16 Years and Over | Per Capita<br>Income (\$) | Poverty<br>(%) |
|-------------------------------------------------|---------------------------------|---------------------------|----------------|
| Census Tract 207.05; Colbert County; Alabama    | 913                             | 26,663                    | 14.8           |
| Census Tract 9792.01; Lawrence County; Alabama  | 1,464                           | 25,628                    | 14.9           |
| Census Tract 307.02; Marshall County; Alabama   | 3,175                           | 38,894                    | 14.9           |
| Census Tract 9558.01; Cherokee County; Alabama  | 1,852                           | 23,869                    | 15.0           |
| Census Tract 104.01; Etowah County; Alabama     | 3,232                           | 21,477                    | 15.0           |
| Census Tract 9506.01; Jackson County; Alabama   | 3,195                           | 23,851                    | 15.0           |
| Census Tract 310.01; Marshall County; Alabama   | 2,443                           | 22,629                    | 15.0           |
| Census Tract 208.02; Colbert County; Alabama    | 2,850                           | 28,554                    | 15.1           |
| Census Tract 9649.01; Cullman County; Alabama   | 3,035                           | 37,422                    | 15.2           |
| Census Tract 9793; Lawrence County; Alabama     | 3,335                           | 35,025                    | 15.3           |
| Census Tract 14.04; Madison County; Alabama     | 3,194                           | 36,939                    | 15.4           |
| Census Tract 112.02; Madison County; Alabama    | 4,545                           | 52,382                    | 15.4           |
| Census Tract 57.01; Morgan County; Alabama      | 1,697                           | 29,545                    | 15.4           |
| Census Tract 57.03; Morgan County; Alabama      | 2,578                           | 31,875                    | 15.5           |
| Census Tract 31; Madison County; Alabama        | 5,078                           | 49,399                    | 15.6           |
| Census Tract 110.02; Etowah County; Alabama     | 3,855                           | 22,382                    | 15.7           |
| Census Tract 505.02; Blount County; Alabama     | 2,911                           | 32,678                    | 15.8           |
| Census Tract 304.01; Marshall County; Alabama   | 3,757                           | 31,212                    | 15.8           |
| Census Tract 9561.02; Cherokee County; Alabama  | 1,918                           | 24,271                    | 15.9           |
| Census Tract 9657; Winston County; Alabama      | 3,163                           | 29,720                    | 15.9           |
| Census Tract 9729; Franklin County; Alabama     | 3,113                           | 24,515                    | 16.1           |
| Census Tract 5.02; Madison County; Alabama      | 1,627                           | 31,700                    | 16.2           |
| Census Tract 9642.02; Cullman County; Alabama   | 2,742                           | 24,585                    | 16.6           |
| Census Tract 17; Etowah County; Alabama         | 1,124                           | 26,497                    | 16.8           |
| Census Tract 111; Etowah County; Alabama        | 3,985                           | 24,836                    | 16.9           |
| Census Tract 104.05; Madison County; Alabama    | 3,181                           | 45,558                    | 16.9           |
| Census Tract 9558.02; Cherokee County; Alabama  | 2,318                           | 31,300                    | 17.0           |
| Census Tract 9602; DeKalb County; Alabama       | 2,666                           | 24,020                    | 17.1           |
| Census Tract 7.02; Madison County; Alabama      | 2,395                           | 30,742                    | 17.1           |
| Census Tract 109.01; Lauderdale County; Alabama | 3,090                           | 30,844                    | 17.3           |
| Census Tract 9641; Cullman County; Alabama      | 5,145                           | 28,445                    | 17.4           |
| Census Tract 9; Etowah County; Alabama          | 2,111                           | 21,511                    | 17.6           |
| Census Tract 308.01; Marshall County; Alabama   | 3,815                           | 31,889                    | 17.6           |
| Census Tract 501.07; Blount County; Alabama     | 2,042                           | 23,043                    | 17.7           |
| Census Tract 9606.02; DeKalb County; Alabama    | 3,931                           | 25,305                    | 17.8           |
| Census Tract 201.04; Limestone County; Alabama  | 2,743                           | 27,553                    | 17.8           |
| Census Tract 9504; Jackson County; Alabama      | 1,806                           | 38,913                    | 17.9           |
| Census Tract 206; Limestone County; Alabama     | 3,880                           | 22,903                    | 17.9           |
| Census Tract 9510; Jackson County; Alabama      | 3,569                           | 28,695                    | 18.0           |
| Census Tract 14.03; Madison County; Alabama     | 2,066                           | 40,351                    | 18.1           |
| Census Tract 103; Etowah County; Alabama        | 2,326                           | 23,128                    | 18.2           |
| Census Tract 6.02; Madison County; Alabama      | 1,798                           | 30,976                    | 18.5           |
| Census Tract 9792.02; Lawrence County; Alabama  | 1,870                           | 25,583                    | 18.6           |
| Census Tract 204.04; Limestone County; Alabama  | 2,513                           | 58,030                    | 18.6           |
| Census Tract 25.02; Madison County; Alabama     | 2,852                           | 22,233                    | 18.7           |

| Geography                                      | Population<br>16 Years and Over | Per Capita<br>Income (\$) | Poverty<br>(%) |
|------------------------------------------------|---------------------------------|---------------------------|----------------|
| Census Tract 9605; DeKalb County; Alabama      | 5,303                           | 23,222                    | 18.8           |
| Census Tract 308.04; Marshall County; Alabama  | 3,793                           | 17,610                    | 18.8           |
| Census Tract 53.05; Morgan County; Alabama     | 4,650                           | 27,137                    | 18.9           |
| Census Tract 203; Limestone County; Alabama    | 2,675                           | 34,130                    | 19.2           |
| Census Tract 501.03; Blount County; Alabama    | 1,614                           | 29,396                    | 19.3           |
| Census Tract 9611; DeKalb County; Alabama      | 2,602                           | 23,331                    | 19.3           |
| Census Tract 106; Lauderdale County; Alabama   | 2,183                           | 25,518                    | 19.3           |
| Census Tract 205; Limestone County; Alabama    | 2,384                           | 24,036                    | 19.3           |
| Census Tract 9655.02; Winston County; Alabama  | 2,981                           | 31,126                    | 19.3           |
| Census Tract 503.02; Blount County; Alabama    | 2,130                           | 24,425                    | 19.4           |
| Census Tract 307.01; Marshall County; Alabama  | 2,775                           | 31,594                    | 19.4           |
| Census Tract 202; Colbert County; Alabama      | 1,478                           | 22,512                    | 19.5           |
| Census Tract 9733; Franklin County; Alabama    | 2,610                           | 24,243                    | 19.5           |
| Census Tract 9503.01; Jackson County; Alabama  | 2,132                           | 25,326                    | 19.7           |
| Census Tract 15; Madison County; Alabama       | 5,425                           | 20,873                    | 20.1           |
| Census Tract 51.09; Morgan County; Alabama     | 3,636                           | 23,010                    | 20.1           |
| Census Tract 9730; Franklin County; Alabama    | 3,922                           | 19,369                    | 20.2           |
| Census Tract 6.01; Madison County; Alabama     | 1,097                           | 29,506                    | 20.4           |
| Census Tract 501.05; Blount County; Alabama    | 4,113                           | 32,880                    | 20.5           |
| Census Tract 9; Morgan County; Alabama         | 4,495                           | 22,269                    | 20.5           |
| Census Tract 308.03; Marshall County; Alabama  | 2,005                           | 23,045                    | 20.6           |
| Census Tract 106.25; Madison County; Alabama   | 4,405                           | 22,280                    | 20.8           |
| Census Tract 9655.03; Winston County; Alabama  | 2,451                           | 27,346                    | 20.9           |
| Census Tract 9557.01; Cherokee County; Alabama | 2,547                           | 25,478                    | 21.2           |
| Census Tract 9607.02; DeKalb County; Alabama   | 1,236                           | 25,111                    | 21.2           |
| Census Tract 107; Etowah County; Alabama       | 2,970                           | 26,449                    | 21.2           |
| Census Tract 208.01; Colbert County; Alabama   | 3,744                           | 33,718                    | 21.3           |
| Census Tract 211.01; Limestone County; Alabama | 3,040                           | 28,553                    | 21.4           |
| Census Tract 8; Morgan County; Alabama         | 2,174                           | 23,590                    | 21.4           |
| Census Tract 205; Colbert County; Alabama      | 4,126                           | 26,362                    | 21.7           |
| Census Tract 6; Etowah County; Alabama         | 1,785                           | 17,336                    | 21.7           |
| Census Tract 9614; DeKalb County; Alabama      | 3,039                           | 31,060                    | 21.8           |
| Census Tract 9603.03; DeKalb County; Alabama   | 3,604                           | 26,475                    | 22.1           |
| Census Tract 302.04; Marshall County; Alabama  | 1,432                           | 30,844                    | 22.2           |
| Census Tract 306.02; Marshall County; Alabama  | 3,578                           | 28,834                    | 22.5           |
| Census Tract 52.02; Morgan County; Alabama     | 3,793                           | 27,008                    | 22.5           |
| Census Tract 507.02; Blount County; Alabama    | 2,259                           | 24,848                    | 22.6           |
| Census Tract 9653; Cullman County; Alabama     | 3,729                           | 25,619                    | 23.0           |
| Census Tract 102; Lauderdale County; Alabama   | 1,777                           | 28,096                    | 23.0           |
| Census Tract 9608; DeKalb County; Alabama      | 3,532                           | 19,388                    | 23.1           |
| Census Tract 9656.02; Winston County; Alabama  | 2,587                           | 22,144                    | 23.1           |
| Census Tract 9609; DeKalb County; Alabama      | 3,227                           | 23,645                    | 23.2           |
| Census Tract 305.02; Marshall County; Alabama  | 3,911                           | 31,618                    | 23.2           |
| Census Tract 110; Lauderdale County; Alabama   | 3,670                           | 26,385                    | 23.3           |
| Census Tract 312; Marshall County; Alabama     | 4,262                           | 24,146                    | 23.3           |
| Census Tract 9655.01; Winston County; Alabama  | 1,525                           | 23,570                    | 23.4           |
| Census Tract 108; Lauderdale County; Alabama   | 2,623                           | 18,842                    | 23.6           |

| Geography                                       | Population<br>16 Years and Over | Per Capita<br>Income (\$) | Poverty<br>(%) |
|-------------------------------------------------|---------------------------------|---------------------------|----------------|
| Census Tract 311; Marshall County; Alabama      | 3,634                           | 22,889                    | 23.6           |
| Census Tract 309.03; Marshall County; Alabama   | 3,684                           | 23,337                    | 24.1           |
| Census Tract 9737.01; Franklin County; Alabama  | 1,014                           | 22,960                    | 24.2           |
| Census Tract 9795.02; Lawrence County; Alabama  | 3,034                           | 29,820                    | 24.2           |
| Census Tract 9734; Franklin County; Alabama     | 1,945                           | 23,618                    | 24.4           |
| Census Tract 9794; Lawrence County; Alabama     | 3,749                           | 24,501                    | 24.5           |
| Census Tract 301.01; Marshall County; Alabama   | 1,665                           | 20,613                    | 24.5           |
| Census Tract 201; Colbert County; Alabama       | 2,960                           | 30,897                    | 24.7           |
| Census Tract 108; Etowah County; Alabama        | 2,315                           | 34,421                    | 24.9           |
| Census Tract 210; Colbert County; Alabama       | 3,059                           | 29,298                    | 25.3           |
| Census Tract 9659; Winston County; Alabama      | 1,866                           | 21,463                    | 25.4           |
| Census Tract 5.01; Madison County; Alabama      | 1,596                           | 21,242                    | 25.5           |
| Census Tract 310.02; Marshall County; Alabama   | 2,601                           | 18,983                    | 25.7           |
| Census Tract 1; Morgan County; Alabama          | 3,559                           | 22,400                    | 25.9           |
| Census Tract 9507; Jackson County; Alabama      | 3,658                           | 32,148                    | 26.0           |
| Census Tract 9508; Jackson County; Alabama      | 3,458                           | 27,246                    | 26.1           |
| Census Tract 9502; Jackson County; Alabama      | 2,822                           | 28,990                    | 26.2           |
| Census Tract 9606.01; DeKalb County; Alabama    | 996                             | 26,988                    | 26.3           |
| Census Tract 9650.02; Cullman County; Alabama   | 3,592                           | 29,958                    | 26.6           |
| Census Tract 501.06; Blount County; Alabama     | 2,322                           | 22,148                    | 27.3           |
| Census Tract 107; Lauderdale County; Alabama    | 1,028                           | 14,658                    | 27.4           |
| Census Tract 9607.03; DeKalb County; Alabama    | 3,539                           | 22,581                    | 27.5           |
| Census Tract 109.02; Lauderdale County; Alabama | 3,395                           | 29,019                    | 27.7           |
| Census Tract 9501.01; Jackson County; Alabama   | 2,389                           | 21,901                    | 28.1           |
| Census Tract 9654.01; Cullman County; Alabama   | 2,793                           | 20,158                    | 28.5           |
| Census Tract 24; Madison County; Alabama        | 2,788                           | 21,210                    | 28.5           |
| Census Tract 56.02; Morgan County; Alabama      | 1,804                           | 29,076                    | 28.6           |
| Census Tract 3.01; Madison County; Alabama      | 3,069                           | 21,318                    | 28.9           |
| Census Tract 12; Etowah County; Alabama         | 2,163                           | 26,936                    | 29.5           |
| Census Tract 23; Madison County; Alabama        | 4,404                           | 20,903                    | 29.5           |
| Census Tract 9503.02; Jackson County; Alabama   | 2,520                           | 22,071                    | 29.9           |
| Census Tract 5; Etowah County; Alabama          | 1,424                           | 20,902                    | 31.0           |
| Census Tract 112; Etowah County; Alabama        | 2,201                           | 25,029                    | 31.1           |
| Census Tract 54.05; Morgan County; Alabama      | 4,054                           | 27,138                    | 31.7           |
| Census Tract 2; Etowah County; Alabama          | 2,537                           | 18,933                    | 32.0           |
| Census Tract 9736; Franklin County; Alabama     | 1,081                           | 21,089                    | 32.2           |
| Census Tract 104; Lauderdale County; Alabama    | 2,921                           | 24,694                    | 32.8           |
| Census Tract 7.01; Madison County; Alabama      | 2,294                           | 23,670                    | 33.8           |
| Census Tract 22; Madison County; Alabama        | 1,588                           | 19,803                    | 34.1           |
| Census Tract 9506.02; Jackson County; Alabama   | 1,671                           | 24,884                    | 34.4           |
| Census Tract 9613; DeKalb County; Alabama       | 4,158                           | 20,787                    | 35.2           |
| Census Tract 13.01; Madison County; Alabama     | 3,080                           | 18,711                    | 35.5           |
| Census Tract 7; Morgan County; Alabama          | 2,935                           | 16,115                    | 35.5           |
| Census Tract 2.03; Madison County; Alabama      | 5,173                           | 10,815                    | 35.6           |
| Census Tract 3.02; Madison County; Alabama      | 3,167                           | 14,035                    | 35.9           |
| Census Tract 207; Limestone County; Alabama     | 1,914                           | 28,442                    | 36.7           |
| Census Tract 8; Etowah County; Alabama          | 864                             | 15,001                    | 36.9           |

| Geography                                      | Population<br>16 Years and Over | Per Capita<br>Income (\$) | Poverty<br>(%) |
|------------------------------------------------|---------------------------------|---------------------------|----------------|
| Census Tract 9607.01; DeKalb County; Alabama   | 1,802                           | 18,173                    | 37.1           |
| Census Tract 25.01; Madison County; Alabama    | 2,149                           | 15,797                    | 38.9           |
| Census Tract 9601.01; DeKalb County; Alabama   | 1,414                           | 22,419                    | 39.0           |
| Census Tract 10; Etowah County; Alabama        | 858                             | 18,152                    | 39.3           |
| Census Tract 30; Madison County; Alabama       | 2,110                           | 16,823                    | 39.9           |
| Census Tract 13; Etowah County; Alabama        | 2,312                           | 21,427                    | 40.1           |
| Census Tract 203; Colbert County; Alabama      | 1,866                           | 21,696                    | 41.5           |
| Census Tract 21; Madison County; Alabama       | 1,878                           | 16,168                    | 41.5           |
| Census Tract 101; Lauderdale County; Alabama   | 2,007                           | 12,400                    | 41.9           |
| Census Tract 3; Etowah County; Alabama         | 1,750                           | 13,430                    | 42.0           |
| Census Tract 6; Morgan County; Alabama         | 1,987                           | 16,191                    | 43.4           |
| Census Tract 12; Madison County; Alabama       | 2,145                           | 13,548                    | 43.6           |
| Census Tract 7; Etowah County; Alabama         | 653                             | 10,940                    | 50.2           |
| Census Tract 103; Lauderdale County; Alabama   | 948                             | 15,330                    | 60.6           |
| Census Tract 9708.02; Gordon County; Georgia   | 1,632                           | 31,506                    | 14.8           |
| Census Tract 803.01; Gilmer County; Georgia    | 1,908                           | 30,347                    | 15.0           |
| Census Tract 15; Whitfield County; Georgia     | 5,187                           | 26,931                    | 15.0           |
| Census Tract 307.02; Catoosa County; Georgia   | 3,755                           | 27,878                    | 15.1           |
| Census Tract 11; Whitfield County; Georgia     | 3,693                           | 20,343                    | 15.2           |
| Census Tract 401.02; Dade County; Georgia      | 3,072                           | 23,792                    | 15.5           |
| Census Tract 2; Whitfield County; Georgia      | 3,783                           | 27,020                    | 15.5           |
| Census Tract 9702.01; Gordon County; Georgia   | 2,745                           | 35,677                    | 15.6           |
| Census Tract 104.01; Murray County; Georgia    | 2,034                           | 20,818                    | 15.6           |
| Census Tract 9603.02; Towns County; Georgia    | 2,023                           | 33,717                    | 15.6           |
| Census Tract 1.04; Union County; Georgia       | 2,195                           | 32,709                    | 16.2           |
| Census Tract 206.02; Walker County; Georgia    | 3,778                           | 22,778                    | 16.4           |
| Census Tract 208; Walker County; Georgia       | 2,347                           | 31,192                    | 16.5           |
| Census Tract 101; Chattooga County; Georgia    | 2,069                           | 25,825                    | 16.6           |
| Census Tract 9703.02; Gordon County; Georgia   | 4,014                           | 25,981                    | 16.6           |
| Census Tract 802; Gilmer County; Georgia       | 5,400                           | 35,078                    | 17.4           |
| Census Tract 104.02; Murray County; Georgia    | 2,198                           | 23,606                    | 17.4           |
| Census Tract 1.01; Whitfield County; Georgia   | 3,048                           | 29,350                    | 17.4           |
| Census Tract 9602; Towns County; Georgia       | 3,432                           | 32,940                    | 17.6           |
| Census Tract 9706.02; Gordon County; Georgia   | 2,855                           | 18,960                    | 17.8           |
| Census Tract 2.03; Union County; Georgia       | 1,833                           | 34,257                    | 18.1           |
| Census Tract 203.01; Walker County; Georgia    | 4,279                           | 25,834                    | 18.3           |
| Census Tract 9704; Gordon County; Georgia      | 4,922                           | 32,643                    | 18.4           |
| Census Tract 101; Murray County; Georgia       | 2,762                           | 28,902                    | 18.6           |
| Census Tract 805; Gilmer County; Georgia       | 3,530                           | 29,806                    | 18.7           |
| Census Tract 203.02; Walker County; Georgia    | 4,247                           | 24,384                    | 20.0           |
| Census Tract 105.01; Chattooga County; Georgia | 2,332                           | 11,259                    | 20.1           |
| Census Tract 1.01; Union County; Georgia       | 3,380                           | 39,100                    | 20.2           |
| Census Tract 201.01; Walker County; Georgia    | 3,076                           | 27,352                    | 20.3           |
| Census Tract 103; Chattooga County; Georgia    | 1,835                           | 24,975                    | 20.4           |
| Census Tract 9707; Gordon County; Georgia      | 3,920                           | 26,292                    | 20.5           |
| Census Tract 202; Walker County; Georgia       | 2,745                           | 26,910                    | 20.6           |
| Census Tract 103; Murray County; Georgia       | 3,586                           | 22,608                    | 21.0           |

| Geography                                         | Population<br>16 Years and Over | Per Capita<br>Income (\$) | Poverty<br>(%) |
|---------------------------------------------------|---------------------------------|---------------------------|----------------|
| Census Tract 9701.02; Gordon County; Georgia      | 1,704                           | 28,152                    | 21.1           |
| Census Tract 9705; Gordon County; Georgia         | 4,034                           | 31,695                    | 21.9           |
| Census Tract 803.02; Gilmer County; Georgia       | 3,172                           | 28,884                    | 22.5           |
| Census Tract 207.02; Walker County; Georgia       | 3,554                           | 15,438                    | 22.9           |
| Census Tract 3.01; Whitfield County; Georgia      | 2,940                           | 25,137                    | 22.9           |
| Census Tract 105.02; Chattooga County; Georgia    | 2,767                           | 21,390                    | 23.3           |
| Census Tract 804.01; Gilmer County; Georgia       | 2,328                           | 36,492                    | 23.5           |
| Census Tract 201.02; Walker County; Georgia       | 1,848                           | 21,297                    | 23.6           |
| Census Tract 207.01; Walker County; Georgia       | 2,133                           | 21,653                    | 24.1           |
| Census Tract 10; Whitfield County; Georgia        | 3,002                           | 19,329                    | 26.1           |
| Census Tract 5.02; Whitfield County; Georgia      | 5,865                           | 23,493                    | 26.3           |
| Census Tract 305.01; Catoosa County; Georgia      | 2,331                           | 24,280                    | 26.4           |
| Census Tract 4.01; Whitfield County; Georgia      | 5,200                           | 20,734                    | 27.2           |
| Census Tract 209.02; Walker County; Georgia       | 1,580                           | 24,655                    | 29.2           |
| Census Tract 104.02; Chattooga County; Georgia    | 2,066                           | 17,659                    | 30.3           |
| Census Tract 102.02; Chattooga County; Georgia    | 2,410                           | 17,999                    | 31.1           |
| Census Tract 9203; Edmonson County; Kentucky      | 1,157                           | 27,436                    | 14.8           |
| Census Tract 9602.02; Muhlenberg County; Kentucky | 2,600                           | 40,555                    | 14.9           |
| Census Tract 2002; Christian County; Kentucky     | 2,847                           | 26,201                    | 15.1           |
| Census Tract 9301; Monroe County; Kentucky        | 1,543                           | 31,215                    | 15.2           |
| Census Tract 9602; Logan County; Kentucky         | 2,990                           | 28,388                    | 15.3           |
| Census Tract 9704.01; Simpson County; Kentucky    | 3,728                           | 25,940                    | 15.3           |
| Census Tract 9206; Allen County; Kentucky         | 2,599                           | 25,197                    | 15.7           |
| Census Tract 108.05; Warren County; Kentucky      | 2,968                           | 37,866                    | 16.1           |
| Census Tract 117.02; Warren County; Kentucky      | 2,895                           | 24,805                    | 16.1           |
| Census Tract 9702.02; Trigg County; Kentucky      | 2,857                           | 31,126                    | 16.2           |
| Census Tract 107.01; Warren County; Kentucky      | 4,573                           | 30,386                    | 16.4           |
| Census Tract 9304; Monroe County; Kentucky        | 3,837                           | 25,915                    | 16.5           |
| Census Tract 9202; Edmonson County; Kentucky      | 3,550                           | 24,235                    | 16.6           |
| Census Tract 9701; Hickman County; Kentucky       | 3,724                           | 38,895                    | 16.7           |
| Census Tract 107.02; Warren County; Kentucky      | 5,868                           | 36,279                    | 16.7           |
| Census Tract 2009.01; Christian County; Kentucky  | 2,144                           | 50,036                    | 16.8           |
| Census Tract 2013.01; Christian County; Kentucky  | 2,725                           | 25,592                    | 16.8           |
| Census Tract 9601; Logan County; Kentucky         | 4,155                           | 26,918                    | 16.8           |
| Census Tract 9602.01; Muhlenberg County; Kentucky | 3,167                           | 23,743                    | 17.2           |
| Census Tract 9701; Simpson County; Kentucky       | 2,046                           | 35,361                    | 17.2           |
| Census Tract 9703; Simpson County; Kentucky       | 3,661                           | 29,145                    | 17.4           |
| Census Tract 113; Warren County; Kentucky         | 3,665                           | 26,620                    | 17.4           |
| Census Tract 9506; Grayson County; Kentucky       | 2,816                           | 24,599                    | 17.5           |
| Census Tract 9506.02; Marshall County; Kentucky   | 1,980                           | 29,020                    | 17.5           |
| Census Tract 108; Calloway County; Kentucky       | 2,821                           | 27,792                    | 17.7           |
| Census Tract 401; Livingston County; Kentucky     | 2,357                           | 28,966                    | 17.7           |
| Census Tract 9604; Logan County; Kentucky         | 3,684                           | 25,207                    | 17.8           |
| Census Tract 209; Graves County; Kentucky         | 2,445                           | 26,367                    | 17.9           |
| Census Tract 9703.02; Trigg County; Kentucky      | 1,679                           | 28,132                    | 18.1           |
| Census Tract 9603; Carlisle County; Kentucky      | 1,160                           | 25,477                    | 18.3           |
| Census Tract 9204.02; Edmonson County; Kentucky   | 3,076                           | 30,352                    | 18.4           |



| Geography                                        | Population<br>16 Years and Over | Per Capita<br>Income (\$) | Poverty<br>(%) |
|--------------------------------------------------|---------------------------------|---------------------------|----------------|
| Census Tract 9605; Muhlenberg County; Kentucky   | 2,999                           | 44,620                    | 18.6           |
| Census Tract 2005; Christian County; Kentucky    | 3,173                           | 27,893                    | 18.9           |
| Census Tract 9203; Allen County; Kentucky        | 3,952                           | 25,997                    | 19.0           |
| Census Tract 9603; Logan County; Kentucky        | 4,807                           | 25,241                    | 19.0           |
| Census Tract 9704.02; Simpson County; Kentucky   | 1,787                           | 25,710                    | 19.2           |
| Census Tract 402.02; Livingston County; Kentucky | 2,513                           | 27,193                    | 19.3           |
| Census Tract 9603; Muhlenberg County; Kentucky   | 3,027                           | 25,872                    | 19.3           |
| Census Tract 9204; Allen County; Kentucky        | 3,384                           | 31,376                    | 19.4           |
| Census Tract 9201; Allen County; Kentucky        | 2,795                           | 29,477                    | 19.5           |
| Census Tract 103.04; Calloway County; Kentucky   | 3,069                           | 25,409                    | 19.5           |
| Census Tract 202; Graves County; Kentucky        | 3,669                           | 27,885                    | 19.5           |
| Census Tract 9304; Butler County; Kentucky       | 1,433                           | 25,372                    | 19.6           |
| Census Tract 104; Calloway County; Kentucky      | 2,035                           | 23,762                    | 19.6           |
| Census Tract 106.01; Calloway County; Kentucky   | 2,254                           | 26,506                    | 19.7           |
| Census Tract 9604; Muhlenberg County; Kentucky   | 4,150                           | 29,619                    | 19.7           |
| Census Tract 9501.01; Grayson County; Kentucky   | 835                             | 31,844                    | 20.4           |
| Census Tract 9702.01; Trigg County; Kentucky     | 2,326                           | 28,119                    | 20.4           |
| Census Tract 9504.02; Grayson County; Kentucky   | 3,918                           | 23,947                    | 20.8           |
| Census Tract 9602; Fulton County; Kentucky       | 2,341                           | 21,229                    | 20.9           |
| Census Tract 2007; Christian County; Kentucky    | 4,591                           | 30,422                    | 21.4           |
| Census Tract 2013.04; Christian County; Kentucky | 2,302                           | 20,844                    | 21.4           |
| Census Tract 9504.01; Grayson County; Kentucky   | 1,669                           | 31,725                    | 21.7           |
| Census Tract 9503; Grayson County; Kentucky      | 3,119                           | 20,477                    | 22.2           |
| Census Tract 110.02; Warren County; Kentucky     | 5,786                           | 22,663                    | 22.3           |
| Census Tract 9502; Cumberland County; Kentucky   | 1,684                           | 24,217                    | 22.4           |
| Census Tract 2004; Christian County; Kentucky    | 2,233                           | 20,076                    | 22.6           |
| Census Tract 108.01; Warren County; Kentucky     | 2,985                           | 51,880                    | 22.6           |
| Census Tract 205; Graves County; Kentucky        | 3,098                           | 25,211                    | 22.7           |
| Census Tract 9502; Todd County; Kentucky         | 4,189                           | 30,680                    | 22.8           |
| Census Tract 9506.03; Marshall County; Kentucky  | 860                             | 45,661                    | 22.9           |
| Census Tract 9501.02; Marshall County; Kentucky  | 1,819                           | 28,577                    | 23.4           |
| Census Tract 105; Calloway County; Kentucky      | 2,539                           | 26,000                    | 23.5           |
| Census Tract 9303; Monroe County; Kentucky       | 2,051                           | 26,342                    | 24.2           |
| Census Tract 9607; Muhlenberg County; Kentucky   | 2,544                           | 21,057                    | 24.2           |
| Census Tract 9302; Butler County; Kentucky       | 1,332                           | 20,929                    | 24.3           |
| Census Tract 9502; Grayson County; Kentucky      | 2,454                           | 20,023                    | 24.8           |
| Census Tract 9507; Grayson County; Kentucky      | 1,754                           | 25,778                    | 25.3           |
| Census Tract 9602; Carlisle County; Kentucky     | 1,449                           | 21,925                    | 25.9           |
| Census Tract 2001; Christian County; Kentucky    | 3,337                           | 19,605                    | 26.6           |
| Census Tract 110.01; Warren County; Kentucky     | 3,305                           | 18,365                    | 27.3           |
| Census Tract 109; Warren County; Kentucky        | 3,658                           | 39,472                    | 27.8           |
| Census Tract 2008; Christian County; Kentucky    | 1,971                           | 13,318                    | 28.7           |
| Census Tract 9505; Grayson County; Kentucky      | 2,472                           | 27,906                    | 28.8           |
| Census Tract 203.02; Graves County; Kentucky     | 1,448                           | 26,566                    | 29.5           |
| Census Tract 9501; Cumberland County; Kentucky   | 3,100                           | 21,878                    | 31.3           |
| Census Tract 9601; Fulton County; Kentucky       | 2,932                           | 19,065                    | 31.3           |
| Census Tract 203.01; Graves County; Kentucky     | 2,813                           | 23,705                    | 31.4           |



| Geography                                            | Population<br>16 Years and Over | Per Capita<br>Income (\$) | Poverty<br>(%) |
|------------------------------------------------------|---------------------------------|---------------------------|----------------|
| Census Tract 9503; Todd County; Kentucky             | 1,788                           | 27,926                    | 31.6           |
| Census Tract 104; Warren County; Kentucky            | 4,445                           | 6,736                     | 31.7           |
| Census Tract 9302; Monroe County; Kentucky           | 1,604                           | 24,058                    | 32.1           |
| Census Tract 9505.02; Marshall County; Kentucky      | 2,282                           | 23,864                    | 32.6           |
| Census Tract 9701; Trigg County; Kentucky            | 2,152                           | 25,837                    | 32.6           |
| Census Tract 108.04; Warren County; Kentucky         | 2,982                           | 24,484                    | 32.8           |
| Census Tract 112; Warren County; Kentucky            | 3,444                           | 24,321                    | 32.8           |
| Census Tract 201; Graves County; Kentucky            | 3,574                           | 27,286                    | 33.6           |
| Census Tract 9303.02; Butler County; Kentucky        | 2,443                           | 18,902                    | 40.0           |
| Census Tract 102; Warren County; Kentucky            | 2,597                           | 15,122                    | 40.6           |
| Census Tract 2003; Christian County; Kentucky        | 2,612                           | 14,386                    | 44.2           |
| Census Tract 103.03; Calloway County; Kentucky       | 2,833                           | 15,297                    | 49.0           |
| Census Tract 105; Warren County; Kentucky            | 2,654                           | 22,747                    | 52.1           |
| Census Tract 103; Warren County; Kentucky            | 2,760                           | 13,508                    | 56.6           |
| Census Tract 103.01; Calloway County; Kentucky       | 2,667                           | 5,764                     | 56.7           |
| Census Tract 101; Warren County; Kentucky            | 2,885                           | 16,636                    | 60.6           |
| Census Tract 9801; Edmonson County; Kentucky         | 157                             | 8,568                     | 76.2           |
| Census Tract 9504.03; Lafayette County; Mississippi  | 2,827                           | 35,469                    | 14.9           |
| Census Tract 9504.04; Lafayette County; Mississippi  | 4,756                           | 42,930                    | 14.9           |
| Census Tract 9501; Tate County; Mississippi          | 4,162                           | 23,090                    | 14.9           |
| Census Tract 9504.01; Tippah County; Mississippi     | 3,992                           | 27,418                    | 14.9           |
| Census Tract 9504; Calhoun County; Mississippi       | 2,283                           | 24,699                    | 15.0           |
| Census Tract 9504.02; Tishomingo County; Mississippi | 3,420                           | 25,815                    | 15.1           |
| Census Tract 9504; Prentiss County; Mississippi      | 3,663                           | 26,883                    | 15.2           |
| Census Tract 9501; Tallahatchie County; Mississippi  | 3,279                           | 26,881                    | 15.3           |
| Census Tract 9503; Union County; Mississippi         | 3,589                           | 31,110                    | 15.3           |
| Census Tract 9509.01; Lee County; Mississippi        | 2,184                           | 39,421                    | 15.4           |
| Census Tract 9501; Tippah County; Mississippi        | 3,602                           | 40,639                    | 15.4           |
| Census Tract 9503; Tallahatchie County; Mississippi  | 3,211                           | 15,797                    | 15.5           |
| Census Tract 9502.02; Panola County; Mississippi     | 864                             | 24,562                    | 15.6           |
| Census Tract 711.22; DeSoto County; Mississippi      | 1,673                           | 36,104                    | 15.7           |
| Census Tract 9504; Panola County; Mississippi        | 4,197                           | 25,795                    | 15.8           |
| Census Tract 9501.02; Prentiss County; Mississippi   | 1,780                           | 38,949                    | 15.8           |
| Census Tract 9509.02; Lee County; Mississippi        | 2,718                           | 30,033                    | 16.0           |
| Census Tract 603; Attala County; Mississippi         | 2,619                           | 24,484                    | 16.1           |
| Census Tract 9502; Clay County; Mississippi          | 1,975                           | 25,129                    | 16.1           |
| Census Tract 703.25; DeSoto County; Mississippi      | 2,543                           | 26,027                    | 16.1           |
| Census Tract 604; Attala County; Mississippi         | 2,146                           | 25,921                    | 16.2           |
| Census Tract 9504.01; Alcorn County; Mississippi     | 2,158                           | 24,102                    | 16.3           |
| Census Tract 401; Leake County; Mississippi          | 2,204                           | 35,562                    | 16.3           |
| Census Tract 9502.02; Lee County; Mississippi        | 4,114                           | 27,001                    | 16.4           |
| Census Tract 705.23; DeSoto County; Mississippi      | 6,161                           | 31,751                    | 16.6           |
| Census Tract 9504.02; Tippah County; Mississippi     | 2,048                           | 16,962                    | 16.6           |
| Census Tract 405; Leake County; Mississippi          | 2,250                           | 26,492                    | 16.7           |
| Census Tract 9501; Clay County; Mississippi          | 3,911                           | 21,004                    | 16.9           |
| Census Tract 5; Lowndes County; Mississippi          | 3,261                           | 29,396                    | 16.9           |
| Census Tract 205; Scott County; Mississippi          | 4,051                           | 20,595                    | 16.9           |

| Geography                                            | Population<br>16 Years and Over | Per Capita<br>Income (\$) | Poverty<br>(%) |
|------------------------------------------------------|---------------------------------|---------------------------|----------------|
| Census Tract 9507; Alcorn County; Mississippi        | 3,201                           | 22,809                    | 17.0           |
| Census Tract 9503.02; Lee County; Mississippi        | 3,366                           | 27,255                    | 17.0           |
| Census Tract 703.10; DeSoto County; Mississippi      | 3,068                           | 25,341                    | 17.1           |
| Census Tract 703.23; DeSoto County; Mississippi      | 3,916                           | 23,755                    | 17.1           |
| Census Tract 9505.02; Panola County; Mississippi     | 3,240                           | 29,646                    | 17.2           |
| Census Tract 9504; Union County; Mississippi         | 2,679                           | 23,895                    | 17.2           |
| Census Tract 9501; Yalobusha County; Mississippi     | 2,876                           | 26,183                    | 17.3           |
| Census Tract 602; Attala County; Mississippi         | 1,971                           | 23,482                    | 17.4           |
| Census Tract 9502.01; Prentiss County; Mississippi   | 3,002                           | 34,594                    | 17.5           |
| Census Tract 9505.02; Monroe County; Mississippi     | 3,245                           | 30,945                    | 17.6           |
| Census Tract 9502; Webster County; Mississippi       | 2,843                           | 25,010                    | 17.6           |
| Census Tract 705.21; DeSoto County; Mississippi      | 2,180                           | 23,869                    | 17.7           |
| Census Tract 9505; Prentiss County; Mississippi      | 1,361                           | 19,877                    | 17.7           |
| Census Tract 9502; Benton County; Mississippi        | 1,970                           | 23,242                    | 17.8           |
| Census Tract 9501.01; Pontotoc County; Mississippi   | 2,697                           | 32,451                    | 18.0           |
| Census Tract 9505; Pontotoc County; Mississippi      | 3,670                           | 26,080                    | 18.0           |
| Census Tract 9505.07; Lafayette County; Mississippi  | 3,810                           | 30,377                    | 18.3           |
| Census Tract 9502; Noxubee County; Mississippi       | 2,168                           | 23,735                    | 18.3           |
| Census Tract 9503; Pontotoc County; Mississippi      | 4,298                           | 26,170                    | 18.4           |
| Census Tract 9510.01; Lee County; Mississippi        | 2,828                           | 24,394                    | 18.6           |
| Census Tract 9511.01; Lee County; Mississippi        | 2,079                           | 25,047                    | 18.7           |
| Census Tract 9502.01; Monroe County; Mississippi     | 2,691                           | 21,644                    | 18.7           |
| Census Tract 9501.02; Pontotoc County; Mississippi   | 4,985                           | 23,400                    | 18.7           |
| Census Tract 9503.02; Prentiss County; Mississippi   | 2,829                           | 34,931                    | 19.0           |
| Census Tract 9501; Noxubee County; Mississippi       | 3,574                           | 18,633                    | 19.3           |
| Census Tract 9501.01; Tishomingo County; Mississippi | 1,470                           | 33,095                    | 19.5           |
| Census Tract 9502; Winston County; Mississippi       | 2,553                           | 29,989                    | 19.5           |
| Census Tract 9502.02; Marshall County; Mississippi   | 3,467                           | 33,020                    | 19.9           |
| Census Tract 206; Scott County; Mississippi          | 2,504                           | 19,689                    | 19.9           |
| Census Tract 704.22; DeSoto County; Mississippi      | 2,121                           | 20,644                    | 20.0           |
| Census Tract 10; Lowndes County; Mississippi         | 2,077                           | 39,856                    | 20.1           |
| Census Tract 703.22; DeSoto County; Mississippi      | 3,194                           | 25,573                    | 20.2           |
| Census Tract 9504.01; Chickasaw County; Mississippi  | 1,520                           | 22,280                    | 20.3           |
| Census Tract 9506.04; Oktibbeha County; Mississippi  | 2,207                           | 24,207                    | 20.4           |
| Census Tract 9502; Choctaw County; Mississippi       | 3,453                           | 24,756                    | 20.5           |
| Census Tract 9502.02; Monroe County; Mississippi     | 2,835                           | 24,606                    | 20.5           |
| Census Tract 9504.02; Chickasaw County; Mississippi  | 2,364                           | 26,600                    | 20.6           |
| Census Tract 702.21; DeSoto County; Mississippi      | 2,911                           | 28,577                    | 20.6           |
| Census Tract 404.02; Leake County; Mississippi       | 2,237                           | 18,537                    | 20.6           |
| Census Tract 9503.01; Marshall County; Mississippi   | 3,077                           | 32,869                    | 20.7           |
| Census Tract 704.21; DeSoto County; Mississippi      | 2,489                           | 26,893                    | 20.8           |
| Census Tract 9501.02; Panola County; Mississippi     | 2,204                           | 24,597                    | 21.5           |
| Census Tract 9501.02; Benton County; Mississippi     | 1,853                           | 23,175                    | 21.6           |
| Census Tract 9503.01; Tate County; Mississippi       | 3,612                           | 32,317                    | 21.8           |
| Census Tract 9504.01; Marshall County; Mississippi   | 2,233                           | 26,784                    | 22.0           |
| Census Tract 201.01; Scott County; Mississippi       | 2,444                           | 27,874                    | 22.0           |
| Census Tract 9503.02; Tate County; Mississippi       | 4,264                           | 30,961                    | 22.1           |

| Geography                                            | Population<br>16 Years and Over | Per Capita<br>Income (\$) | Poverty<br>(%) |
|------------------------------------------------------|---------------------------------|---------------------------|----------------|
| Census Tract 202; Scott County; Mississippi          | 3,645                           | 24,223                    | 22.4           |
| Census Tract 9504; Tate County; Mississippi          | 5,164                           | 21,053                    | 22.5           |
| Census Tract 9503; Calhoun County; Mississippi       | 2,466                           | 21,959                    | 22.6           |
| Census Tract 704.11; DeSoto County; Mississippi      | 1,406                           | 16,020                    | 22.6           |
| Census Tract 701.01; DeSoto County; Mississippi      | 2,492                           | 29,412                    | 22.7           |
| Census Tract 9506.02; Lee County; Mississippi        | 3,035                           | 32,568                    | 22.8           |
| Census Tract 9502; Yalobusha County; Mississippi     | 3,593                           | 23,180                    | 23.1           |
| Census Tract 4.05; Lowndes County; Mississippi       | 4,682                           | 22,415                    | 23.2           |
| Census Tract 9506; Monroe County; Mississippi        | 2,218                           | 24,582                    | 23.4           |
| Census Tract 9502.01; Marshall County; Mississippi   | 2,948                           | 22,817                    | 23.5           |
| Census Tract 9505; Calhoun County; Mississippi       | 1,981                           | 21,227                    | 23.6           |
| Census Tract 9503; Alcorn County; Mississippi        | 2,985                           | 34,583                    | 23.7           |
| Census Tract 407; Leake County; Mississippi          | 3,129                           | 30,556                    | 23.8           |
| Census Tract 9504; Monroe County; Mississippi        | 2,598                           | 21,299                    | 24.1           |
| Census Tract 107; Neshoba County; Mississippi        | 3,176                           | 28,177                    | 24.2           |
| Census Tract 605; Attala County; Mississippi         | 2,689                           | 47,572                    | 24.3           |
| Census Tract 9503.03; Lafayette County; Mississippi  | 1,610                           | 27,030                    | 24.4           |
| Census Tract 104; Neshoba County; Mississippi        | 2,814                           | 29,862                    | 24.8           |
| Census Tract 9507; Lee County; Mississippi           | 2,992                           | 29,198                    | 25.2           |
| Census Tract 9505.02; Lafayette County; Mississippi  | 2,250                           | 22,795                    | 25.4           |
| Census Tract 11; Lowndes County; Mississippi         | 1,221                           | 27,113                    | 25.8           |
| Census Tract 9502; Tishomingo County; Mississippi    | 1,668                           | 22,968                    | 25.8           |
| Census Tract 9503; Chickasaw County; Mississippi     | 4,126                           | 21,110                    | 26.2           |
| Census Tract 9504; Winston County; Mississippi       | 2,523                           | 31,233                    | 26.2           |
| Census Tract 9505.01; Marshall County; Mississippi   | 1,872                           | 23,350                    | 26.5           |
| Census Tract 9507; Monroe County; Mississippi        | 1,815                           | 29,203                    | 26.9           |
| Census Tract 703.24; DeSoto County; Mississippi      | 3,350                           | 19,474                    | 27.1           |
| Census Tract 9506.01; Oktibbeha County; Mississippi  | 4,796                           | 38,858                    | 27.3           |
| Census Tract 9502.01; Tippah County; Mississippi     | 3,522                           | 23,327                    | 27.7           |
| Census Tract 7; Lowndes County; Mississippi          | 4,036                           | 21,834                    | 27.9           |
| Census Tract 9503; Oktibbeha County; Mississippi     | 2,764                           | 20,400                    | 28.4           |
| Census Tract 406; Leake County; Mississippi          | 4,537                           | 21,249                    | 28.5           |
| Census Tract 9505.02; Alcorn County; Mississippi     | 2,308                           | 17,385                    | 28.8           |
| Census Tract 9508; Monroe County; Mississippi        | 2,129                           | 26,868                    | 28.9           |
| Census Tract 9501; Winston County; Mississippi       | 2,429                           | 24,821                    | 29.1           |
| Census Tract 9502; Chickasaw County; Mississippi     | 2,485                           | 18,637                    | 29.2           |
| Census Tract 9503; Choctaw County; Mississippi       | 1,285                           | 20,780                    | 29.2           |
| Census Tract 9510.02; Lee County; Mississippi        | 2,941                           | 20,651                    | 29.2           |
| Census Tract 9505.02; Marshall County; Mississippi   | 2,208                           | 35,316                    | 29.3           |
| Census Tract 9504.01; Tishomingo County; Mississippi | 2,623                           | 26,532                    | 29.3           |
| Census Tract 9502.01; Oktibbeha County; Mississippi  | 3,212                           | 29,639                    | 29.4           |
| Census Tract 201.02; Scott County; Mississippi       | 2,840                           | 16,624                    | 29.5           |
| Census Tract 9505.04; Lafayette County; Mississippi  | 2,554                           | 25,655                    | 29.6           |
| Census Tract 9502.02; Tippah County; Mississippi     | 1,711                           | 18,965                    | 29.6           |
| Census Tract 106; Neshoba County; Mississippi        | 3,579                           | 20,288                    | 29.7           |
| Census Tract 102; Neshoba County; Mississippi        | 2,385                           | 20,370                    | 29.9           |
| Census Tract 9507.02; Oktibbeha County; Mississippi  | 3,012                           | 32,456                    | 30.8           |

| Geography                                             | Population<br>16 Years and Over | Per Capita<br>Income (\$) | Poverty<br>(%) |
|-------------------------------------------------------|---------------------------------|---------------------------|----------------|
| Census Tract 9501.02; Oktibbeha County; Mississippi   | 3,294                           | 25,800                    | 30.9           |
| Census Tract 9504.02; Marshall County; Mississippi    | 4,093                           | 15,538                    | 31.2           |
| Census Tract 9503; Webster County; Mississippi        | 1,309                           | 21,914                    | 31.4           |
| Census Tract 9506.02; Panola County; Mississippi      | 1,871                           | 13,721                    | 31.7           |
| Census Tract 9504.02; Oktibbeha County; Mississippi   | 2,255                           | 28,425                    | 32.1           |
| Census Tract 9506.03; Oktibbeha County; Mississippi   | 2,274                           | 47,548                    | 32.4           |
| Census Tract 9501; Chickasaw County; Mississippi      | 2,774                           | 22,240                    | 33.1           |
| Census Tract 9502; Calhoun County; Mississippi        | 980                             | 22,167                    | 33.2           |
| Census Tract 9502; Tallahatchie County; Mississippi   | 2,085                           | 18,044                    | 33.3           |
| Census Tract 301; Kemper County; Mississippi          | 3,970                           | 19,140                    | 33.6           |
| Census Tract 9504; Clay County; Mississippi           | 3,514                           | 26,669                    | 33.7           |
| Census Tract 9503; Noxubee County; Mississippi        | 2,254                           | 18,210                    | 33.7           |
| Census Tract 9501.02; Tishomingo County; Mississippi  | 1,191                           | 25,651                    | 34.1           |
| Census Tract 9502.01; Alcorn County; Mississippi      | 2,783                           | 21,086                    | 34.4           |
| Census Tract 606; Attala County; Mississippi          | 2,527                           | 18,685                    | 34.7           |
| Census Tract 9501.01; Oktibbeha County; Mississippi   | 5,298                           | 22,082                    | 34.9           |
| Census Tract 601; Attala County; Mississippi          | 1,807                           | 22,346                    | 35.0           |
| Census Tract 9503.01; Prentiss County; Mississippi    | 2,459                           | 16,844                    | 35.1           |
| Census Tract 9503.04; Lafayette County; Mississippi   | 2,032                           | 27,561                    | 35.4           |
| Census Tract 9501.01; Panola County; Mississippi      | 2,990                           | 14,595                    | 35.4           |
| Census Tract 704.12; DeSoto County; Mississippi       | 3,245                           | 19,577                    | 35.7           |
| Census Tract 9503.01; Yalobusha County; Mississippi   | 1,623                           | 23,508                    | 36.0           |
| Census Tract 204; Scott County; Mississippi           | 2,358                           | 27,193                    | 36.2           |
| Census Tract 9.02; Lowndes County; Mississippi        | 1,825                           | 28,577                    | 36.3           |
| Census Tract 9505; Oktibbeha County; Mississippi      | 3,558                           | 26,313                    | 37.3           |
| Census Tract 9401; Neshoba County; Mississippi        | 3,288                           | 15,227                    | 38.6           |
| Census Tract 9503; Winston County; Mississippi        | 3,174                           | 23,623                    | 40.1           |
| Census Tract 8; Lowndes County; Mississippi           | 2,445                           | 13,897                    | 41.9           |
| Census Tract 9503; Clay County; Mississippi           | 2,262                           | 17,417                    | 42.1           |
| Census Tract 9502.04; Lafayette County; Mississippi   | 2,030                           | 42,774                    | 43.5           |
| Census Tract 105; Neshoba County; Mississippi         | 2,581                           | 21,693                    | 45.1           |
| Census Tract 9502.03; Lafayette County; Mississippi   | 2,704                           | 25,802                    | 46.0           |
| Census Tract 9503.01; Lafayette County; Mississippi   | 6,213                           | 8,404                     | 49.0           |
| Census Tract 6; Lowndes County; Mississippi           | 2,476                           | 10,871                    | 50.9           |
| Census Tract 9504; Tallahatchie County; Mississippi   | 1,706                           | 20,334                    | 51.4           |
| Census Tract 9504.01; Oktibbeha County; Mississippi   | 4,735                           | 13,366                    | 53.7           |
| Census Tract 9502.01; Panola County; Mississippi      | 1,385                           | 14,569                    | 55.6           |
| Census Tract 9305.02; Cherokee County; North Carolina | 3,169                           | 32,767                    | 15.9           |
| Census Tract 9303.02; Avery County; North Carolina    | 2,225                           | 30,883                    | 17.4           |
| Census Tract 9207.03; Watauga County; North Carolina  | 5,270                           | 39,658                    | 17.7           |
| Census Tract 9501.01; Clay County; North Carolina     | 2,516                           | 34,744                    | 18.6           |
| Census Tract 9502.02; Clay County; North Carolina     | 2,318                           | 23,387                    | 20.9           |
| Census Tract 9306.04; Cherokee County; North Carolina | 1,504                           | 24,760                    | 22.9           |
| Census Tract 9304.02; Cherokee County; North Carolina | 1,589                           | 27,543                    | 23.0           |
| Census Tract 9301.01; Cherokee County; North Carolina | 2,021                           | 27,293                    | 23.1           |
| Census Tract 9301.02; Cherokee County; North Carolina | 1,741                           | 23,312                    | 23.5           |
| Census Tract 9206.02; Watauga County; North Carolina  | 2,315                           | 46,666                    | 26.7           |

| Geography                                             | Population<br>16 Years and Over | Per Capita<br>Income (\$) | Poverty<br>(%) |
|-------------------------------------------------------|---------------------------------|---------------------------|----------------|
| Census Tract 9304.01; Cherokee County; North Carolina | 3,653                           | 27,679                    | 30.1           |
| Census Tract 9205; Watauga County; North Carolina     | 7,387                           | 11,327                    | 38.9           |
| Census Tract 9204; Watauga County; North Carolina     | 7,526                           | 25,205                    | 41.6           |
| Census Tract 9206.01; Watauga County; North Carolina  | 6,322                           | 17,068                    | 62.3           |
| Census Tract 102.01; Bradley County; Tennessee        | 2,121                           | 32,463                    | 14.8           |
| Census Tract 9623; Carroll County; Tennessee          | 3,496                           | 28,766                    | 14.8           |
| Census Tract 502; Hawkins County; Tennessee           | 4,112                           | 23,100                    | 14.8           |
| Census Tract 9607; Lawrence County; Tennessee         | 3,196                           | 27,140                    | 14.8           |
| Census Tract 14.01; Madison County; Tennessee         | 1,790                           | 26,100                    | 14.8           |
| Census Tract 9203; Cocke County; Tennessee            | 3,962                           | 34,753                    | 14.9           |
| Census Tract 9710.02; Coffee County; Tennessee        | 4,266                           | 34,369                    | 14.9           |
| Census Tract 9502.02; Hickman County; Tennessee       | 2,714                           | 25,819                    | 14.9           |
| Census Tract 106; Maury County; Tennessee             | 4,295                           | 25,628                    | 14.9           |
| Census Tract 1020.01; Montgomery County; Tennessee    | 5,211                           | 33,244                    | 14.9           |
| Census Tract 201.02; Shelby County; Tennessee         | 2,226                           | 34,533                    | 14.9           |
| Census Tract 426; Sullivan County; Tennessee          | 3,112                           | 32,383                    | 14.9           |
| Census Tract 611; Washington County; Tennessee        | 4,337                           | 37,515                    | 14.9           |
| Census Tract 106; Blount County; Tennessee            | 3,577                           | 23,985                    | 15.0           |
| Census Tract 9250.02; Monroe County; Tennessee        | 3,169                           | 30,593                    | 15.0           |
| Census Tract 201.02; Sumner County; Tennessee         | 4,288                           | 27,510                    | 15.0           |
| Census Tract 9633; Benton County; Tennessee           | 2,883                           | 27,076                    | 15.1           |
| Census Tract 9550.03; Decatur County; Tennessee       | 1,955                           | 23,903                    | 15.1           |
| Census Tract 48; Knox County; Tennessee               | 4,130                           | 29,481                    | 15.1           |
| Census Tract 9554; Marshall County; Tennessee         | 3,529                           | 31,413                    | 15.1           |
| Census Tract 9657; Obion County; Tennessee            | 3,648                           | 28,088                    | 15.1           |
| Census Tract 206.35; Shelby County; Tennessee         | 2,198                           | 30,951                    | 15.1           |
| Census Tract 413; Sullivan County; Tennessee          | 4,047                           | 35,891                    | 15.1           |
| Census Tract 802; Unicoi County; Tennessee            | 5,002                           | 28,267                    | 15.1           |
| Census Tract 9701.02; Chester County; Tennessee       | 2,869                           | 28,858                    | 15.2           |
| Census Tract 1007; Hamblen County; Tennessee          | 4,684                           | 27,972                    | 15.2           |
| Census Tract 9502; Hardeman County; Tennessee         | 5,702                           | 12,402                    | 15.2           |
| Census Tract 706; Jefferson County; Tennessee         | 3,833                           | 33,034                    | 15.2           |
| Census Tract 39.01; Knox County; Tennessee            | 3,382                           | 34,639                    | 15.2           |
| Census Tract 63; Shelby County; Tennessee             | 2,180                           | 42,802                    | 15.2           |
| Census Tract 112.01; Blount County; Tennessee         | 4,134                           | 31,719                    | 15.3           |
| Census Tract 701.03; Cheatham County; Tennessee       | 3,292                           | 29,420                    | 15.3           |
| Census Tract 9750; Rhea County; Tennessee             | 3,949                           | 32,909                    | 15.3           |
| Census Tract 717; Carter County; Tennessee            | 2,794                           | 29,273                    | 15.4           |
| Census Tract 104.01; Davidson County; Tennessee       | 4,620                           | 29,237                    | 15.4           |
| Census Tract 173; Davidson County; Tennessee          | 2,428                           | 28,185                    | 15.4           |
| Census Tract 602.01; Dickson County; Tennessee        | 2,857                           | 26,002                    | 15.4           |
| Census Tract 9640.01; Dyer County; Tennessee          | 3,828                           | 25,211                    | 15.4           |
| Census Tract 9609; Lawrence County; Tennessee         | 1,704                           | 22,947                    | 15.4           |
| Census Tract 1016; Montgomery County; Tennessee       | 4,747                           | 29,928                    | 15.4           |
| Census Tract 9650; Obion County; Tennessee            | 3,427                           | 31,491                    | 15.4           |
| Census Tract 401.05; Rutherford County; Tennessee     | 3,282                           | 28,142                    | 15.4           |
| Census Tract 9703.01; Cumberland County; Tennessee    | 3,009                           | 27,955                    | 15.5           |



| Geography                                          | Population<br>16 Years and Over | Per Capita<br>Income (\$) | Poverty<br>(%) |
|----------------------------------------------------|---------------------------------|---------------------------|----------------|
| Census Tract 137.02; Davidson County; Tennessee    | 3,326                           | 36,226                    | 15.5           |
| Census Tract 908; Greene County; Tennessee         | 3,957                           | 25,633                    | 15.5           |
| Census Tract 1304; Humphreys County; Tennessee     | 2,059                           | 28,540                    | 15.5           |
| Census Tract 23; Knox County; Tennessee            | 2,854                           | 28,926                    | 15.5           |
| Census Tract 9555; Marshall County; Tennessee      | 3,968                           | 31,081                    | 15.5           |
| Census Tract 133; Davidson County; Tennessee       | 4,315                           | 55,214                    | 15.6           |
| Census Tract 608; Fayette County; Tennessee        | 1,784                           | 29,463                    | 15.6           |
| Census Tract 18; Hamilton County; Tennessee        | 2,244                           | 33,762                    | 15.6           |
| Census Tract 9552; Marshall County; Tennessee      | 5,247                           | 36,519                    | 15.6           |
| Census Tract 9708.01; Coffee County; Tennessee     | 3,141                           | 30,124                    | 15.7           |
| Census Tract 9504; Hardeman County; Tennessee      | 4,129                           | 25,919                    | 15.7           |
| Census Tract 9505; Hardeman County; Tennessee      | 3,360                           | 25,002                    | 15.7           |
| Census Tract 9503; Wayne County; Tennessee         | 2,772                           | 24,870                    | 15.7           |
| Census Tract 9301; McNairy County; Tennessee       | 3,284                           | 24,362                    | 15.8           |
| Census Tract 427.03; Sullivan County; Tennessee    | 2,011                           | 22,273                    | 15.8           |
| Census Tract 9252; Van Buren County; Tennessee     | 2,690                           | 22,989                    | 15.8           |
| Census Tract 183.03; Davidson County; Tennessee    | 3,970                           | 48,048                    | 15.9           |
| Census Tract 9606; Lawrence County; Tennessee      | 1,721                           | 26,865                    | 15.9           |
| Census Tract 9654; Obion County; Tennessee         | 3,571                           | 35,593                    | 15.9           |
| Census Tract 9754.02; Rhea County; Tennessee       | 2,759                           | 29,379                    | 15.9           |
| Census Tract 206.58; Shelby County; Tennessee      | 4,673                           | 26,325                    | 15.9           |
| Census Tract 156.29; Davidson County; Tennessee    | 4,294                           | 25,898                    | 16.0           |
| Census Tract 157; Davidson County; Tennessee       | 1,382                           | 34,213                    | 16.0           |
| Census Tract 31; Hamilton County; Tennessee        | 1,918                           | 66,209                    | 16.0           |
| Census Tract 110.01; Hamilton County; Tennessee    | 1,697                           | 26,607                    | 16.0           |
| Census Tract 9753; Rhea County; Tennessee          | 5,232                           | 24,987                    | 16.0           |
| Census Tract 418; Rutherford County; Tennessee     | 3,912                           | 29,568                    | 16.0           |
| Census Tract 9686; Weakley County; Tennessee       | 3,150                           | 26,911                    | 16.0           |
| Census Tract 9506; Bedford County; Tennessee       | 6,049                           | 24,473                    | 16.1           |
| Census Tract 715; Carter County; Tennessee         | 1,861                           | 37,200                    | 16.1           |
| Census Tract 113; Davidson County; Tennessee       | 4,601                           | 35,948                    | 16.1           |
| Census Tract 103.02; Davidson County; Tennessee    | 1,334                           | 46,533                    | 16.2           |
| Census Tract 9201.01; DeKalb County; Tennessee     | 2,547                           | 36,348                    | 16.2           |
| Census Tract 21; Knox County; Tennessee            | 2,253                           | 23,253                    | 16.2           |
| Census Tract 9756.01; Lincoln County; Tennessee    | 5,076                           | 27,943                    | 16.2           |
| Census Tract 420; Sullivan County; Tennessee       | 2,965                           | 27,240                    | 16.2           |
| Census Tract 505.04; Williamson County; Tennessee  | 3,739                           | 34,635                    | 16.2           |
| Census Tract 9503; Bedford County; Tennessee       | 2,804                           | 30,836                    | 16.3           |
| Census Tract 103.01; Blount County; Tennessee      | 5,233                           | 31,082                    | 16.3           |
| Census Tract 9704.01; Cumberland County; Tennessee | 3,944                           | 20,878                    | 16.3           |
| Census Tract 422; Rutherford County; Tennessee     | 4,011                           | 29,445                    | 16.3           |
| Census Tract 407; Sullivan County; Tennessee       | 2,199                           | 37,691                    | 16.3           |
| Census Tract 9507.01; Campbell County; Tennessee   | 1,732                           | 27,913                    | 16.4           |
| Census Tract 605.02; Dickson County; Tennessee     | 2,789                           | 35,426                    | 16.4           |
| Census Tract 62.08; Knox County; Tennessee         | 4,072                           | 32,812                    | 16.4           |
| Census Tract 9707; McMinn County; Tennessee        | 3,809                           | 33,344                    | 16.4           |
| Census Tract 804.01; Sevier County; Tennessee      | 2,577                           | 36,038                    | 16.4           |

| Geography                                         | Population<br>16 Years and Over | Per Capita<br>Income (\$) | Poverty<br>(%) |
|---------------------------------------------------|---------------------------------|---------------------------|----------------|
| Census Tract 16; Shelby County; Tennessee         | 2,961                           | 43,312                    | 16.4           |
| Census Tract 431; Sullivan County; Tennessee      | 2,564                           | 27,407                    | 16.4           |
| Census Tract 9506; Hardeman County; Tennessee     | 2,052                           | 22,177                    | 16.5           |
| Census Tract 501; Hawkins County; Tennessee       | 3,543                           | 24,938                    | 16.5           |
| Census Tract 75; Shelby County; Tennessee         | 922                             | 34,999                    | 16.5           |
| Census Tract 711; Carter County; Tennessee        | 1,735                           | 28,586                    | 16.6           |
| Census Tract 156.19; Davidson County; Tennessee   | 4,294                           | 32,914                    | 16.6           |
| Census Tract 9202.02; DeKalb County; Tennessee    | 1,566                           | 24,612                    | 16.6           |
| Census Tract 503.01; Hawkins County; Tennessee    | 3,939                           | 27,118                    | 16.6           |
| Census Tract 602.03; Loudon County; Tennessee     | 2,505                           | 19,981                    | 16.6           |
| Census Tract 9302; McNairy County; Tennessee      | 2,085                           | 27,051                    | 16.6           |
| Census Tract 3; Madison County; Tennessee         | 3,606                           | 33,415                    | 16.6           |
| Census Tract 9254.02; Monroe County; Tennessee    | 4,234                           | 26,200                    | 16.6           |
| Census Tract 210.02; Anderson County; Tennessee   | 2,960                           | 24,131                    | 16.7           |
| Census Tract 9205.02; Cocke County; Tennessee     | 4,120                           | 27,768                    | 16.7           |
| Census Tract 9203; Hardin County; Tennessee       | 3,350                           | 25,732                    | 16.7           |
| Census Tract 46.08; Knox County; Tennessee        | 2,354                           | 33,632                    | 16.7           |
| Census Tract 9255.01; Monroe County; Tennessee    | 2,637                           | 25,945                    | 16.7           |
| Census Tract 9753; Smith County; Tennessee        | 1,738                           | 24,194                    | 16.7           |
| Census Tract 9302.02; Warren County; Tennessee    | 3,147                           | 29,316                    | 16.7           |
| Census Tract 9208; Giles County; Tennessee        | 2,588                           | 29,027                    | 16.8           |
| Census Tract 606; Loudon County; Tennessee        | 3,926                           | 31,168                    | 16.8           |
| Census Tract 210.23; Shelby County; Tennessee     | 6,193                           | 54,822                    | 16.8           |
| Census Tract 9302.01; Warren County; Tennessee    | 2,610                           | 29,971                    | 16.8           |
| Census Tract 112.04; Hamilton County; Tennessee   | 4,510                           | 37,769                    | 16.9           |
| Census Tract 9201; Hardin County; Tennessee       | 3,263                           | 33,482                    | 16.9           |
| Census Tract 32; Knox County; Tennessee           | 2,679                           | 23,962                    | 16.9           |
| Census Tract 103; Bradley County; Tennessee       | 2,939                           | 22,171                    | 17.0           |
| Census Tract 9706; Claiborne County; Tennessee    | 4,058                           | 31,787                    | 17.0           |
| Census Tract 161; Davidson County; Tennessee      | 2,038                           | 46,981                    | 17.0           |
| Census Tract 9754; Lincoln County; Tennessee      | 3,549                           | 28,590                    | 17.0           |
| Census Tract 3.03; Putnam County; Tennessee       | 1,723                           | 22,497                    | 17.0           |
| Census Tract 305; Roane County; Tennessee         | 3,919                           | 30,860                    | 17.0           |
| Census Tract 9755; Henderson County; Tennessee    | 3,197                           | 24,722                    | 17.1           |
| Census Tract 9602; Lawrence County; Tennessee     | 2,282                           | 23,612                    | 17.1           |
| Census Tract 102.05; Maury County; Tennessee      | 1,196                           | 41,314                    | 17.1           |
| Census Tract 404.04; Rutherford County; Tennessee | 2,416                           | 31,782                    | 17.1           |
| Census Tract 205.11; Shelby County; Tennessee     | 1,992                           | 36,989                    | 17.1           |
| Census Tract 201.01; Sumner County; Tennessee     | 2,829                           | 26,746                    | 17.1           |
| Census Tract 9681.01; Weakley County; Tennessee   | 2,969                           | 27,588                    | 17.1           |
| Census Tract 225; Shelby County; Tennessee        | 3,497                           | 23,292                    | 17.2           |
| Census Tract 406.01; Tipton County; Tennessee     | 3,887                           | 25,545                    | 17.2           |
| Census Tract 9508; Campbell County; Tennessee     | 2,106                           | 28,899                    | 17.3           |
| Census Tract 164; Davidson County; Tennessee      | 4,381                           | 24,509                    | 17.3           |
| Census Tract 9202; Giles County; Tennessee        | 3,936                           | 27,924                    | 17.3           |
| Census Tract 9503.02; Hickman County; Tennessee   | 3,587                           | 35,818                    | 17.3           |
| Census Tract 418; Sullivan County; Tennessee      | 3,569                           | 30,132                    | 17.3           |



| Geography                                          | Population<br>16 Years and Over | Per Capita<br>Income (\$) | Poverty<br>(%) |
|----------------------------------------------------|---------------------------------|---------------------------|----------------|
| Census Tract 430; Sullivan County; Tennessee       | 3,806                           | 33,077                    | 17.3           |
| Census Tract 9630; Benton County; Tennessee        | 2,735                           | 27,761                    | 17.4           |
| Census Tract 101; Bradley County; Tennessee        | 4,091                           | 33,113                    | 17.4           |
| Census Tract 101.04; Hamilton County; Tennessee    | 3,188                           | 30,634                    | 17.4           |
| Census Tract 108; Hamilton County; Tennessee       | 3,441                           | 39,260                    | 17.4           |
| Census Tract 404.05; Rutherford County; Tennessee  | 3,366                           | 32,517                    | 17.4           |
| Census Tract 427.02; Sullivan County; Tennessee    | 1,947                           | 35,259                    | 17.4           |
| Census Tract 128.02; Davidson County; Tennessee    | 3,435                           | 24,695                    | 17.5           |
| Census Tract 35.01; Knox County; Tennessee         | 2,446                           | 45,391                    | 17.5           |
| Census Tract 505.03; Lauderdale County; Tennessee  | 1,856                           | 27,791                    | 17.5           |
| Census Tract 406; Rutherford County; Tennessee     | 4,353                           | 29,632                    | 17.5           |
| Census Tract 201; Anderson County; Tennessee       | 2,364                           | 25,664                    | 17.6           |
| Census Tract 508; Hawkins County; Tennessee        | 4,094                           | 28,382                    | 17.6           |
| Census Tract 410; Tipton County; Tennessee         | 2,306                           | 24,999                    | 17.6           |
| Census Tract 9685; Weakley County; Tennessee       | 3,548                           | 24,136                    | 17.6           |
| Census Tract 9664; Gibson County; Tennessee        | 3,860                           | 20,986                    | 17.7           |
| Census Tract 9251.01; Pickett County; Tennessee    | 2,405                           | 31,904                    | 17.7           |
| Census Tract 211.22; Shelby County; Tennessee      | 4,243                           | 25,009                    | 17.7           |
| Census Tract 416; Sullivan County; Tennessee       | 2,199                           | 31,234                    | 17.7           |
| Census Tract 217.52; Shelby County; Tennessee      | 4,172                           | 29,606                    | 17.8           |
| Census Tract 103.03; Davidson County; Tennessee    | 4,180                           | 31,647                    | 17.9           |
| Census Tract 9551.02; Decatur County; Tennessee    | 2,481                           | 27,910                    | 17.9           |
| Census Tract 1005; Hamblen County; Tennessee       | 2,658                           | 38,428                    | 17.9           |
| Census Tract 113.26; Hamilton County; Tennessee    | 5,114                           | 43,527                    | 17.9           |
| Census Tract 504; Hawkins County; Tennessee        | 4,872                           | 25,364                    | 17.9           |
| Census Tract 9253.02; Monroe County; Tennessee     | 2,788                           | 22,229                    | 17.9           |
| Census Tract 1102; Morgan County; Tennessee        | 3,232                           | 31,662                    | 17.9           |
| Census Tract 72; Shelby County; Tennessee          | 2,586                           | 64,075                    | 17.9           |
| Census Tract 217.54; Shelby County; Tennessee      | 3,515                           | 29,314                    | 17.9           |
| Census Tract 9703; Claiborne County; Tennessee     | 3,904                           | 23,031                    | 18.0           |
| Census Tract 9709; Claiborne County; Tennessee     | 3,803                           | 25,840                    | 18.0           |
| Census Tract 1017.01; Montgomery County; Tennessee | 2,339                           | 32,018                    | 18.0           |
| Census Tract 5004.02; Grainger County; Tennessee   | 4,237                           | 28,071                    | 18.1           |
| Census Tract 9504; Hickman County; Tennessee       | 1,617                           | 26,648                    | 18.1           |
| Census Tract 54.02; Knox County; Tennessee         | 2,698                           | 30,211                    | 18.1           |
| Census Tract 108.20; Shelby County; Tennessee      | 3,210                           | 25,731                    | 18.1           |
| Census Tract 9351; White County; Tennessee         | 4,923                           | 28,934                    | 18.1           |
| Census Tract 9551; Clay County; Tennessee          | 2,064                           | 25,975                    | 18.2           |
| Census Tract 9307; McNairy County; Tennessee       | 2,578                           | 27,300                    | 18.3           |
| Census Tract 9301; Perry County; Tennessee         | 2,700                           | 30,633                    | 18.3           |
| Census Tract 9250; Van Buren County; Tennessee     | 2,466                           | 25,260                    | 18.3           |
| Census Tract 9354; White County; Tennessee         | 3,044                           | 22,046                    | 18.3           |
| Census Tract 9552; Grundy County; Tennessee        | 3,476                           | 20,009                    | 18.4           |
| Census Tract 308.02; Roane County; Tennessee       | 2,865                           | 24,999                    | 18.4           |
| Census Tract 9502; Wayne County; Tennessee         | 4,405                           | 27,147                    | 18.4           |
| Census Tract 703; Carter County; Tennessee         | 4,981                           | 25,279                    | 18.5           |
| Census Tract 156.37; Davidson County; Tennessee    | 3,174                           | 35,813                    | 18.5           |

| Geography                                          | Population<br>16 Years and Over | Per Capita<br>Income (\$) | Poverty<br>(%) |
|----------------------------------------------------|---------------------------------|---------------------------|----------------|
| Census Tract 914; Greene County; Tennessee         | 2,316                           | 25,173                    | 18.5           |
| Census Tract 1010.01; Montgomery County; Tennessee | 3,342                           | 23,660                    | 18.5           |
| Census Tract 118; Shelby County; Tennessee         | 4,639                           | 31,953                    | 18.5           |
| Census Tract 910.01; Greene County; Tennessee      | 3,530                           | 26,154                    | 18.6           |
| Census Tract 701.02; Jefferson County; Tennessee   | 4,436                           | 32,847                    | 18.6           |
| Census Tract 503.01; Marion County; Tennessee      | 4,506                           | 26,316                    | 18.6           |
| Census Tract 98; Shelby County; Tennessee          | 1,947                           | 24,971                    | 18.6           |
| Census Tract 902; Trousdale County; Tennessee      | 2,438                           | 26,165                    | 18.6           |
| Census Tract 9625; Carroll County; Tennessee       | 2,160                           | 24,347                    | 18.7           |
| Census Tract 9705; Claiborne County; Tennessee     | 2,103                           | 24,422                    | 18.7           |
| Census Tract 46.09; Knox County; Tennessee         | 4,015                           | 30,021                    | 18.7           |
| Census Tract 9504; Campbell County; Tennessee      | 3,631                           | 26,323                    | 18.8           |
| Census Tract 606.01; Dickson County; Tennessee     | 2,956                           | 28,385                    | 18.8           |
| Census Tract 9305.02; McNairy County; Tennessee    | 4,154                           | 23,299                    | 18.8           |
| Census Tract 402.01; Union County; Tennessee       | 3,200                           | 24,396                    | 18.8           |
| Census Tract 9501; Campbell County; Tennessee      | 2,457                           | 19,862                    | 18.9           |
| Census Tract 9602.01; Cannon County; Tennessee     | 1,907                           | 26,194                    | 18.9           |
| Census Tract 1; Knox County; Tennessee             | 2,492                           | 58,958                    | 18.9           |
| Census Tract 1019.06; Montgomery County; Tennessee | 4,638                           | 32,020                    | 18.9           |
| Census Tract 811.01; Sevier County; Tennessee      | 1,124                           | 30,846                    | 18.9           |
| Census Tract 1107; Stewart County; Tennessee       | 3,723                           | 30,345                    | 18.9           |
| Census Tract 9667.01; Gibson County; Tennessee     | 1,649                           | 21,625                    | 19.0           |
| Census Tract 30; Hamilton County; Tennessee        | 1,664                           | 23,888                    | 19.0           |
| Census Tract 502; Lauderdale County; Tennessee     | 2,568                           | 28,386                    | 19.0           |
| Census Tract 703; Jefferson County; Tennessee      | 6,430                           | 27,921                    | 19.1           |
| Census Tract 9252; Monroe County; Tennessee        | 4,207                           | 32,330                    | 19.1           |
| Census Tract 9253.01; Monroe County; Tennessee     | 3,129                           | 20,027                    | 19.1           |
| Census Tract 156.23; Davidson County; Tennessee    | 4,342                           | 33,836                    | 19.2           |
| Census Tract 114.44; Hamilton County; Tennessee    | 3,068                           | 22,882                    | 19.2           |
| Census Tract 9503; Hardeman County; Tennessee      | 3,323                           | 26,060                    | 19.2           |
| Census Tract 1302; Humphreys County; Tennessee     | 1,708                           | 22,361                    | 19.2           |
| Census Tract 217.21; Shelby County; Tennessee      | 3,312                           | 22,789                    | 19.2           |
| Census Tract 9681.02; Weakley County; Tennessee    | 1,463                           | 27,439                    | 19.2           |
| Census Tract 9708; Claiborne County; Tennessee     | 3,047                           | 25,227                    | 19.3           |
| Census Tract 40; Knox County; Tennessee            | 3,937                           | 27,506                    | 19.3           |
| Census Tract 46.15; Knox County; Tennessee         | 3,502                           | 29,056                    | 19.3           |
| Census Tract 9506; Overton County; Tennessee       | 2,347                           | 32,004                    | 19.3           |
| Census Tract 401.06; Rutherford County; Tennessee  | 3,520                           | 22,571                    | 19.3           |
| Census Tract 605.01; Fayette County; Tennessee     | 3,602                           | 30,687                    | 19.4           |
| Census Tract 9601; Franklin County; Tennessee      | 2,958                           | 28,534                    | 19.4           |
| Census Tract 5001; Grainger County; Tennessee      | 3,840                           | 20,195                    | 19.4           |
| Census Tract 903; Greene County; Tennessee         | 4,966                           | 32,230                    | 19.4           |
| Census Tract 30; Knox County; Tennessee            | 4,070                           | 27,360                    | 19.4           |
| Census Tract 59.11; Knox County; Tennessee         | 2,352                           | 32,929                    | 19.4           |
| Census Tract 428.02; Sullivan County; Tennessee    | 3,540                           | 21,143                    | 19.4           |
| Census Tract 911; Greene County; Tennessee         | 2,816                           | 32,639                    | 19.5           |
| Census Tract 18; Knox County; Tennessee            | 2,122                           | 30,531                    | 19.5           |

| Geography                                        | Population<br>16 Years and Over | Per Capita<br>Income (\$) | Poverty<br>(%) |
|--------------------------------------------------|---------------------------------|---------------------------|----------------|
| Census Tract 106.02; Davidson County; Tennessee  | 2,914                           | 28,182                    | 19.6           |
| Census Tract 107; Maury County; Tennessee        | 3,919                           | 22,950                    | 19.6           |
| Census Tract 32; Hamilton County; Tennessee      | 2,886                           | 31,946                    | 19.7           |
| Census Tract 220.24; Shelby County; Tennessee    | 2,464                           | 23,190                    | 19.7           |
| Census Tract 9305; Warren County; Tennessee      | 4,106                           | 22,136                    | 19.7           |
| Census Tract 9352; White County; Tennessee       | 3,471                           | 27,365                    | 19.7           |
| Census Tract 901; Greene County; Tennessee       | 4,999                           | 21,761                    | 19.8           |
| Census Tract 9202; Hardin County; Tennessee      | 4,025                           | 27,491                    | 19.8           |
| Census Tract 3.05; Putnam County; Tennessee      | 2,460                           | 27,676                    | 19.8           |
| Census Tract 9754.01; Rhea County; Tennessee     | 5,870                           | 20,303                    | 19.8           |
| Census Tract 210.20; Shelby County; Tennessee    | 5,007                           | 61,188                    | 19.8           |
| Census Tract 212.02; Anderson County; Tennessee  | 4,140                           | 25,683                    | 19.9           |
| Census Tract 9509; Campbell County; Tennessee    | 2,401                           | 30,628                    | 19.9           |
| Census Tract 9550.04; Decatur County; Tennessee  | 1,967                           | 33,915                    | 19.9           |
| Census Tract 9705; McMinn County; Tennessee      | 3,353                           | 25,315                    | 19.9           |
| Census Tract 156.34; Davidson County; Tennessee  | 8,893                           | 29,465                    | 20.0           |
| Census Tract 23; Hamilton County; Tennessee      | 1,099                           | 18,967                    | 20.0           |
| Census Tract 9504; Overton County; Tennessee     | 1,826                           | 25,908                    | 20.0           |
| Census Tract 801; Unicoi County; Tennessee       | 2,025                           | 27,468                    | 20.0           |
| Census Tract 210.01; Anderson County; Tennessee  | 2,093                           | 25,812                    | 20.1           |
| Census Tract 9620; Carroll County; Tennessee     | 3,449                           | 26,755                    | 20.1           |
| Census Tract 109; Maury County; Tennessee        | 2,720                           | 29,092                    | 20.1           |
| Census Tract 9624; Carroll County; Tennessee     | 2,046                           | 23,452                    | 20.2           |
| Census Tract 158.04; Davidson County; Tennessee  | 4,005                           | 28,653                    | 20.2           |
| Census Tract 28; Knox County; Tennessee          | 3,386                           | 21,691                    | 20.2           |
| Census Tract 37; Knox County; Tennessee          | 2,526                           | 44,866                    | 20.2           |
| Census Tract 9750; Scott County; Tennessee       | 3,247                           | 24,382                    | 20.2           |
| Census Tract 602; Sequatchie County; Tennessee   | 3,876                           | 29,818                    | 20.2           |
| Census Tract 206.10; Shelby County; Tennessee    | 3,199                           | 25,473                    | 20.2           |
| Census Tract 403; Sullivan County; Tennessee     | 2,131                           | 30,279                    | 20.2           |
| Census Tract 402.02; Union County; Tennessee     | 4,941                           | 25,848                    | 20.2           |
| Census Tract 9602.02; Cannon County; Tennessee   | 3,435                           | 30,144                    | 20.3           |
| Census Tract 502.03; Marion County; Tennessee    | 2,275                           | 22,391                    | 20.3           |
| Census Tract 104.02; Maury County; Tennessee     | 1,990                           | 27,543                    | 20.3           |
| Census Tract 9659; Obion County; Tennessee       | 1,149                           | 23,850                    | 20.3           |
| Census Tract 303.01; Roane County; Tennessee     | 2,708                           | 42,957                    | 20.3           |
| Census Tract 9701; Claiborne County; Tennessee   | 2,118                           | 21,493                    | 20.4           |
| Census Tract 9707; Claiborne County; Tennessee   | 4,734                           | 22,643                    | 20.4           |
| Census Tract 402; Tipton County; Tennessee       | 1,683                           | 23,734                    | 20.4           |
| Census Tract 9255.04; Monroe County; Tennessee   | 1,606                           | 27,982                    | 20.5           |
| Census Tract 223.22; Shelby County; Tennessee    | 3,044                           | 24,869                    | 20.5           |
| Census Tract 9704; Claiborne County; Tennessee   | 575                             | 20,598                    | 20.6           |
| Census Tract 5004.01; Grainger County; Tennessee | 2,256                           | 20,075                    | 20.6           |
| Census Tract 602.01; Loudon County; Tennessee    | 3,734                           | 27,123                    | 20.6           |
| Census Tract 9614; Crockett County; Tennessee    | 2,910                           | 32,501                    | 20.7           |
| Census Tract 205.42; Shelby County; Tennessee    | 4,458                           | 18,529                    | 20.7           |
| Census Tract 9306; Warren County; Tennessee      | 2,927                           | 27,929                    | 20.7           |

| Geography                                          | Population<br>16 Years and Over | Per Capita<br>Income (\$) | Poverty<br>(%) |
|----------------------------------------------------|---------------------------------|---------------------------|----------------|
| Census Tract 109.02; Hamilton County; Tennessee    | 620                             | 34,290                    | 20.8           |
| Census Tract 222.10; Shelby County; Tennessee      | 3,592                           | 23,054                    | 20.8           |
| Census Tract 223.21; Shelby County; Tennessee      | 2,760                           | 20,528                    | 20.8           |
| Census Tract 804; Unicoi County; Tennessee         | 3,514                           | 26,044                    | 20.8           |
| Census Tract 9621.02; Carroll County; Tennessee    | 2,851                           | 30,192                    | 20.9           |
| Census Tract 158.06; Davidson County; Tennessee    | 3,348                           | 22,332                    | 20.9           |
| Census Tract 9550.01; Decatur County; Tennessee    | 1,523                           | 29,706                    | 20.9           |
| Census Tract 1017.02; Montgomery County; Tennessee | 4,520                           | 30,859                    | 20.9           |
| Census Tract 9612; Crockett County; Tennessee      | 1,401                           | 32,182                    | 21.0           |
| Census Tract 174.02; Davidson County; Tennessee    | 4,831                           | 37,292                    | 21.0           |
| Census Tract 9203; DeKalb County; Tennessee        | 4,301                           | 29,347                    | 21.0           |
| Census Tract 1004; Hamblen County; Tennessee       | 5,487                           | 25,751                    | 21.0           |
| Census Tract 505.01; Hawkins County; Tennessee     | 3,300                           | 28,792                    | 21.0           |
| Census Tract 9502.01; Hickman County; Tennessee    | 3,363                           | 27,360                    | 21.0           |
| Census Tract 9505.01; Overton County; Tennessee    | 3,557                           | 32,282                    | 21.0           |
| Census Tract 714; Carter County; Tennessee         | 2,592                           | 27,901                    | 21.1           |
| Census Tract 9702.01; Coffee County; Tennessee     | 3,132                           | 26,160                    | 21.1           |
| Census Tract 156.28; Davidson County; Tennessee    | 2,972                           | 26,964                    | 21.1           |
| Census Tract 49; Knox County; Tennessee            | 4,712                           | 32,086                    | 21.1           |
| Census Tract 16.05; Madison County; Tennessee      | 2,877                           | 32,418                    | 21.1           |
| Census Tract 201.01; Shelby County; Tennessee      | 2,675                           | 24,292                    | 21.1           |
| Census Tract 9682.01; Weakley County; Tennessee    | 3,247                           | 32,278                    | 21.1           |
| Census Tract 9650; Fentress County; Tennessee      | 3,012                           | 24,756                    | 21.2           |
| Census Tract 15; Knox County; Tennessee            | 2,952                           | 33,119                    | 21.2           |
| Census Tract 16.07; Madison County; Tennessee      | 4,218                           | 31,161                    | 21.2           |
| Census Tract 110.04; Maury County; Tennessee       | 3,178                           | 31,567                    | 21.2           |
| Census Tract 1021; Montgomery County; Tennessee    | 3,939                           | 32,581                    | 21.2           |
| Census Tract 414.01; Rutherford County; Tennessee  | 5,385                           | 39,640                    | 21.2           |
| Census Tract 81.20; Shelby County; Tennessee       | 4,366                           | 22,526                    | 21.2           |
| Census Tract 619.04; Washington County; Tennessee  | 3,163                           | 28,068                    | 21.2           |
| Census Tract 9631; Benton County; Tennessee        | 2,684                           | 30,759                    | 21.3           |
| Census Tract 9503.01; Overton County; Tennessee    | 4,000                           | 27,191                    | 21.3           |
| Census Tract 601.04; Sequatchie County; Tennessee  | 3,782                           | 22,159                    | 21.3           |
| Census Tract 804.02; Sevier County; Tennessee      | 2,835                           | 24,637                    | 21.3           |
| Census Tract 9643; Dyer County; Tennessee          | 4,429                           | 27,727                    | 21.4           |
| Census Tract 9665.02; Gibson County; Tennessee     | 2,582                           | 31,681                    | 21.4           |
| Census Tract 1104; Morgan County; Tennessee        | 3,210                           | 37,306                    | 21.4           |
| Census Tract 428.01; Sullivan County; Tennessee    | 2,071                           | 29,795                    | 21.4           |
| Census Tract 5003.01; Grainger County; Tennessee   | 2,657                           | 26,577                    | 21.5           |
| Census Tract 9702; Lewis County; Tennessee         | 6,227                           | 26,903                    | 21.5           |
| Census Tract 13; Madison County; Tennessee         | 4,848                           | 24,390                    | 21.5           |
| Census Tract 7; Putnam County; Tennessee           | 2,842                           | 22,975                    | 21.5           |
| Census Tract 806.01; Sevier County; Tennessee      | 3,488                           | 31,546                    | 21.5           |
| Census Tract 9752; Smith County; Tennessee         | 4,772                           | 29,787                    | 21.5           |
| Census Tract 9355; White County; Tennessee         | 2,985                           | 22,246                    | 21.5           |
| Census Tract 304.02; Wilson County; Tennessee      | 3,504                           | 26,960                    | 21.5           |
| Census Tract 9704.02; Coffee County; Tennessee     | 4,362                           | 23,781                    | 21.6           |

| Geography                                          | Population<br>16 Years and Over | Per Capita<br>Income (\$) | Poverty<br>(%) |
|----------------------------------------------------|---------------------------------|---------------------------|----------------|
| Census Tract 905.02; Greene County; Tennessee      | 1,313                           | 41,538                    | 21.6           |
| Census Tract 1003; Montgomery County; Tennessee    | 4,625                           | 30,274                    | 21.7           |
| Census Tract 417; Sullivan County; Tennessee       | 2,930                           | 33,372                    | 21.7           |
| Census Tract 608; Washington County; Tennessee     | 2,264                           | 34,133                    | 21.7           |
| Census Tract 9662; Gibson County; Tennessee        | 2,761                           | 22,360                    | 21.8           |
| Census Tract 1011.02; Montgomery County; Tennessee | 6,764                           | 22,175                    | 21.8           |
| Census Tract 9501; Wayne County; Tennessee         | 3,859                           | 20,247                    | 21.8           |
| Census Tract 9703.01; Chester County; Tennessee    | 1,247                           | 25,584                    | 21.9           |
| Census Tract 9705.01; Cumberland County; Tennessee | 2,520                           | 26,631                    | 21.9           |
| Census Tract 9606; Franklin County; Tennessee      | 3,742                           | 24,887                    | 21.9           |
| Census Tract 9551; Grundy County; Tennessee        | 1,424                           | 26,993                    | 21.9           |
| Census Tract 202.02; Anderson County; Tennessee    | 3,828                           | 36,502                    | 22.0           |
| Census Tract 15.01; Madison County; Tennessee      | 4,055                           | 28,874                    | 22.0           |
| Census Tract 803.02; Robertson County; Tennessee   | 2,532                           | 22,171                    | 22.0           |
| Census Tract 79; Shelby County; Tennessee          | 3,841                           | 21,454                    | 22.0           |
| Census Tract 9502; Campbell County; Tennessee      | 1,844                           | 26,047                    | 22.1           |
| Census Tract 144; Davidson County; Tennessee       | 2,553                           | 40,562                    | 22.1           |
| Census Tract 416.02; Rutherford County; Tennessee  | 2,333                           | 38,853                    | 22.1           |
| Census Tract 93; Shelby County; Tennessee          | 3,312                           | 45,132                    | 22.1           |
| Census Tract 217.55; Shelby County; Tennessee      | 1,233                           | 30,819                    | 22.1           |
| Census Tract 712; Carter County; Tennessee         | 3,050                           | 24,141                    | 22.2           |
| Census Tract 709; Carter County; Tennessee         | 3,313                           | 25,527                    | 22.3           |
| Census Tract 158.05; Davidson County; Tennessee    | 2,183                           | 25,958                    | 22.4           |
| Census Tract 9604.01; Lawrence County; Tennessee   | 4,348                           | 35,350                    | 22.4           |
| Census Tract 421.02; Rutherford County; Tennessee  | 3,458                           | 21,024                    | 22.4           |
| Census Tract 88; Shelby County; Tennessee          | 4,913                           | 16,186                    | 22.4           |
| Census Tract 9702; Chester County; Tennessee       | 4,355                           | 17,993                    | 22.6           |
| Census Tract 9754; Henderson County; Tennessee     | 3,738                           | 23,697                    | 22.6           |
| Census Tract 9603; Lawrence County; Tennessee      | 4,200                           | 21,667                    | 22.6           |
| Census Tract 602.04; Loudon County; Tennessee      | 4,270                           | 25,936                    | 22.6           |
| Census Tract 804.01; Robertson County; Tennessee   | 4,228                           | 27,105                    | 22.6           |
| Census Tract 9753; Scott County; Tennessee         | 1,940                           | 25,511                    | 22.6           |
| Census Tract 15; Shelby County; Tennessee          | 1,553                           | 25,337                    | 22.6           |
| Census Tract 804.02; Robertson County; Tennessee   | 3,998                           | 26,770                    | 22.7           |
| Census Tract 9203.01; Giles County; Tennessee      | 3,830                           | 29,079                    | 22.8           |
| Census Tract 1008; Hamblen County; Tennessee       | 2,238                           | 25,267                    | 22.8           |
| Census Tract 9205.02; Hardin County; Tennessee     | 1,272                           | 20,101                    | 22.8           |
| Census Tract 913; Greene County; Tennessee         | 3,746                           | 25,016                    | 22.9           |
| Census Tract 166; Davidson County; Tennessee       | 3,395                           | 50,299                    | 23.0           |
| Census Tract 73; Shelby County; Tennessee          | 3,817                           | 28,706                    | 23.0           |
| Census Tract 205.31; Shelby County; Tennessee      | 3,799                           | 18,174                    | 23.0           |
| Census Tract 9510; Campbell County; Tennessee      | 1,828                           | 21,738                    | 23.1           |
| Census Tract 9707; Coffee County; Tennessee        | 3,853                           | 27,568                    | 23.1           |
| Census Tract 9602; Jackson County; Tennessee       | 1,912                           | 26,602                    | 23.1           |
| Census Tract 9703; McMinn County; Tennessee        | 3,126                           | 27,702                    | 23.1           |
| Census Tract 9304; McNairy County; Tennessee       | 1,728                           | 24,073                    | 23.1           |
| Census Tract 227; Shelby County; Tennessee         | 6,148                           | 18,465                    | 23.1           |

| Geography                                          | Population<br>16 Years and Over | Per Capita<br>Income (\$) | Poverty<br>(%) |
|----------------------------------------------------|---------------------------------|---------------------------|----------------|
| Census Tract 407; Tipton County; Tennessee         | 3,931                           | 23,847                    | 23.1           |
| Census Tract 9530; Bledsoe County; Tennessee       | 3,664                           | 24,107                    | 23.2           |
| Census Tract 9701; Coffee County; Tennessee        | 2,965                           | 26,010                    | 23.2           |
| Census Tract 9303.01; Haywood County; Tennessee    | 3,415                           | 27,168                    | 23.3           |
| Census Tract 9251.01; Monroe County; Tennessee     | 3,708                           | 24,157                    | 23.3           |
| Census Tract 1012.01; Montgomery County; Tennessee | 1,778                           | 26,771                    | 23.3           |
| Census Tract 308; Wilson County; Tennessee         | 5,602                           | 27,710                    | 23.3           |
| Census Tract 189.05; Davidson County; Tennessee    | 2,440                           | 36,854                    | 23.4           |
| Census Tract 9646; Dyer County; Tennessee          | 2,046                           | 29,916                    | 23.4           |
| Census Tract 9563; Johnson County; Tennessee       | 4,812                           | 24,511                    | 23.4           |
| Census Tract 505.04; Lauderdale County; Tennessee  | 1,945                           | 22,637                    | 23.5           |
| Census Tract 60; Shelby County; Tennessee          | 1,487                           | 18,912                    | 23.5           |
| Census Tract 9309; Warren County; Tennessee        | 1,730                           | 24,342                    | 23.5           |
| Census Tract 419; Sullivan County; Tennessee       | 2,959                           | 29,519                    | 23.6           |
| Census Tract 605.01; Washington County; Tennessee  | 3,804                           | 23,341                    | 23.6           |
| Census Tract 9652.02; Fentress County; Tennessee   | 2,503                           | 25,374                    | 23.7           |
| Census Tract 217.58; Shelby County; Tennessee      | 2,463                           | 22,457                    | 23.7           |
| Census Tract 221.21; Shelby County; Tennessee      | 3,648                           | 28,223                    | 23.7           |
| Census Tract 127.02; Davidson County; Tennessee    | 2,317                           | 29,411                    | 23.8           |
| Census Tract 9205.01; Hardin County; Tennessee     | 3,179                           | 23,951                    | 23.8           |
| Census Tract 9561; Johnson County; Tennessee       | 3,557                           | 20,270                    | 23.8           |
| Census Tract 2; Madison County; Tennessee          | 4,602                           | 27,771                    | 23.8           |
| Census Tract 9602; Meigs County; Tennessee         | 4,067                           | 23,982                    | 23.8           |
| Census Tract 9703.01; Macon County; Tennessee      | 3,352                           | 18,446                    | 23.9           |
| Census Tract 221.22; Shelby County; Tennessee      | 3,302                           | 25,085                    | 23.9           |
| Census Tract 614.04; Washington County; Tennessee  | 2,983                           | 60,045                    | 23.9           |
| Census Tract 156.13; Davidson County; Tennessee    | 4,123                           | 20,478                    | 24.0           |
| Census Tract 182.04; Davidson County; Tennessee    | 2,578                           | 36,894                    | 24.0           |
| Census Tract 124; Hamilton County; Tennessee       | 5,937                           | 25,835                    | 24.0           |
| Census Tract 503.02; Marion County; Tennessee      | 2,569                           | 35,518                    | 24.0           |
| Census Tract 9504; Wayne County; Tennessee         | 2,770                           | 36,132                    | 24.0           |
| Census Tract 1103; Morgan County; Tennessee        | 4,770                           | 15,948                    | 24.1           |
| Census Tract 9506.01; Campbell County; Tennessee   | 1,844                           | 20,297                    | 24.2           |
| Census Tract 104.03; Davidson County; Tennessee    | 3,223                           | 18,791                    | 24.2           |
| Census Tract 502.01; Marion County; Tennessee      | 3,311                           | 26,700                    | 24.2           |
| Census Tract 205.32; Shelby County; Tennessee      | 4,990                           | 27,384                    | 24.2           |
| Census Tract 408; Sullivan County; Tennessee       | 3,050                           | 27,525                    | 24.2           |
| Census Tract 9550; Clay County; Tennessee          | 4,144                           | 21,440                    | 24.3           |
| Census Tract 143; Davidson County; Tennessee       | 1,353                           | 27,164                    | 24.3           |
| Census Tract 9302; Haywood County; Tennessee       | 1,198                           | 31,407                    | 24.3           |
| Census Tract 39.02; Knox County; Tennessee         | 2,646                           | 18,941                    | 24.3           |
| Census Tract 67; Knox County; Tennessee            | 2,182                           | 29,416                    | 24.3           |
| Census Tract 414.07; Rutherford County; Tennessee  | 4,583                           | 48,250                    | 24.3           |
| Census Tract 11; Shelby County; Tennessee          | 2,067                           | 14,947                    | 24.3           |
| Census Tract 211.11; Shelby County; Tennessee      | 2,963                           | 21,892                    | 24.3           |
| Census Tract 113.02; Bradley County; Tennessee     | 2,012                           | 32,392                    | 24.4           |
| Census Tract 9694; Henry County; Tennessee         | 1,539                           | 30,518                    | 24.4           |



| Geography                                          | Population<br>16 Years and Over | Per Capita<br>Income (\$) | Poverty<br>(%) |
|----------------------------------------------------|---------------------------------|---------------------------|----------------|
| Census Tract 204; Anderson County; Tennessee       | 3,406                           | 31,312                    | 24.5           |
| Census Tract 205; Anderson County; Tennessee       | 3,146                           | 24,072                    | 24.5           |
| Census Tract 24; Knox County; Tennessee            | 3,619                           | 22,536                    | 24.5           |
| Census Tract 409; Sullivan County; Tennessee       | 2,832                           | 44,349                    | 24.5           |
| Census Tract 9698; Henry County; Tennessee         | 1,911                           | 22,876                    | 24.6           |
| Census Tract 9305.01; McNairy County; Tennessee    | 1,869                           | 21,683                    | 24.6           |
| Census Tract 421.01; Rutherford County; Tennessee  | 4,248                           | 22,893                    | 24.6           |
| Census Tract 195.01; Davidson County; Tennessee    | 2,540                           | 73,440                    | 24.7           |
| Census Tract 9551.01; Decatur County; Tennessee    | 1,512                           | 22,554                    | 24.7           |
| Census Tract 9605; Franklin County; Tennessee      | 3,427                           | 31,366                    | 24.8           |
| Census Tract 116; Hamilton County; Tennessee       | 5,401                           | 27,237                    | 24.8           |
| Census Tract 123; Hamilton County; Tennessee       | 3,142                           | 24,547                    | 24.8           |
| Census Tract 221.30; Shelby County; Tennessee      | 4,059                           | 26,726                    | 24.8           |
| Census Tract 203; Sumner County; Tennessee         | 4,220                           | 25,249                    | 24.8           |
| Census Tract 710; Carter County; Tennessee         | 2,115                           | 24,374                    | 24.9           |
| Census Tract 507; Hawkins County; Tennessee        | 2,973                           | 24,409                    | 25.0           |
| Census Tract 9670.02; Gibson County; Tennessee     | 2,739                           | 23,301                    | 25.1           |
| Census Tract 221.32; Shelby County; Tennessee      | 2,038                           | 28,668                    | 25.1           |
| Census Tract 9667.02; Gibson County; Tennessee     | 2,467                           | 19,779                    | 25.2           |
| Census Tract 9692; Henry County; Tennessee         | 1,571                           | 23,221                    | 25.2           |
| Census Tract 9251.02; Pickett County; Tennessee    | 1,796                           | 21,491                    | 25.2           |
| Census Tract 803.01; Robertson County; Tennessee   | 2,132                           | 24,451                    | 25.2           |
| Census Tract 221.11; Shelby County; Tennessee      | 4,003                           | 30,131                    | 25.2           |
| Census Tract 156.20; Davidson County; Tennessee    | 5,152                           | 26,205                    | 25.3           |
| Census Tract 165; Davidson County; Tennessee       | 4,551                           | 15,784                    | 25.4           |
| Census Tract 9550; Grundy County; Tennessee        | 2,070                           | 28,734                    | 25.4           |
| Census Tract 107; Bradley County; Tennessee        | 3,801                           | 18,045                    | 25.5           |
| Census Tract 807.02; Sevier County; Tennessee      | 4,491                           | 20,352                    | 25.5           |
| Census Tract 46; Shelby County; Tennessee          | 1,088                           | 22,490                    | 25.6           |
| Census Tract 606.01; Washington County; Tennessee  | 3,032                           | 35,196                    | 25.6           |
| Census Tract 610; Washington County; Tennessee     | 1,875                           | 22,921                    | 25.6           |
| Census Tract 107.02; Davidson County; Tennessee    | 2,689                           | 31,152                    | 25.7           |
| Census Tract 9564; Johnson County; Tennessee       | 4,034                           | 25,082                    | 25.7           |
| Census Tract 609.02; Washington County; Tennessee  | 2,439                           | 18,698                    | 25.7           |
| Census Tract 9304; Haywood County; Tennessee       | 2,745                           | 22,045                    | 25.8           |
| Census Tract 27; Shelby County; Tennessee          | 1,433                           | 35,397                    | 25.8           |
| Census Tract 66; Knox County; Tennessee            | 2,913                           | 50,648                    | 25.9           |
| Census Tract 6; Madison County; Tennessee          | 1,506                           | 30,598                    | 25.9           |
| Census Tract 9705.02; Cumberland County; Tennessee | 3,315                           | 21,774                    | 26.0           |
| Census Tract 156.18; Davidson County; Tennessee    | 5,673                           | 29,926                    | 26.0           |
| Census Tract 427.04; Sullivan County; Tennessee    | 1,924                           | 23,695                    | 26.0           |
| Census Tract 208; Anderson County; Tennessee       | 3,815                           | 28,234                    | 26.1           |
| Census Tract 190.08; Davidson County; Tennessee    | 3,891                           | 23,136                    | 26.2           |
| Census Tract 109.04; Hamilton County; Tennessee    | 2,497                           | 41,663                    | 26.2           |
| Census Tract 226; Shelby County; Tennessee         | 2,940                           | 19,152                    | 26.2           |
| Census Tract 19; Knox County; Tennessee            | 1,163                           | 21,404                    | 26.3           |
| Census Tract 9751; Henderson County; Tennessee     | 3,137                           | 22,473                    | 26.4           |



| Geography                                         | Population<br>16 Years and Over | Per Capita<br>Income (\$) | Poverty<br>(%) |
|---------------------------------------------------|---------------------------------|---------------------------|----------------|
| Census Tract 118; Davidson County; Tennessee      | 2,239                           | 47,881                    | 26.5           |
| Census Tract 190.03; Davidson County; Tennessee   | 2,878                           | 20,475                    | 26.5           |
| Census Tract 9605; Hancock County; Tennessee      | 2,083                           | 29,388                    | 26.5           |
| Census Tract 102.20; Shelby County; Tennessee     | 5,112                           | 20,638                    | 26.5           |
| Census Tract 612; Washington County; Tennessee    | 3,244                           | 31,372                    | 26.5           |
| Census Tract 9710.01; Coffee County; Tennessee    | 1,018                           | 43,787                    | 26.6           |
| Census Tract 509; Hawkins County; Tennessee       | 2,602                           | 22,219                    | 26.6           |
| Census Tract 9701; Macon County; Tennessee        | 3,807                           | 21,842                    | 26.6           |
| Census Tract 1; Putnam County; Tennessee          | 4,217                           | 23,045                    | 26.6           |
| Census Tract 613.01; Washington County; Tennessee | 2,592                           | 30,255                    | 26.6           |
| Census Tract 190.04; Davidson County; Tennessee   | 2,990                           | 18,934                    | 26.8           |
| Census Tract 9753.02; Henderson County; Tennessee | 3,036                           | 22,694                    | 26.8           |
| Census Tract 25; Shelby County; Tennessee         | 2,362                           | 29,235                    | 26.8           |
| Census Tract 1001; Hamblen County; Tennessee      | 4,735                           | 20,317                    | 26.9           |
| Census Tract 102.10; Shelby County; Tennessee     | 4,119                           | 19,730                    | 27.0           |
| Census Tract 9205.01; Cocke County; Tennessee     | 5,065                           | 24,546                    | 27.1           |
| Census Tract 505.05; Lauderdale County; Tennessee | 2,787                           | 22,087                    | 27.1           |
| Census Tract 100.02; Shelby County; Tennessee     | 2,312                           | 19,656                    | 27.1           |
| Census Tract 9307; Warren County; Tennessee       | 3,810                           | 26,388                    | 27.1           |
| Census Tract 9604; Jackson County; Tennessee      | 1,622                           | 24,492                    | 27.2           |
| Census Tract 308.01; Roane County; Tennessee      | 1,501                           | 25,204                    | 27.2           |
| Census Tract 36; Shelby County; Tennessee         | 1,470                           | 42,436                    | 27.2           |
| Census Tract 80; Shelby County; Tennessee         | 3,451                           | 22,863                    | 27.2           |
| Census Tract 9504.02; Bedford County; Tennessee   | 5,137                           | 20,946                    | 27.3           |
| Census Tract 9632; Benton County; Tennessee       | 1,669                           | 27,014                    | 27.3           |
| Census Tract 181.01; Davidson County; Tennessee   | 3,630                           | 41,748                    | 27.3           |
| Census Tract 912; Greene County; Tennessee        | 2,886                           | 23,101                    | 27.3           |
| Census Tract 156.32; Davidson County; Tennessee   | 3,250                           | 37,911                    | 27.5           |
| Census Tract 9602; Lake County; Tennessee         | 1,799                           | 20,249                    | 27.6           |
| Census Tract 9501; Polk County; Tennessee         | 1,244                           | 27,744                    | 27.6           |
| Census Tract 20; Shelby County; Tennessee         | 1,136                           | 22,107                    | 27.6           |
| Census Tract 217.56; Shelby County; Tennessee     | 1,613                           | 31,405                    | 27.7           |
| Census Tract 9503; Campbell County; Tennessee     | 1,578                           | 21,828                    | 27.8           |
| Census Tract 9644.01; Dyer County; Tennessee      | 2,193                           | 24,017                    | 27.8           |
| Census Tract 9693; Henry County; Tennessee        | 2,274                           | 23,795                    | 27.8           |
| Census Tract 24; Shelby County; Tennessee         | 1,426                           | 23,218                    | 28.1           |
| Census Tract 110.10; Shelby County; Tennessee     | 2,427                           | 20,913                    | 28.1           |
| Census Tract 213.04; Anderson County; Tennessee   | 2,764                           | 25,852                    | 28.2           |
| Census Tract 503.02; Hawkins County; Tennessee    | 3,203                           | 24,213                    | 28.2           |
| Census Tract 9601; Lake County; Tennessee         | 4,219                           | 19,402                    | 28.3           |
| Census Tract 701; Carter County; Tennessee        | 1,745                           | 25,405                    | 28.4           |
| Census Tract 119; Davidson County; Tennessee      | 2,264                           | 36,753                    | 28.6           |
| Census Tract 506; Lauderdale County; Tennessee    | 1,935                           | 18,358                    | 28.6           |
| Census Tract 8; Putnam County; Tennessee          | 5,702                           | 14,534                    | 28.6           |
| Census Tract 808.01; Sevier County; Tennessee     | 2,166                           | 19,888                    | 28.6           |
| Census Tract 9532; Bledsoe County; Tennessee      | 3,966                           | 21,455                    | 28.8           |
| Census Tract 1; Madison County; Tennessee         | 3,068                           | 31,128                    | 28.8           |

| Geography                                         | Population<br>16 Years and Over | Per Capita<br>Income (\$) | Poverty<br>(%) |
|---------------------------------------------------|---------------------------------|---------------------------|----------------|
| Census Tract 19; Hamilton County; Tennessee       | 2,550                           | 22,501                    | 28.9           |
| Census Tract 46.10; Knox County; Tennessee        | 3,608                           | 27,262                    | 28.9           |
| Census Tract 9702.02; McMinn County; Tennessee    | 2,942                           | 22,841                    | 28.9           |
| Census Tract 9751.02; Scott County; Tennessee     | 3,347                           | 24,424                    | 28.9           |
| Census Tract 20; Knox County; Tennessee           | 2,311                           | 19,753                    | 29.0           |
| Census Tract 421; Sullivan County; Tennessee      | 4,456                           | 34,168                    | 29.0           |
| Census Tract 9695.02; Henry County; Tennessee     | 3,121                           | 25,273                    | 29.1           |
| Census Tract 403.05; Rutherford County; Tennessee | 2,039                           | 19,313                    | 29.1           |
| Census Tract 97; Shelby County; Tennessee         | 1,796                           | 18,210                    | 29.1           |
| Census Tract 107.10; Shelby County; Tennessee     | 3,101                           | 20,239                    | 29.2           |
| Census Tract 13; Hamilton County; Tennessee       | 1,685                           | 29,051                    | 29.3           |
| Census Tract 107.20; Shelby County; Tennessee     | 2,394                           | 23,132                    | 29.3           |
| Census Tract 1101; Morgan County; Tennessee       | 2,392                           | 24,905                    | 29.4           |
| Census Tract 109.04; Davidson County; Tennessee   | 2,363                           | 23,270                    | 29.5           |
| Census Tract 419; Rutherford County; Tennessee    | 3,354                           | 22,885                    | 29.5           |
| Census Tract 62; Shelby County; Tennessee         | 1,462                           | 19,566                    | 29.6           |
| Census Tract 68; Shelby County; Tennessee         | 1,422                           | 18,801                    | 29.6           |
| Census Tract 220.23; Shelby County; Tennessee     | 1,552                           | 22,180                    | 29.7           |
| Census Tract 34; Hamilton County; Tennessee       | 3,309                           | 26,368                    | 29.8           |
| Census Tract 10; Madison County; Tennessee        | 1,674                           | 17,872                    | 29.9           |
| Census Tract 3; Shelby County; Tennessee          | 530                             | 13,353                    | 29.9           |
| Census Tract 405; Sullivan County; Tennessee      | 3,768                           | 20,186                    | 30.0           |
| Census Tract 29; Hamilton County; Tennessee       | 2,254                           | 31,649                    | 30.1           |
| Census Tract 136; Davidson County; Tennessee      | 4,860                           | 19,266                    | 30.2           |
| Census Tract 21; Shelby County; Tennessee         | 1,022                           | 19,187                    | 30.2           |
| Census Tract 105; Maury County; Tennessee         | 3,444                           | 23,310                    | 30.3           |
| Census Tract 56; Shelby County; Tennessee         | 3,191                           | 19,814                    | 30.3           |
| Census Tract 601.03; Sequatchie County; Tennessee | 3,459                           | 22,114                    | 30.4           |
| Census Tract 102.02; Bradley County; Tennessee    | 2,130                           | 39,023                    | 30.5           |
| Census Tract 1002; Hamblen County; Tennessee      | 4,676                           | 19,008                    | 30.5           |
| Census Tract 414.06; Rutherford County; Tennessee | 4,206                           | 33,643                    | 30.5           |
| Census Tract 9752; Scott County; Tennessee        | 4,896                           | 18,174                    | 30.6           |
| Census Tract 12; Shelby County; Tennessee         | 2,417                           | 19,700                    | 30.6           |
| Census Tract 156.14; Davidson County; Tennessee   | 3,098                           | 29,985                    | 30.8           |
| Census Tract 9680; Weakley County; Tennessee      | 913                             | 24,253                    | 30.8           |
| Census Tract 156.15; Davidson County; Tennessee   | 4,268                           | 16,747                    | 31.0           |
| Census Tract 108; Blount County; Tennessee        | 2,398                           | 25,994                    | 31.1           |
| Census Tract 108; Bradley County; Tennessee       | 2,530                           | 18,159                    | 31.1           |
| Census Tract 706; Carter County; Tennessee        | 2,153                           | 25,710                    | 31.1           |
| Census Tract 9601; Jackson County; Tennessee      | 1,650                           | 24,725                    | 31.1           |
| Census Tract 57; Shelby County; Tennessee         | 1,942                           | 16,175                    | 31.1           |
| Census Tract 220.26; Shelby County; Tennessee     | 1,268                           | 18,132                    | 31.1           |
| Census Tract 402; Sullivan County; Tennessee      | 1,872                           | 25,726                    | 31.1           |
| Census Tract 194.01; Davidson County; Tennessee   | 2,772                           | 58,752                    | 31.2           |
| Census Tract 67; Shelby County; Tennessee         | 2,794                           | 19,059                    | 31.2           |
| Census Tract 191.08; Davidson County; Tennessee   | 2,249                           | 19,373                    | 31.3           |
| Census Tract 9303.02; Haywood County; Tennessee   | 2,384                           | 19,697                    | 31.7           |

| Geography                                         | Population<br>16 Years and Over | Per Capita<br>Income (\$) | Poverty<br>(%) |
|---------------------------------------------------|---------------------------------|---------------------------|----------------|
| Census Tract 620; Washington County; Tennessee    | 3,860                           | 24,103                    | 31.8           |
| Census Tract 9202.01; DeKalb County; Tennessee    | 4,099                           | 19,561                    | 31.9           |
| Census Tract 138; Davidson County; Tennessee      | 1,368                           | 23,519                    | 32.0           |
| Census Tract 113; Shelby County; Tennessee        | 1,042                           | 29,949                    | 32.1           |
| Census Tract 9656; Obion County; Tennessee        | 2,931                           | 19,717                    | 32.2           |
| Census Tract 128.01; Davidson County; Tennessee   | 4,099                           | 28,048                    | 32.3           |
| Census Tract 9651; Fentress County; Tennessee     | 3,575                           | 19,006                    | 32.3           |
| Census Tract 304.01; Roane County; Tennessee      | 2,231                           | 23,599                    | 32.3           |
| Census Tract 9531.02; Bledsoe County; Tennessee   | 3,562                           | 23,061                    | 32.4           |
| Census Tract 24; Hamilton County; Tennessee       | 3,224                           | 21,650                    | 32.4           |
| Census Tract 9702.01; McMinn County; Tennessee    | 1,768                           | 20,531                    | 32.4           |
| Census Tract 112; Shelby County; Tennessee        | 782                             | 16,666                    | 32.4           |
| Census Tract 9682.03; Weakley County; Tennessee   | 2,689                           | 23,562                    | 32.4           |
| Census Tract 103; Shelby County; Tennessee        | 955                             | 15,050                    | 32.6           |
| Census Tract 7; Madison County; Tennessee         | 2,590                           | 22,257                    | 32.7           |
| Census Tract 9507.02; Campbell County; Tennessee  | 2,205                           | 23,340                    | 32.8           |
| Census Tract 704; Carter County; Tennessee        | 1,528                           | 20,303                    | 33.1           |
| Census Tract 606.02; Washington County; Tennessee | 3,680                           | 28,106                    | 33.3           |
| Census Tract 11; Hamilton County; Tennessee       | 1,572                           | 28,786                    | 33.4           |
| Census Tract 9506.02; Campbell County; Tennessee  | 1,724                           | 27,882                    | 33.8           |
| Census Tract 1002; Montgomery County; Tennessee   | 1,235                           | 22,032                    | 33.8           |
| Census Tract 106.20; Shelby County; Tennessee     | 2,365                           | 16,387                    | 33.8           |
| Census Tract 14; Knox County; Tennessee           | 1,738                           | 13,696                    | 34.0           |
| Census Tract 65; Shelby County; Tennessee         | 1,634                           | 20,655                    | 34.0           |
| Census Tract 109.03; Davidson County; Tennessee   | 5,092                           | 25,130                    | 34.1           |
| Census Tract 27; Knox County; Tennessee           | 1,640                           | 16,796                    | 34.1           |
| Census Tract 810.02; Sevier County; Tennessee     | 2,205                           | 25,039                    | 34.1           |
| Census Tract 4; Madison County; Tennessee         | 2,418                           | 19,834                    | 34.2           |
| Census Tract 9605.01; Lawrence County; Tennessee  | 3,788                           | 19,126                    | 34.5           |
| Census Tract 601; Washington County; Tennessee    | 3,359                           | 26,482                    | 34.5           |
| Census Tract 191.05; Davidson County; Tennessee   | 3,829                           | 24,817                    | 34.6           |
| Census Tract 7; Shelby County; Tennessee          | 3,322                           | 22,528                    | 34.6           |
| Census Tract 9644.02; Dyer County; Tennessee      | 2,154                           | 23,733                    | 34.7           |
| Census Tract 106.10; Shelby County; Tennessee     | 4,156                           | 21,545                    | 34.7           |
| Census Tract 30; Shelby County; Tennessee         | 2,266                           | 41,440                    | 34.8           |
| Census Tract 9204.02; Hardin County; Tennessee    | 2,288                           | 19,654                    | 35.0           |
| Census Tract 53; Shelby County; Tennessee         | 2,413                           | 15,723                    | 35.3           |
| Census Tract 205.21; Shelby County; Tennessee     | 1,912                           | 14,595                    | 35.3           |
| Census Tract 205.43; Shelby County; Tennessee     | 2,295                           | 20,499                    | 35.3           |
| Census Tract 26; Hamilton County; Tennessee       | 1,697                           | 21,012                    | 35.5           |
| Census Tract 108.10; Shelby County; Tennessee     | 4,477                           | 19,703                    | 35.5           |
| Census Tract 8; Knox County; Tennessee            | 4,268                           | 40,799                    | 35.8           |
| Census Tract 13; Shelby County; Tennessee         | 1,810                           | 19,440                    | 35.9           |
| Census Tract 406; Sullivan County; Tennessee      | 2,600                           | 20,362                    | 36.0           |
| Census Tract 207; Anderson County; Tennessee      | 1,226                           | 21,596                    | 36.1           |
| Census Tract 9606; Hancock County; Tennessee      | 3,334                           | 20,765                    | 36.1           |
| Census Tract 122; Hamilton County; Tennessee      | 1,665                           | 16,348                    | 36.2           |

| Geography                                         | Population<br>16 Years and Over | Per Capita<br>Income (\$) | Poverty<br>(%) |
|---------------------------------------------------|---------------------------------|---------------------------|----------------|
| Census Tract 110.20; Shelby County; Tennessee     | 952                             | 31,532                    | 36.4           |
| Census Tract 26; Knox County; Tennessee           | 1,927                           | 15,852                    | 36.5           |
| Census Tract 89; Shelby County; Tennessee         | 3,023                           | 18,128                    | 36.6           |
| Census Tract 205.44; Shelby County; Tennessee     | 1,921                           | 22,371                    | 37.0           |
| Census Tract 12; Hamilton County; Tennessee       | 2,620                           | 21,234                    | 37.1           |
| Census Tract 9; Shelby County; Tennessee          | 1,916                           | 22,379                    | 37.2           |
| Census Tract 69; Shelby County; Tennessee         | 1,933                           | 21,809                    | 37.3           |
| Census Tract 159; Davidson County; Tennessee      | 2,820                           | 22,859                    | 37.4           |
| Census Tract 203.02; Shelby County; Tennessee     | 2,360                           | 21,910                    | 37.4           |
| Census Tract 9709; Coffee County; Tennessee       | 3,541                           | 21,319                    | 37.6           |
| Census Tract 9553; Marshall County; Tennessee     | 3,288                           | 15,089                    | 37.6           |
| Census Tract 37; Shelby County; Tennessee         | 1,058                           | 26,028                    | 38.0           |
| Census Tract 87; Shelby County; Tennessee         | 3,604                           | 20,969                    | 38.0           |
| Census Tract 4; Hamilton County; Tennessee        | 2,409                           | 16,234                    | 38.1           |
| Census Tract 127.01; Davidson County; Tennessee   | 4,747                           | 21,953                    | 38.4           |
| Census Tract 16; Hamilton County; Tennessee       | 2,191                           | 30,424                    | 38.6           |
| Census Tract 217.31; Shelby County; Tennessee     | 1,970                           | 13,602                    | 38.8           |
| Census Tract 70; Knox County; Tennessee           | 2,152                           | 18,930                    | 39.0           |
| Census Tract 9202; Cocke County; Tennessee        | 4,466                           | 19,192                    | 39.2           |
| Census Tract 100.01; Shelby County; Tennessee     | 2,610                           | 18,618                    | 39.3           |
| Census Tract 609.01; Washington County; Tennessee | 2,369                           | 17,765                    | 39.3           |
| Census Tract 307; Wilson County; Tennessee        | 3,082                           | 20,455                    | 39.6           |
| Census Tract 9751.01; Scott County; Tennessee     | 1,813                           | 25,237                    | 39.8           |
| Census Tract 78.21; Shelby County; Tennessee      | 3,995                           | 26,214                    | 39.8           |
| Census Tract 208; Sumner County; Tennessee        | 5,417                           | 16,542                    | 39.8           |
| Census Tract 38; Shelby County; Tennessee         | 634                             | 21,035                    | 39.9           |
| Census Tract 74; Shelby County; Tennessee         | 2,849                           | 21,617                    | 39.9           |
| Census Tract 82; Shelby County; Tennessee         | 3,726                           | 12,265                    | 40.7           |
| Census Tract 14; Shelby County; Tennessee         | 1,080                           | 17,866                    | 40.8           |
| Census Tract 1009; Montgomery County; Tennessee   | 2,214                           | 17,108                    | 41.2           |
| Census Tract 217.10; Shelby County; Tennessee     | 1,555                           | 18,557                    | 41.2           |
| Census Tract 8; Madison County; Tennessee         | 1,299                           | 16,570                    | 41.9           |
| Census Tract 81.10; Shelby County; Tennessee      | 1,513                           | 15,163                    | 41.9           |
| Census Tract 78.22; Shelby County; Tennessee      | 1,154                           | 22,923                    | 42.4           |
| Census Tract 4; Shelby County; Tennessee          | 1,046                           | 17,382                    | 42.7           |
| Census Tract 78.10; Shelby County; Tennessee      | 1,609                           | 16,613                    | 42.8           |
| Census Tract 29; Knox County; Tennessee           | 2,476                           | 17,597                    | 42.9           |
| Census Tract 39; Shelby County; Tennessee         | 1,454                           | 26,710                    | 43.0           |
| Census Tract 105; Shelby County; Tennessee        | 1,897                           | 14,883                    | 43.0           |
| Census Tract 221.31; Shelby County; Tennessee     | 2,087                           | 25,483                    | 43.1           |
| Census Tract 223.30; Shelby County; Tennessee     | 3,774                           | 18,390                    | 43.1           |
| Census Tract 2; Shelby County; Tennessee          | 880                             | 12,578                    | 43.5           |
| Census Tract 99.01; Shelby County; Tennessee      | 2,315                           | 16,136                    | 43.6           |
| Census Tract 139; Davidson County; Tennessee      | 1,380                           | 24,762                    | 44.1           |
| Census Tract 19; Shelby County; Tennessee         | 1,102                           | 17,840                    | 44.2           |
| Census Tract 114.01; Shelby County; Tennessee     | 900                             | 14,179                    | 44.2           |
| Census Tract 115; Shelby County; Tennessee        | 1,612                           | 12,796                    | 44.7           |

| Geography                                       | Population<br>16 Years and Over | Per Capita<br>Income (\$) | Poverty<br>(%) |
|-------------------------------------------------|---------------------------------|---------------------------|----------------|
| Census Tract 91; Shelby County; Tennessee       | 2,173                           | 15,531                    | 45.3           |
| Census Tract 70; Shelby County; Tennessee       | 2,420                           | 21,286                    | 45.5           |
| Census Tract 1003; Hamblen County; Tennessee    | 2,320                           | 13,728                    | 46.6           |
| Census Tract 9; Madison County; Tennessee       | 1,600                           | 15,483                    | 46.6           |
| Census Tract 3.04; Putnam County; Tennessee     | 3,778                           | 16,143                    | 46.7           |
| Census Tract 68; Knox County; Tennessee         | 3,817                           | 18,619                    | 46.8           |
| Census Tract 223.10; Shelby County; Tennessee   | 4,086                           | 14,373                    | 46.8           |
| Census Tract 106.30; Shelby County; Tennessee   | 2,417                           | 13,584                    | 46.9           |
| Census Tract 8; Shelby County; Tennessee        | 1,475                           | 21,765                    | 47.0           |
| Census Tract 6; Shelby County; Tennessee        | 1,206                           | 15,557                    | 47.3           |
| Census Tract 1008; Montgomery County; Tennessee | 2,399                           | 11,901                    | 47.9           |
| Census Tract 101.21; Shelby County; Tennessee   | 1,682                           | 17,148                    | 48.0           |
| Census Tract 117; Shelby County; Tennessee      | 813                             | 19,803                    | 48.0           |
| Census Tract 104; Bradley County; Tennessee     | 2,264                           | 14,230                    | 48.2           |
| Census Tract 160; Davidson County; Tennessee    | 2,018                           | 27,708                    | 49.4           |
| Census Tract 101.22; Shelby County; Tennessee   | 2,352                           | 14,516                    | 49.4           |
| Census Tract 162; Davidson County; Tennessee    | 2,497                           | 45,142                    | 49.8           |
| Census Tract 55; Shelby County; Tennessee       | 1,588                           | 13,398                    | 49.8           |
| Census Tract 25; Hamilton County; Tennessee     | 3,431                           | 18,188                    | 49.9           |
| Census Tract 28; Shelby County; Tennessee       | 2,231                           | 16,995                    | 49.9           |
| Census Tract 217.57; Shelby County; Tennessee   | 1,717                           | 18,833                    | 50.5           |
| Census Tract 205.23; Shelby County; Tennessee   | 2,164                           | 13,096                    | 51.1           |
| Census Tract 222.20; Shelby County; Tennessee   | 3,887                           | 17,307                    | 51.4           |
| Census Tract 111; Shelby County; Tennessee      | 1,291                           | 18,765                    | 51.9           |
| Census Tract 114.02; Shelby County; Tennessee   | 3,348                           | 16,102                    | 52.4           |
| Census Tract 142; Davidson County; Tennessee    | 1,928                           | 12,426                    | 52.7           |
| Census Tract 1001; Montgomery County; Tennessee | 1,350                           | 13,975                    | 52.8           |
| Census Tract 5; Madison County; Tennessee       | 3,061                           | 10,536                    | 52.9           |
| Census Tract 58; Shelby County; Tennessee       | 692                             | 10,646                    | 54.0           |
| Census Tract 35.02; Knox County; Tennessee      | 2,080                           | 25,565                    | 55.0           |
| Census Tract 193; Davidson County; Tennessee    | 3,018                           | 22,695                    | 57.5           |
| Census Tract 11; Madison County; Tennessee      | 832                             | 11,081                    | 57.5           |
| Census Tract 101.20; Shelby County; Tennessee   | 2,780                           | 12,050                    | 57.9           |
| Census Tract 116; Shelby County; Tennessee      | 1,767                           | 12,615                    | 58.0           |
| Census Tract 220.25; Shelby County; Tennessee   | 2,393                           | 13,136                    | 58.6           |
| Census Tract 99.02; Shelby County; Tennessee    | 1,482                           | 15,731                    | 59.3           |
| Census Tract 50; Shelby County; Tennessee       | 659                             | 8,737                     | 64.4           |
| Census Tract 59; Shelby County; Tennessee       | 1,418                           | 14,355                    | 68.8           |
| Census Tract 45; Shelby County; Tennessee       | 539                             | 11,371                    | 69.6           |
| Census Tract 69.01; Knox County; Tennessee      | 4,124                           | 10,996                    | 69.7           |
| Census Tract 69.02; Knox County; Tennessee      | 3,034                           | 9,266                     | 72.4           |
| Census Tract 148; Davidson County; Tennessee    | 1,037                           | 6,434                     | 77.9           |
| Census Tract 69.03; Knox County; Tennessee      | 2,227                           | 9,761                     | 79.0           |
| Census Tract 9682.02; Weakley County; Tennessee | 2,069                           | 8,229                     | 82.6           |
| Census Tract 9.02; Knox County; Tennessee       | 3,061                           | 4,852                     | 96.1           |
| Census Tract 109; Washington County; Virginia   | 3,808                           | 26,902                    | 15.0           |
| Census Tract 9310; Wise County; Virginia        | 1,573                           | 26,736                    | 15.4           |

| Geography                                        | Population<br>16 Years and Over | Per Capita<br>Income (\$) | Poverty<br>(%) |
|--------------------------------------------------|---------------------------------|---------------------------|----------------|
| Census Tract 306; Scott County; Virginia         | 3,358                           | 25,001                    | 15.5           |
| Census Tract 101.01; Washington County; Virginia | 2,754                           | 32,527                    | 15.9           |
| Census Tract 304; Scott County; Virginia         | 3,038                           | 28,322                    | 16.2           |
| Census Tract 9309; Wise County; Virginia         | 3,482                           | 26,812                    | 19.9           |
| Census Tract 302; Scott County; Virginia         | 3,428                           | 21,052                    | 20.3           |
| Census Tract 103.01; Washington County; Virginia | 2,514                           | 26,229                    | 20.3           |
| Census Tract 9307; Wise County; Virginia         | 2,712                           | 19,897                    | 21.9           |
| Census Tract 9315; Wise County; Virginia         | 2,918                           | 20,610                    | 22.0           |
| Census Tract 105.02; Washington County; Virginia | 3,920                           | 39,896                    | 22.2           |
| Census Tract 9504; Lee County; Virginia          | 2,092                           | 25,950                    | 22.4           |
| Census Tract 9316; Wise County; Virginia         | 1,963                           | 27,112                    | 23.0           |
| Census Tract 203; Bristol city; Virginia         | 1,938                           | 20,437                    | 23.9           |
| Census Tract 9314; Wise County; Virginia         | 4,401                           | 23,582                    | 24.3           |
| Census Tract 9503.02; Lee County; Virginia       | 2,579                           | 12,921                    | 26.2           |
| Census Tract 201; Bristol city; Virginia         | 2,952                           | 21,899                    | 26.6           |
| Census Tract 9501; Lee County; Virginia          | 2,224                           | 19,173                    | 27.4           |
| Census Tract 9317; Wise County; Virginia         | 1,333                           | 23,738                    | 28.9           |
| Census Tract 9601; Norton city; Virginia         | 3,138                           | 27,666                    | 29.1           |
| Census Tract 303; Scott County; Virginia         | 2,509                           | 23,050                    | 30.4           |
| Census Tract 9311; Wise County; Virginia         | 1,959                           | 18,176                    | 32.8           |
| Census Tract 9505; Lee County; Virginia          | 3,878                           | 21,393                    | 36.0           |
| Census Tract 202.01; Bristol city; Virginia      | 1,849                           | 19,257                    | 46.1           |
| Census Tract 9503.01; Lee County; Virginia       | 1,528                           | 19,876                    | 50.4           |

Source: USCB 2023h



## B.4 Minority Populations in the TVA PSA

| Geography                   | 2022 Population | % White Alone | % Minority Population | % Black or African American | % American Indian and Alaska Native | % Asian | % Native Hawaiian and Other Pacific Islander | % Some Other Race | % Two or More Races | % Hispanic or Latino |
|-----------------------------|-----------------|---------------|-----------------------|-----------------------------|-------------------------------------|---------|----------------------------------------------|-------------------|---------------------|----------------------|
| Blount County, Alabama      | 59,077          | 85.7          | 14.3                  | 1.2                         | 0.1                                 | 0.2     | 0.2                                          | 0.1               | 2.8                 | 9.7                  |
| Cherokee County, Alabama    | 25,069          | 90.7          | 9.3                   | 4.0                         | 0.5                                 | 0.1     | 0.0                                          | 0.1               | 2.8                 | 1.9                  |
| Colbert County, Alabama     | 57,270          | 77.7          | 22.3                  | 16.0                        | 0.3                                 | 0.4     | 0.1                                          | 0.1               | 2.2                 | 3.2                  |
| Cullman County, Alabama     | 88,284          | 90.8          | 9.2                   | 1.1                         | 0.3                                 | 0.3     | 0.0                                          | 0.1               | 2.8                 | 4.6                  |
| DeKalb County, Alabama      | 71,680          | 79.1          | 20.9                  | 1.5                         | 0.5                                 | 0.1     | 0.0                                          | 0.5               | 2.9                 | 15.4                 |
| Etowah County, Alabama      | 103,348         | 77.1          | 22.9                  | 15.0                        | 0.1                                 | 0.7     | 0.0                                          | 0.4               | 2.3                 | 4.4                  |
| Franklin County, Alabama    | 32,011          | 75.2          | 24.8                  | 4.2                         | 0.2                                 | 0.1     | 0.0                                          | 0.2               | 1.5                 | 18.4                 |
| Jackson County, Alabama     | 52,618          | 88.8          | 11.2                  | 3.2                         | 0.8                                 | 0.4     | 0.0                                          | 0.1               | 3.5                 | 3.2                  |
| Lauderdale County, Alabama  | 94,329          | 83.4          | 16.6                  | 9.7                         | 0.2                                 | 0.6     | 0.1                                          | 0.1               | 2.8                 | 3.0                  |
| Lawrence County, Alabama    | 33,116          | 76.3          | 23.7                  | 10.2                        | 5.0                                 | 0.3     | 0.1                                          | 0.0               | 5.6                 | 2.5                  |
| Limestone County, Alabama   | 104,199         | 74.7          | 25.3                  | 13.0                        | 0.4                                 | 1.8     | 0.1                                          | 0.1               | 3.6                 | 6.3                  |
| Madison County, Alabama     | 389,781         | 63.5          | 36.5                  | 24.3                        | 0.4                                 | 2.4     | 0.0                                          | 0.3               | 3.8                 | 5.3                  |
| Marshall County, Alabama    | 97,923          | 79.1          | 20.9                  | 2.7                         | 0.1                                 | 0.6     | 0.1                                          | 0.2               | 2.1                 | 15.1                 |
| Morgan County, Alabama      | 123,102         | 74.3          | 25.7                  | 12.9                        | 0.2                                 | 0.5     | 0.0                                          | 0.3               | 3.0                 | 8.8                  |
| Winston County, Alabama     | 23,655          | 92.3          | 7.7                   | 1.1                         | 0.2                                 | 0.4     | 0.0                                          | 0.0               | 2.7                 | 3.2                  |
| Catoosa County, Georgia     | 68,052          | 89.0          | 11.0                  | 2.2                         | 0.1                                 | 1.5     | 0.1                                          | 0.6               | 3.3                 | 3.4                  |
| Chattooga County, Georgia   | 24,902          | 82.0          | 18.0                  | 9.5                         | 0.1                                 | 0.1     | 0.0                                          | 0.0               | 2.7                 | 5.7                  |
| Dade County, Georgia        | 16,239          | 92.2          | 7.8                   | 1.0                         | 0.0                                 | 0.8     | 0.0                                          | 0.3               | 3.1                 | 2.6                  |
| Fannin County, Georgia      | 25,436          | 93.1          | 6.9                   | 0.3                         | 0.0                                 | 0.5     | 0.0                                          | 0.4               | 3.0                 | 2.8                  |
| Gilmer County, Georgia      | 31,519          | 84.3          | 15.7                  | 0.5                         | 0.2                                 | 0.4     | 0.0                                          | 0.1               | 2.1                 | 12.4                 |
| Gordon County, Georgia      | 57,785          | 76.0          | 24.0                  | 3.3                         | 0.1                                 | 1.1     | 0.1                                          | 0.2               | 2.4                 | 16.8                 |
| Murray County, Georgia      | 40,063          | 80.2          | 19.8                  | 0.4                         | 0.1                                 | 0.8     | 0.0                                          | 0.4               | 2.2                 | 15.9                 |
| Towns County, Georgia       | 12,546          | 93.6          | 6.4                   | 1.3                         | 0.1                                 | 0.2     | 0.0                                          | 0.1               | 1.8                 | 2.9                  |
| Union County, Georgia       | 24,880          | 92.9          | 7.1                   | 0.6                         | 0.2                                 | 0.2     | 0.0                                          | 0.0               | 2.4                 | 3.8                  |
| Walker County, Georgia      | 68,065          | 89.9          | 10.1                  | 3.9                         | 0.2                                 | 0.6     | 0.0                                          | 0.1               | 2.8                 | 2.7                  |
| Whitfield County, Georgia   | 103,033         | 56.6          | 43.4                  | 3.2                         | 0.1                                 | 1.5     | 0.0                                          | 0.1               | 1.8                 | 36.8                 |
| Allen County, Kentucky      | 20,773          | 94.1          | 5.9                   | 0.8                         | 0.0                                 | 0.0     | 0.0                                          | 0.3               | 2.3                 | 2.4                  |
| Butler County, Kentucky     | 12,365          | 93.7          | 6.3                   | 0.4                         | 0.1                                 | 0.7     | 0.0                                          | 0.0               | 1.4                 | 3.8                  |
| Calloway County, Kentucky   | 37,345          | 88.7          | 11.3                  | 3.4                         | 0.2                                 | 1.6     | 0.3                                          | 0.4               | 2.7                 | 2.8                  |
| Carlisle County, Kentucky   | 4,782           | 92.3          | 7.7                   | 1.2                         | 0.3                                 | 0.5     | 0.1                                          | 0.1               | 3.0                 | 2.5                  |
| Christian County, Kentucky  | 72,766          | 64.7          | 35.3                  | 19.7                        | 0.1                                 | 1.2     | 0.3                                          | 0.4               | 5.1                 | 8.4                  |
| Cumberland County, Kentucky | 5,974           | 93.0          | 7.0                   | 2.7                         | 0.3                                 | 0.8     | 0.0                                          | 0.0               | 1.5                 | 1.8                  |
| Edmonson County, Kentucky   | 12,179          | 95.2          | 4.8                   | 0.8                         | 0.1                                 | 0.0     | 0.0                                          | 0.0               | 2.3                 | 1.6                  |
| Fulton County, Kentucky     | 6,480           | 69.8          | 30.2                  | 23.6                        | 0.4                                 | 0.0     | 0.9                                          | 0.0               | 3.8                 | 1.5                  |



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|---------------------------------|-----------------|---------------|-----------------------|-----------------------------|-------------------------------------|---------|----------------------------------------------|-------------------|---------------------|----------------------|
| Graves County, Kentucky         | 36,701          | 85.0          | 15.0                  | 4.0                         | 0.0                                 | 0.4     | 0.0                                          | 0.3               | 2.9                 | 7.4                  |
| Grayson County, Kentucky        | 26,465          | 95.1          | 4.9                   | 0.5                         | 0.0                                 | 0.3     | 0.0                                          | 0.2               | 2.3                 | 1.5                  |
| Hickman County, Kentucky        | 4,491           | 86.1          | 13.9                  | 9.4                         | 0.1                                 | 0.0     | 0.0                                          | 0.0               | 2.1                 | 2.2                  |
| Livingston County, Kentucky     | 8,980           | 94.5          | 5.5                   | 0.3                         | 0.0                                 | 0.0     | 0.0                                          | 0.0               | 2.6                 | 2.6                  |
| Logan County, Kentucky          | 27,498          | 88.1          | 11.9                  | 5.8                         | 0.0                                 | 0.4     | 0.0                                          | 0.2               | 2.3                 | 3.1                  |
| Lyon County, Kentucky           | 8,721           | 87.9          | 12.1                  | 6.5                         | 0.5                                 | 0.7     | 0.1                                          | 0.3               | 1.6                 | 2.5                  |
| Marshall County, Kentucky       | 31,706          | 96.0          | 4.0                   | 0.6                         | 0.3                                 | 0.2     | 0.0                                          | 0.0               | 1.0                 | 1.8                  |
| Monroe County, Kentucky         | 11,331          | 93.2          | 6.8                   | 2.6                         | 0.1                                 | 0.2     | 0.0                                          | 0.0               | 0.8                 | 3.2                  |
| Muhlenberg County, Kentucky     | 30,735          | 92.5          | 7.5                   | 1.9                         | 0.2                                 | 1.1     | 0.0                                          | 0.0               | 2.4                 | 1.7                  |
| Simpson County, Kentucky        | 19,574          | 84.9          | 15.1                  | 9.3                         | 0.0                                 | 0.4     | 0.0                                          | 0.1               | 2.6                 | 2.8                  |
| Todd County, Kentucky           | 12,281          | 85.1          | 14.9                  | 8.0                         | 0.0                                 | 0.1     | 0.0                                          | 0.4               | 1.6                 | 4.8                  |
| Trigg County, Kentucky          | 14,154          | 87.1          | 12.9                  | 6.3                         | 0.0                                 | 0.3     | 0.0                                          | 0.4               | 3.3                 | 2.5                  |
| Warren County, Kentucky         | 135,307         | 76.6          | 23.4                  | 8.6                         | 0.1                                 | 4.9     | 0.5                                          | 0.1               | 3.5                 | 5.7                  |
| Avery County, North Carolina    | 17,679          | 87.5          | 12.5                  | 3.6                         | 0.8                                 | 0.5     | 0.0                                          | 0.0               | 2.4                 | 5.1                  |
| Cherokee County, North Carolina | 28,868          | 90.1          | 9.9                   | 1.5                         | 1.6                                 | 0.5     | 0.0                                          | 0.1               | 2.5                 | 3.7                  |
| Clay County, North Carolina     | 11,186          | 91.7          | 8.3                   | 1.0                         | 1.1                                 | 1.1     | 0.1                                          | 0.0               | 1.1                 | 3.9                  |
| Watauga County, North Carolina  | 54,540          | 91.1          | 8.9                   | 1.7                         | 0.3                                 | 1.4     | 0.0                                          | 0.1               | 1.5                 | 4.0                  |
| Lee County, Virginia            | 22,287          | 92.1          | 7.9                   | 4.0                         | 0.1                                 | 0.3     | 0.0                                          | 0.0               | 1.4                 | 2.1                  |
| Scott County, Virginia          | 21,536          | 96.1          | 3.9                   | 1.2                         | 0.1                                 | 0.1     | 0.2                                          | 0.1               | 0.8                 | 1.5                  |
| Washington County, Virginia     | 53,985          | 94.8          | 5.2                   | 1.7                         | 0.1                                 | 0.5     | 0.0                                          | 0.1               | 1.3                 | 1.6                  |
| Wise County, Virginia           | 36,105          | 90.8          | 9.2                   | 4.6                         | 0.1                                 | 1.1     | 0.0                                          | 0.2               | 1.9                 | 1.3                  |
| Bristol city, Virginia          | 17,036          | 86.6          | 13.4                  | 6.3                         | 0.0                                 | 0.3     | 0.0                                          | 0.7               | 3.6                 | 2.6                  |
| Norton city, Virginia           | 3,668           | 94.4          | 5.6                   | 2.0                         | 0.0                                 | 0.1     | 0.0                                          | 0.0               | 3.5                 | 0.0                  |
| Alcorn County, Mississippi      | 34,717          | 80.8          | 19.2                  | 9.4                         | 0.1                                 | 0.4     | 0.1                                          | 0.1               | 5.6                 | 3.5                  |
| Attala County, Mississippi      | 17,842          | 52.6          | 47.4                  | 42.2                        | 0.1                                 | 0.3     | 0.0                                          | 0.0               | 2.6                 | 2.2                  |
| Benton County, Mississippi      | 7,637           | 60.1          | 39.9                  | 32.9                        | 0.0                                 | 0.4     | 0.1                                          | 0.0               | 3.3                 | 3.1                  |
| Calhoun County, Mississippi     | 13,193          | 63.8          | 36.2                  | 28.4                        | 0.0                                 | 0.0     | 0.0                                          | 0.1               | 1.3                 | 6.5                  |
| Chickasaw County, Mississippi   | 17,024          | 49.1          | 50.9                  | 43.7                        | 0.0                                 | 0.2     | 0.0                                          | 0.0               | 1.9                 | 5.1                  |
| Choctaw County, Mississippi     | 8,208           | 67.0          | 33.0                  | 29.2                        | 0.1                                 | 0.4     | 0.0                                          | 0.2               | 1.3                 | 1.8                  |
| Clay County, Mississippi        | 18,598          | 38.0          | 62.0                  | 60.0                        | 0.0                                 | 0.0     | 0.0                                          | 0.0               | 1.8                 | 0.2                  |
| DeSoto County, Mississippi      | 186,214         | 59.8          | 40.2                  | 30.8                        | 0.1                                 | 1.3     | 0.0                                          | 0.2               | 2.7                 | 5.2                  |
| Itawamba County, Mississippi    | 23,888          | 88.8          | 11.2                  | 6.0                         | 0.4                                 | 0.2     | 0.0                                          | 0.2               | 2.6                 | 1.8                  |
| Kemper County, Mississippi      | 8,980           | 33.4          | 66.6                  | 61.8                        | 3.8                                 | 0.0     | 0.0                                          | 0.0               | 0.2                 | 0.8                  |
| Lafayette County, Mississippi   | 56,172          | 69.9          | 30.1                  | 23.3                        | 0.1                                 | 2.3     | 0.0                                          | 0.1               | 1.6                 | 2.6                  |
| Leake County, Mississippi       | 21,335          | 47.7          | 52.3                  | 39.8                        | 5.7                                 | 0.4     | 0.0                                          | 0.0               | 1.4                 | 5.1                  |
| Lee County, Mississippi         | 83,343          | 63.7          | 36.3                  | 29.7                        | 0.1                                 | 1.0     | 0.2                                          | 0.5               | 1.8                 | 3.0                  |

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|----------------------------------|-----------------|---------------|-----------------------|-----------------------------|-------------------------------------|---------|----------------------------------------------|-------------------|---------------------|----------------------|
| Lowndes County, Mississippi      | 58,547          | 50.0          | 50.0                  | 44.5                        | 0.1                                 | 1.1     | 0.0                                          | 0.4               | 1.5                 | 2.4                  |
| Marshall County, Mississippi     | 33,980          | 47.1          | 52.9                  | 45.5                        | 0.0                                 | 0.1     | 0.0                                          | 0.5               | 2.4                 | 4.3                  |
| Monroe County, Mississippi       | 34,168          | 66.7          | 33.3                  | 30.2                        | 0.0                                 | 0.3     | 0.0                                          | 0.0               | 1.3                 | 1.5                  |
| Neshoba County, Mississippi      | 28,970          | 57.7          | 42.3                  | 22.8                        | 16.0                                | 0.6     | 0.1                                          | 0.7               | 1.9                 | 0.2                  |
| Noxubee County, Mississippi      | 10,261          | 25.6          | 74.4                  | 73.6                        | 0.4                                 | 0.0     | 0.0                                          | 0.0               | 0.2                 | 0.3                  |
| Oktibbeha County, Mississippi    | 51,388          | 56.0          | 44.0                  | 36.6                        | 0.1                                 | 3.1     | 0.1                                          | 0.1               | 2.3                 | 1.8                  |
| Panola County, Mississippi       | 33,157          | 46.9          | 53.1                  | 49.6                        | 0.1                                 | 0.3     | 0.4                                          | 0.1               | 1.9                 | 0.6                  |
| Pontotoc County, Mississippi     | 31,202          | 75.1          | 24.9                  | 14.4                        | 0.2                                 | 0.0     | 0.0                                          | 0.1               | 2.8                 | 7.5                  |
| Prentiss County, Mississippi     | 24,945          | 79.9          | 20.1                  | 10.7                        | 0.1                                 | 2.5     | 0.0                                          | 1.0               | 4.3                 | 1.5                  |
| Scott County, Mississippi        | 27,943          | 48.7          | 51.3                  | 35.6                        | 0.1                                 | 0.1     | 0.0                                          | 0.2               | 3.5                 | 11.8                 |
| Tallahatchie County, Mississippi | 12,621          | 34.9          | 65.1                  | 61.4                        | 0.0                                 | 0.1     | 0.0                                          | 0.2               | 1.5                 | 1.9                  |
| Tate County, Mississippi         | 28,094          | 64.2          | 35.8                  | 30.4                        | 0.0                                 | 0.0     | 0.1                                          | 0.0               | 1.8                 | 3.4                  |
| Tippah County, Mississippi       | 21,769          | 77.1          | 22.9                  | 14.5                        | 0.0                                 | 0.0     | 0.0                                          | 0.4               | 3.2                 | 4.7                  |
| Tishomingo County, Mississippi   | 18,837          | 91.0          | 9.0                   | 1.3                         | 0.4                                 | 0.6     | 0.0                                          | 0.4               | 2.7                 | 3.5                  |
| Union County, Mississippi        | 27,880          | 77.2          | 22.8                  | 15.7                        | 0.2                                 | 0.2     | 0.0                                          | 0.6               | 1.6                 | 4.6                  |
| Webster County, Mississippi      | 9,942           | 78.2          | 21.8                  | 18.5                        | 0.1                                 | 0.8     | 0.0                                          | 0.1               | 0.8                 | 1.6                  |
| Winston County, Mississippi      | 17,741          | 49.6          | 50.4                  | 46.7                        | 0.5                                 | 0.1     | 0.0                                          | 0.0               | 1.6                 | 1.5                  |
| Yalobusha County, Mississippi    | 12,499          | 57.8          | 42.2                  | 38.3                        | 0.2                                 | 0.1     | 0.0                                          | 0.0               | 1.0                 | 2.6                  |
| Anderson County, Tennessee       | 77,337          | 87.6          | 12.4                  | 3.2                         | 0.3                                 | 1.3     | 0.1                                          | 0.6               | 3.6                 | 3.4                  |
| Bedford County, Tennessee        | 50,533          | 75.2          | 24.8                  | 6.5                         | 0.3                                 | 0.3     | 0.0                                          | 0.5               | 3.7                 | 13.6                 |
| Benton County, Tennessee         | 15,933          | 91.4          | 8.6                   | 1.9                         | 0.1                                 | 1.1     | 0.8                                          | 0.0               | 2.9                 | 1.8                  |
| Bledsoe County, Tennessee        | 14,816          | 87.3          | 12.7                  | 5.7                         | 0.3                                 | 0.1     | 0.0                                          | 0.2               | 3.3                 | 3.0                  |
| Blount County, Tennessee         | 135,951         | 89.9          | 10.1                  | 2.6                         | 0.1                                 | 0.7     | 0.0                                          | 0.2               | 2.6                 | 3.8                  |
| Bradley County, Tennessee        | 108,859         | 83.9          | 16.1                  | 4.6                         | 0.2                                 | 1.0     | 0.0                                          | 1.0               | 2.5                 | 6.9                  |
| Campbell County, Tennessee       | 39,397          | 95.9          | 4.1                   | 0.3                         | 0.0                                 | 0.4     | 0.0                                          | 0.0               | 1.6                 | 1.7                  |
| Cannon County, Tennessee         | 14,481          | 92.9          | 7.1                   | 2.5                         | 0.1                                 | 0.0     | 0.0                                          | 0.0               | 1.7                 | 2.7                  |
| Carroll County, Tennessee        | 28,381          | 84.0          | 16.0                  | 8.8                         | 0.1                                 | 0.3     | 0.0                                          | 0.0               | 3.6                 | 3.1                  |
| Carter County, Tennessee         | 56,315          | 92.9          | 7.1                   | 2.2                         | 0.1                                 | 0.5     | 0.0                                          | 0.0               | 1.6                 | 2.7                  |
| Cheatham County, Tennessee       | 41,184          | 90.2          | 9.8                   | 1.9                         | 0.2                                 | 0.5     | 0.0                                          | 0.7               | 2.5                 | 3.8                  |
| Chester County, Tennessee        | 17,392          | 84.6          | 15.4                  | 10.3                        | 0.0                                 | 0.2     | 0.0                                          | 0.6               | 1.4                 | 2.9                  |
| Claiborne County, Tennessee      | 32,092          | 94.7          | 5.3                   | 0.8                         | 0.1                                 | 0.8     | 0.0                                          | 0.0               | 2.1                 | 1.5                  |
| Clay County, Tennessee           | 7,592           | 93.9          | 6.1                   | 0.7                         | 0.4                                 | 0.6     | 0.0                                          | 0.0               | 1.7                 | 2.8                  |
| Cocke County, Tennessee          | 36,186          | 92.5          | 7.5                   | 1.2                         | 0.5                                 | 0.5     | 0.1                                          | 0.0               | 2.4                 | 2.8                  |
| Coffee County, Tennessee         | 58,080          | 86.7          | 13.3                  | 3.8                         | 0.0                                 | 1.3     | 0.2                                          | 0.4               | 2.3                 | 5.2                  |
| Crockett County, Tennessee       | 13,955          | 72.0          | 28.0                  | 11.0                        | 0.6                                 | 0.5     | 0.1                                          | 0.0               | 4.3                 | 11.5                 |
| Cumberland County, Tennessee     | 61,552          | 93.8          | 6.2                   | 0.8                         | 0.2                                 | 0.3     | 0.0                                          | 0.1               | 1.7                 | 3.2                  |

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| Davidson County, Tennessee   | 709,786         | 55.6          | 44.4                  | 26.0                        | 0.1                                 | 3.6     | 0.1                                          | 0.5               | 3.6                 | 10.6                 |
| Decatur County, Tennessee    | 11,483          | 91.0          | 9.0                   | 2.4                         | 0.0                                 | 0.1     | 0.0                                          | 0.0               | 2.9                 | 3.6                  |
| DeKalb County, Tennessee     | 20,209          | 87.0          | 13.0                  | 1.6                         | 0.3                                 | 0.4     | 0.0                                          | 0.1               | 2.1                 | 8.4                  |
| Dickson County, Tennessee    | 54,563          | 88.2          | 11.8                  | 3.6                         | 0.2                                 | 0.1     | 0.0                                          | 0.4               | 3.3                 | 4.2                  |
| Dyer County, Tennessee       | 36,818          | 78.3          | 21.7                  | 13.3                        | 0.1                                 | 0.5     | 0.0                                          | 0.0               | 4.1                 | 3.8                  |
| Fayette County, Tennessee    | 42,228          | 66.7          | 33.3                  | 26.9                        | 0.0                                 | 0.7     | 0.0                                          | 0.2               | 2.2                 | 3.2                  |
| Fentress County, Tennessee   | 18,642          | 95.3          | 4.7                   | 0.3                         | 0.0                                 | 0.3     | 0.1                                          | 0.0               | 2.1                 | 1.8                  |
| Franklin County, Tennessee   | 42,980          | 87.7          | 12.3                  | 4.8                         | 0.0                                 | 0.6     | 0.1                                          | 0.2               | 2.8                 | 3.8                  |
| Gibson County, Tennessee     | 50,455          | 75.9          | 24.1                  | 16.0                        | 0.2                                 | 0.3     | 0.0                                          | 0.1               | 4.5                 | 3.0                  |
| Giles County, Tennessee      | 30,317          | 82.7          | 17.3                  | 8.8                         | 0.1                                 | 0.1     | 0.0                                          | 0.4               | 4.6                 | 3.3                  |
| Grainger County, Tennessee   | 23,648          | 93.0          | 7.0                   | 0.9                         | 0.2                                 | 0.1     | 0.3                                          | 0.1               | 1.7                 | 3.6                  |
| Greene County, Tennessee     | 70,399          | 92.0          | 8.0                   | 1.7                         | 0.1                                 | 0.5     | 0.0                                          | 0.2               | 2.3                 | 3.3                  |
| Grundy County, Tennessee     | 13,550          | 94.8          | 5.2                   | 0.4                         | 0.2                                 | 0.3     | 0.0                                          | 0.0               | 2.7                 | 1.6                  |
| Hamblen County, Tennessee    | 64,531          | 80.3          | 19.7                  | 3.1                         | 0.2                                 | 0.9     | 0.4                                          | 0.3               | 2.6                 | 12.3                 |
| Hamilton County, Tennessee   | 367,193         | 70.1          | 29.9                  | 17.7                        | 0.1                                 | 1.9     | 0.0                                          | 0.4               | 3.6                 | 6.2                  |
| Hancock County, Tennessee    | 6,726           | 96.2          | 3.8                   | 0.6                         | 0.0                                 | 0.5     | 0.0                                          | 0.1               | 1.9                 | 0.7                  |
| Hardeman County, Tennessee   | 25,519          | 53.9          | 46.1                  | 39.4                        | 0.6                                 | 0.4     | 0.0                                          | 0.1               | 3.6                 | 2.0                  |
| Hardin County, Tennessee     | 26,824          | 90.9          | 9.1                   | 3.4                         | 0.3                                 | 0.1     | 0.0                                          | 0.1               | 2.7                 | 2.6                  |
| Hawkins County, Tennessee    | 57,107          | 94.1          | 5.9                   | 1.0                         | 0.1                                 | 0.5     | 0.1                                          | 0.1               | 2.3                 | 1.8                  |
| Haywood County, Tennessee    | 17,806          | 43.7          | 56.3                  | 50.0                        | 0.0                                 | 0.1     | 0.0                                          | 0.4               | 1.4                 | 4.3                  |
| Henderson County, Tennessee  | 27,845          | 86.5          | 13.5                  | 8.2                         | 0.1                                 | 0.1     | 0.1                                          | 0.1               | 2.2                 | 2.7                  |
| Henry County, Tennessee      | 32,305          | 86.4          | 13.6                  | 7.4                         | 0.5                                 | 0.4     | 0.0                                          | 0.0               | 2.5                 | 2.8                  |
| Hickman County, Tennessee    | 24,996          | 89.6          | 10.4                  | 3.4                         | 0.5                                 | 0.9     | 0.0                                          | 0.2               | 2.5                 | 2.9                  |
| Houston County, Tennessee    | 8,253           | 91.0          | 9.0                   | 3.4                         | 0.3                                 | 0.3     | 0.2                                          | 0.0               | 1.9                 | 2.8                  |
| Humphreys County, Tennessee  | 19,032          | 90.4          | 9.6                   | 1.2                         | 0.2                                 | 0.8     | 0.0                                          | 0.9               | 3.7                 | 2.7                  |
| Jackson County, Tennessee    | 11,730          | 93.3          | 6.7                   | 0.7                         | 0.1                                 | 0.0     | 0.1                                          | 0.0               | 3.4                 | 2.4                  |
| Jefferson County, Tennessee  | 55,017          | 91.0          | 9.0                   | 1.7                         | 0.1                                 | 0.6     | 0.0                                          | 0.4               | 2.4                 | 3.9                  |
| Johnson County, Tennessee    | 17,982          | 90.4          | 9.6                   | 3.6                         | 0.6                                 | 0.2     | 0.0                                          | 0.3               | 2.7                 | 2.3                  |
| Knox County, Tennessee       | 481,406         | 81.1          | 18.9                  | 8.2                         | 0.1                                 | 2.3     | 0.1                                          | 0.4               | 3.2                 | 4.8                  |
| Lake County, Tennessee       | 6,898           | 65.8          | 34.2                  | 25.5                        | 0.7                                 | 0.2     | 0.1                                          | 0.0               | 4.7                 | 2.9                  |
| Lauderdale County, Tennessee | 25,171          | 58.8          | 41.2                  | 34.4                        | 0.4                                 | 0.2     | 0.0                                          | 0.3               | 3.2                 | 2.9                  |
| Lawrence County, Tennessee   | 44,377          | 92.2          | 7.8                   | 1.4                         | 0.0                                 | 0.4     | 0.1                                          | 0.4               | 2.9                 | 2.5                  |
| Lewis County, Tennessee      | 12,637          | 92.1          | 7.9                   | 1.2                         | 0.0                                 | 1.1     | 0.0                                          | 0.0               | 3.0                 | 2.6                  |
| Lincoln County, Tennessee    | 35,365          | 85.4          | 14.6                  | 6.2                         | 0.1                                 | 0.7     | 0.0                                          | 0.1               | 3.6                 | 3.9                  |
| Loudon County, Tennessee     | 55,507          | 86.3          | 13.7                  | 1.2                         | 0.1                                 | 1.0     | 0.0                                          | 0.4               | 1.4                 | 9.6                  |
| McMinn County, Tennessee     | 53,532          | 87.1          | 12.9                  | 3.4                         | 0.1                                 | 0.8     | 0.0                                          | 0.1               | 4.1                 | 4.5                  |

| Geography                    | 2022 Population | % White Alone | % Minority Population | % Black or African American | % American Indian and Alaska Native | % Asian | % Native Hawaiian and Other Pacific Islander | % Some Other Race | % Two or More Races | % Hispanic or Latino |
|------------------------------|-----------------|---------------|-----------------------|-----------------------------|-------------------------------------|---------|----------------------------------------------|-------------------|---------------------|----------------------|
| McNairy County, Tennessee    | 25,895          | 89.1          | 10.9                  | 5.9                         | 0.3                                 | 0.6     | 0.0                                          | 0.1               | 1.7                 | 2.4                  |
| Macon County, Tennessee      | 25,365          | 90.3          | 9.7                   | 0.6                         | 0.1                                 | 0.4     | 0.0                                          | 0.0               | 3.3                 | 5.3                  |
| Madison County, Tennessee    | 98,644          | 54.5          | 45.5                  | 37.1                        | 0.1                                 | 1.0     | 0.1                                          | 0.5               | 2.5                 | 4.3                  |
| Marion County, Tennessee     | 28,852          | 90.9          | 9.1                   | 2.9                         | 0.1                                 | 0.5     | 0.0                                          | 0.1               | 3.5                 | 2.1                  |
| Marshall County, Tennessee   | 34,567          | 84.4          | 15.6                  | 4.7                         | 0.3                                 | 0.6     | 0.0                                          | 0.6               | 3.4                 | 6.0                  |
| Mauzy County, Tennessee      | 102,002         | 78.0          | 22.0                  | 10.8                        | 0.2                                 | 0.9     | 0.0                                          | 0.1               | 3.3                 | 6.6                  |
| Meigs County, Tennessee      | 12,839          | 90.4          | 9.6                   | 2.4                         | 0.0                                 | 0.5     | 0.0                                          | 0.4               | 5.1                 | 1.2                  |
| Monroe County, Tennessee     | 46,489          | 88.0          | 12.0                  | 1.8                         | 0.1                                 | 0.4     | 0.0                                          | 0.2               | 4.9                 | 4.6                  |
| Montgomery County, Tennessee | 222,305         | 60.9          | 39.1                  | 19.6                        | 0.2                                 | 2.3     | 0.3                                          | 0.6               | 5.3                 | 10.7                 |
| Moore County, Tennessee      | 6,558           | 92.3          | 7.7                   | 3.7                         | 0.5                                 | 0.9     | 0.0                                          | 0.0               | 2.1                 | 0.5                  |
| Morgan County, Tennessee     | 21,124          | 90.5          | 9.5                   | 4.7                         | 0.3                                 | 0.2     | 0.0                                          | 0.0               | 2.7                 | 1.6                  |
| Obion County, Tennessee      | 30,670          | 80.1          | 19.9                  | 10.5                        | 0.1                                 | 0.2     | 0.1                                          | 0.2               | 3.7                 | 5.1                  |
| Overton County, Tennessee    | 22,576          | 95.5          | 4.5                   | 1.3                         | 0.1                                 | 0.3     | 0.0                                          | 0.0               | 1.0                 | 1.9                  |
| Perry County, Tennessee      | 8,432           | 90.9          | 9.1                   | 0.4                         | 0.5                                 | 2.2     | 0.0                                          | 0.0               | 5.0                 | 1.0                  |
| Pickett County, Tennessee    | 5,042           | 95.2          | 4.8                   | 0.3                         | 0.0                                 | 0.0     | 0.0                                          | 0.0               | 2.3                 | 2.2                  |
| Polk County, Tennessee       | 17,620          | 90.6          | 9.4                   | 0.4                         | 0.3                                 | 0.2     | 0.0                                          | 0.2               | 6.0                 | 2.2                  |
| Putnam County, Tennessee     | 80,157          | 87.2          | 12.8                  | 2.1                         | 0.1                                 | 1.0     | 0.0                                          | 0.0               | 2.8                 | 6.7                  |
| Rhea County, Tennessee       | 33,031          | 88.0          | 12.0                  | 1.7                         | 0.1                                 | 0.5     | 0.0                                          | 0.3               | 3.9                 | 5.5                  |
| Roane County, Tennessee      | 53,777          | 91.2          | 8.8                   | 2.7                         | 0.2                                 | 0.6     | 0.0                                          | 0.1               | 2.8                 | 2.2                  |
| Robertson County, Tennessee  | 73,297          | 81.4          | 18.6                  | 7.1                         | 0.1                                 | 0.7     | 0.0                                          | 0.6               | 2.5                 | 7.7                  |
| Rutherford County, Tennessee | 343,727         | 67.5          | 32.5                  | 15.0                        | 0.1                                 | 3.6     | 0.0                                          | 0.3               | 4.3                 | 9.1                  |
| Scott County, Tennessee      | 21,917          | 96.8          | 3.2                   | 0.3                         | 0.2                                 | 0.4     | 0.0                                          | 0.3               | 1.8                 | 0.2                  |
| Sequatchie County, Tennessee | 16,065          | 92.3          | 7.7                   | 0.5                         | 0.4                                 | 0.3     | 0.1                                          | 0.3               | 2.2                 | 4.0                  |
| Sevier County, Tennessee     | 98,455          | 88.4          | 11.6                  | 0.9                         | 0.2                                 | 1.2     | 0.0                                          | 0.3               | 2.1                 | 6.9                  |
| Shelby County, Tennessee     | 926,440         | 34.5          | 65.5                  | 53.6                        | 0.1                                 | 2.9     | 0.0                                          | 0.3               | 1.9                 | 6.8                  |
| Smith County, Tennessee      | 20,034          | 90.5          | 9.5                   | 1.7                         | 0.1                                 | 0.4     | 0.0                                          | 0.3               | 3.8                 | 3.2                  |
| Stewart County, Tennessee    | 13,724          | 90.1          | 9.9                   | 0.7                         | 0.1                                 | 0.5     | 0.8                                          | 0.0               | 4.2                 | 3.6                  |
| Sullivan County, Tennessee   | 158,722         | 92.4          | 7.6                   | 1.9                         | 0.1                                 | 0.8     | 0.0                                          | 0.3               | 2.3                 | 2.2                  |
| Sumner County, Tennessee     | 196,845         | 81.1          | 18.9                  | 8.2                         | 0.1                                 | 1.6     | 0.0                                          | 0.3               | 2.9                 | 5.7                  |
| Tipton County, Tennessee     | 61,116          | 74.5          | 25.5                  | 18.5                        | 0.1                                 | 0.6     | 0.0                                          | 0.7               | 2.7                 | 2.9                  |
| Trousdale County, Tennessee  | 11,596          | 81.9          | 18.1                  | 11.8                        | 0.4                                 | 0.2     | 0.0                                          | 0.0               | 2.8                 | 2.9                  |
| Unicoi County, Tennessee     | 17,845          | 91.3          | 8.7                   | 0.3                         | 0.4                                 | 0.2     | 0.0                                          | 0.0               | 2.0                 | 5.9                  |
| Union County, Tennessee      | 19,860          | 95.1          | 4.9                   | 0.5                         | 0.0                                 | 0.0     | 0.0                                          | 0.1               | 2.3                 | 2.0                  |
| Van Buren County, Tennessee  | 6,182           | 95.1          | 4.9                   | 0.1                         | 0.4                                 | 0.2     | 0.0                                          | 0.0               | 3.2                 | 0.9                  |
| Warren County, Tennessee     | 41,163          | 84.1          | 15.9                  | 2.6                         | 0.2                                 | 0.4     | 0.1                                          | 0.0               | 3.0                 | 9.5                  |
| Washington County, Tennessee | 133,282         | 87.4          | 12.6                  | 3.7                         | 0.1                                 | 1.5     | 0.0                                          | 0.1               | 3.4                 | 3.9                  |

| Geography                    | 2022<br>Population | %<br>White<br>Alone | % Minority<br>Population | %<br>Black or<br>African<br>American | % American<br>Indian and<br>Alaska<br>Native | %<br>Asian | % Native<br>Hawaiian and<br>Other Pacific<br>Islander | % Some<br>Other<br>Race | % Two<br>or More<br>Races | %<br>Hispanic<br>or<br>Latino |
|------------------------------|--------------------|---------------------|--------------------------|--------------------------------------|----------------------------------------------|------------|-------------------------------------------------------|-------------------------|---------------------------|-------------------------------|
| Wayne County, Tennessee      | 16,325             | 88.9                | 11.1                     | 4.8                                  | 0.1                                          | 0.1        | 0.1                                                   | 0.1                     | 3.5                       | 2.4                           |
| Weakley County, Tennessee    | 32,946             | 85.5                | 14.5                     | 7.9                                  | 0.2                                          | 1.2        | 0.1                                                   | 0.3                     | 1.9                       | 3.0                           |
| White County, Tennessee      | 27,420             | 92.7                | 7.3                      | 1.8                                  | 0.1                                          | 0.3        | 0.2                                                   | 0.0                     | 2.0                       | 2.9                           |
| Williamson County, Tennessee | 248,897            | 82.7                | 17.3                     | 3.9                                  | 0.0                                          | 5.1        | 0.0                                                   | 0.4                     | 2.8                       | 5.1                           |
| Wilson County, Tennessee     | 149,096            | 82.1                | 17.9                     | 6.9                                  | 0.1                                          | 1.9        | 0.0                                                   | 1.0                     | 3.1                       | 5.0                           |

Source: USCB 2022b

County has a minority population greater than the TVA PSA average of 26.7%

County has a minority population greater than 50%

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# C

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## **Appendix C – Environmental Parameters of the Nine Capacity Expansion Plans**

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## Appendix C - Environmental Parameters of the Nine Capacity Expansion Plans

### Total 2026 – 2050 SO<sub>2</sub> Emissions, tons

| Strategy | Scenario |         |         |
|----------|----------|---------|---------|
|          | 1        | 2       | 3       |
| A        | 330,710  | 359,234 | 199,449 |
| B        | 334,479  | 357,813 | 210,664 |
| C        | 332,790  | 358,569 | 205,386 |

### Total 2026 – 2050 NO<sub>x</sub> Emissions, tons

| Strategy | Scenario |         |         |
|----------|----------|---------|---------|
|          | 1        | 2       | 3       |
| A        | 289,891  | 281,284 | 175,698 |
| B        | 277,078  | 267,932 | 184,976 |
| C        | 281,391  | 264,875 | 175,357 |

### Total 2026 – 2050 Mercury Emissions, pounds

| Strategy | Scenario |       |     |
|----------|----------|-------|-----|
|          | 1        | 2     | 3   |
| A        | 1,418    | 1,765 | 751 |
| B        | 1,475    | 1,754 | 784 |
| C        | 1,428    | 1,760 | 769 |

### Total 2026 – 2050 CO<sub>2</sub> Emissions, thousand tons

| Strategy | Scenario  |           |         |
|----------|-----------|-----------|---------|
|          | 1         | 2         | 3       |
| A        | 1,297,904 | 1,218,397 | 868,077 |
| B        | 1,166,567 | 1,160,728 | 876,889 |
| C        | 1,215,245 | 1,157,055 | 836,609 |

### Average Annual CO<sub>2</sub> Emission Rate (2026-2050), pounds/MWh

| Strategy | Scenario |     |     |
|----------|----------|-----|-----|
|          | 1        | 2   | 3   |
| A        | 542      | 466 | 382 |
| B        | 489      | 445 | 385 |
| C        | 513      | 447 | 370 |

**Average Annual Water Withdrawal, million gallons**

| Strategy | Scenario  |           |           |
|----------|-----------|-----------|-----------|
|          | 1         | 2         | 3         |
| A        | 2,801,857 | 3,007,364 | 2,467,508 |
| B        | 2,839,928 | 3,006,191 | 2,490,973 |
| C        | 2,809,749 | 2,998,820 | 2,475,880 |

**Average Annual Water Consumption, million gallons**

| Strategy | Scenario |        |        |
|----------|----------|--------|--------|
|          | 1        | 2      | 3      |
| A        | 57,452   | 73,100 | 61,123 |
| B        | 64,265   | 76,354 | 61,381 |
| C        | 55,944   | 69,229 | 57,554 |

**Total 2026 – 2050 Coal Consumption, million tons**

| Strategy | Scenario |     |     |
|----------|----------|-----|-----|
|          | 1        | 2   | 3   |
| A        | 175      | 201 | 108 |
| B        | 177      | 201 | 111 |
| C        | 135      | 202 | 68  |

**Total 2026 – 2050 Natural Gas Consumption, billion standard cubic feet**

| Strategy | Scenario |        |        |
|----------|----------|--------|--------|
|          | 1        | 2      | 3      |
| A        | 15,776   | 13,386 | 10,802 |
| B        | 13,367   | 12,442 | 10,784 |
| C        | 14,304   | 12,358 | 10,169 |

**Total 2026-2050 Waste (Coal Combustion Residuals) Production, MM tons**

| Strategy | Scenario |       |       |
|----------|----------|-------|-------|
|          | 1        | 2     | 3     |
| A        | 20.63    | 24.21 | 14.37 |
| B        | 21.18    | 24.09 | 14.94 |
| C        | 20.92    | 24.16 | 14.72 |

**Total 2026 – 2050 Ash Production, MM tons**

| Strategy | Scenario |       |      |
|----------|----------|-------|------|
|          | 1        | 2     | 3    |
| A        | 9.77     | 10.89 | 6.80 |
| B        | 9.92     | 10.85 | 7.11 |
| C        | 9.89     | 10.87 | 6.98 |

**Total 2026 – 2050 Gypsum Production, MM tons**

| Strategy | Scenario |       |      |
|----------|----------|-------|------|
|          | 1        | 2     | 3    |
| A        | 10.86    | 13.31 | 7.57 |
| B        | 11.26    | 13.24 | 7.82 |
| C        | 11.02    | 13.28 | 7.74 |

**Land Use, total acres**

| Strategy | Scenario |         |         |
|----------|----------|---------|---------|
|          | 1        | 2       | 3       |
| A        | 22,245   | 126,527 | 89,553  |
| B        | 16,952   | 126,774 | 90,166  |
| C        | 79,161   | 175,012 | 134,279 |

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# D

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## **Appendix D – Life Cycle Greenhouse Gas Emissions**

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## Appendix D - Life Cycle Greenhouse Gas Emissions

### D.1 National Laboratory of the Rockies Partnership

TVA partnered with the National Laboratory of the Rockies (NLR) (formerly the National Renewable Energy Laboratory, or NREL) for technical expertise while performing the greenhouse gas life cycle analysis (GHG LCA). The GHG LCA model used for the 2026 IRP was developed in tandem with NLR's methods and guidance. NLR provided TVA with a technical report in February 2025 which explains the scope of NLR's work with TVA for the GHG LCA and documents values used in TVA's LCA study. This report was produced when the laboratory operated as the National Renewable Energy Laboratory (NREL). The laboratory is now the National Laboratory of the Rockies (NLR). A copy of this report is available as a supporting document on TVA's 2026 IRP website ([www.tva.com/irp](http://www.tva.com/irp)).

### D.2 Detailed Total Emissions

The following tables include detailed annual emissions for three select IRP cases. These three cases represent a baseline portfolio (Table D-1), the portfolio with the highest total GHG emissions (Table D-2), and the portfolio with the lowest total GHG emissions (Table D-3). Detailed tables for all core portfolios and sensitivities, together reflective of the Preferred Alternative, will be made available as a supporting data file on the IRP website at [tva.com/irp](http://tva.com/irp).

**Table D-1: Detailed Total Emissions, by Year (short tons), Life Cycle Phase, and per GHG, for Portfolio 1A, Reference Case with Baseline Utility Planning (Baseline Portfolio)**

| 1A Phase               | GHG              | 2026       | 2027       | 2028       | 2029       | 2030       | 2031       |
|------------------------|------------------|------------|------------|------------|------------|------------|------------|
| Upstream               | CO <sub>2</sub>  | 769,228    | 1,253,422  | 505,332    | 276,704    | 53,264     | 117,007    |
|                        | CH <sub>4</sub>  | 2,712      | 4,689      | 1,890      | 1,058      | 157        | 293        |
|                        | N <sub>2</sub> O | 26         | 44         | 19         | 10         | 2          | 4          |
| Ongoing Combustion     | CO <sub>2</sub>  | 61,916,232 | 57,543,592 | 56,975,729 | 56,337,958 | 56,914,494 | 59,250,466 |
|                        | CH <sub>4</sub>  | 639        | 643        | 661        | 657        | 668        | 697        |
|                        | N <sub>2</sub> O | 1,383      | 1,278      | 1,241      | 1,221      | 1,225      | 1,277      |
| Ongoing Non-Combustion | CO <sub>2</sub>  | 2,618,223  | 2,973,119  | 3,188,740  | 3,228,491  | 3,286,845  | 3,360,929  |
|                        | CH <sub>4</sub>  | 61,203     | 73,881     | 80,906     | 80,821     | 82,127     | 85,036     |
|                        | N <sub>2</sub> O | 142        | 154        | 164        | 169        | 173        | 175        |
| Downstream             | CO <sub>2</sub>  | -          | 209        | 31,878     | 2          | 0          | 1,513      |
|                        | CH <sub>4</sub>  | -          | 0          | 21         | 0          | 0          | 1          |
|                        | N <sub>2</sub> O | -          | 0          | 1          | 0          | 0          | 0          |

| 1A Phase               | GHG              | 2032       | 2033                   | 2034       | 2035       | 2036       | 2037       |
|------------------------|------------------|------------|------------------------|------------|------------|------------|------------|
| Upstream               | CO <sub>2</sub>  | 222,379    | 132,584                | 551,520    | 2,382      | -          | -          |
|                        | CH <sub>4</sub>  | 444        | 392                    | 1,365      | 6          | -          | -          |
|                        | N <sub>2</sub> O | 6          | 6                      | 20         | 0          | -          | -          |
| Ongoing Combustion     | CO <sub>2</sub>  | 61,093,003 | 56,168,700             | 60,821,238 | 51,856,942 | 51,824,869 | 53,172,201 |
|                        | CH <sub>4</sub>  | 735        | 701                    | 738        | 704        | 700        | 715        |
|                        | N <sub>2</sub> O | 1,314      | 1,201                  | 1,304      | 1,167      | 1,168      | 1,201      |
| Ongoing Non-Combustion | CO <sub>2</sub>  | 3,536,184  | 3,693,035              | 3,648,205  | 4,086,627  | 4,079,815  | 4,097,376  |
|                        | CH <sub>4</sub>  | 91,541     | 95,941                 | 95,606     | 110,320    | 109,418    | 110,517    |
|                        | N <sub>2</sub> O | 182        | 187                    | 186        | 197        | 198        | 198        |
| Downstream             | CO <sub>2</sub>  | 8,235      | 39,799                 | -          | 194,458    | 40         | 3,033      |
|                        | CH <sub>4</sub>  | 5          | 26                     | -          | 127        | 0          | 2          |
|                        | N <sub>2</sub> O | 0          | 2                      | -          | 9          | 0          | 0          |
| 1A Phase               | GHG              | 2038       | 2039                   | 2040       | 2041       | 2042       | 2043       |
| Upstream               | CO <sub>2</sub>  | -          | 222,379                | 392        | -          | -          | 222,379    |
|                        | CH <sub>4</sub>  | -          | 444                    | 1          | -          | -          | 444        |
|                        | N <sub>2</sub> O | -          | 6                      | 0          | -          | -          | 6          |
| Ongoing Combustion     | CO <sub>2</sub>  | 54,664,588 | 53,477,075             | 44,056,900 | 43,163,838 | 43,567,066 | 44,786,107 |
|                        | CH <sub>4</sub>  | 738        | 717                    | 726        | 711        | 717        | 738        |
|                        | N <sub>2</sub> O | 1,236      | 1,209                  | 925        | 905        | 914        | 940        |
| Ongoing Non-Combustion | CO <sub>2</sub>  | 4,154,933  | 4,113,006              | 4,733,239  | 4,699,195  | 4,730,228  | 4,799,118  |
|                        | CH <sub>4</sub>  | 112,941    | 110,270                | 133,064    | 131,070    | 132,030    | 134,986    |
|                        | N <sub>2</sub> O | 200        | 199                    | 218        | 218        | 218        | 220        |
| Downstream             | CO <sub>2</sub>  | -          | 15,992                 | 148,041    | 4,147      | 9,181      | 8,186      |
|                        | CH <sub>4</sub>  | -          | 10                     | 97         | 3          | 6          | 5          |
|                        | N <sub>2</sub> O | -          | 1                      | 6          | 0          | 0          | 0          |
| 1A Phase               | GHG              | 2044       | 2045                   | 2046       | 2047       | 2048       | 2049       |
| Upstream               | CO <sub>2</sub>  | -          | -                      | 481,224    | 148,253    | 1,042,652  | 1,633,331  |
|                        | CH <sub>4</sub>  | -          | -                      | 1,906      | 296        | 4,129      | 6,425      |
|                        | N <sub>2</sub> O | -          | -                      | 17         | 4          | 37         | 58         |
| Ongoing Combustion     | CO <sub>2</sub>  | 44,908,352 | 44,517,177             | 47,629,735 | 47,752,782 | 47,454,413 | 48,691,571 |
|                        | CH <sub>4</sub>  | 740        | 734                    | 787        | 790        | 782        | 804        |
|                        | N <sub>2</sub> O | 943        | 935                    | 1,002      | 1,006      | 997        | 1,024      |
| Ongoing Non-Combustion | CO <sub>2</sub>  | 4,878,108  | 4,871,930              | 5,034,440  | 5,056,372  | 5,119,736  | 5,190,732  |
|                        | CH <sub>4</sub>  | 138,026    | 136,935                | 144,208    | 144,385    | 146,415    | 149,334    |
|                        | N <sub>2</sub> O | 222        | 221                    | 225        | 226        | 227        | 230        |
| Downstream             | CO <sub>2</sub>  | 7,168      | 12,005                 | 32,390     | 28,606     | 15,782     | 23,661     |
|                        | CH <sub>4</sub>  | 5          | 8                      | 21         | 19         | 10         | 15         |
|                        | N <sub>2</sub> O | 0          | 1                      | 1          | 1          | 1          | 1          |
| 1A Phase               | GHG              | 2050       | Cumulative (2026-2050) |            |            |            |            |
| Upstream               | CO <sub>2</sub>  | 148,253    | 7,782,685              |            |            |            |            |
|                        | CH <sub>4</sub>  | 296        | 26,946                 |            |            |            |            |
|                        | N <sub>2</sub> O | 4          | 269                    |            |            |            |            |
| Ongoing Combustion     | CO <sub>2</sub>  | 49,358,552 | 1,297,903,578          |            |            |            |            |
|                        | CH <sub>4</sub>  | 815        | 18,058                 |            |            |            |            |
|                        | N <sub>2</sub> O | 1,038      | 28,052                 |            |            |            |            |
| Ongoing Non-Combustion | CO <sub>2</sub>  | 5,237,927  | 104,416,554            |            |            |            |            |
|                        | CH <sub>4</sub>  | 150,800    | 2,841,779              |            |            |            |            |
|                        | N <sub>2</sub> O | 234        | 4,983                  |            |            |            |            |
| Downstream             | CO <sub>2</sub>  | 32,157     | 616,485                |            |            |            |            |
|                        | CH <sub>4</sub>  | 21         | 403                    |            |            |            |            |
|                        | N <sub>2</sub> O | 1          | 27                     |            |            |            |            |



**Table D-2: Detailed Total Emissions (short tons), by Year, Life Cycle Phase, and per GHG, for Portfolio Supercharged Growth (SG) Sensitivity (Representing the Highest Total GHG Portfolio Studied)**

| SG Phase               | GHG              | 2026       | 2027       | 2028       | 2029       | 2030       | 2031       |
|------------------------|------------------|------------|------------|------------|------------|------------|------------|
| Upstream               | CO <sub>2</sub>  | 769,228    | 1,253,422  | 505,332    | 276,704    | 3,069,269  | 1,240,400  |
|                        | CH <sub>4</sub>  | 2,712      | 4,689      | 1,890      | 1,058      | 11,490     | 2,948      |
|                        | N <sub>2</sub> O | 26         | 44         | 19         | 10         | 116        | 43         |
| Ongoing Combustion     | CO <sub>2</sub>  | 63,966,793 | 63,594,704 | 68,472,000 | 73,766,540 | 78,756,482 | 81,431,233 |
|                        | CH <sub>4</sub>  | 665        | 712        | 795        | 857        | 950        | 990        |
|                        | N <sub>2</sub> O | 1,429      | 1,415      | 1,494      | 1,617      | 1,720      | 1,779      |
| Ongoing Non-Combustion | CO <sub>2</sub>  | 2,711,845  | 3,180,634  | 3,575,991  | 3,830,162  | 4,344,725  | 4,523,097  |
|                        | CH <sub>4</sub>  | 64,408     | 80,963     | 94,145     | 101,374    | 118,387    | 123,886    |
|                        | N <sub>2</sub> O | 146        | 162        | 181        | 194        | 215        | 227        |
| Downstream             | CO <sub>2</sub>  | -          | 209        | 31,878     | 2          | 0          | 1,513      |
|                        | CH <sub>4</sub>  | -          | 0          | 21         | 0          | 0          | 1          |
|                        | N <sub>2</sub> O | -          | 0          | 1          | 0          | 0          | 0          |
| SG Phase               | GHG              | 2032       | 2033       | 2034       | 2035       | 2036       | 2037       |
| Upstream               | CO <sub>2</sub>  | 503,957    | 117,007    | 901,319    | 641,483    | 503,429    | 503,429    |
|                        | CH <sub>4</sub>  | 1,197      | 293        | 947        | 445        | 63         | 63         |
|                        | N <sub>2</sub> O | 17         | 4          | 26         | 19         | 14         | 14         |
| Ongoing Combustion     | CO <sub>2</sub>  | 79,771,871 | 80,774,740 | 86,250,998 | 74,529,930 | 74,227,889 | 74,374,311 |
|                        | CH <sub>4</sub>  | 992        | 1,026      | 1,095      | 1,054      | 1,048      | 1,052      |
|                        | N <sub>2</sub> O | 1,722      | 1,744      | 1,868      | 1,657      | 1,650      | 1,654      |
| Ongoing Non-Combustion | CO <sub>2</sub>  | 4,958,807  | 5,301,408  | 5,451,946  | 6,029,391  | 6,091,229  | 6,143,267  |
|                        | CH <sub>4</sub>  | 139,223    | 149,929    | 156,266    | 173,842    | 173,354    | 173,740    |
|                        | N <sub>2</sub> O | 243        | 257        | 263        | 281        | 286        | 290        |
| Downstream             | CO <sub>2</sub>  | 8,235      | 39,799     | -          | 194,458    | 40         | 3,033      |
|                        | CH <sub>4</sub>  | 5          | 26         | -          | 127        | 0          | 2          |
|                        | N <sub>2</sub> O | 0          | 2          | -          | 9          | 0          | 0          |
| SG Phase               | GHG              | 2038       | 2039       | 2040       | 2041       | 2042       | 2043       |
| Upstream               | CO <sub>2</sub>  | 503,821    | 3,152,286  | 3,494,802  | 2,909,548  | 2,983,674  | 2,625,842  |
|                        | CH <sub>4</sub>  | 64         | 8,224      | 9,666      | 9,592      | 9,740      | 10,041     |
|                        | N <sub>2</sub> O | 14         | 102        | 115        | 99         | 101        | 92         |
| Ongoing Combustion     | CO <sub>2</sub>  | 75,201,887 | 73,587,702 | 59,423,876 | 52,071,269 | 50,521,355 | 49,148,985 |
|                        | CH <sub>4</sub>  | 1,067      | 1,039      | 982        | 856        | 830        | 805        |
|                        | N <sub>2</sub> O | 1,673      | 1,637      | 1,250      | 1,091      | 1,057      | 1,026      |
| Ongoing Non-Combustion | CO <sub>2</sub>  | 6,236,537  | 6,230,075  | 6,650,422  | 6,336,738  | 6,312,585  | 6,317,632  |
|                        | CH <sub>4</sub>  | 175,501    | 172,144    | 181,866    | 163,995    | 160,178    | 158,064    |
|                        | N <sub>2</sub> O | 295        | 297        | 319        | 318        | 324        | 330        |
| Downstream             | CO <sub>2</sub>  | -          | 15,992     | 148,041    | 4,147      | 9,181      | 8,186      |
|                        | CH <sub>4</sub>  | -          | 10         | 97         | 3          | 6          | 5          |
|                        | N <sub>2</sub> O | -          | 1          | 6          | 0          | 0          | 0          |
| SG Phase               | GHG              | 2044       | 2045       | 2046       | 2047       | 2048       | 2049       |
| Upstream               | CO <sub>2</sub>  | 2,464,623  | 2,965,359  | 2,855,798  | 2,773,495  | 2,464,623  | 2,554,372  |
|                        | CH <sub>4</sub>  | 9,675      | 11,117     | 10,758     | 10,542     | 9,675      | 9,824      |
|                        | N <sub>2</sub> O | 87         | 105        | 100        | 98         | 87         | 89         |
| Ongoing Combustion     | CO <sub>2</sub>  | 50,822,046 | 50,597,958 | 52,160,442 | 51,088,520 | 51,510,853 | 53,199,566 |
|                        | CH <sub>4</sub>  | 831        | 827        | 853        | 835        | 843        | 872        |
|                        | N <sub>2</sub> O | 1,058      | 1,054      | 1,087      | 1,064      | 1,074      | 1,111      |
| Ongoing Non-Combustion | CO <sub>2</sub>  | 6,469,276  | 6,501,888  | 6,599,901  | 6,584,640  | 6,635,958  | 6,753,305  |
|                        | CH <sub>4</sub>  | 162,553    | 161,870    | 165,822    | 163,843    | 164,412    | 168,428    |
|                        | N <sub>2</sub> O | 341        | 347        | 353        | 358        | 364        | 372        |
| Downstream             | CO <sub>2</sub>  | 7,168      | 12,005     | 32,390     | 28,606     | 15,782     | 23,661     |
|                        | CH <sub>4</sub>  | 5          | 8          | 21         | 19         | 10         | 15         |
|                        | N <sub>2</sub> O | 0          | 1          | 1          | 1          | 1          | 1          |

| SG Phase               | GHG              | 2050       | Cumulative (2026-2050) |
|------------------------|------------------|------------|------------------------|
| Upstream               | CO <sub>2</sub>  | 1,046,330  | 43,079,551             |
|                        | CH <sub>4</sub>  | 2,974      | 139,687                |
|                        | N <sub>2</sub> O | 38         | 1,477                  |
| Ongoing Combustion     | CO <sub>2</sub>  | 53,574,300 | 1,622,826,249          |
|                        | CH <sub>4</sub>  | 877        | 22,753                 |
|                        | N <sub>2</sub> O | 1,117      | 35,049                 |
| Ongoing Non-Combustion | CO <sub>2</sub>  | 6,844,933  | 140,616,391            |
|                        | CH <sub>4</sub>  | 171,065    | 3,719,259              |
|                        | N <sub>2</sub> O | 380        | 7,143                  |
| Downstream             | CO <sub>2</sub>  | 32,157     | 616,485                |
|                        | CH <sub>4</sub>  | 21         | 403                    |
|                        | N <sub>2</sub> O | 1          | 27                     |

**Table D-3: Detailed Total Emissions (short tons), by Year, Life Cycle Phase, and per GHG, for Portfolio 3C, Carbon Legislation with Distributed (Representing the Lowest Total GHG Portfolio Studied)**

| 3C Phase               | GHG              | 2026       | 2027       | 2028       | 2029       | 2030       | 2031       |
|------------------------|------------------|------------|------------|------------|------------|------------|------------|
| Upstream               | CO <sub>2</sub>  | 769,228    | 1,253,422  | 505,332    | 276,704    | 1,763,411  | 906,800    |
|                        | CH <sub>4</sub>  | 2,712      | 4,689      | 1,890      | 1,058      | 6,823      | 3,325      |
|                        | N <sub>2</sub> O | 26         | 44         | 19         | 10         | 64         | 35         |
| Ongoing Combustion     | CO <sub>2</sub>  | 61,339,992 | 56,782,789 | 54,542,575 | 54,881,759 | 56,491,596 | 56,795,342 |
|                        | CH <sub>4</sub>  | 632        | 634        | 645        | 639        | 649        | 652        |
|                        | N <sub>2</sub> O | 1,369      | 1,260      | 1,187      | 1,189      | 1,217      | 1,223      |
| Ongoing Non-Combustion | CO <sub>2</sub>  | 2,598,608  | 2,937,242  | 3,206,767  | 3,167,572  | 3,155,340  | 3,168,595  |
|                        | CH <sub>4</sub>  | 60,533     | 72,654     | 81,555     | 78,737     | 77,600     | 77,739     |
|                        | N <sub>2</sub> O | 141        | 152        | 164        | 166        | 168        | 172        |
| Downstream             | CO <sub>2</sub>  | -          | 209        | 31,878     | 2          | 0          | 1,513      |
|                        | CH <sub>4</sub>  | -          | 0          | 21         | 0          | 0          | 1          |
|                        | N <sub>2</sub> O | -          | 0          | 1          | 0          | 0          | 0          |
| 3C Phase               | GHG              | 2032       | 2033       | 2034       | 2035       | 2036       | 2037       |
| Upstream               | CO <sub>2</sub>  | 1,380,893  | 1,158,514  | 1,187,496  | 1,119,776  | 1,855,794  | 893,346    |
|                        | CH <sub>4</sub>  | 3,801      | 3,357      | 3,429      | 3,236      | 6,384      | 2,573      |
|                        | N <sub>2</sub> O | 48         | 42         | 43         | 40         | 63         | 29         |
| Ongoing Combustion     | CO <sub>2</sub>  | 48,224,176 | 39,591,453 | 40,382,436 | 36,623,575 | 33,527,576 | 29,858,935 |
|                        | CH <sub>4</sub>  | 668        | 595        | 590        | 552        | 507        | 477        |
|                        | N <sub>2</sub> O | 1,005      | 823        | 840        | 783        | 710        | 619        |
| Ongoing Non-Combustion | CO <sub>2</sub>  | 3,747,992  | 3,866,936  | 3,763,528  | 3,812,980  | 3,724,346  | 3,701,833  |
|                        | CH <sub>4</sub>  | 97,924     | 99,712     | 96,004     | 95,929     | 90,961     | 89,014     |
|                        | N <sub>2</sub> O | 192        | 198        | 197        | 201        | 201        | 204        |
| Downstream             | CO <sub>2</sub>  | 8,235      | 39,799     | -          | 194,458    | 40         | 3,033      |
|                        | CH <sub>4</sub>  | 5          | 26         | -          | 127        | 0          | 2          |
|                        | N <sub>2</sub> O | 0          | 2          | -          | 9          | 0          | 0          |
| 3C Phase               | GHG              | 2038       | 2039       | 2040       | 2041       | 2042       | 2043       |
| Upstream               | CO <sub>2</sub>  | 921,936    | 1,052,447  | 2,014,895  | 2,014,895  | 2,014,895  | 1,763,180  |
|                        | CH <sub>4</sub>  | 2,644      | 3,043      | 6,855      | 6,855      | 6,855      | 6,823      |
|                        | N <sub>2</sub> O | 30         | 37         | 71         | 71         | 71         | 64         |
| Ongoing Combustion     | CO <sub>2</sub>  | 28,915,730 | 25,496,133 | 25,366,582 | 22,276,641 | 20,333,496 | 19,103,917 |
|                        | CH <sub>4</sub>  | 460        | 406        | 408        | 359        | 329        | 310        |
|                        | N <sub>2</sub> O | 599        | 523        | 519        | 458        | 419        | 395        |
| Ongoing Non-Combustion | CO <sub>2</sub>  | 3,646,032  | 3,507,002  | 3,517,791  | 3,344,585  | 3,238,755  | 3,168,162  |
|                        | CH <sub>4</sub>  | 86,237     | 79,003     | 79,395     | 71,086     | 65,758     | 62,328     |
|                        | N <sub>2</sub> O | 204        | 203        | 205        | 203        | 203        | 204        |
| Downstream             | CO <sub>2</sub>  | -          | 15,992     | 148,041    | 4,147      | 9,181      | 8,186      |
|                        | CH <sub>4</sub>  | -          | 10         | 97         | 3          | 6          | 5          |
|                        | N <sub>2</sub> O | -          | 1          | 6          | 0          | 0          | 0          |
| 3C Phase               | GHG              | 2044       | 2045       | 2046       | 2047       | 2048       | 2049       |
| Upstream               | CO <sub>2</sub>  | 1,763,180  | 1,763,180  | 1,763,180  | 1,821,684  | 1,763,180  | 1,763,180  |
|                        | CH <sub>4</sub>  | 6,823      | 6,823      | 6,823      | 6,969      | 6,823      | 6,823      |
|                        | N <sub>2</sub> O | 64         | 64         | 64         | 66         | 64         | 64         |
| Ongoing Combustion     | CO <sub>2</sub>  | 19,240,205 | 17,675,952 | 18,697,476 | 17,735,318 | 17,309,042 | 17,545,342 |
|                        | CH <sub>4</sub>  | 307        | 283        | 299        | 284        | 276        | 279        |
|                        | N <sub>2</sub> O | 392        | 361        | 382        | 363        | 352        | 356        |
| Ongoing Non-Combustion | CO <sub>2</sub>  | 3,185,960  | 3,100,332  | 3,161,415  | 3,111,369  | 3,100,141  | 3,119,104  |
|                        | CH <sub>4</sub>  | 62,506     | 58,071     | 61,055     | 58,212     | 56,979     | 57,846     |
|                        | N <sub>2</sub> O | 208        | 208        | 211        | 213        | 215        | 217        |
| Downstream             | CO <sub>2</sub>  | 7,168      | 12,005     | 32,390     | 28,606     | 15,782     | 23,661     |
|                        | CH <sub>4</sub>  | 5          | 8          | 21         | 19         | 10         | 15         |
|                        | N <sub>2</sub> O | 0          | 1          | 1          | 1          | 1          | 1          |

| 3C Phase               | GHG              | 2050       | Cumulative (2026-2050) |
|------------------------|------------------|------------|------------------------|
| Upstream               | CO <sub>2</sub>  | 58,504     | 33,549,050             |
|                        | CH <sub>4</sub>  | 147        | 117,582                |
|                        | N <sub>2</sub> O | 2          | 1,197                  |
| Ongoing Combustion     | CO <sub>2</sub>  | 17,871,259 | 836,609,299            |
|                        | CH <sub>4</sub>  | 285        | 11,527                 |
|                        | N <sub>2</sub> O | 363        | 17,709                 |
| Ongoing Non-Combustion | CO <sub>2</sub>  | 3,140,095  | 83,192,482             |
|                        | CH <sub>4</sub>  | 58,405     | 1,875,241              |
|                        | N <sub>2</sub> O | 221        | 4,872                  |
| Downstream             | CO <sub>2</sub>  | 32,157     | 616,485                |
|                        | CH <sub>4</sub>  | 21         | 403                    |
|                        | N <sub>2</sub> O | 1          | 27                     |

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# E

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## **Appendix E – NEPA Documents Reviewed for Chapter 5 Generic Effects Tables**

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## Appendix E - NEPA Documents Reviewed for Chapter 5

### Generic Effects Tables

The following eight NEPA documents (available at [www.tva.gov/nepa](http://www.tva.gov/nepa)) addressing nine TVA projects were reviewed in compiling information presented in *Table 5-2 (Generic Construction Effects of Natural Gas Generation Plants (TVA Projects 2010-2025))*:

- Allen Fossil Plant Emission Control Project Environmental Assessment, August 2014
- Paradise and Colbert Combustion Turbine Plants Environmental Assessment, June 2021
- Cumberland Fossil Plant Retirement Final Environmental Impact Statement, December 2022
- John Sevier Fossil Plant Addition of Gas-Fired Combustion Turbine/Combined-Cycle Generating Capacity and Associated Gas Pipeline Environmental Assessment, March 2010
- Johnsonville Aeroderivative Combustion Turbine Project Environmental Assessment, July 2022
- Kingston Fossil Plant Retirement Final Environmental Impact Statement (February 2024)
- New Caledonia Gas Plant Project Final Environmental Impact Statement (January 2025)
- Allen Aeroderivative Combustion Turbine Project Final Environmental Impact Statement (July 2025)

To compile information for *Table 5-4 (Generic Construction Effects of Solar Generation Facilities (TVA Projects 2014-2023))*, TVA reviewed the following 44 environmental documents that analyzed impacts at 47 solar projects (available at [www.tva.gov/nepa](http://www.tva.gov/nepa)):

- Bellefonte Solar Energy Center Project Environmental Assessment, April 2020
- Cumberland Solar Farm Environmental Assessment, January 2018
- Elora Solar Energy Center Project Environmental Assessment, February 2020
- Five Western North Carolina Solar Farms Environmental Assessments (5 documents), March and April 2014
- Golden Triangle I Solar and Battery Energy Storage (BESS) Project Draft Environmental Assessment, December 2020
- Golden Triangle II Solar Facility and BESS Project Environmental Assessment, May 2022
- Haywood Solar Farm Environmental Assessment, March 2017
- Horus Kentucky 1 Solar Project Environmental Assessment, December 2021
- Houston, Mississippi Solar Farms Environmental Assessment, June 2016
- Jackson Solar Project Environmental Assessment, March 2019
- JEA Industrial Community Solar Environmental Assessment, March 2019
- Jonesborough Solar Site Environmental Assessment, October 2017
- Knoxville Utilities Board Solar Project Environmental Assessment, October 2020
- Latitude Solar Center Environmental Assessment, August 2016



- Logan County Solar Environmental Assessment, January 2023
- Marshall Properties Solar Farm Environmental Assessment, March 2014
- Memphis Solar Project Environmental Assessment, December 2018
- Millington Solar Farm Environmental Assessment, December 2017
- Moore County Solar Project Final Environmental Impact Assessment, December 2022
- Muscle Shoals Solar Project Environmental Assessment, November 2019
- Naval Air Station Meridian Solar Farm Environmental Assessment, April 2017 (U.S. Department of the Navy)
- North Alabama Utility-Scale Solar Project Final Environmental Impact Statement, May 2022
- Optimist Solar and BESS Project Environmental Assessment, September 2022
- Purchase of Power Generated at Brownsville, Tennessee Solar Facility, March 2017
- Providence Solar Center Environmental Assessment, March 2016
- Pulaski Energy Park Expansion Environmental Assessment, April 2014
- Ridgely Energy Farm Environmental Assessment, April 2021
- River Bend Solar Project Environmental Assessment, November 2015
- Selmer North I Solar Project Environmental Assessments, October 2016
- Selmer North II Solar Project Environmental Assessments, August 2016
- Skyhawk Solar Project Environmental Assessment, January 2021
- Silicon Ranch (SR) Bell Buckle Solar Project Environmental Assessment, November 2021
- SR Canadaville Solar Environmental Assessment, July 2022
- SR McKellar Solar Project Environmental Assessment, May 2021
- SR Millington II Solar Project Environmental Assessment, August 2022
- Starkville Solar Facilities Environmental Assessment (3 locations were analyzed separately), February 2014
- Volunteer Electric Cooperative – Gaynor Solar Project, July 2023
- Wildberry Solar Center Environmental Assessment, June 2016
- WR Graceland Solar Project Environmental Assessment, September 2022
- Yum Yum Solar Project Environmental Assessment, December 2019

To compile information for Table 5-5 (Generic Effects of Transmission System Construction and Maintenance Activities (TVA Projects 2005-2023), TVA reviewed records of the following 470 transmission-related projects:

| Environmental Impact Statements                                 | Completion Date |
|-----------------------------------------------------------------|-----------------|
| 500-kV Transmission Line in Middle Tennessee                    | 1-Oct-2005      |
| Rutherford-Williamson-Davidson Power Supply Improvement Project | 1-Apr-2008      |

| Environmental Assessments                                      | Completion Date |
|----------------------------------------------------------------|-----------------|
| Algood 161-KV Transmission Line                                | 1-May-2008      |
| Anderson 500-kV Substation and Associated System Modifications | 9-Dec-2020      |

| Environmental Assessments                                                                                           | Completion Date |
|---------------------------------------------------------------------------------------------------------------------|-----------------|
| Artesia-West Columbus Power System Improvements                                                                     | 31-Aug-2020     |
| Ashland, Mississippi 161-kV Delivery Point                                                                          | 1-Jun-2016      |
| Biggersville, MS                                                                                                    | 1-Jan-2010      |
| Bradley 500-KV Substation and Transmission Line - Southeast Area Power Improvement Project                          | 1-Jun-2005      |
| Bridgeport Alabama Power Supply Upgrade                                                                             | 1-Feb-2008      |
| Burkesville, KY 161-kV Transmission Line                                                                            | 9-Mar-2012      |
| Burlison 161-kV Transmission Line                                                                                   | May-27-2011     |
| Calhoun, Georgia – Area Power System Improvements                                                                   | 1-Apr-2016      |
| Calpine's Morgan Energy Center Transmission Line                                                                    | 1-Sep-2005      |
| Center Point to Moss Lake Substation, N. Georgia                                                                    | 1-Aug-2007      |
| Columbus Air Force Base 161-kV Substation and Transmission Line                                                     | 1-Sep-2005      |
| Eagle Creek 161-kV Transmission Line                                                                                | 8-Oct-2020      |
| East Franklin-Triune 161-KV Transmission Line Tap to Clovercroft 161-KV Substation                                  | 1-Nov-2006      |
| Etowah Power Supply Improvement Project                                                                             | 1-Mar-2005      |
| Five Points-Homewood 161-kV Transmission Line                                                                       | 1-Mar-2006      |
| Florence-South Jackson 115-kV Transmission Line - Mississippi                                                       | 1-Nov-2010      |
| Gallatin Fossil Plant-Angeltown 161-kV Transmission Line and Switching Station                                      | Oct-8-2010      |
| Helicon, Alabama Power Supply Improvement Project                                                                   | Apr-7-2011      |
| Hillsboro 161-kV Transmission Line                                                                                  | Dec-17-2012     |
| Holly Springs-Miller 161-KV Transmission Line Tap to Coldwater Substation                                           | 1-Aug-2007      |
| Kelsey Road-Byrdstown 161-kV Transmission Line and Switching Station                                                | Jan-31-11       |
| Kirkmansville-Clifty City Power Improvement Project                                                                 | 1-Feb-2005      |
| Madison-Charity Lane 161-kV Transmission Line                                                                       | Jul-9-2013      |
| Memphis Regional Megasite Power Supply                                                                              | 1-Feb-2016      |
| Memphis Regional Megasite Power Supply SEA                                                                          | 1-Jun-2022      |
| Monroe, TN-Provide 161-KV Delivery Point                                                                            | 1-Dec-2008      |
| Montgomery-Oakwood Transmission Line                                                                                | 1-Feb-2007      |
| Montpelier, Mississippi 161-kV Transmission Line                                                                    | 1-Feb-2017      |
| Moscow-Miller Power System Improvements                                                                             | 16-Oct-2019     |
| Murfreesboro-East Franklin and Pinhook-Radnor 161-KV Transmission Lines                                             | 1-Mar-2007      |
| New Transmission Line to Bolivar Substation                                                                         | 1-Nov-2006      |
| North Dayton Power System Improvements                                                                              | 30-Oct-2020     |
| ORNL Primary 161-kV Substation and Transmission Line Connection                                                     | 1-May-2005      |
| Oxford-Coffeeville, Mississippi 161 kV Transmission Line                                                            | 28-Feb-2019     |
| Putnam-Cumberland, Tennessee Improve Power Supply Project                                                           | Nov-13-2013     |
| Ranger North Carolina Substation 161-kV Delivery Point                                                              | 1-Apr-2005      |
| RedHills-Kosciusko 161-kV Transmission Line                                                                         | 1-Jan-2017      |
| Replacement Ocoee Transmission Line                                                                                 | 1-Nov-2006      |
| Replacement of Structure 7 - Kentucky Hydroelectric Plant-Gilbertsville 69-kV Transmission Line, KY Dam Reservation | Jun-15-2010     |
| Rugby-Sunbright Power Supply Improvements                                                                           | 1-Feb-2017      |
| Selmer-West Adamsville 161-kV Transmission Line and Switching Station                                               | 1-Jan-2015      |
| SeverCorr 2-Catalpa Crk-Lowndes County Power Supply Improvement Project                                             | 1-Jan-2008      |
| South Pittsburg 161-kV Delivery Point                                                                               | 20-Aug-2014     |
| Starksville and Columbus, Mississippi - Power Supply Improvements                                                   | Jul-9-2010      |
| Supplement to the Wacker Chemi Poly 11 Request for TVA Land Use and Section 26a Approval                            | Jul-21-2011     |

| Environmental Assessments                                                                                                                                              | Completion Date |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| Transmission Line Tap to New BGMU Substation                                                                                                                           | 1-Dec-2006      |
| TVA System Operations Center and Power System Supply                                                                                                                   | 19-Feb-2020     |
| Union-Rally Hill 161-kV Transmission System Improvements                                                                                                               | Aug-8-2010      |
| Union-Tupelo No. 3 161-kV Transmission Line                                                                                                                            | 1-Oct-2014      |
| Volunteer-East Knox Bulk Transmission Project                                                                                                                          | Dec-03-2012     |
| Watts Bar Hydro Plant-Great Falls Hydro Plant 161-kV Transmission Line Tap to Spencer & Great Falls Hydro Plant-Spencer 46-kV Transmission Line Retirement and Removal | 1-Feb-2016      |
| Weir 161-kV Transmission Line                                                                                                                                          | 1-Jan-2006      |
| West Batesville-North Oakland, Mississippi 161-kV Transmission Line                                                                                                    | 27-Oct-2017     |
| West Pleasant Hill 161-KV Transmission Line                                                                                                                            | 1-May-2006      |
| West Point-SeverCorr 161-KV Transmission Line                                                                                                                          | 1-Mar-2006      |

| Categorical Exclusion Checklist (CEC) Reviews                                           | Completion Date | CEC # |
|-----------------------------------------------------------------------------------------|-----------------|-------|
| Wrigley-Dickson District- Retire 12.1 miles of TL                                       | 19-Mar-2001     | 32051 |
| Polk Tennessee Delivery Point                                                           | 10-Mar-2008     | 17616 |
| Improve Power Supply in Huntsville, TN Area                                             | 25-Mar-2008     | 17898 |
| Park City 161-kV Substation-Provide Delivery Point                                      | 8-Oct-2008      | 19175 |
| Resaca North and Resaca South-Construct Tap Line                                        | 4-Nov-2008      | 19510 |
| Locust Fork-Ketona Transmission Line-Relocation for Alawest                             | 22-Dec-2008     | 19727 |
| Revision-Gallatin-Murfreesboro 161-kV Uprate                                            | 1-Jan-2009      | 17348 |
| Campbelltown 161-kV Delivery Point                                                      | 22-Jan-2009     | 18085 |
| Parsons, TN 161-kV Substation-Provide Delivery Point                                    | 6-Feb-2009      | 19104 |
| Milligan College 161-kV Substation-Provide Delivery Point                               | 15-Apr-2009     | 20291 |
| Jena, TN 161-kV Substation-Provide Delivery Point                                       | 21-Apr-2009     | 20251 |
| Fanin 161-kV Delivery Point                                                             | 23-Apr-2009     | 20326 |
| Revision-Marshall-C33 161-kV TL-Reconductor                                             | 21-May-2009     | 18236 |
| Wheeler-Maury 161-kV TL-Uprate/Reconductor Project                                      | 7-Jul-2009      | 20704 |
| North Cowan-161-kV Substation and Connections                                           | 31-Jul-2009     | 19691 |
| Moccasin 161-kV Substation-Install Capacitor Bank                                       | 29-Sep-2009     | 21154 |
| Revision 2-Johnsonville-South Jackson 161-kV TL Uprate                                  | 7-Jan-2010      | 20346 |
| Volkswagen Chattanooga-Provide 161-kV Delivery Point                                    | 15-Jan-2010     | 20430 |
| Revision 1-Alvaton 161-kV Delivery Point                                                | 11-Feb-2010     | 20719 |
| Elysian Fields - Craighead 161-kV TL - Reconductor Section                              | 25-Mar-2010     | 21986 |
| Revision 1-Taylor-McFerrin 161-kV Delivery Point                                        | 8-Apr-2010      | 18084 |
| Cloudland Canyon, GA. 230-kV SS - Provide 230-kV Deliver Point - Project No. 203515     | 27-Apr-2010     | 22236 |
| Owl Hollow, TN-Provide 161-kV Delivery Point                                            | 9-Jun-2010      | 20709 |
| Rainsville 161-kV Substation-Provide Delivery Point - Project 201470                    | 28-Jun-2010     | 22511 |
| County Line Rd., AL. 161-kV SS - Provide Delivery Point - PN 201326                     | 8-Jul-2010      | 22640 |
| Madison Farley #1 & #2 161-kV TL Uprate - Project 104432                                | 19-Aug-2010     | 22884 |
| Cordova - Freeport 500-kV TL - Relocation for Memphis BFI Landfill - Project No. 203551 | 24-Aug-2010     | 22939 |
| East Batesville, MS 161-kV SS - Provide Delivery Point & Breakers - Project No. 200417  | 23-Sep-2010     | 23121 |
| Hemlock Semiconductor, TN 161-kV Substation-Provide Delivery Point                      | 6-Oct-2010      | 21876 |
| Kingston 161-kV Substation-Provide Delivery Point                                       | 9-Oct-2010      | 21215 |
| Wheeler Mountain, TN. 161-kV - Provide Delivery Point - PN.104032                       | 18-Oct-2010     | 23209 |
| Byrd Springs, AL SS - Provide 161-kv Delivery Point - PN 200527                         | 18-Oct-2010     | 23243 |

| Categorical Exclusion Checklist (CEC) Reviews                                                                               | Completion Date | CEC # |
|-----------------------------------------------------------------------------------------------------------------------------|-----------------|-------|
| Widows Creek Fossil Plant - Install Capacitor Banks - PN 203604                                                             | 20-Oct-2010     | 23192 |
| Morris 161-kV Delivery Point                                                                                                | 21-Oct-2010     | 23012 |
| Gibbs Lane, TN. 161-kV SS - Provide Delivery Point – PN 203592                                                              | 17-Nov-2010     | 23398 |
| Chapel Hill, TN. 161-kv SS - Provide 161-kV Deliver Point - 202366                                                          | 24-Jan-2011     | 23661 |
| New Albany - Ripley 161-kV TL - Relocate for MDOT - PN 203914                                                               | 9-Feb-2011      | 23756 |
| Rockvale, TN Provide Delivery Point Project Number 107008,                                                                  | 28-Mar-2011     | 23634 |
| 201460 - Niles Ferry, TN. SS - Provide Delivery Point - PN 201460                                                           | 8-Apr-2011      | 23283 |
| Tiptonville-Ridgley 161kV Reconductor Project Number 205943                                                                 | 15-Apr-2011     | 24209 |
| S. Philadelphia MS, Provide 161-KV Delivery Point Project Number: 103581                                                    | 18-Apr-2011     | 23671 |
| Southwest Bruce 161-kV Delivery Point - Project No. 102907,                                                                 | 9-May-2011      | 24200 |
| Shelby-Cordova # 2 500-KV TL                                                                                                | 27-Jul-2011     | 24367 |
| North Knoxville – Eagle Bend 161-kV TL – Relocate for Chestnut Ridge Landfill - Project No. 204353                          | 15-Aug-2011     | 24860 |
| Niota, TN. 161-kV SS - Provide Delivery Point - Project No. 107345                                                          | 24-Aug-2011     | 24950 |
| Mt. Vernon Road Provide Delivery Point Project Number: 200588                                                               | 31-Aug-2011     | 24966 |
| Goodlettsville, Tn 161kV Substation - Improve Power Supply                                                                  | 26-Sep-2011     | 25105 |
| Widows Creek - Rock Springs 230kV T.L. Relocate for GADOT Project 400459                                                    | 17-Oct-2011     | 25292 |
| Redstone Arsenal No. 1 161-kV SS – Relocate Substation - 205768                                                             | 20-Oct-2011     | 25321 |
| Ripley, TN. 161-kV SS - Supply Loop Feed and Install Breakers - 202363                                                      | 27-Oct-2011     | 25355 |
| Greeneville, TN. 161-kV SS - Install 161-kV Capacitor Banks - 400180                                                        | 6-Dec-2011      | 25512 |
| Bells 161-kV Delivery Point - Project 202094 - line and substation expansion                                                | 5-Jan-2012      | 25466 |
| Occidental, TN. 161-kV SS - Provide Delivery Point - 205922/205946                                                          | 17-Jan-2012     | 25696 |
| Revision - Lake Lowndes 161-kV Delivery Point - Project 104651                                                              | 19-Jan-2012     | 25166 |
| Guntersville - Goosepond 161-kV TL - Up-rate/Reconductor - 203607                                                           | 30-Jan-2012     | 23736 |
| Shippo Bend, Tn. 161-kV SS - Provide Delivery Point - 204641                                                                | 8-Feb-2012      | 25819 |
| Rarity Pointe, TN 161kV Substation Provide 161kV Delivery Point (Fort Loudoun EC)                                           | 9-Apr-2012      | 26122 |
| East Simpson Ky 161-KV Provide Delivery Point - Project 106988                                                              | 2-May-2012      | 23329 |
| Calvert-South Calvert 161-kV TL - Reconductor - Project 402465                                                              | 15-May-2012     | 25549 |
| Holly Springs - Miller 161-kV TL - Relocate for MDOT - 203883                                                               | 18-May-2012     | 26434 |
| Revision - Beulah Grove 161-kV Delivery Point - Project 204615                                                              | 31-May-2012     | 26143 |
| East Point - Fairview 161-kV TL - Uprate - 204098 - W.O. 4497A - reconductor and select pole modifications                  | 13-Jun-2012     | 26592 |
| Guntersville - Decatur 161kV Transmission Line Reconductor Decatur - Priceville Section                                     | 13-Jul-2012     | 26722 |
| Bridgeport, Al SS Slack Span Delivery Point Project Number 200587                                                           | 13-Jul-2012     | 26773 |
| Paradise - Wilson - New Hardinsburg 161-kV TL - Modify Protection and Associated Equipment for 3-Terminal TL(BREC) - 403390 | 14-Aug-2012     | 26893 |
| Revision - Marshall-Calvert #1 and #2 161-kV TL Reconductor - Project 204542                                                | 5-Sep-2012      | 23266 |
| HCA, TN 161kV Substation Provide Delivery Point                                                                             | 14-Sep-2012     | 27032 |
| Wilson HP - Shoals 161kV TL Reconductor Line                                                                                | 23-Oct-2012     | 27314 |
| Finley SS - Amoco 161-kV TL - Up-Rate - 206051                                                                              | 24-Oct-2012     | 27312 |
| Montgomery-Clarksville #1 / Montgomery-Savage 161kV TL CIP Relocation                                                       | 25-Oct-2012     | 27334 |
| Waverly, MS161 kV Substation Provide Delivery Point (4 County EPA)                                                          | 30-Oct-2012     | 27381 |
| Wilson HP - Reynolds 161kV TL Reconductor Line                                                                              | 31-Oct-2012     | 27344 |
| Lexington 161-kV SS - Convert to 161-kV Operation - 102383 - 44K87 & 43Q84.                                                 | 26-Nov-2012     | 27471 |
| Widows Creek - East Point 500-kV TL - Relocate for Duck River Reservoir - 400139                                            | 3-Dec-2012      | 26220 |
| South Limestone, AL. 161-kV SS - Provide Delivery Point - 404798                                                            | 10-Dec-2012     | 27518 |
| Jackson Avenue, Alabama 161 kV Substation Provide Delivery Point                                                            | 20-Dec-2012     | 27591 |

| Categorical Exclusion Checklist (CEC) Reviews                                                                              | Completion Date | CEC # |
|----------------------------------------------------------------------------------------------------------------------------|-----------------|-------|
| Replacement of two spans of OPGW on the Murfreesboro-Smyrna 161kV TL                                                       | 23-Jan-2013     | 27758 |
| Wilson-Shoals 161-KV TL – Reconductor, Material Laydown Yard                                                               | 25-Jan-2013     | 27792 |
| Construction Laydown Yard - Chesterfield - Montgomery 161-kV SS - Convert to 161-kV Operation                              | 25-Jan-2013     | 27800 |
| Volunteer-East Knox Bulk Transmission Project - Construction Laydown Yard - Project 102350                                 | 12-Feb-2013     | 27905 |
| C33-Marshall 161-kV TL Uprate and Reconductor - Project 206074                                                             | 1-Mar-2013      | 26892 |
| Montgomery, TN. 161-kV SS - Convert To 161-kV Operation - 202006                                                           | 1-Mar-2013      | 27329 |
| Trinity - Browns Ferry NP 161 & 500-kV TL - Uprate & Install OPGW - 206087                                                 | 12-Mar-2013     | 28027 |
| Toray, AL. 161-kV SS - Provide Delivery Point (JWEMC) - 407271                                                             | 29-Apr-2013     | 28284 |
| Ardmore - Fayetteville 161kV TL Reconductor Ardmore-Park City Line Section                                                 | 30-Apr-2013     | 27299 |
| Marshall-Golo-Mayfield 161-kV TL - Uprate and Reconductor - Project 402468                                                 | 29-May-2013     | 28469 |
| Centerville, TN. 161-kV SS - Relocate Substation - Project No. 205814                                                      | 10-Jun-2013     | 28547 |
| Colbert Fossil Plant - Install Capacitor Bank                                                                              | 11-Jul-2013     | 28681 |
| Mecca Pike 161-kV Delivery Point - Project 205908                                                                          | 22-Jul-2013     | 28347 |
| Oak Level, KY. 161-kV SS - Provide Delivery Point (West Kentucky RECC) - Project No. 403949                                | 22-Jul-2013     | 28755 |
| Johnsonville – McEwen 69-kV TL – Retire, Acquire, and Relocate Sections of TL - Project No. 406030                         | 22-Jul-2013     | 28767 |
| John Sevier-White Pine #2 161-kV TL Uprate - Project 400456, W.O. 310CT (conductor replacement)                            | 31-Jul-2013     | 28787 |
| Bethel Valley, TN. 161-kV SS - Construct SS and TL Feeds for ORNL - 406588                                                 | 5-Aug-2013      | 28515 |
| Revision - Hartselle-Cullman 161-kV TL Uprate - Project 400209                                                             | 13-Aug-2013     | 27894 |
| Georgetown, TN. 161-kV Substation - Provide Delivery Point (VEC) - Project No. 107018                                      | 19-Aug-2013     | 28909 |
| Trinity -Caddo 161-kV Transmission Line Uprate - reconductoring                                                            | 3-Sep-2013      | 28967 |
| Cordova-Benton 500kV Uprate                                                                                                | 5-Sep-2013      | 28108 |
| Athens-Ardmore 161kV TL Rebuild - Project 206089 - reconductor entire line and replace many structures                     | 11-Sep-2013     | 28134 |
| Revision - Browns Ferry-Athens 161-kV TL Rebuild - Project 206083                                                          | 2-Oct-2013      | 27943 |
| Lake Kathy, Ga - Provide Delivery Point                                                                                    | 23-Oct-2013     | 29248 |
| Geraldine 161 kV Substation                                                                                                | 24-Oct-2013     | 27276 |
| Colbert Shoals 161-kV TL - Reconductor Shoals - Tuscumbia - Woodmont TL Section - Project No. 400207                       | 4-Nov-2013      | 29336 |
| Barkley Hydro Plant - Oakwood Switching Station 161kV TL Uprate                                                            | 6-Nov-2013      | 29377 |
| GAF Scrubber - TL Feeds and associated Relay and Yard Work                                                                 | 13-Nov-2013     | 28940 |
| Trinity Hills, TN. 161-kV SS - Provide Delivery Point - 407583                                                             | 14-Nov-2013     | 29446 |
| 161-kV Delivery Point at Flex Drive                                                                                        | 19-Nov-2013     | 29411 |
| Colbert FP-Oakland 161kV TL Reconductor and Uprate                                                                         | 2-Dec-2013      | 29419 |
| Triathlon 161-kV Delivery Point - Project 409174                                                                           | 4-Dec-2013      | 29360 |
| Northwest Area Fiber Project - Install Fiber Optic Equipment - Project: 206093                                             | 9-Jan-2014      | 29687 |
| Volunteer-North Knoxville 161kV TL Reconductor                                                                             | 10-Jan-2014     | 29695 |
| Construction Laydown Yard - Trinity - Decatur - Guntersville 161-kV TL- Reconductor                                        | 15-Jan-2014     | 28554 |
| Construction Laydown Yard - Apalachia - East Cleveland No. 1 & No. 2 161-kV TL - Uprate                                    | 16-Jan-2014     | 29738 |
| Guntersville - Farley 161-kV TL - Uprate - Project No. 203609                                                              | 17-Jan-2014     | 23640 |
| Apalachia - East Cleveland No. 1 161-kV TL - Reconductor/Uprate & Install Fiber Optic Cable - Project No. 205213 & 406589. | 22-Jan-2014     | 29188 |
| Westbourne-Jellico 69-kV Transmission Line (L3874) Retirement                                                              | 14-Feb-2014     | 29903 |



| Categorical Exclusion Checklist (CEC) Reviews                                                                                 | Completion Date | CEC # |
|-------------------------------------------------------------------------------------------------------------------------------|-----------------|-------|
| Cornersville 161-kV Delivery Point - Project 400251                                                                           | 21-Feb-2014     | 29835 |
| Waynesboro, TN 161 kV Substation - Provide Delivery Point                                                                     | 25-Feb-2014     | 28270 |
| East Calvert, South Calvert, and Calvert Substations - Calvert Area Improvements - Project No. 406878,406901,& 406907.        | 25-Feb-2014     | 28662 |
| Marshall Area Projects - Construction Laydown Yard                                                                            | 6-Mar-2014      | 30067 |
| Martintown-Enterprise 46-kV Transmission Line (L2712) - Install 46-kV Sectionalizing Switch - Project: 103446                 | 4-Apr-2014      | 30192 |
| Center Hill-Str. 117 (Baxter) 46-kV Transmission Line - Transmission Line Retirement - Project: 402666                        | 4-Apr-2014      | 30221 |
| Cross Plains Capacitor Bank Addition                                                                                          | 1-May-2014      | 30141 |
| Paradise-Peabody 69-kV Transmission Line (L3857) - Transmission Line Retirement - Project: 402660                             | 6-May-2014      | 30385 |
| Center Point - Moss Lake 115/230-kV TL - GADOT Replace Structure - Project No. 413028                                         | 12-May-2014     | 30406 |
| Pickwick HP - Kimberly Clark 161-kV Transmission Line (L5877) - Partial Reconductor - Project: 409552                         | 21-May-2014     | 30349 |
| Mississippi Silicon, MS 161-kV Substation (Direct Serve) - Provide Delivery Point - Project: 410270                           | 23-Jul-2014     | 30813 |
| Wolf Creek - Huntsville 161-kV TL - Uprate - Project No. 205216                                                               | 28-Jul-2014     | 30866 |
| Widow's Creek - Reese Ferry 161-kV TL - Reconductor & Widow's Creek - Nickajack 161-kV TL - Uprate - Projects 403986 & 403989 | 19-Aug-2014     | 30235 |
| Roane-Harriman 161kV NERC Alert                                                                                               | 24-Sep-2014     | 31243 |
| Lafayette-Str. 4 (L3050) and Lafayette-Str. 172 (Scottsville) (L3355) 69-kV Transmission Lines Retirement - Project: 402660   | 25-Sep-2014     | 31211 |
| Transpark, Kentucky 161KV delivery point                                                                                      | 29-Sep-2014     | 31251 |
| Winchester-Hillsboro 46-kV Transmission Line - Transmission Line Retirement - Project 202139                                  | 16-Oct-2014     | 31345 |
| Project No. 400210 - Spring Creek-Nance 161kV Transmission Line Uprate                                                        | 20-Nov-2014     | 31580 |
| Belfast-Cornersville 46-kV Transmission Line - TL Retirement - Project 400251                                                 | 15-Jan-2015     | 31882 |
| Hankook, TN. 161-kV Substation - Provide Delivery Point - Project No. 412721                                                  | 20-Jan-2015     | 31244 |
| Union-Tupelo #3 161-kV Transmission Line - Construction Laydown Yard - Project 400236                                         | 2-Feb-2015      | 31961 |
| Laydown Area associated with East Bowling Green - Summershade 161kV Project                                                   | 2-Feb-2015      | 31973 |
| Colbert - Stateline No. 1 161-kV TL - Uprate - 206039                                                                         | 10-Feb-2015     | 32012 |
| East Bowling Green - Summer Shade 161-kV Uprate                                                                               | 19-Feb-2015     | 31680 |
| TL Retirement- Rockwood Dist-Spring City TL- Retire 18.878 miles of TL                                                        | 19-Mar-2015     | 32050 |
| Great Falls-Sparta TL2437 Retirement                                                                                          | 14-Apr-2015     | 31960 |
| Temporary Construction Laydown Area - Wilson - Oakland 161-kV TL Uprate                                                       | 15-Apr-2015     | 32393 |
| Wilson HP-Oakland 161-kV TL - Reconductor - Project 400215                                                                    | 1-May-2015      | 32105 |
| Vesta Road, TN - Provide 161-kV Delivery Point                                                                                | 5-Jun-2015      | 32245 |
| John Sevier - Volunteer 161-kV TL - Uprate - Project No. 205211                                                               | 22-Jun-2015     | 30392 |
| Dover-Erin 69kV Transmission Line - TL Retirement-Retire approximately 10 miles of TL - Project 402667                        | 13-Jul-2015     | 32708 |
| Hopkinsville-Casky-Edgoten 161-kV Transmission Line Uprate                                                                    | 17-Jul-2015     | 32988 |
| Fontana-Peppertree 13-kV TL Relocation/Rebuild - Project 418958                                                               | 24-Jul-2015     | 32974 |
| Widows Creek-Bryant-Oglethorpe #1 161-kV Transmission Line - Uprate - 206037-31A5H                                            | 21-Aug-2015     | 33161 |
| Plateau 500-kV Substation - Borrow Area                                                                                       | 14-Sep-2015     | 33268 |
| Athens-Etowah Power Supply Improvement - Project 409013                                                                       | 23-Sep-2015     | 33321 |
| Covington-Dyersburg 161-kV TL Uprate - Project 406725                                                                         | 5-Oct-2015      | 32399 |

| Categorical Exclusion Checklist (CEC) Reviews                                                         | Completion Date | CEC # |
|-------------------------------------------------------------------------------------------------------|-----------------|-------|
| Lynnville, TN. 161-kV Substation - Provide Delivery Point - 409288                                    | 7-Dec-2015      | 33768 |
| Paradise CC Plant, KY. - Provide 161-kV Interconnection - 412718                                      | 22-Dec-2015     | 32008 |
| Center Hill-Smithville 46kV Transmission Line Retirement                                              | 17-Feb-2016     | 33171 |
| Cullman - Moulton 161-kV TL - Medium NERC Alert - Project 406572                                      | 24-Feb-2016     | 34199 |
| Selmer West Adamsville Access Road Alterations                                                        | 25-Feb-2016     | 34268 |
| Battery Hill Access Road Improvement - Project: 422462                                                | 7-Mar-2016      | 34308 |
| Construction Laydown Yard - Lynnville 161-kV TL - Provide Delivery Point                              | 9-Mar-2016      | 34303 |
| Kingston-Rockwood-Roane Brookfield Smokey Mountain Hydro 161kV TL Uprate                              | 10-Mar-2016     | 34306 |
| Wilson - Trinity OHGW Replacement - Project 107319                                                    | 15-Mar-2016     | 34320 |
| Morgan, AL 161-kV Delivery Point - Project 418783                                                     | 21-Mar-2016     | 34425 |
| Smithville, TN 161kV Transmission Line Delivery Point for Smithville Electric System (SES) PN: 420637 | 28-Mar-2016     | 34348 |
| Franklin, KY 161-kV Substation- Project: 420182                                                       | 8-Apr-2016      | 34114 |
| Cordova - Haywood 500kV Uprate - Project 202879                                                       | 21-Apr-2016     | 34662 |
| Deerbrook 161-kV Delivery Point - Project 413337                                                      | 26-Apr-2016     | 34598 |
| Allen CC Plant Interconnection - 414013                                                               | 28-Apr-2016     | 34310 |
| John Sevier FP - Phipps Bend No 3 161kV Uprate                                                        | 9-May-2016      | 32760 |
| L3803-2 Gallatin-Hartsville-Westmoreland (69 kV) 7.78 miles Line Retirement.                          | 12-May-2016     | 33990 |
| L3808 Rogersville-Fitts Gap (69 kV) 15.197 miles Transmission Line Retirement                         | 12-May-2016     | 34009 |
| Johnsonville-Lawrenceburg 161kV TL - Lightning Mitigation - 404668                                    | 16-May-2016     | 34718 |
| L3351-1 N.E. Johnson City-Erwin No. 2 (1.19 miles) Transmission Line Retirement.                      | 19-May-2016     | 34003 |
| Transmission Line Laydown Yard-Spencer, TN area projects                                              | 8-Jun-2016      | 34963 |
| Wheeler - Ardmore OHGW Replacement - 107319                                                           | 15-Jun-2016     | 34967 |
| Oxford-CR 300 46-kV TL - Construct 161-kV TL - Project 422806                                         | 15-Jun-2016     | 35004 |
| 421225 Davis Ferry 161kV Delivery Point for Loudon Utilities                                          | 17-Jun-2016     | 35018 |
| Calhoun, GA area Projects-Construction Laydown Yard                                                   | 30-Jun-2016     | 35031 |
| Loopers Farm – Alpha 230 KV 31GP1                                                                     | 5-Jul-2016      | 35105 |
| Selmer West Adamsville 161-kV TL Segment Reroute                                                      | 7-Jul-2016      | 35130 |
| Starkville - Sturgis 161kV TL NERC Alert Remediation - Medium Priority - Project: 421234              | 11-Jul-2016     | 34265 |
| Sequoyah - Watts Bar HP 161-kV TL                                                                     | 2-Aug-2016      | 35290 |
| TL Retirement-L2447 Huntsville-Scottsboro (Str 125-Str 167 & Str 200-S) 46 kV TL (5.858 miles).       | 8-Aug-2016      | 34055 |
| Nolensville-Elysian Fields TL Reconductor - Project 202004                                            | 15-Aug-2016     | 35337 |
| Murfreesboro-Smyrna 161-kV TL Reconductor - Project 202004                                            | 15-Aug-2016     | 35339 |
| Murfreesboro Road-Airport 161-kV TL Reconductor - Project 202004                                      | 15-Aug-2016     | 35340 |
| Relocation of Dover-Erin 69-kV TL Easement for Cumberland Landfill                                    | 12-Sep-2016     | 35475 |
| Cox Road Delivery Point - 421830                                                                      | 26-Sep-2016     | 35463 |
| Clay - Aberdeen 161-kV Uprate - Project 420116                                                        | 3-Oct-2016      | 35140 |
| Center Hill-Smithville 46kV Transmission Line Demolition                                              | 21-Oct-2016     | 35093 |
| Bluefield, MS. 161-kV Substation - Provide Delivery Point – 417652                                    | 21-Oct-2016     | 35669 |
| Westbourne-Jellico 69-kV Transmission Line (L3874) Retirement Phase 1 - Emergency Work PN: 402659     | 8-Nov-2016      | 35595 |
| Temporary Construction Laydown Yard: Deerbrook 161-kV Delivery Point - Project 413337                 | 21-Nov-2016     | 35864 |
| Weyerhaeuser-S. Macon NERC MP L5316 31IPT                                                             | 22-Nov-2016     | 35858 |
| Southeast Huntsville, AL. 161-kV Substation - Provide Delivery Point (Huntsville Utilities) - 409812  | 22-Nov-2016     | 35862 |



| Categorical Exclusion Checklist (CEC) Reviews                                                                                                              | Completion Date | CEC # |
|------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|-------|
| Buck Island Delivery Point - Project No. 414719                                                                                                            | 28-Nov-2016     | 35813 |
| Clay-Starkville (West Point) 161-KV T.L. NERC Medium Priority Remediation L5675 31K1P                                                                      | 28-Nov-2016     | 35880 |
| Colbert-Pickwick                                                                                                                                           | 5-Dec-2016      | 35856 |
| Broadview, TN 161kV DP for DREMC                                                                                                                           | 8-Dec-2016      | 34477 |
| Weakley-Dyersburg 1 161 KV TL 415149                                                                                                                       | 21-Dec-2016     | 35282 |
| Pine Ridge, TN. 161-kV Switching Station - Provide Delivery Point (Y12-UPF) - 422917                                                                       | 4-Jan-2017      | 36047 |
| Guntown-Turner Park 46kV Transmission Line (L2470), Structures 570D, 571, 572, and 578 - Line Retirement                                                   | 23-Jan-2017     | 35982 |
| Demolition of the Englewood-Madisonville 69 KV transmission line (L3056).                                                                                  | 23-Feb-2017     | 34987 |
| Oakland, Alabama OPGW Fiber line ROW Clearing                                                                                                              | 23-Feb-2017     | 36125 |
| North Huntsville-Limestone L5836 TL Medium Priority NERC Alert - Project Number 421234                                                                     | 24-Feb-2017     | 36120 |
| Guthrie Kentucky Purchase R.O.W - 418551                                                                                                                   | 2-Mar-2017      | 36361 |
| Indorama 161-kV – Provide Temporary 161-kV Feed to Indorama - 427179                                                                                       | 8-Mar-2017      | 36421 |
| Gallatin Industrial 161kV Delivery Point for Gallatin Electric Department PN: 413061                                                                       | 9-Mar-2017      | 36392 |
| North Wilkey, KY 161kV Delivery Point for WRECC 422432                                                                                                     | 10-Mar-2017     | 36377 |
| Ider, AL 161-kV Substation - Provide Delivery Point - 414720                                                                                               | 14-Mar-2017     | 35930 |
| Widows Creek FP - Provide Temporary Power Feed (NAEC) - 403988                                                                                             | 27-Mar-2017     | 33975 |
| Battery Hill TL Work - Install Moccasin Loop, Nickajack HP Loop, and OPGW - Widows Creek - Battery Hill NO.1 and NO.2 Reconductor - Project: 422462/422119 | 28-Mar-2017     | 34659 |
| Pulaski-Fayetteville 161kV Medium NERC Alert - L5904 PN: 421234                                                                                            | 16-Apr-2017     | 36643 |
| Tupelo - Turner Park 161kV Transmission Line - 415148                                                                                                      | 18-Apr-2017     | 36539 |
| Retire Portions of the Kingston - Rockwood - Roane 161kV TL - Project: 419583                                                                              | 26-Apr-2017     | 36656 |
| Summer Shade - Summer Shade Tap 161kV Upgrade Tap Section Capacity PN: 415148, 425422, 421558                                                              | 12-May-2017     | 36788 |
| East Chickamauga, GA. 161-kV Substation - Provide Delivery Point - 407532                                                                                  | 15-Jun-2017     | 36976 |
| Jackson - Bud Crockett 161-kV TL - Medium Priority NERC Alert - 31J70 - 415148                                                                             | 27-Jun-2017     | 37031 |
| Kittrell, TN 161-KV Delivery Point PN: 421320                                                                                                              | 2-Jul-2017      | 36980 |
| Dalton B Smith 161kV Provide Transmission Line Delivery Point PN: 417829                                                                                   | 2-Jul-2017      | 37030 |
| Widows Creek - Rock Springs OPGW Installation - 426396                                                                                                     | 5-Jul-2017      | 36616 |
| Sturgis - Louisville 161kV TL - OPGW Replacement - 417191                                                                                                  | 6-Jul-2017      | 37037 |
| Northeast College 161-kV Substation Provide Slack Span Delivery Point Project Number: 424945                                                               | 18-Jul-2017     | 37149 |
| North Dayton, TN 161kV Delivery Point PN: 403139                                                                                                           | 15-Aug-2017     | 37261 |
| Wildberry Solar Center Interconnection - Project: 428114                                                                                                   | 21-Aug-2017     | 37313 |
| Temporary Construction Laydown Yard : Bluefield 161-kV Delivery Point - Project 417652                                                                     | 22-Aug-2017     | 37314 |
| Bolivar-Bolivar Dist #2 46kV Transmission Line (L2659), Structures 4-17 - Line Retirement                                                                  | 23-Aug-2017     | 36039 |
| Project 419888 - Replace Microwave System                                                                                                                  | 23-Aug-2017     | 36255 |
| John Sevier-Cherokee No.1 NERC Medium Priority PN: 415148                                                                                                  | 24-Aug-2017     | 37130 |
| Cordova - Shelby L6089 500-kV Capacity Increase                                                                                                            | 30-Aug-2017     | 37234 |
| Pinewood, TN. 161-kV Substation - Provide Delivery Point - 407530                                                                                          | 30-Aug-2017     | 37359 |
| Martintown - Enterprise 46kV TL - L2712 - Lightning Mitigation - 404668                                                                                    | 30-Aug-2017     | 37399 |
| Singleton to Kosciusko Transmission Line Rebuild                                                                                                           | 1-Sep-2017      | 36877 |
| Watts Bar HP - Great Falls HP 161kV Transmission Line Relocation Section PN: 428834                                                                        | 5-Sep-2017      | 37430 |
| Mountain Home Road Delivery Point - 409294                                                                                                                 | 11-Sep-2017     | 34964 |

| Categorical Exclusion Checklist (CEC) Reviews                                                         | Completion Date | CEC # |
|-------------------------------------------------------------------------------------------------------|-----------------|-------|
| Longtown 161-kV Delivery Point - Project 414684                                                       | 14-Sep-2017     | 37478 |
| Alcoa Substation - TPS Material Storage Laydown Yard                                                  | 20-Sep-2017     | 37511 |
| Widows Creek - Rock Springs NAMP - Project 421234                                                     | 26-Sep-2017     | 36620 |
| Beckwith Connector Project - South Nashville-Green River 161-kV TL (L5029) - 425987                   | 2-Oct-2017      | 37554 |
| Nickajack Hydro Plant Reservation - TPS Material Storage Laydown Yard.                                | 4-Oct-2017      | 36682 |
| Van Vleet, MS Microwave - Replace Unlicensed MW CKT 8613 - Project: 413168                            | 4-Oct-2017      | 37536 |
| Waynesboro-Howenwald 69kV Transmission Line (L3882), Structures 1-25 and 175-244 - Line Retirement    | 6-Oct-2017      | 36040 |
| Columbia Dist-Str 234 Lewisburg #2 46kV Transmission Line (L2468) - Line Retirement                   | 6-Oct-2017      | 36178 |
| Montgomery-Clarksville #3 161-kV TL - Construct - 202004                                              | 12-Oct-2017     | 36526 |
| Newtown, TN 161kV Substation Provide Delivery Point-Metering & UFLS, 429471                           | 16-Oct-2017     | 37604 |
| Colbert - Pickwick 161-kV TL(Pickwick - Str. 74) - Install Fiber - 429445                             | 16-Oct-2017     | 37606 |
| Gallatin - Lebanon No. 1 Tap to Lebanon Industrial Park Replace Switch PN: 421558 L5781               | 16-Oct-2017     | 37628 |
| Moscow Microwave Repeater Station - 413168                                                            | 17-Oct-2017     | 36988 |
| Coosa River - Centre Rebuild River Crossing - 425124                                                  | 8-Nov-2017      | 36843 |
| Spring Creek, TN. 161-kV Substation - Provide Delivery Point - 425096 - 31MMD, 33MQD, & 33MQI.        | 13-Nov-2017     | 36736 |
| Colbert - Oakland 161-kV TL (Str. 74 - Str. 66) - Install Fiber - 429445                              | 29-Nov-2017     | 37827 |
| Westbourne - Jellico 69kV Transmission Line Retirement PN: 430042                                     | 7-Dec-2017      | 36730 |
| Construction Laydown Yard – Ashland, MS 161-kV TL 405784                                              | 11-Dec-2017     | 37920 |
| Project Flash Switching Station and 161-kV TL Connection Project Number 432262,                       | 21-Dec-2017     | 37400 |
| SNS - ORNL 161kV Reconductor PN: 424633 & Bethel Valley 161kV Loop Kingston FP - Ft Loudon PN: 426017 | 3-Jan-2018      | 36762 |
| House 161-kV Delivery Point - Project 409942                                                          | 5-Jan-2018      | 35050 |
| House 161-kV Delivery Point - Project 409942                                                          | 15-Jan-2018     | 35050 |
| Shawnee Area Reconfiguration - Project 409329, 421127, 421229                                         | 20-Jan-2018     | 34272 |
| Removing 2.93 miles of L2420 segment 3 of Columbia-Jongo 46 kV Transmission Line.                     | 23-Jan-2018     | 36373 |
| Johnsonville -Monsanto 161kV TL Replace Structure 98 - 31OUX - 431609                                 | 1-Feb-2018      | 37665 |
| Sequoyah NP - Chickamauga Hydro 161-kV TL (L5043) - Install OPGW Project Number: 432352               | 15-Feb-2018     | 38236 |
| Colbert - Wilson 161-kV TL - Install Fiber - 429445                                                   | 27-Feb-2018     | 38289 |
| Harriman, TN 161kV Switching Station - Install Breakers - Project: 419583                             | 13-Mar-2018     | 35932 |
| Counce - Hickory Valley L5216 MP NERC - Project Number 415148                                         | 13-Mar-2018     | 37190 |
| Colbert - Reynolds #2 L5793 MP NERC - 415148                                                          | 13-Mar-2018     | 38136 |
| Construction Laydown Yard - Montpelier, MS. 161-kV SS - Provide Delivery Point                        | 16-Mar-2018     | 37369 |
| Union City - Samburg 69kV Transmission Line (L3860) Retirement                                        | 20-Mar-2018     | 36185 |
| Latitude Solar Interconnection - Project: 430779                                                      | 22-Mar-2018     | 38469 |
| Gallatin-West Cookeville 161kV OPGW Installation PN; 432352                                           | 22-Mar-2018     | 38532 |
| Sequoyah NP- Watts Bar HP 161-kV TL (L-5047) – Install OPGW Project Number 432352                     | 23-Mar-2018     | 38165 |
| Limestone-Jetport 161-kV TL (L5922) Install OPGW Project Number: 429445                               | 27-Mar-2018     | 38581 |
| Artesia 161-kV Delivery Point and Switching Station Construction                                      | 28-Mar-2018     | 37268 |
| Johnsonville FP - Lawrenceburg 161-kV TL - Medium Priority NERC Alert                                 | 9-Apr-2018      | 37659 |
| Wilson-Wheeler 161-kV TL (I5123) - Install OPGW Project Number: 429445                                | 12-Apr-2018     | 38566 |
| Wheeler-Nance (L5669) & Nance-Trinity (L5832) 161-kV TL Install Fiber Project Number: 429445          | 16-Apr-2018     | 38578 |
| Superior Graphite #2 Provide Delivery Point PN: 432937                                                | 30-Apr-2018     | 38649 |
| Science Hill, TN 161-kV Switching Station Install Capacitor Banks                                     | 3-May-2018      | 37127 |

| Categorical Exclusion Checklist (CEC) Reviews                                                        | Completion Date | CEC # |
|------------------------------------------------------------------------------------------------------|-----------------|-------|
| Redstone Gateway, AL 161-kV Delivery Point - Project number 423388                                   | 3-May-2018      | 38764 |
| Gallatin - Center Hill-West Cookeville, Gallatin - Cordell Hull, Cordell Hull - West Cookeville MPNA | 8-May-2018      | 37083 |
| Huntsville-Jetport 161-kV TL (L5146) Install OPGW Project Number: 429445                             | 14-May-2018     | 38838 |
| N. Nash.-Str.24 to Str.24A-W. Nash. (NES Whites Creek)161-kV TL-Install OPGW-PN: 432352              | 22-May-2018     | 38936 |
| Cordova - Benton OPGW L6125 - Project Number 417191                                                  | 29-May-2018     | 38925 |
| Tusculum - Jonesborough 161kV Transmission Line Reconductor PN: 431164                               | 29-May-2018     | 38937 |
| Construction of 0.86-Acre LayDown Yard Within the Existing Jackson 500-kV Substation Reservation     | 21-Jun-2018     | 39076 |
| West Greene, TN 161kV Transmission Line Delivery Point PN: 425432                                    | 12-Jul-2018     | 39063 |
| Winton, AL 161-kV Switching Station & TL Loop - Project: 409268                                      | 10-Aug-2018     | 36793 |
| Paradise - Montgomery 500kV Capacity Increase PN: 406884                                             | 21-Sep-2018     | 37464 |
| Sullivan - NE Johnson City 161kV TL L5005 MPNA PN: 421234                                            | 21-Sep-2018     | 39623 |
| Construction Laydown Yard: West Batesville - North Oakland Project: Project Number 413286            | 10-Oct-2018     | 39090 |
| Jackson - Haywood 161-kV TL - LPC fix span 349-350 & 355-356 - 425997                                | 12-Oct-2018     | 38823 |
| Woodland Mills 161-kV Delivery Point                                                                 | 18-Nov-2018     | 31559 |
| West Centerville-Monsanto 161kV TL MPNA L5101 PN: 415148                                             | 27-Nov-2018     | 37908 |
| West Trousdale, TN 161kV Delivery Point PN: 431057                                                   | 27-Nov-2018     | 38905 |
| Racer, KY. 161-kV Substation - Provide Delivery Point - PN: 410513                                   | 30-Nov-2018     | 39250 |
| Oakland Laydown Yard - 413286                                                                        | 10-Dec-2018     | 39468 |
| Counce, TN 161-kV Switching Station - Convert to Double Breaker & Add Two Lines - Project: 424553    | 17-Dec-2018     | 36873 |
| Russellville Industrial Park, AL. 161-kV Substation - Provide Delivery Point.                        | 18-Dec-2018     | 38308 |
| Horn Lake-Allen 161-kV TL Rebuild                                                                    | 10-Jan-2019     | 39769 |
| Town Creek, AL 161-kV substation - Provide delivery point. Project: 435304                           | 10-Jan-2019     | 39789 |
| Bud Crockett, TN 161-kV Switching Station - Provide Slack Span Delivery Point - Project: 416952      | 16-Jan-2019     | 40146 |
| Dumplin Valley - Pigeon Forge WO: 31PBQ PN: 407277                                                   | 29-Jan-2019     | 40287 |
| New Johnsonville, TN. 161-kV Substation - Provide Delivery Point - 430383 - 31ODT.                   | 4-Feb-2019      | 38755 |
| Clay MS 500-kV Laydown Yard                                                                          | 14-Feb-2019     | 39826 |
| Sandtown 161-kV Delivery Point: 426571                                                               | 25-Feb-2019     | 36956 |
| Construction Laydown Yard - Alcoa Substation                                                         | 25-Feb-2019     | 39042 |
| Guthrie, KY. 161-kV Substation - Provide Delivery Point to Pennyryle RECC - 435580                   | 27-Feb-2019     | 38223 |
| North Starkville Delivery Point - Project Number 432320                                              | 11-Mar-2019     | 39362 |
| Provide 161-kV Delivery Point - Paducah Gaseous Diffusion Plant (PGDP) - Project: 434276             | 13-Mar-2019     | 38380 |
| Oxford-Coffeeville 161-kV TL - Construction Laydown Yard - Project 420142                            | 19-Mar-2019     | 40658 |
| West Ringgold - Alpha 115/230-kV TL - GA DOT Relocation - PN: 433434                                 | 26-Mar-2019     | 39680 |
| Wolf Creek HP - Summer Shade No. 1 MPNA L5700 PN: 415148                                             | 18-Apr-2019     | 38671 |
| Douglas HP-Pigeon Forge 161kV TL L5693 MPNA PN: 415148                                               | 24-Apr-2019     | 39696 |
| Sedalia, KY. 161-kV Delivery Point - PN: 430142                                                      | 20-May-2019     | 39253 |
| Sewell, AL 161-kV Substation and Transmission Line Project Number 435704                             | 29-May-2019     | 39541 |
| Springfield-Logan Aluminum 161kV MPNA L5310 PN: 415148                                               | 29-May-2019     | 40373 |
| Singleton-Leake Laydown Yard Project Number 409032                                                   | 17-Jun-2019     | 41122 |
| Construction Laydown Yard - Counce Area Projects                                                     | 20-Jun-2019     | 41143 |
| Piperton, TN 161-kV substation: Provide delivery point. Project: 441422 - WO: 33U9W; Project: 441576 | 21-Jun-2019     | 40829 |

| Categorical Exclusion Checklist (CEC) Reviews                                                            | Completion Date | CEC # |
|----------------------------------------------------------------------------------------------------------|-----------------|-------|
| Vonore, TN 161kV Substation Construct and 161kV Transmission Line PN: 429909                             | 2-Jul-2019      | 37841 |
| Blackjack, MS 161-kV SS- Provide Delivery Point - 429943                                                 | 12-Jul-2019     | 37403 |
| Miser, TN 161kV Transmission Line Delivery Point PN: 435339                                              | 17-Jul-2019     | 40141 |
| Mayfield 161-kV Substation Laydown                                                                       | 23-Jul-2019     | 41267 |
| Longino 161 kV Delivery Point: 426568                                                                    | 24-Jul-2019     | 36955 |
| SW Starkville Delivery Point - 430440                                                                    | 3-Sep-2019      | 37926 |
| Construction Laydown Yard -Philadelphia Area Projects                                                    | 28-Oct-2019     | 41810 |
| McMinnville-Manchester 161kV MPNA L5696 PN: 430018                                                       | 4-Nov-2019      | 40374 |
| West Lewisburg, TN. 161-kV Substation - Provide Delivery Point for LES - 434970                          | 8-Nov-2019      | 38711 |
| Ryan Creek, AL 161-kV Delivery Point - Project Number 490093                                             | 30-Jan-2020     | 39361 |
| Flowood, MS 161 kV Delivery Point - Project Number 429122 -                                              | 2-Apr-2020      | 39359 |
| South Medina, TN. 161-kV Delivery Point - PN: 441019                                                     | 28-May-2020     | 40874 |
| Flowood Temporary Transmission Laydown Yard                                                              | 29-Jul-2020     | 42832 |
| Fontana Area System Improvements- PWR REPLACE L1914 PN: 532634                                           | 15-Sep-2020     | 43344 |
| Shelby - Dell 500-kV Transmission Line Relocation - 442893                                               | 2-Oct-2020      | 39672 |
| Shady Grove 161-kV Delivery Point - PN: 438332                                                           | 20-Oct-2020     | 42181 |
| Mineral Wells - West Pleasant Hill - 436014 - W.O. 64A01                                                 | 28-Oct-2020     | 41670 |
| Madisonville - Vonore Construct 161kV TL - Project: 409409                                               | 4-Dec-2020      | 41812 |
| North Gallatin, TN 161-kV Switching Station and Loop Line. Project: 439098 - Work Orders: Multiple       | 17-Dec-2020     | 42028 |
| Sweet Home, AL 161-kV Transmission Line: 440238                                                          | 10-Feb-2021     | 42018 |
| Construction Laydown Yard - Shady Grove 161-kV TL Project.                                               | 22-Feb-2021     | 44794 |
| W Oktibbeha 161-kV DP: 441647                                                                            | 1-Mar-2021      | 42014 |
| Sweet Home Laydown Yard WO:31S5V                                                                         | 10-Mar-2021     | 44984 |
| Kenlake, KY. 161-kV Substation - Provide Delivery Point - PN: 410521                                     | 16-Mar-2021     | 41584 |
| Davis Gap 161-kV Transmission Line DP: 441235                                                            | 16-Mar-2021     | 42015 |
| Pond Creek 161- KV Delivery Point - 615175                                                               | 16-Mar-2021     | 42430 |
| Allen - Horn Lake TL and Re-conductor: 500370                                                            | 17-Mar-2021     | 42013 |
| Madison-Flash #2 161-kV Transmission Line. Funding Project: FP614903 - Work Orders: Multiple             | 18-Mar-2021     | 42267 |
| Hwy 412 Re-conductor Laydown Yard                                                                        | 23-Mar-2021     | 45108 |
| Temporary Laydown Yard: Madison-Flash TL Project. Project: 443762                                        | 13-Jul-2021     | 45253 |
| South West Point 161-kV Delivery Point - 442746                                                          | 16-Jul-2021     | 42286 |
| North Desoto 161 - KV Delivery Point - 440387                                                            | 5-Aug-2021      | 42429 |
| Santa Fe TN161kV Slack Span Delivery Point Project: 430220 WO: 31OOX                                     | 1-Sep-2021      | 42591 |
| North Lawrenceburg, TN 161-kV Substation - Provide Delivery Point to LUS- Project: 200922                | 3-Sep-2021      | 44425 |
| Construction Laydown Yard - Murray, KY.                                                                  | 16-Sep-2021     | 44024 |
| Fox Hollow Tie Line and Substation PN: 433070                                                            | 20-Sep-2021     | 39943 |
| Mary Haughton Delivery Point PN:531115                                                                   | 3-Nov-2021      | 43669 |
| Construction Laydown Yard - Decatur, AL.                                                                 | 10-Nov-2021     | 46831 |
| Fontana Phase 2 Transmission Work - 533962                                                               | 16-Nov-2021     | 43910 |
| Transmission Line (L5190) Upgrades for Yum Yum Solar                                                     | 18-Nov-2021     | 44484 |
| Horus, KY Laydown Yard Q388 WO:2T113 PN:535290                                                           | 3-Dec-2021      | 46725 |
| Alcoa-Nixon Road 161-kV TL. Project: 443430                                                              | 6-Jan-2022      | 44826 |
| Strategic Fiber Benefit-Haywood/Brownsville, Jackson, and S. Jackson switching stations. Project: 531962 | 24-Jan-2022     | 47340 |
| Construction Laydown Yard - TVA Lagoon Creek                                                             | 25-Feb-2022     | 47611 |

| Categorical Exclusion Checklist (CEC) Reviews                                                                              | Completion Date | CEC # |
|----------------------------------------------------------------------------------------------------------------------------|-----------------|-------|
| Pilot Oak KY 161kV Delivery Point                                                                                          | 11-Apr-2022     | 43357 |
| Temporary Construction Laydown Yard - Fayette County, TN                                                                   | 19-Apr-2022     | 47990 |
| Gladstone, AL 161-kV Switching Station and Loop Line. Project: 533772                                                      | 22-Apr-2022     | 45858 |
| Temporary Construction Laydown Yard - Marshall County, MS                                                                  | 10-May-2022     | 48112 |
| Construction Laydown Yard - Memphis Regional Megasite Power Supply                                                         | 27-May-2022     | 48195 |
| Tupelo Area Fiber Work : PN: 533698, 533699, 533706, 533707, 533708, 533709                                                | 16-Jun-2022     | 48273 |
| FP629008 Strategic Fiber Benefit Implementation Albertville, AL and Geraldine, AL – Install Fiber Optic Equipment (539625) | 29-Jun-2022     | 48392 |
| Trade, AL 161-kV Substation - Provide Delivery Point. Project: 438921                                                      | 8-Aug-2022      | 46028 |
| Project Night Sky - TVA Ultium, TN 161kV Switching Station and Loop Line. Project: 539168                                  | 11-Aug-2022     | 47184 |
| Limestone-Harding Spring 161-kV Transmission Line: Install OPGW. Project: 533773                                           | 11-Aug-2022     | 48540 |
| AP 40 Line Relocation L3305 (E. Cleveland - McDonald 161kV TL) WO: 2T02M, Project: 532602                                  | 18-Aug-2022     | 43940 |
| Temporary Laydown Yard - Mercer, TN. Project: 534347 - Work Order: 31SEY                                                   | 23-Aug-2022     | 48727 |
| Tiptonville-Hwy 412 TL (L5931) Upgrades. Project: 535291                                                                   | 29-Aug-2022     | 46210 |
| Provide Cantrell Flats, TN 161-kV slack span delivery point. Project: 438641                                               | 30-Aug-2022     | 42262 |
| South Okolona, MS 161-kV substation - Provide delivery point. Project: 542351                                              | 1-Sep-2022      | 48794 |
| Temporary Construction Lay Down Yard - Knoxville Area Projects                                                             | 19-Sep-2022     | 48943 |
| Elizabethton - Cranberry #2 161-KV TL - 437516                                                                             | 29-Sep-2022     | 41831 |
| Morristown Laydown yard expansion                                                                                          | 21-Oct-2022     | 48506 |
| Guntersville - Goose Pond L5683 Str 433 to Dam Emergency Fiber Replacement                                                 | 25-Oct-2022     | 49120 |
| Burnsville - Tri-State Commerce 443434                                                                                     | 8-Nov-2022      | 47395 |
| Colbert - Cherokee MPNERC L5668 - PN:443187                                                                                | 8-Nov-2022      | 48046 |
| License Agreement: 2.3-acre Preliminary Site (Cullman County, AL). Project: 438921                                         | 14-Nov-2022     | 49235 |
| Braytown - Wartburg 537493                                                                                                 | 17-Nov-2022     | 47392 |
| Gallatin-Cairo Bend Reconductor 2T06C 532033                                                                               | 21-Nov-2022     | 47200 |
| Construction laydown yard - Hanceville, AL. Project: 438921                                                                | 11-Jan-2023     | 49125 |
| Browns Ferry River Crossing Assessment on L6074 Structures 23-26 and L6078 Structures 25-28                                | 26-Jan-2023     | 49433 |
| North Madisonville, TN 161-kV Delivery Point. Project: 540361                                                              | 26-Jan-2023     | 49527 |
| Flat Fork 69-KV Expansion                                                                                                  | 31-Jan-2023     | 47975 |
| Powell Chapel Road, TN 46-kV Substation - Metering & Delivery Point - FP: 629843 - PN: 537573                              | 6-Feb-2023      | 47972 |
| Mountain City, TN 161-kV Delivery Point. Project: 541594 -                                                                 | 15-Feb-2023     | 48384 |
| Ludlow, MS PN: 530475                                                                                                      | 21-Mar-2023     | 45946 |
| Sanford Road Delivery Point - PN: 541285-FP630045                                                                          | 29-Mar-2023     | 49949 |
| Northeast New Albany, MS 161kV Delivery Point - FP: 629734 - PN: 537013                                                    | 10-Apr-2023     | 47779 |
| Wheeler - Maury 161-kV TL - Reconductor Str. 1-232A - PN: 532588                                                           | 12-Apr-2023     | 46355 |
| Tiptonville-New Madrid 161-kV TL - Reconductor & Build Second Line - PN: 529154                                            | 12-Apr-2023     | 48399 |
| Hertz 161kV Delivery Point to Microvast                                                                                    | 17-Apr-2023     | 48307 |
| North Green Street, MS 161-kV Delivery Point - FP: 628675                                                                  | 2-May-2023      | 47964 |
| Gallatin-Portland 161-kV TL Loop into North Gallatin. Project: 533421                                                      | 11-May-2023     | 47568 |
| Thacker, MS 161-kV Delivery Point                                                                                          | 15-May-2023     | 48050 |
| Hardin Valley, TN 161-kV Delivery Point. Project: 441716                                                                   | 24-May-2023     | 47201 |
| Berlin, AL DP PN:543434, 544883,539329                                                                                     | 25-May-2023     | 49339 |
| NAEC Fiber Request at Widow's Creek – Dark Fiber Lease/Splicing                                                            | 1-Jun-2023      | 50303 |

| Categorical Exclusion Checklist (CEC) Reviews                                                                              | Completion Date | CEC # |
|----------------------------------------------------------------------------------------------------------------------------|-----------------|-------|
| Lawrenceburg-Anderson-Pulaski 161-kV (L5021, L5117) MPNA OPGW - PN: 500500, 537971, 537992, 540829, 540926, 540927, 540928 | 2-Jun-2023      | 47712 |
| Tiny Town Provide 161kV Delivery Point                                                                                     | 5-Jun-2023      | 48005 |
| Lawrenceburg Area Temporary Construction Laydown Area                                                                      | 12-Jun-2023     | 50363 |
| Claysville, AL 161-kV Delivery Point - 539720, 542083, 542089                                                              | 26-Jun-2023     | 48035 |
| Winstead, TN 161-kV Delivery Point - FP: 629992 - PN: 540583, 541439, 541760                                               | 28-Jun-2023     | 49434 |
| VZW L5292 OPGW Replacement                                                                                                 | 3-Jul-2023      | 49792 |
| East Cleveland - NE Benton TL OPGW Repair                                                                                  | 6-Jul-2023      | 50592 |
| Tower Installation - Beech Grove, TN Microwave - PN: 536993                                                                | 3-Aug-2023      | 49622 |

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## Appendix F – Literature Cited



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## Appendix F - Literature Cited

- Allender, M.C., Raudabaugh, D.B., Gleason, F.H., Miller, A.N., 2015, The natural history, ecology, and epidemiology of *Ophidiomyces ophiodiicola* and its potential impact on free-ranging snake populations: Fungal Ecology, v. 17, p. 187–196.
- America’s Energy Future Panel on Electricity from Renewable Resources (AEFPERR). 2009. Electricity from Renewable Resources: Status, Prospects, and Impediments. National Academies Press, Washington, D.C.
- American Farmland Trust. 2023. “Tennessee Data and Statistics. Census of Agriculture.” Accessed December 20, 2023, at <https://farmlandinfo.org/statistics/tennessee-statistics/>.
- Appalachian Regional Commission (ARC). 2015. Appalachia Then and Now. Examining Changes to the Appalachian Region Since 1965. Available at <https://www.arc.gov/wp-content/uploads/2020/06/AppalachiaThenAndNowCompiledReports.pdf>.
- \_\_\_\_\_. 2021. The Appalachian Region: A Data Overview from the 2017-2021 American Community Survey. Available at <https://www.arc.gov/wp-content/uploads/2023/05/DataOverviewfrom2017-2021ACS-Data.xlsx>.
- \_\_\_\_\_. 2023a. About the Appalachian Region. Accessed January 12, 2024, at <https://www.arc.gov/about-the-appalachian-region/>.
- \_\_\_\_\_. 2023b. Rural Appalachia Compared to the Rest of Rural America. Accessed January 12, 2024 at <https://www.arc.gov/about-the-appalachian-region/the-chartbook/rural-appalachia/>.
- Arnett, E. B., W. K Brown, W. P. Erickson, J. K. Fiedler, B. L. Hamilton, T. H. Henry, A. Jain, G. D. Johnson, J. Kerns, R. R. Koford, C. P. Nicholson, T. J. O’Connell, M. D. Piorkowski, and R. D. Tankersley Jr. 2008. Patterns of Bat Fatalities at Wind Energy Facilities in North America. J. Wildl. Manage 72: 61-78, doi:10.2193/2007-221.
- \_\_\_\_\_. M. M. P. Huso, M. R. Schirmacher, and J. P. Hayes. 2011. Altering Turbine Speed Reduces Bat Mortality at Wind-Energy Facilities. Front. Ecol. Environ. 9(4): 209-214, doi:10.1890/100103.
- Augustine, C. 2011. Updated U.S. Geothermal Supply Characterization and Representation for Market Penetration Model Input. U.S. Department of Energy, National Renewable Energy Laboratory, Tech. Report NREL/TP-6A20-47459. Available at <https://www.nrel.gov/docs/fy12osti/47459.pdf>.
- Baerwald, E. F., G. H. D’Amours, G. J. Klug, and R. M. R. Barclay. 2008. Barotrauma Is a Significant Cause of Bat Fatalities at Wind Turbines. Current Biology 18:R695- R696, doi:10.1016/j.cub.2008.06.029.
- Barré, Kévin, Isabelle Le Viol, Yves Bas, Romain Julliard, Christian Kerbiriou. 2018. Estimating habitat loss due to wind turbine avoidance by bats: Implications for

- European siting guidance. *Biological Conservation*, 226, pp. 205-214. doi: 10.1016/j.biocon.2018.07.011.
- Baskin, J. M. and C. C. Baskin. 2003. The Vascular Flora of Cedar Glades of the Southeastern United States and Its Phytogeographical Relationships. *J. Torrey Botanical Society* 130: 100-117.
- Beatty, B., J. Macknick, J. McCall, G. Braus, and D. Buckner. 2017. Native Vegetation Performance under a PV Solar Array at the National Wind Technology Center. Tech. Report NREL/TP-1900-66218, Department of Energy, National Renewable Energy Laboratory. Available at <https://www.nrel.gov/docs/fy17osti/66218.pdf>.
- Beaulieu, B., and M. Littles. 2009. A Look at the Mid South Delta Region: A Glimpse of Its Assets, Socioeconomic Complexion, and Emerging Opportunities. Southern Rural Development Center, Mississippi State University, Mississippi State.
- Beck, J., W. Frandsen, and A. Randall. 2009. *Southern Culture: An Introduction*. Carolina Academic Press, Durham, North Carolina.
- Bellow, Matthew. 2023. Memphis Is Shrinking. Here's Why We Need to Change That. Shelterforce.org. November 16. Accessed January 10, 2024, at <https://shelterforce.org/2023/11/16/memphis-is-shrinking-heres-why-we-need-to-change-that/>.
- Birnbaum, C. A. 1994. Protecting Cultural Landscapes: Planning, Treatments and Management of Historic Landscapes. Preservation Briefs 36. U. S. Department of Interior, National Park Service. Available at <https://www.nps.gov/tps/how-to-preserve/briefs/36-cultural-landscapes.htm>.
- Bolinger, M., and Bolinger, G. 2022. Land requirements for utility-scale PV: an empirical update on power and energy density. *IEEE Journal of Photovoltaics*, 12/(2), 589-594.
- Bureau of Land Management (BLM). 2005. Final Programmatic Environmental Impact Statement on Wind Energy Development on Bureau of Land Management-Administered Lands in the Western United States. FES 05-11, U.S. Department of the Interior, Bureau of Land Management. Available at <http://windeis.anl.gov/documents/fpeis/index.cfm>.
- \_\_\_\_\_. 2018. Desert Quartzite Solar Project Draft Plan Amendment Environmental Impact Statement/ Environmental Impact Report. DOI-BLM-CA-D060-2017-0002. Bureau of Land Management, Palm Springs, CA.
- Carley, S., T.P. Evans, and D.M. Konisky. 2018. Adaptation, Culture, and the Energy Transition in American Coal Country. Pages 133-139 in *Energy Research & Social Science* 37.
- Caruso, N.M. and K. R. Lips. 2012. Truly enigmatic declines in terrestrial salamander populations in Great Smoky Mountains National Park. *Diversity and Distributions* 19(1): 38-48.

- Center for Business And Economic Research (CBER). 2022. Alabama Population Projections Demographics. Accessed February 14, 2024, at <https://cber.culverhouse.ua.edu/resources/alabama-demographics/>.
- Charlson, R.J., and H. Rodhe. 1982. Factors Controlling the Acidity of Natural Rainwater. *Nature* 295: 683-685.
- Cherokee Chamber of Commerce. 2024. About Cherokee. Accessed January 25, 2024, at <https://cherokeesmokies.com/about-cherokee/>.
- Choctaw.org. 2024a. Mississippi Band of Choctaw Indians - History. Accessed January 25, 2024, at <https://www.choctaw.org/aboutMBCI/history/index.html>.
- Choctaw.org. 2024b. Mississippi Band of Choctaw Indians Tribal Profile. Available at <https://www.choctaw.org>.
- Choi, D.Y., T.W. Wittig, B.M. Kluever. 2020. An evaluation of bird and bat mortality at wind turbines in the Northeastern United States. *PLoS ONE* 15(8): e0238034. Available at <https://doi.org/10.1371/journal.pone.0238034>.
- Cleveland, T. and D. Sarkisian. 2019. Balancing Agricultural Productivity with Ground-Based Solar Photovoltaic (PV) Development. White Paper. NC Clean Energy Technology Center. NC State University.
- Cooper Center. 2022. Virginia Population Projections. Accessed January 12, 2024, at <https://www.coopercenter.org/virginia-population-projections>.
- County of Imperial. 2016. Campo Verde Battery Storage System Final Supplemental Environmental Impact Report. County of Imperial, El Centro, Ca. Available at <http://www.icpds.com/CMS/Media/SFEIR.pdf>.
- Cowardin, L. M., V. Carter, F. C. Golet, and E. T. LaRoe. 1979. Classification of Wetland and Deepwater Habitats of the United States. Washington, D.C.: U.S. Fish and Wildlife Publication FWS/OBS-79/31.
- Curtis, Taylor L., Heather Buchanon, Garvin Heath, Ligia Smith, and Stephanie Shaw. 2021. Solar Photovoltaic Module Recycling: A Survey of U.S. Policies and Initiatives. National Renewable Energy Laboratory and the Electric Power Research Institute. Available at <https://www.nrel.gov/docs/fy21osti/74124.pdf>.
- Cushman, R. M. 1985. Review of Ecological Effects of Rapidly Varying Flows Downstream from Hydroelectric Facilities. *N. Amer. J. Fisheries Management* 5:330–339.
- Dahl, T. E. 2000. Status and Trends of Wetlands in the Conterminous United States 1986 to 1997. U.S. Department of the Interior, Fish and Wildlife Service, Washington, D.C.
- \_\_\_\_\_. 2006. Status and Trends of Wetlands in the Conterminous United States 1998 to 2004. U.S. Department of the Interior; Fish and Wildlife Service, Washington, D.C.
- \_\_\_\_\_. 2011. Status and Trends of Wetlands in the Conterminous United States 2004 to 2009. U.S. Department of the Interior; Fish and Wildlife Service, Washington, D.C.

- Denholm, P., R. Margolis, M. Hand, M. Jackson, and S. Ong. 2009. Land-use Requirements of Modern Wind Power Plants in the United States. National Renewable Energy Laboratory Tech. Rep. NREL/TP-6A2-45834.
- Dyer, J. M. 2006. Revisiting the Deciduous Forests of Eastern North America. *Bioscience* 56: 341-352.
- Electric Power Research Institute (EPRI). 2002. Water and Sustainability (Volume 2): An Assessment of Water Demand, Supply, and Quality in the U. S. – The Next Half Century. Topical Report 1006785, EPRI, Palo Alto, California.
- EPRI and Tennessee Valley Authority. 2009. Potential Impact of Climate Change on Natural Resources in the Tennessee Valley Authority Region. Report 1020420, EPRI, Palo Alto, California, and TVA, Knoxville, Tennessee.
- Energy Efficiency & Renewable Energy (EERE). 2023. U.S. Hydropower Market Report. Available at <https://www.energy.gov/sites/default/files/2023-09/U.S.%20Hydropower%20Market%20Report%202023%20Edition.pdf>.
- Erickson, W. P., M. M. Wolfe, K. J. Bay, D. H. Johnson, and J. L. Gehring. 2014. A Comprehensive Analysis of Small-Passerine Fatalities from Collision with Turbines at Wind Energy Facilities. *PLoS One* 9(9): e107491. doi:10.1371/journal.pone.0107491.
- Federal Land Manager Environmental Database (FED). 2026. CSU and the Cooperative Institute for Research in the Atmosphere (CIRA). Regional Haze Trends and Composition Summaries. Accessed February 9, 2026, at <https://views.cira.colostate.edu/fed/>.
- Fenneman, N. M. 1938. *Physiography of the Eastern United States*. McGraw-Hill, New York.
- Frey, William H. 2019. How Migration of Millennials and Seniors Has Shifted since the Great Recession. Accessed January 11, 2024, at <https://www.brookings.edu/research/how-migration-of-millennials-and-seniors-has-shifted-since-the-great-recession/>.
- Fthenakis, V., and H. C. Kim. 2009. Land Use and Electricity Generation: A Life-Cycle Analysis. *Renewable & Sustainable Energy Reviews* 13:1465-1474.
- Gagnon, P., Margolis, R., Melius, J., Phillips, C., and R. Elmore. 2016. Rooftop Solar Photovoltaic Technical Potential in the United States: A Detailed Assessment. (Rep. No. NREL/TP-6A20-65298, National Renewable Energy Laboratory, Golden, CO. DOI:10.2172/1236153.
- Galloway, J. N., W. H. Schlesinger, C. M. Clark, N. B. Grimm, R. B. Jackson, B. E. Law, P. E. Thornton, A. R. Townsend, and R. Martin. 2014. Ch. 15 – Biogeochemical Cycles. Pp. 350-368 In *Climate Change Impacts in the United States: The Third National Climate Assessment*, J.M. Melillo, Terese (T.C.) Richmond, and G.W. Yohe, Eds. U.S. Global Change Research Program. DOI:10.7930/J0X63JT0.
- Goldenberg, S.Z., P.M. Cryan, P.M. Gorresen, L.J. Fingersh. 2021. Behavioral patterns of bats at a wind turbine confirm seasonality of fatality risk. *Ecology and Evolution*. 11:4843–4853. Available at <https://doi.org/10.1002/ece3.7388>.

- Governor's Office of Planning and Budget (GOPB). 2023. Georgia Population Projections. Accessed February 14, 2024, at <https://opb.georgia.gov/census-data/population-projections>.
- Griffith, G.E., J. M. Omernik and S. Azevedo. 1998. Ecoregions of Tennessee (color poster with map, descriptive text, summary tables, and photographs). Reston, Virginia. US Geological Survey (map scale 1:250,000). Available at <https://www.epa.gov/eco-research/ecoregion-download-files-state-region-4#pane-40>.
- Hayes, M.A. 2013. Bats Killed in Large Numbers at United States Wind Energy Facilities. *BioScience* 63(12). Available at <https://doi.org/10.1525/bio.2013.63.12.10>.
- Hefner, J. M., B. O. Wilen, T. E. Dahl, and W. E. Frayer. 1994. Southeast Wetlands, Status and Trends. Cooperative Publication by United States Department of the Interior, Fish and Wildlife Service, and the U.S. Environmental Protection Agency.
- Huber, D., Z. Taylor, and S. Knudson. 2011. Environmental Impacts of Smart Grid. DOE/NETL-2010/1428, National Energy Technology Laboratory, U.S. Department of Energy.
- International Panel on Climate Change (IPCC). 2018. Special Report on Global Warming of 1.5°C. Available at <https://www.ipcc.ch/sr15/>.
- Jordaan, S. M., G. A. Heath, J. Macknick, B. W. Bush, E. Mohammadi, D. Ben-Horin, V. Urrea, and D. Marceau. 2017. Understanding the Life Cycle Surface Land Requirements of Natural Gas-Fired Electricity. *Nature Energy* 2: 8042-812. DOI 10.1038/s41560-017-0004-0.
- Kentucky State Data Center (KSDC). 2022. Population and Household Projections. Kentucky, Kentucky Counties, and Area Development Districts. 2020-2050. Available at <http://ksdc.louisville.edu/data-downloads/projections/>.
- Lanzante, J.R., T.C. Peterson, F.J. Wentz, and K.Y. Vinnikov. 2006. What Do Observations Indicate about the Change of Temperatures in the Atmosphere and at the Surface since the Advent of Measuring Temperatures Vertically? In *Temperature Trends in the Lower Atmosphere: Steps for Understanding and Reconciling Differences*; Karl, T.R.; Hassol, S.J.; Miller, C.D.; Murray, W.L., Eds. A Report by the U.S. Climate Change Science Program and the Subcommittee on Global Change Research, Washington, DC.
- Loss, S. R., T. Will, and P. P. Marra. 2013. Estimates of Bird Collision Mortality at Wind Facilities in the Contiguous United States. *Biol. Cons.* 168:201-209.
- Maidment, C. D., C. R. Jones, T. L. Webb, E. A. Hathway, and J. M. Gilbertson. 2014. The Impact of Household Energy Efficiency Measures on Health: A Meta-analysis. *Energy Policy* 65: 583-593.
- Marques, A.T., C.D. Santos, F. Hanssen, A. Munoz, A. Onrubia, M. Wikelski, F. Moreira, J.M. Palmeirim, and J.P. Silva. 2019. Wind turbines cause functional habitat loss for

- migratory soaring birds. *Journal of Animal Ecology*. 2020;89:93–103. Available at <https://doi.org/10.1111/1365-2656.12961>.
- May R, T. Nygård, U. Falkdalen, J. Åström, Ø. Hamre, B.G. Stokke. 2020. Paint it black: Efficacy of increased wind-turbine rotor blade visibility to reduce avian fatalities. *Ecology and Evolution* 2020;10:8927–8935. Available at <https://doi.org/10.1002/ece3.6592>.
- Melotte, Sarah. 2023. Thousands of People Moved to the Rural South During the First Year of the Pandemic. Where Did They Come From? *Dailyyonder.com*. August 24. Accessed January 10, 2024 at <http://dailyyonder.com/thousands-of-people-moved-to-the-rural-south-during-the-first-year-of-the-pandemic-where-did-they-come-from/2023/08/24/>.
- Miller, B. A., V. Alavian, M.D. Bender, D. J. Benton, L. L. Cole, L. K. Ewing, P. Ostrowski, et al. 1993. Sensitivity of the TVA Reservoir and Power Supply Systems to Extreme Meteorology. Tennessee Valley Authority, Engineering Laboratory, Report No. WR28-1-680-111.
- Miller, L. M., and D. W. Keith. 2018. Observation-based Solar and Wind Power Capacity Factors and Power Densities. *Environ. Res. Lett.* 13 104008. Available at <https://doi.org/10.1088/1748-9326/aae102>.
- Miller, R. A. 1974. The Geologic History of Tennessee. Tennessee Div. Geology Bull. 74, Nashville.
- Milly, P.C., J. Betancourt, J. Falkenmark, R.M. Hirsch, Z.W. Kundzewicz, D.P. Lettenmaier, and R.J. Stouffer. 2008. Stationarity is Dead: Whither Water Management? *Science* 319: 573-574, DOI:10.1126/science.1151915.
- National Academy of Science and Royal Society (NAS and RS). 2020. Climate Change: Evidence and Causes: Update 2020. Available at <https://nap.nationalacademies.org/catalog/25733/climate-change-evidence-and-causes-update-2020>.
- National Alliance for Computational Science & Engineering (NACSE). 2024. 30-yr Normal Precipitation: Annual. Available at <https://prism.oregonstate.edu/normals/>.
- National Atmospheric Deposition Program (NADP). 2023. Annual MDN Maps. Available at <nadp.slh.wisc.edu/maps-data/mdn-gradient-maps/>.
- National Centers for Environmental Information (NCEI). 2021. U.S. Climate Normals, 1991-2020. U.S. Department of Commerce, National Centers for Environmental Information. Available at <https://www.ncei.noaa.gov/products/land-based-station/us-climate-normals>.
- National Energy Technology Laboratory (NETL). 2010a. Best Practices for: Geologic Storage Formation Classification: Understanding Its Importance and Impacts on CCS Opportunities in the United States. DOE/NETL-2010/1420.



- \_\_\_\_\_. 2010b. Life Cycle Analysis: Existing Pulverized Coal (EXPC) Power Plant. DOE/NETL-403-110809. U.S. Department of Energy, National Energy Technology Laboratory.
  - \_\_\_\_\_. 2010c. Life Cycle Analysis: Supercritical Pulverized Coal (SCPC) Power Plant. DOE/NETL-403-110609. U.S. Department of Energy, National Energy Technology Laboratory.
  - \_\_\_\_\_. 2015. Carbon Storage Atlas. Fifth Edition. August. Available at <https://www.netl.doe.gov/sites/default/files/2018-10/ATLAS-V-2015.pdf>.
  - \_\_\_\_\_. 2023. Carbon Capture and Storage Database. Accessed December 15, 2023, at <https://netl.doe.gov/carbon-management/carbon-storage/worldwide-ccs-database>.
- National Invasive Species Council (NISC). 2016. 2016 to 2018 National Invasive Species Management Plan. U.S. Department of Interior, Washington, D.C. Available at: <https://www.doi.gov/sites/doi.gov/files/uploads/2016-2018-nisc-management-plan.pdf>.
- National Oceanic and Atmospheric Administration (NOAA). 2023. Climate Change: Atmospheric Carbon Dioxide. Available at <https://www.climate.gov/news-features/understanding-climate/climate-change-atmospheric-carbon-dioxide>.
- Natural Resources Conservation Service (NRCS). 2024a. Plant List of Attributes, Names, Taxonomy, and Symbols (PLANTS) Database. Accessed January 9, 2024, at <https://plants.usda.gov/home>.
- \_\_\_\_\_. 2024b. Web Soil Survey. Available at <https://www.nrcs.usda.gov/resources/data-and-reports/web-soil-survey>.
- National Laboratory of the Rockies (NLR). 2018. Solar Resource Maps and Data. Accessed February 1, 2024, at <https://www.nlr.gov/gis/solar>.
- National Weather Service (NWS). 2023. Climate. Available at <https://www.weather.gov/wrh/climate>.
- NatureServe. 2024. NatureServe Explorer [web application]. List of terrestrial plant communities according to data query (TVA PSA). NatureServe, Arlington, Virginia. Available at <https://explorer.natureserve.org/Search#q>.
- New York State Department of Public Service (NYSDPS) and New York State Energy Research & Development Authority (NYSERDA). 2018. CASE 18-E-0130 – In the Matter of Energy Storage Deployment Program Final Generic Environmental Impact Statement. New York Department of Public Service, Office of Energy Efficiency and the Environment, Albany. Available at <http://documents.dps.ny.gov/public/MatterManagement/CaseMaster.aspx?MatterSeq=55960>.
- North American Bird Conservation Initiative, U.S. Committee (NABCI). 2022. State of the Birds 2022. <https://www.stateofthebirds.org/2022/>.

- North Carolina Office of State Budget and Management (NC OSBM). 2023. North Carolina County Population Growth 2020-2030.” Accessed January 24, 2024, at <https://www.osbm.nc.gov/facts-figures/population-demographics/state-demographer/countystate-population-projections/population-growth-2020-2030>.
- Nuclear Regulatory Commission (NRC). 2019. Environmental Impact Statement for an Early Site Permit (ESP) at the Clinch River Nuclear Site – Final Report. Available at <https://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr2226/v1/index.html>.
- Omernik, J.M. 1987. Ecoregions of the Conterminous United States. Map (scale 1:7,500,000). *Annals Assoc. Amer. Geographers* 77(1):118-125. Available at: <https://www.epa.gov/eco-research/level-iii-and-iv-ecoregions-continental-united-states>.
- Ong, S., C. Campbell, P. Denholm, R. Margolis, and G. Heath. 2013. Land-Use Requirements for Solar Power Plants in the United States. National Renewable Energy Laboratory Tech. Report NREL/TP-6A20-56290. Available at <https://www.nrel.gov/docs/fy13osti/56290.pdf>.
- Parker, P. L. and T. F. King. 1998. Guidelines for Evaluating and Documenting Traditional Cultural Properties. National Register Bulletin 38. US Department of the Interior, National Park Service, National Register, History and Education National Register of Historic Places, Washington, DC.
- Region 4 Regional Response Team (RRT). 2024. Mississippi Band of Choctaw Indians. Accessed January 25, 2024, at <https://r4data.response.epa.gov/r4rrt/mississippi-band-of-choctaw-indians/>.
- Renewable Fuels Association. 2024. Biorefinery Locations. Accessed March 1, 2024, at <https://ethanolrfa.org/resources/biorefinery-locations/>.
- Ricketts, T. H., E. Dinerstein, D. M. Olson, C. J. Loucks, W. Eichbaum, D. DellaSala, K. Kavanagh, P. Hedao, P. T. Hurley, K. M. Carney, R. Abell, and S. Walters. 1999. Terrestrial Ecoregions of North America: A Conservation Assessment. Island Press, Washington, D.C.
- Romano, W.B., J.R. Skalski, R.L. Townsend, K.W. Kinzie, K.D. Coppinger, M.F. Miller. 2019. Evaluation of an Acoustic Deterrent to Reduce Bat Mortalities at an Illinois Wind Farm. *Wildlife Society Bulletin* 43(4):608–618; 2019; DOI: 10.1002/wsb.1025.
- Scheele BC, Pasmans F, Skerratt LF, Berger L, Martel A, Beukema W, Acevedo AA, Burrowes PA, Carvalho T, Catenazzi A, De la Riva I, Fisher MC, Flechas SV, Foster CN, Frías-Álvarez P, Garner TWJ, Gratwicke B, Guayasamin JM, Hirschfeld M, Kolby JE, Kosch TA, La Marca E, Lindenmayer DB, Lips KR, Longo AV, Maneyro R, McDonald CA, Mendelson J 3rd, Palacios-Rodriguez P, Parra-Olea G, Richards-Zawacki CL, Rödel MO, Rovito SM, Soto-Azat C, Toledo LF, Voyles J, Weldon C, Whitfield SM, Wilkinson M, Zamudio KR. 2019. Canessa S. Amphibian fungal panzootic causes catastrophic and ongoing loss of biodiversity. *Science*. 2019 Mar 29;363(6434):1459-1463. doi: 10.1126/science.aav0379. PMID: 30923224.

- Schippers, P, R. Buij, A. Schotman, J. Verboom, H. van der Jeugd, E. Jongejans. 2020. Mortality limits used in wind energy impact assessment underestimate impacts of wind farms on bird populations. *Ecology and Evolution*. 10:6274–6287. Available at <https://doi.org/10.1002/ece3.6360>
- Sharkey, Jennifer K. and Gary L. Springston. 2022. Water Use in the Tennessee Valley for 2020 and Projected Use in 2045. Tennessee Valley Authority. River and Resources Stewardship. Available at [https://tva-azr-eastus-cdn-ep-tvawcm-prd.azureedge.net/cdn-tvawcma/docs/default-source/default-document-library/site-content/environment/managing-the-river/water-use-in-the-tennessee-valley-for-2020-and-projected-use-in-2045.pdf?sfvrsn=baf315a5\\_2](https://tva-azr-eastus-cdn-ep-tvawcm-prd.azureedge.net/cdn-tvawcma/docs/default-source/default-document-library/site-content/environment/managing-the-river/water-use-in-the-tennessee-valley-for-2020-and-projected-use-in-2045.pdf?sfvrsn=baf315a5_2).
- Smallwood, K.S., and D.A. Bell. 2020. Effects of Wind Turbine Curtailment on Bird and Bat Fatalities. *The Journal of Wildlife Management* 84(4):685–696; 2020; DOI: 10.1002/jwmg.21844.
- Solar Energy Industries Association. 2023. Accessed February 28, 2024, at <http://www.seia.org/initiatives/land-use-solar-development>.
- Spitzley, D. V., and G. A. Keoleian. 2005. Life-cycle Environmental and Economic Assessment of Willow Biomass Electricity: A Comparison with Other Renewable and Non-Renewable Sources. Report No. CSS04-05R, Center for Sustainable Systems, Univ. Michigan, Ann Arbor, MI.
- State Data Center of MS (SDC MS). 2024. County and State Population Projections for Mississippi, 2020 - 2050.
- Stein, B. A., L. S. Kutner, G. A. Hammerson, L. L. Master, and L. E. Morse. 2000. State of the States: Geographic Patterns of Diversity, Rarity, and Endemism. In B. A. Stein, L. S. Kutner, and J. S. Adams, eds. *Precious Heritage: The Status of Biodiversity in the United States*. Oxford University Press, New York, New York.
- Tennessee Bird Records Committee (TBRC). 2023. Official List of the Birds of Tennessee. Accessed at <https://tnbirds.org/wp-content/uploads/2023/02/UPDATED-OFFICIAL-LIST-OF-THE-BIRDS-OF-TENNESSEE-Feb2023.pdf>.
- Tennessee Department of Environment and Conservation (TDEC). 2022. Final Year 2018 303(d) List. Tennessee Department of Environment and Conservation, Nashville. Available at <https://www.tn.gov/environment/program-areas/wr-water-resources/water-quality/water-quality-reports---publications.html>.
- Tennessee Invasive Plant Council (TN-IPC). 2023. TN-IPC Invasive Plant Lists. Accessed December 18, 2023 at <https://www.tnipc.org/invasive-plants/>.
- Tennessee State Data Center (TN SDC). 2022. Tennessee Population Projections. Accessed January 24, 2024, at <https://tnsdc.utk.edu/estimates-and-projections/boycd-center-population-projections/>.

- Tennessee Valley Authority (TVA). 1974. The Effects of Johnsonville Steam Plant on the Fish Populations of Kentucky Reservoir. Tennessee Valley Authority, Division of Forestry, Fisheries and Wildlife Development.
- \_\_\_\_\_. 1995. Energy Vision 2020 Integrated Resource Plan and Environmental Impact Statement. Chattanooga, Tennessee, Tennessee.
- \_\_\_\_\_. 2004. Reservoir Operations Study Final Environmental Impact Statement. Available at <https://www.tva.gov/Environment/Environmental-Stewardship/Environmental-Reviews/Reservoir-Operations-Study>.
- \_\_\_\_\_. 2005. Wilson Hydro Plant Modernization of Hydroturbines - Final Environmental Assessment. Knoxville, Tennessee.
- \_\_\_\_\_. 2008. Bellefonte Nuclear Plant, Units 3 & 4, Combined License Application, Part 3, Environmental Report, Rev 1. Submitted to Nuclear Regulatory Commission. Tennessee Valley Authority, Chattanooga, TN.
- \_\_\_\_\_. 2011a. Integrated Resource Plan and Final Environmental Impact Statement. Knoxville, Tennessee.
- \_\_\_\_\_. 2011b. Caney River Wind Energy Project Environmental Assessment. Tennessee Valley Authority, Knoxville, TN.
- \_\_\_\_\_. 2011c. Competitive Power Ventures (CPV) Cimarron Energy Project Environmental Assessment. Tennessee Valley Authority, Knoxville, TN.
- \_\_\_\_\_. 2014. TVA Solar Photovoltaic Projects – Final Programmatic Environmental Assessment. Available at <https://www.tva.gov/Environment/Environmental-Stewardship/Environmental-Reviews/TVA-Solar-Photovoltaic-Projects>.
- \_\_\_\_\_. 2015. Integrated Resource Plan and Final Environmental Impact Statement. Knoxville, Tennessee.
- \_\_\_\_\_. 2018a. Transmission System Vegetation Management Program – Draft Programmatic Environmental Impact Statement. Available at <https://www.tva.gov/Environment/Environmental-Stewardship/Environmental-Reviews/Transmission-System-Vegetation-Management-Program>.
- \_\_\_\_\_. 2019a. Integrated Resource Plan, Volume I - Final Resource Plan and Volume II – Final Environmental Impact Statement. Available at <https://www.tva.gov/Environment/Environmental-Stewardship/Integrated-Resource-Plan>.
- \_\_\_\_\_. 2019b. TVA Tax Equivalent Payments Total Nearly \$548 Million in 2019. Accessed January 24, 2024, at <https://www.tva.com/newsroom/press-releases/tva-tax-equivalent-payments-total-nearly-548-million-in-2019>.
- \_\_\_\_\_. 2019c. Annual Report Pursuant to Section 13, 15(d), OR 37 of the Securities Exchange Act of 1934. For the fiscal year ended September 30, 2019. November 15, 2019.

- \_\_\_\_\_. 2020a. Annual Report Pursuant to Section 13, 15(d), OR 37 of the Securities Exchange Act of 1934. For the fiscal year ended September 30, 2020. November 17, 2020.
- \_\_\_\_\_. 2020b. Economic Development. Accessed January 24, 2024, at <https://www.tva.com/annual-report-fy20/economic-development>.
- \_\_\_\_\_. 2020c. FY 2020 Annual Report. Accessible at [https://tva-azr-eastus-cdn-ep-tvawcm-prd.azureedge.net/cdn-tvawcma/docs/default-source/annual-report/tva-2020-annual-report6d24c98dacd74ea78710363cd68b7634.pdf?sfvrsn=f7f3871e\\_14](https://tva-azr-eastus-cdn-ep-tvawcm-prd.azureedge.net/cdn-tvawcma/docs/default-source/annual-report/tva-2020-annual-report6d24c98dacd74ea78710363cd68b7634.pdf?sfvrsn=f7f3871e_14).
- \_\_\_\_\_. 2020d. TVA Tax Equivalent Payments Total Nearly \$552 Million in FY20. Accessed January 24, 2024, at <https://www.tva.com/newsroom/press-releases/tva-tax-equivalent-payments-total-nearly-552-million-in-fy20>.
- \_\_\_\_\_. 2020e. Leadership and Innovation on a Path to Net-Zero. Available at [https://issuu.com/tva-pub/docs/tva\\_carbon\\_report](https://issuu.com/tva-pub/docs/tva_carbon_report).
- \_\_\_\_\_. 2021a. Annual Report Pursuant to Section 13, 15(d), OR 37 of the Securities Exchange Act of 1934. For the fiscal year ended September 30, 2021. November 15, 2021.
- \_\_\_\_\_. 2021b. FY 2021 Annual Report. Stronger Together. Available at <https://www.tva.com/annualreport-fy21>.
- \_\_\_\_\_. 2021c. TVA Tax Equivalent Payments Total Nearly \$500 Million in 2021. Accessed January 24, 2024 at <https://www.tva.com/newsroom/press-releases/tva-tax-equivalent-payments-total-nearly-500-million-in-2021>.
- \_\_\_\_\_. 2022a. Annual Report Pursuant to Section 13, 15(d), OR 37 of the Securities Exchange Act of 1934. For the fiscal year ended September 30, 2022. November 15, 2022.
- \_\_\_\_\_. 2022b. FY 2022 Annual Report. Building the Future Together. Accessible at <https://www.tva.com/annual-report-fy22>.
- \_\_\_\_\_. 2022c. TVA Tax Equivalent Payments Total \$512 Million in 2022. Accessed January 24, 2024, at <https://www.tva.com/newsroom/press-releases/tva-tax-equivalent-payments-total-512-million-in-2022>.
- \_\_\_\_\_. 2022d. Strategic Plan FY 2022 - 2026. Available at [https://tva-azr-eastus-cdn-ep-tvawcm-prd.azureedge.net/cdn-tvawcma/docs/default-source/about-tva/guidelines-reports/fy-2022---2026-strategic-plan5be28920-60e0-4839-b86b-608794f85519.pdf?sfvrsn=ee73bc84\\_3](https://tva-azr-eastus-cdn-ep-tvawcm-prd.azureedge.net/cdn-tvawcma/docs/default-source/about-tva/guidelines-reports/fy-2022---2026-strategic-plan5be28920-60e0-4839-b86b-608794f85519.pdf?sfvrsn=ee73bc84_3).
- \_\_\_\_\_. 2022e. Clinch River Nuclear Site Advanced Nuclear Reactor Site Advanced Nuclear Reactor Technology Park Final Programmatic Environmental Impact Statement (July 2022). Available at <https://www.tva.com/environment/environmental-stewardship/environmental-reviews/nepa-detail/clinch-river-nuclear-site-advanced-nuclear-reactor-technology-park>.

- 
- \_\_\_\_\_. 2022f. Delivering Sustainable Solutions. Available at [https://issuu.com/tva-pub/docs/tva\\_sustainability\\_report\\_fy2022](https://issuu.com/tva-pub/docs/tva_sustainability_report_fy2022).
- \_\_\_\_\_. 2022h. A Guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority Construction and Maintenance Activities Revision 4. Edited by S.T. Benefield, R.L. Brannon, J.C. Buttram, B.V. Dalton, G.D. Dalton, C.A. Henley, W.G. Martin, A.E. Masters, C.L. Phillips, C.A. Suttles, and R.C. Wilson. Chattanooga, Tennessee. Accessed March 2025, 2025 at <https://www.tva.com/Energy/Transmission-System/Transmission-System-Projects>.
- \_\_\_\_\_. 2023a. Annual Report Pursuant to Section 13, 15(d), OR 37 of the Securities Exchange Act of 1934. For the fiscal year ended September 30, 2023. November 14, 2023.
- \_\_\_\_\_. 2023b. Undeveloped Recreation Map. Accessed December 14, 2023, at [https://www.arcgis.com/apps/Embed/index.html?webmap=b110b866ffec492cb95e5c62b1a4f40f&extent=-88.891,33.5017,-82.0685,37.389&home=true&zoom=true&scale=true&search=true&searchextent=true&legend=true&show\\_panel=true&disable\\_scroll=false&theme=light](https://www.arcgis.com/apps/Embed/index.html?webmap=b110b866ffec492cb95e5c62b1a4f40f&extent=-88.891,33.5017,-82.0685,37.389&home=true&zoom=true&scale=true&search=true&searchextent=true&legend=true&show_panel=true&disable_scroll=false&theme=light)
- \_\_\_\_\_. 2023c. The TVA Act. TVA.Com. Accessed January 24, 2024, at <https://www.tva.com/about-tva/our-history/the-tva-act>.
- \_\_\_\_\_. 2023d. FY 2023 Annual Report. The Energy to Lead.
- \_\_\_\_\_. 2024a. Annual Report Pursuant to Section 13, 15(d), OR 37 of the Securities Exchange Act of 1934. For the fiscal year ended September 30, 2024. November 14, 2024.
- \_\_\_\_\_. 2024b. FY 2024 Annual Report. Built for the People: Driving America's Energy Future.
- \_\_\_\_\_. 2025a. Annual Report Pursuant to Section 13, 15(d), OR 37 of the Securities Exchange Act of 1934. For the fiscal year ended September 30, 2025. November 13, 2025. Accessed January 30, 2026, at: <https://tva.q4ir.com/sec-filings/sec-filings-details/default.aspx?FilingId=18916689>.
- \_\_\_\_\_. 2025b. Carbon dioxide emissions. Accessed March 10, 2026, at <https://www.tva.gov/Environment/Environmental-Stewardship/Air-Quality/Carbon-Dioxide>
- \_\_\_\_\_. 2026a. Ecological Health Ratings. <https://www.tva.gov/Environment/Environmental-Stewardship/Water-Quality/Reservoir-Health-Ratings>.
- \_\_\_\_\_. 2026b. TVA Regional Natural Heritage Database. March 2026.
- Tennessee Wildlife Resources Agency (TWRA). 2009. Climate Change and Potential Impacts to Wildlife in Tennessee: An update to Tennessee's State Wildlife Action Plan. Tennessee Wildlife Resources Agency, Nashville. Available at <http://www.state.tn.us/twra/cwcs/cwcsindex.html>.
-



- \_\_\_\_\_. 2015. Tennessee's Comprehensive Wildlife Conservation Strategy. TWRA, Nashville, Tennessee. Available at <https://www.tn.gov/content/tn/twra/wildlife/action-plan/tennessee-wildlife-action-plan.html>.
- \_\_\_\_\_. 2023. TWRA Lands Open For Hunting by TWRA GIS. Online application accessed December 14, 2023, at <https://twra.maps.arcgis.com/apps/webappviewer/index.html?id=953ef9d3bd044f9d9f0f9d7c0dd6b71c>.
- Texas Christian University (TCU). 2019. Texturizing Wind Turbine Towers to Reduce Bat Mortality: Final Technical Report. 47 pp.
- U.S. Census Bureau (USCB). 1994. Geographic Areas Reference Manual. Bureau of the Census and Economics and Statistics Administration, US Department of Commerce.
- \_\_\_\_\_. 2000. Census Regions and Divisions of the United States. Accessed December 20, 2023, at [https://www2.census.gov/geo/pdfs/maps-data/maps/reference/us\\_regdiv.pdf](https://www2.census.gov/geo/pdfs/maps-data/maps/reference/us_regdiv.pdf).
- \_\_\_\_\_. 2010. 2010 Table P1: Total Population. Accessed December 20, 2023, at [https://data.census.gov/table/DECENNIALSF12010.P1?text=population&q=040XX00US17\\_160XX00US1777005,1767860,1712385\\_050XX00US17019\\_010XX00US&y=2010&d=DEC%20Summary%20File%201&tp=false](https://data.census.gov/table/DECENNIALSF12010.P1?text=population&q=040XX00US17_160XX00US1777005,1767860,1712385_050XX00US17019_010XX00US&y=2010&d=DEC%20Summary%20File%201&tp=false).
- \_\_\_\_\_. 2020. 2020 DP1: Profile of the General Population. Accessed December 20, 2023, at <https://data.census.gov/table?q=United%20States&q=050XX00US21003,21031,21035,21039,21047,21057,21061,21075,21171,28003,28007,28009,28013,28017,28019,28025,28033,28057,28069,28071,28079,28081,28087,28093,28095,28099,28103,28105,28107,28115,28117,28123,28135,28137,28139,28141,28145,28155,28159,28161&d=DEC%20Demographic%20Profile>.
- \_\_\_\_\_. 2022a. 2022 Table S0101: Age and Sex. 2018 - 2022 American Community Survey 5 Year Estimates. Accessed December 20, 2023, at <https://data.census.gov/table/ACSST5Y2022.S0101?q=United%20States&t=Age%20and%20Sex&q=050XX00US28003,28007,28009,28013,28017,28019,28025,28033,28057,28069,28071,28079,28081,28087,28093,28095,28099,28103,28105,28107,28115,28117,28123,28135,28137,28139,28141,28145>.
- \_\_\_\_\_. 2022b. Table B03002: Hispanic or Latino Origin. 2018 - 2022 American Community Survey 5 Year Estimates. Accessed December 20, 2023, at <https://data.census.gov/table/ACSST5Y2022.B03002?q=B03002&q=050XX00US01009,01019,01033,01043,01049,01055,01059,01071,01077,01079,01083,01089,01095,01103,01133,13047,13055,13083,13111,13123,13129,13213,13281,13291,13295,13313,21003,21031,21035,21039,21047,21057,21061,21075,21083,21085,21105,21139,21141,21143,21157,21171,21177,21213,21219,21221,21227,37011,37039,37043,37189,51105,51169,51191,51195,51520,51720&moe=false>.
- \_\_\_\_\_. 2022c. Table S1501: Educational Attainment. 2018 - 2022 American Community Survey 5 Year Estimates. Accessed December 20, 2023 at <https://data.census.gov/table/ACSST5Y2022.S1501?q=S1501:%20Educational%20At>
-



- [tainment&g=050XX00US01009,01019,01033,01043,01049,01055,01059,01071,01077,01079,01083,01089,01095,01103,01133,13047,13055,13083,13111,13123,13129,13213,13281,13291,13295,13313,21003,21031,21035,21039,21047,21057,21061,21075,21083,21085,21105,21139,21141,21143,21157,21171,21177,21213,21219,21221,21227,37011,37039,37043,37189,51105,51169,51191,51195,51520,51720&moe=false](#).
- \_\_\_\_\_. 2022d. My Tribal Area - Eastern Band of Cherokee Indians. 2022. Accessed January 24, 2024, at <https://www.census.gov/tribal/?st=37&aianihh=0990>.
- \_\_\_\_\_. 2022e. My Tribal Area - Mississippi Choctaw Reservation. Accessed January 24, 2024, at <https://www.census.gov/tribal/?st=28&aianihh=2300>.
- \_\_\_\_\_. 2023a. U.S. Population Projections for the Nation by Age, Sex, Race, Hispanic Origin and Nativity. 2023. <https://www.census.gov/newsroom/press-kits/2023/population-projections.html>.
- \_\_\_\_\_. 2023b. 2020 TIGER/Line® Shapefiles. Online database. Accessed December 20, 2023, at <https://www.census.gov/cgi-bin/geo/shapefiles/index.php?year=2020&layergroup=Urban+Areas>.
- \_\_\_\_\_. 2023c. Nation's Urban and Rural Populations Shift Following 2020 Census. Census.Gov. Accessed December 20, 2023, at <https://www.census.gov/newsroom/press-releases/2022/urban-rural-populations.html>.
- \_\_\_\_\_. 2023d. Urban and Rural. County-Level Urban and Rural Information for the 2020 Census. List of 2020 Urban Areas. Accessed December 20, 2023, at <https://www.census.gov/programs-surveys/geography/guidance/geo-areas/urban-rural.html>.
- \_\_\_\_\_. 2023e. Table B17021: Population for Whom Poverty Status Is Determined. 2018 - 2022 American Community Survey 5 Year Estimates. Accessed December 20, 2023, at <https://data.census.gov/table/ACSDT5Y2021.B17021?q=B17021:%20POVERTY%20STATUS%20OF%20INDIVIDUALS%20IN%20THE%20PAST%2012%20MONTHS%20BY%20LIVING%20ARRANGEMENT&g=050XX00US01009,01019,01033,01043,01049,01055,01059,01071,01077,01079,01083,01089,01095,01103,01133,13047,13055,13083,13111,13123,13129,13213,13281,13291,13295,13313,21003,21031,21035,21039,21047,21057,21061,21075,21083,21085,21105,21139,21141,21143,21157,21171,21177,21213,21219,21221,21227,37011,37039,37043,37189,51105,51169,51191,51195,51520,51720&moe=false>.
- \_\_\_\_\_. 2023f. Table DP03: Selected Economic Characteristics. Accessed December 20, 2023, at <https://data.census.gov/table/ACSDP5Y2022.DP03?q=DP03:%20SELECTED%20ECONOMIC%20CHARACTERISTICS&g=050XX00US47105,050XX00US01009,01019,01033,01043,01049,01055,01059,01071,01077,01079,01083,01089,01095,01103,01133,13047,13055,13083,13111,13123,13129,13213,13281,13291,13295,13313,21003,21031,21035,21039,21047,21057,21061,21075,21083,21085,21105,21139,21141,21143,21157,21171,21177,21213,21219,21221,21227,37011,37039,37043,37189,51105,51169,51191,51195,51520,51720&moe=false>.

- [1143,21157,21171,21177,21213,21219,21221,21227,37011,37039,37043,37189,51105,51169,51191,51195,51520,51720&moe=false.](#)
- \_\_\_\_\_. 2023g. Table DP03: Selected Economic Characteristics. Census Tracts in the TVA PSA. Accessed December 22, 2024, at <https://data.census.gov/table/ACSDP5Y2022.DP03>.
- \_\_\_\_\_. 2024. 2020 Census Urban Areas Facts. Accessed December 20, 2023, at <https://www.census.gov/programs-surveys/geography/guidance/geo-areas/urban-rural/2020-ua-facts.html>.
- U.S. Department of Agriculture (USDA). 2010. Introduced, Invasive, and Noxious Plants. Available at <https://plants.usda.gov/java/noxiousDriver>.
- \_\_\_\_\_. 2012. Energy Efficiency and Conservation Loan Program Proposed Subpart H of 7 DFR Part 1710 – Programmatic Environmental Assessment. USDA Rural Utilities Service, Washington, D.C.
- \_\_\_\_\_. 2014. 2012 Census of Agriculture. United States Summary and State Data. Volume 1, Geographic Area Series, Part 51. AC-12-A-51. Available at <http://www.agcensus.usda.gov/Publications/2012/>.
- \_\_\_\_\_. 2018a. National Invasive Species Information Center. Executive Orders for Invasive Species. <https://www.invasivespeciesinfo.gov/executive-order-13751>.
- \_\_\_\_\_. 2018b. Summary Report: 2015 National Resources Inventory, Natural Resources Conservation Service, Washington, DC, and Center for Survey Statistics and Methodology, Iowa State University, Ames, Iowa. Available at <http://www.nrcs.usda.gov/technical/nri/15summary>.
- \_\_\_\_\_. 2019. 2017 Census of Agriculture: United States. Summary and State Data. Volume 1, Graphic Area Series, Part 51. AC-17-A-51. Available at [https://www.nass.usda.gov/Publications/AgCensus/2017/Full\\_Report/Volume\\_1,\\_Chapter\\_1\\_US/usv1.pdf](https://www.nass.usda.gov/Publications/AgCensus/2017/Full_Report/Volume_1,_Chapter_1_US/usv1.pdf).
- \_\_\_\_\_. 2020. Summary Report: 2017 National Resources Inventory, Natural Resources Conservation Service, Washington, DC, and Center for Survey Statistics and Methodology, Iowa State University, Ames, Iowa. Available at <https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/technical/nra/nri/results/>.
- \_\_\_\_\_. 2022. Rural America at a Glance. 2022 Edition. Economic Research Service. By James C. Davis, Anil Rupasingha, John Cromartie, and Austin Sanders. Available at <https://www.ers.usda.gov/webdocs/publications/105155/eib-246.pdf>.
- USDA Forest Service. 2024. Forest Inventory and Analysis Program. Forest Inventory EVALIDator web-application Version 2.1.0. St. Paul, MN: U.S. Department of Agriculture, Forest Service, Northern Research Station. Accessed January 11, 2024, at <https://apps.fs.usda.gov/fiadb-api/evaluator>.

- U.S. Department of Energy (DOE). 2010. Kemper County Integrated Gasification Combined-Cycle Project — Final Environmental Impact Statement. DOE/EIS-0409. Pittsburgh, PA. Available at <http://www.netl.doe.gov/library/environmental-impact-statements/eis-kemper>.
- \_\_\_\_\_. 2015a. Hawai'i Clean Energy Final Environmental Impact Statement. DOE/EIS-0459. Available at <https://www.energy.gov/nepa/downloads/eis-0459-final-programmatic-environmental-impact-statement>.
- \_\_\_\_\_. 2023a. Carbon Capture, Use, Transport, and Storage. Fossil Energy and Carbon Management. Office of Fossil Energy and Carbon Management. June. Available at [https://www.energy.gov/sites/default/files/2023-06/Carbon%20Capture%20Use%20Transport%20and%20Storage%20FACTSHEET\\_6.20.23.pdf](https://www.energy.gov/sites/default/files/2023-06/Carbon%20Capture%20Use%20Transport%20and%20Storage%20FACTSHEET_6.20.23.pdf).
- \_\_\_\_\_. 2023b. Carbon Matchmaker. Accessed January 28, 2024, at <https://arcgis.netl.doe.gov/portal/apps/experiencebuilder/experience/?id=d99eb93bfdbf450eb17ec29d637ad370>.
- U.S. Department of Justice (DOJ). 2024. Indian Country. Western District of North Carolina. Accessed February 19, 2024 at <https://www.justice.gov/usao-wdnc/indian-country>.
- U.S. Energy Information Administration (USEIA). 2022. Coal Data Browser - Aggregate Coal Mine Production for All Coal. Accessed January 10, 2024, at <https://www.eia.gov/coal/data/browser/>.
- \_\_\_\_\_. 2023a. Table 3. State Energy-Related Carbon Dioxide Emissions by Sector. Accessed January 11, 2024, at <https://www.eia.gov/environment/emissions/state/>.
- \_\_\_\_\_. 2023b. Tennessee Profile. Accessed January 23, 2024, at <https://www.eia.gov/state/print.php?sid=TN>.
- \_\_\_\_\_. 2023c. United States Profiles and Energy Estimates. Accessed January 24, 2024, at <https://www.eia.gov/state/>.
- \_\_\_\_\_. 2023d. Alabama State Profile and Energy Estimates. Accessed January 24, 2024, at <https://www.eia.gov/state/?sid=AL>.
- \_\_\_\_\_. 2023e. Tennessee State Energy Profile. 2024. Available at <https://www.eia.gov/state/print.php?sid=TN>.
- U.S. Environmental Protection Agency (USEPA). 1997. Mercury Study Report to Congress. Available at <https://www.epa.gov/mercury/mercury-study-report-congress>.
- \_\_\_\_\_. 2014. National Pollutant Discharge Elimination System—Final Regulations To Establish Requirements for Cooling Water Intake Structures at Existing Facilities and Amend Requirements at Phase I Facilities; Final Rule. Available at <http://water.epa.gov/lawsregs/lawsguidance/cwa/316b/>.

- \_\_\_\_\_. 2023a. Mercury Emissions: The Global Context. Last updated April 25, 2023. Accessed November 15, 2023, at <https://www.epa.gov/international-cooperation/mercury-emissions-global-context>.
- \_\_\_\_\_. 2023b. Mercury and Air Toxics Standards – Rule Summary. Last updated May 15, 2023. Accessed November 27, 2023, at <https://www.epa.gov/stationary-sources-air-pollution/mercury-and-air-toxics-standards#rule-summary>.
- \_\_\_\_\_. 2023c. Basic Information about Visibility. Last updated February 14, 2023. Accessed November 24, 2023, at <https://www.epa.gov/visibility/basic-information-about-visibility>.
- \_\_\_\_\_. 2023d. Total Deposition Maps. Last updated August 10, 2023. Accessed December 6, 2023, at <https://www.epa.gov/castnet/total-deposition-maps>.
- \_\_\_\_\_. 2023e. Inventory of US Greenhouse Gas Emissions and Sinks. Accessed August 26, 2024, at <https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks>.
- \_\_\_\_\_. 2023f. Wetlands: Bottomland Hardwoods. Available at: <https://www.epa.gov/wetlands/bottomland-hardwoods>.
- \_\_\_\_\_. 2023g. EJScreen Community Report. Accessed February 8, 2024, at <https://ejscreen.epa.gov/mapper/>.
- \_\_\_\_\_. 2025. Air Pollutant Emissions Trends Data. Last updated April 28, 2025. Accessed February 9, 2026, at <https://www.epa.gov/air-emissions-inventories/air-pollutant-emissions-trends-data>.
- \_\_\_\_\_. 2026a. Air Quality – National Summary. Air Trends. Last updated February 19, 2026. Accessed March 10, 2026, at <https://www.epa.gov/air-trends/air-quality-national-summary>.
- \_\_\_\_\_. 2026b. AP-42, Fifth Edition, Volume 1 Chapter 1: External Combustion Sources, Section 1.4 Natural Gas Combustion. Accessed June 2026 at [https://www.epa.gov/sites/default/files/2020-09/documents/1.4\\_natural\\_gas\\_combustion.pdf](https://www.epa.gov/sites/default/files/2020-09/documents/1.4_natural_gas_combustion.pdf)
- U.S. Fish and Wildlife Service (USFWS). 2011. Birds of Management Concern and Focal Species. U.S. Fish and Wildlife Service, Migratory Bird Program. Available at <https://www.fws.gov/birds/management/managed-species/birds-of-management-concern.php>.
- \_\_\_\_\_. 2012. Land-Based Wind Energy Guidelines. Available at <http://www.fws.gov/windenergy/>.
- \_\_\_\_\_. 2021. Birds of Conservation Concern 2021: Migratory Bird Program. <https://www.fws.gov/sites/default/files/documents/birds-of-conservation-concern-2021.pdf>.

- \_\_\_\_\_. 2023. National Wetland Inventory website. U.S. Department of the Interior. Washington, D.C. Available at <https://www.fws.gov/program/national-wetlands-inventory>.
- \_\_\_\_\_. 2026. Information for Planning and Consultation. Accessed March 6, 2026, at <https://ecos.fws.gov/ipac/>.
- U.S. Geological Survey (USGS). 1996. Coal Fields of the Conterminous United States. USGS Open-File Report OF 96-92. Available at <http://pubs.usgs.gov/of/1996/of96-092/doc.htm>.
- \_\_\_\_\_. 2016. Land Cover Trends Project. Available at <http://landcover Trends.usgs.gov/main/resultsOverview.html>.
- \_\_\_\_\_. 2021. National Landcover Dataset (NLCD). <https://www.usgs.gov/centers/eros/science/national-land-cover-database>.
- U.S. Global Change Research Program (USGCRP). 2017. Climate Science Special Report: Fourth National Climate Assessment, Volume I. U.S. Global Change Research Program, Washington, DC, USA, 470 pp., doi: 10.7930/J0J964J6. Available at <https://science2017.globalchange.gov/>.
- \_\_\_\_\_. 2023. Fifth National Climate Assessment: Report-in-Brief. Crimmins, A.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, B.C. Stewart, and T.K. Maycock, Eds. U.S. Global Change Research Program, Washington, DC, USA. <https://doi.org/10.7930/NCA5.2023.RiB>
- U.S. Government Accountability Office (GAO). 2014. Climate Change: Energy Infrastructure Risks and Adaptation Efforts. GAO-14-74. Available at <https://www.gao.gov/products/GAO-14-74>.
- \_\_\_\_\_. 2022. Tennessee Valley Authority - Additional Steps are Needed to Better Manage Climate-Related Risks. Report to Congressional Requesters. GAO-23-105375. Available at <https://www.gao.gov/assets/gao-23-105375.pdf>.
- U.S. Water Resources Council. 1978. Floodplain Management Guidelines for Implementing E.O. 11988. 43 FR 6030.
- United South and Eastern Tribes, Inc. (USET). 2007. USET Resolution No. 2007-37: Sacred Ceremonial Stone Landscapes Found in the Ancestral Territories of United Transmission System Vegetation Management PEIS 272 Draft Programmatic Environmental Impact Statement South and Eastern Tribes, Inc., Member Tribes. Available at <https://www.usetinc.org/wp-content/uploads/mbreedlove/USET-Resolutions%202007%20%20resolutions/02%2007%20resolutions%20pdf/2007%20037.pdf>.
- University of Tennessee Knoxville (UTK) Baker School of Public Policy and Public Affairs, and TVA. 2024. The Valley Pathways Study Preliminary Findings (February 2024). Accessed March 18, 2024, at <https://baker.utk.edu/valley-pathways-study/>.

- Visual Capitalist. 2020. Mapped: The Anatomy of Land Use in America. Accessed December 20, 2023, at <https://www.visualcapitalist.com/america-land-use/>.
- Voigtlander, C. W., and W. L. Poppe. 1989. The Tennessee River. Pages 372-384 in D. P. Dodge, ed. Proc. International Large River Symposium, Canadian Journal of Fisheries and Aquatic Sciences Special Publication 106.
- Wagman, D. 2017. The Three Factors That Doomed Kemper County IGCC. IEEE Spectrum. Available at <https://spectrum.ieee.org/energywise/energy/fossil-fuels/the-three-factors-that-doomed-kemper-county-igcc>.
- Walsh, J., D. Wuebbles, K. Hayhoe, J. Kossin, K. Kunkel, G. Stephens, P. Thorne, R. Vose, M. Wehner, J. Willis, D. Anderson, V. Kharin, T. Knutson, F. Landerer, T. Lenton, J. Kennedy, and R. Somerville. 2014a. Appendix 3: Climate Science Supplement. Pp. 735-789 In Climate Change Impacts in the United States: The Third National Climate Assessment, J. M. Melillo, Terese (T.C.) Richmond, and G. W. Yohe, Eds., U.S. Global Change Research Program. doi:10.7930/J0KS6PHH.
- Walsh, J., D. Wuebbles, K. Hayhoe, J. Kossin, K. Kunkel, G. Stephens, P. Thorne, R. Vose, M. Wehner, J. Willis, D. Anderson, S. Doney, R. Feely, P. Hennon, V. Kharin, T. Knutson, F. Landerer, T. Lenton, J. Kennedy, and R. Somerville. 2014b. Ch. 2 – Our Changing Climate. Pp. 19-67 In Climate Change Impacts in the United States: The Third National Climate Assessment, J. M. Melillo, Terese (T.C.) Richmond, and G. W. Yohe, Eds., U.S. Global Change Research Program. doi:10.7930/J0KW5CXT.
- Wear, D. N. and Greis, J. G., eds. 2013. The Southern Forest Futures Project: Technical Report. Gen. Tech. Rep. SRS-GTR-178. USDA-Forest Service, Southern Research Station, Asheville, NC. Available at <https://www.srs.fs.usda.gov/pubs/44183>.
- Webbers, A. 2003. Public Water-Supply Systems and Associated Water Use in Tennessee, 2000. U.S. Geological Survey Water-Resources Investigations Report 03-4262. Available at <http://pubs.usgs.gov/wri/wri034264/PDF/PublicSupply.pdf>.
- Western Regional Climate Center (WRCC). 2023. Tennessee Climate Trends. Accessed January 11, 2024, at [https://wrcc.dri.edu/cgi-bin/divplot1\\_form.pl?2102](https://wrcc.dri.edu/cgi-bin/divplot1_form.pl?2102).
- Wright, T., J. Tomlinson, T. Schueler, K. Cappiella, A. Kitchell, and D. Hirschman. 2006. Direct and Indirect Impacts of Urbanization on Wetland Quality. Office of Oceans and Watersheds, U.S. Environmental Protection Agency, Washington, D.C.

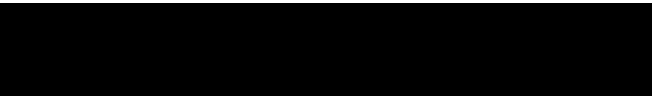


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## Appendix G – List of Preparers





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## Appendix G - List of Preparers

Anneliesa Barta (AECOM)

Education: M.B.A., Finance, B.S., Psychology

Experience: 13 years of experience in environmental and sustainability planning, 5 years of experience in NEPA compliance

Role: Socioeconomics

Kelly Baxter (TVA)

Education: M.S., Plant Science and Landscape Systems; B.S., Botany

Experience: 11 years in NEPA compliance and 10 years in TVA land management and planning

Role: NEPA Compliance and EIS Document Preparation

Crystal Bishop (TVA)

Education: M.S., Biology, B.S., Wildlife and Fisheries Science

Experience: 18 years in surface water and NPDES permitting, monitoring and compliance

Role: Water Quality and Surface Water

Suama Bolden (TVA)

Education: M.S., Geology

Experience: 15 years in groundwater investigation

Role: Groundwater and Wastewater

Jane-Coleman Cottone (AECOM)

Education: M.A., History, M.S., Information Science, and B.A., History

Experience: 10 years in historic preservation and 1 year in NEPA compliance

Role: Cultural Resources

Amy Dalton (AECOM)

Education: M.S., Forestry, B.S./B.A., Biology

Experience: 25 years in wetland delineation and permitting and 6 years in NEPA compliance

Role: Wetlands and Floodplains

Michael Deacon (AECOM)

Education: B.S., Environmental Studies; B.S., Environmental Health

Experience: Over 30 years of experience in NEPA compliance

Role: EIS Document Preparation

Shane Downey (TVA)

Education: B.S., Finance

Experience: 16 years of experience in resource planning, financial planning, commodity forecasting, and accounting

Role: Production cost, financial modeling, and stochastic and risk analysis

Regina Greer (AECOM)

Education: B.S., Computer Science

Experience: 28 years in project administration and 19 years of experience in NEPA document preparation

Role: EIS Technical Editor and Document Preparation

Hallie Hearnese (TVA)

Education: M.A., History; B.S., Historic Preservation

Experience: 15 years in cultural resource management

Role: Cultural Resources

Matthew Higdon (TVA)

Education: M.S., Environmental Planning; B.A., History

Experience: 22 years in natural resource planning and NEPA compliance

Role: NEPA Compliance and Document Preparation

Susan Innis (AECOM)

Education: Master of Public Administration, B.S. Biology

Experience: 25 years' experience in public affairs and project management

Role: Deputy Project Manager and Technical Reviewer

Candy Kelly (TVA)

Education: M.B.A., B.S., Chemistry

Experience: 19 years of TVA experience in environmental planning, strategic planning, and long-range resource planning and forecasting.

Role: TVA Senior Manager, Capacity Strategy, Integrated Resource Planning Modeling

Russell Kiesling (AECOM)

Education: M.A., Public Administration, M.S., Zoology, B.S., Biology

Experience: 35 years of directing siting and permitting experience and 19 years of experience in NEPA compliance

Role: NEPA Compliance

Trystan Knowles (TVA)

Education: B.A., Economics; B.A., French

Experience: 2 years in data analytics, 1 year in government programs and financial modeling

Role: Capacity Planning and Data Analytics

Kyle Lawson (TVA)

Education: M.S. and B.S., Economics;

Experience: 10 years in planning, forecasting, implementation, and measurement of energy efficiency and demand response programs

Role: Energy efficiency and demand response program accomplishments, current programs, and program plans

Amy Lin (AECOM)

Education: B.A., Earth and Space Sciences

Experience: 1 year in environmental laboratory testing, and 1 year in NEPA compliance

Role: Air Quality and Climate Change

John Majsztrik (AECOM)

Education: Ph.D., Plant Science and Landscape Architecture; M.S., Forest Biotechnology; B.S., Biology

Experience: Over 8 years in specialty crop production, experimental design and analysis, and survey methodology; and 2 years in NEPA compliance

Role: Air Quality and Climate Change

David K. Mitchell (TVA)

Education: M.S., Soil and Water Science, B.S., Horticulture

Experience: 16 years of botany and ecological restoration, 6 years of environmental research management.

Role: Botany

Kate Melanson (AECOM)

Education: Ph.D., Ecology and Evolutionary Biology, M.A., Ecology and Evolutionary Biology; B.A., Biology

Experience: 9 years in research, 3 years in government, and 1 year in NEPA compliance

Role: Biological Resources

Molly Notestine (AECOM)

Education: M.S. Plant, Soil, and Insect Sciences; B.S. Ecology

Experience: 16 years in environmental services and NEPA compliance

Role: Geology, Solid and Hazardous Wastes

Laura Owens (AECOM)

Education: B.S., Physics and Geology

Experience: 27 years in environmental services and 10 years in NEPA compliance

Role: Technical Reviewer

Fallon Parker Hutcheon (TVA)

Education: M.S., Environmental Studies, B.S., Biology

Experience: 7 years in wetland delineation, wetland impact analysis, and NEPA and CWA compliance

Role: Wetlands

Roger Pierce (TVA)

Education: M.B.A.; B.S.M.E., Mechanical Engineering

Experience: 15 years TVA experience in resource planning.

Role: Expansion and production cost modeling

M. Hunter Reed (TVA)

Education: M.B.A.; B.S.B.A., Finance and Management of Information Systems

Experience: 14 years TVA experience in resource planning and IT systems engineering

Role: 2026 IRP Project Manager, strategy and scenario development, IRP and EIS document preparation

Bob Roth (TVA)

Education: M.S. and B.S., Economics

Experience: 39 years of energy industry experience, with 22 years of utility industry experience in economic and load forecasting, marketing, and rates

Role: Economic forecasting, Socioeconomics

Kelley Samuels (AECOM)

Education: B.A. Environmental Sciences

Experience: 31 years experience environmental services

Role: Project Manager

Alex Britt Sandoval (TVA)

Education: M.B.A., Accounting; M.S. Industrial-Organizational Psychology

Experience: 7 years experience in strategic business and resource planning

Role: IRP Document Preparation

Marylee Sauder (TVA contractor)

Education: B.A., English and Journalism

Experience: 29 years in corporate communications

Role: IRP project communications

Jennifer Sharkey, P.E. (TVA)

Education: M.S. and B.S., Civil and Environmental Engineering

Experience: 8 years in River Forecasting; 1 year in Floodplains and Flood Risk; 1 year in Water Supply

Role: Water Supply

Gary Springston (TVA)

Education: M.S. and B.S., Civil Engineering

Experience: 38 years in water resource analyses and management

Role: Water Supply

Preeth Srinivasaraghavan (TVA)

Education: M.E.M., Environmental Management; B.A., Environmental Studies and Political Science

Experience: 10 years experience in wholesale power markets, environmental policy, and resource planning

Role: IRP document preparation

Chloe Sweda (TVA)

Education: B.S., Earth and Environmental Sciences

Experience: 6 years in natural resource management

Role: Managed and Natural Areas

James Hunter Terrell (TVA)

Education: M.S., Geography; B.S., Environmental Studies

Experience: 20 years in natural resource management and species data management

Role: TVA Regional Natural Heritage data (wildlife and vegetation)

Jesse Troxler (TVA)

Education: B.S. and M.S., Wildlife and Fisheries Science

Experience: 20 years in wildlife monitoring/research, 8 years NEPA/Endangered Species Act compliance

Role: Terrestrial Wildlife, Threatened and Endangered Species

Amy Vargas (AECOM)

Education: M.S., Biology; B.S., Botany

Experience: 18 years experience in environmental consulting and 16 years in NEPA compliance

Role: Project Reviewer, QA/QC

Carrie C. Williamson, P.E., CFM (TVA)

Education: M.S., Civil Engineering; B.S., Civil Engineering

Experience: 12 years in Floodplains and Flood Risk; 3 years in River Forecasting; 11 years in Compliance Monitoring

Role: Floodplains and Flood Risk

Daniel A. Woolley (TVA)

Education: B.S., Finance

Experience: 22 years of experience in financial and risk analysis and modeling, resource planning

Role: Scenario, strategy, and metrics design, IRP document preparation

Fang Yang (AECOM)

Education: M.S., Atmospheric Science; B.S., Physics

Experience: Over 35 years of experience in air quality and noise studies and 29 years in NEPA compliance

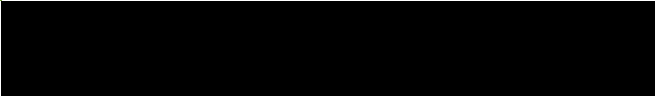
Role: Greenhouse gas and climate change analysis



# H

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## **Appendix H – Draft 2025 IRP and EIS – Comment Response Report**





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# Appendix H - Draft 2025 IRP and EIS - Comment Response Report

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## H.1 Introduction

The draft Integrated Resource Plan (IRP) and Environmental Impact Statement (EIS) were released on September 23, 2024, and the formal notice of their availability was published in the Federal Register on September 27, 2024. This initiated the public comment period, which closed on December 11, 2024. Chapter 2 of Volume 1 (IRP) includes a description of TVA efforts to engage stakeholders and the public, as well as advise them of the availability of the draft IRP and EIS and encourage them to review and comment on the documents. TVA also held a series of two virtual and 10 in-person public meetings to describe the project and to accept comments on the draft IRP and EIS. The in-person meetings were held across the seven-state region in Antioch (Nashville), Tenn., Bristol, Va., Chattanooga, Tenn., Hopkinsville, Ky., Huntsville, Ala., Memphis, Tenn., Murphy, N.C., Oak Ridge, Tenn., Rossville, Ga., and Starkville, Miss. About 600 members of the public attended the public webinars and in-person open houses, representing a 32 percent increase in open house public participation from the last IRP.

In total, TVA received more than 2,500 official public comments on the draft IRP and EIS. Comments could be submitted through the online portal ([www.tva.com/irp](http://www.tva.com/irp)), via email or U.S. mail, or submitted at an in-person open house meeting during the public comment period. About 900 comments were submitted through the online portal, and the balance were largely submitted via email. In total, about 1,900 of the online and email submittals contained form letters that favored renewable energy and urged TVA toward decarbonization, while 40 submittals requested that no solar or wind farms be located in their community. TVA received two form letters related to coal mining, one that opposed new coal mining in Illinois (not specifically related to the IRP or EIS) and another that generally focused on keeping coal in the ground. Collectively, these accounted for over 600 submittals. About 70 discrete emails and letters were also submitted, including letters from agencies, a government representative, about 20 non-governmental organizations, and other organizations and individuals. Comments were received from individuals and entities in Tennessee, other Southeast states, California, New York, and other states across the nation.

These comment submissions were carefully reviewed and comments with similar themes were summarized, resulting in about 380 individual comment statements. This appendix provides these comment statements and TVA's responses to them. The comments and responses are categorized into six broad topics – integrated resource planning, energy resource options, energy infrastructure, economics, environmental impacts, and other. Most of these topics are further categorized into more specific issues. Key themes from public comments include:

- Support for more renewable energy generation and calls for decarbonization
- For/against certain resource technologies (e.g., nuclear, gas, coal, renewables)
- Environmental considerations, such as concerns about climate change, extreme weather, the environment, wildlife, and pollution
- Economic considerations, such as benefits or costs of programs, maintaining a ratepayer focus, and rebates or incentives
- Power infrastructure considerations, such as reliability, decentralization, using existing infrastructure, benefits of storage, and concerns about high demand data centers

The balance of this appendix, organized by the six broad topic areas, includes the summary and unique comment statements on the draft IRP and EIS, along with TVA's response.

## H.2 Responses to Comments

### H.2.1 Integrated Resource Planning

#### H.2.1.1 Economic Development and National Security

1. The IRP does not address how existing methane generators will enhance national security or economic development, except by provision of additional capacity. (*Commenter: Carlson Swafford – Eco Demo Law PLLC*)

*Response:* TVA's integrated resource planning is grounded in least-cost planning principles, in alignment with Section 113 of the Energy Policy Act of 1992. These least-cost principles include balancing the following goals: low cost, risk informed, environmentally responsible, reliable and resilient, diverse, and flexible. For more on TVA's least-cost planning requirements, please see Section 2.1 of Volume 1.

#### H.2.1.2 Emissions

2. Explain discrepancies in direct emissions between the IRP and the draft EIS. For instance, while the IRP Appendix J shows the net-zero 2050 goal achieved (no direct emissions) for all strategies in Scenario 4, Appendix D of the draft EIS shows 1,578,711 short tons of CO<sub>2</sub> combustion emissions and 4,337,508 short tons of non-combustion CO<sub>2</sub> emissions in 2050 for Scenario 4D (“Net-zero Regulation with Distributed and Demand Side Focus”). (*Commenter: Ntale Kajumba – EPA Region 4*)

*Response:* As a result of key changes in the electric utility landscape in 2025 (see Section 2.2 of Volume 1), TVA updated baseline IRP assumptions which included a streamlined set of scenarios. As such, the Scenario 4 referenced in this comment is no longer included in the IRP analysis.

In Volume 1, the environmental responsibility metrics section includes CO<sub>2</sub> Direct Emissions which focuses on direct emissions from combustion. Volume 2 includes information on both direct emissions of greenhouse gasses as well as on a combination of direct and indirect emissions within the greenhouse gas lifecycle analysis (LCA) (see Section 5.5.2 of Volume 2). For the LCA, all generating resources are assigned non-combustion emissions, including renewables. Non-combustion emissions are based on emission factors provided by the National Laboratory of the Rockies.

#### H.2.1.3 Energy Efficiency

3. We're interested in understanding how TVA's investments in EE compares to the range outlined in the 2019 IRP, as the data currently makes it difficult to assess whether the actions align with the recommendations. We request TVA provide additional clarification and / or more consistent data that would enable an apples-to-apples comparison between the 2019 IRP recommendations and the actions taken since. (*Commenter: Ann Livingston – Southeast Sustainability Directors Network*)

*Response:* While IRP results typically highlight capacity, energy efficiency (EE) impacts are best understood on an annual energy basis (GWh saved). The 2019 IRP included EE impacts using an FY 2018 base year (basis for all values shown here), with the first few years of forecasted EE based on the FY 2019 business plan and expansion EE available starting in 2020. 2019 IRP case 1A (Current Outlook with Base Case strategy) included approximately 456 cumulative GWh of energy savings between 2018 and 2025. Over that same time period, 2019 IRP case 3D (Valley Load Growth with Promote Efficient Load Shape strategy) included approximately 524 cumulative GWh of energy.



These values compare to approximately 900 cumulative GWh of actual energy savings achieved from 2018 to 2025. Since installations occur throughout the year, TVA projects that the full impact of actual EE deployment from 2018 to 2025 will result in approximately 1,050 GWh of full year annual savings. Actual GWh savings were calculated using "as-planned" values that are still pending final evaluation, measurement, and validation or other reviews.

#### **H.2.1.4 Goals and Targets**

4. TVA should target net-zero emissions in its IRP. (*Commenters: Grace Levin – City of Knoxville, TN, Joe Franklin, Kathryn, Madison Rollings – City of Chattanooga, Audra Morelock, Leigh Huffman – City of Memphis, Tiffany, Jonathan Geldof – ACORE, Ken Jones, Ntale Kajumba – EPA Region 4, Nicholas Poggioli, Mark Jorgen Nicoson, Scott Dunbar – Clean Energy Buyers Association, John Todd Waterman, Kent Minault, Richard Henighan, Brant Miller, Patricia Miller, Joanne Logan, Gabriela Sarri-Tobar – Center For Biological Diversity, Leah McCord – CleanUpTVA Coalition, Kendra Abkowitz – Metropolitan Government of Nashville and Davidson County, Cortney Piper – Tennessee Advanced Energy Business Council, Ann Livingston – Southeast Sustainability Directors Network, Pam Jones, Daniel Joranko, Nathaniel Bass, Leigh Huffman – Shelby County Government*)

*Response:* TVA's integrated resource planning is grounded in least-cost planning principles, in alignment with Section 113 of the Energy Policy Act of 1992. These least-cost principles include balancing the following goals: low cost, risk informed, environmentally responsible, reliable and resilient, diverse, and flexible. Specifically, in conducting least-cost planning, TVA must comply with the following requirements in Section 113 of the Energy Policy Act of 1992:

- The least-cost planning program “evaluates the full range of existing and incremental resources (including new power supplies, energy conservation and efficiency, and renewable energy resources) in order to provide adequate and reliable service...at the lowest system cost”;
- System cost encompasses only those costs that are “direct and quantifiable net costs for an energy resource over its available life, including production, transportation, utilization, waste management, and environmental compliance”; and
- In addition to cost, the planning process will also consider “necessary features for system operation,” including diversity of resources, reliability, dispatchability, and other factors of risk.

Based on these requirements, TVA does not set a goal or target for emissions in its IRP. For more on TVA's least-cost planning requirements, please see Section 2.1 of Volume 1.

In the final IRP, Scenario 3, Carbon Legislation, includes a carbon tax which serves as a proxy for current and potential future legislation and/or regulatory actions seeking to reduce greenhouse gas emissions, which is an uncertainty outside of TVA's control. Capacity expansion results as well as environmental metric performance, including CO<sub>2</sub> direct emissions and CO<sub>2</sub> intensity, for scenario 3 portfolios can be found in Chapter 3 of Volume 1.

5. TVA should not engage in activities or capacity expansion that produce greenhouse gas emissions, especially by building new gas plants. (*Commenters: Mary Cawthorn, Claire Broome, Julie Grower, Gabriela Sarri-Tobar – Center for Biological Diversity, Leah McCord – CleanUpTVA Coalition, Katherine Brubaker – EDF, Rachael Maitland – Tennessee Department of Environment and Conservation, Evergreen Form Letter Commenters, Clean Energy Form Letter Commenters, Trey Bussey – SELC, et al., William "Bill" Bell – 4-County EPA, Bonnie Swinford – Sierra Club*)

*Response:* TVA's integrated resource planning is grounded in least-cost planning principles, in alignment with Section 113 of the Energy Policy Act of 1992. These least-cost principles include balancing the following goals: low cost, risk informed, environmentally responsible, reliable and resilient, diverse, and flexible. Specifically, in conducting least-cost planning, TVA must comply with the following requirements in Section 113 of the Energy Policy Act of 1992:

- The least-cost planning program “evaluates the full range of existing and incremental resources (including new power supplies, energy conservation and efficiency, and renewable energy resources) in order to provide adequate and reliable service...at the lowest system cost”;
- System cost encompasses only those costs that are “direct and quantifiable net costs for an energy resource over its available life, including production, transportation, utilization, waste management, and environmental compliance”; and
- In addition to cost, the planning process will also consider “necessary features for system operation,” including diversity of resources, reliability, dispatchability, and other factors of risk.

Based on these requirements, TVA does not set a goal or target for emissions in its IRP. For more on TVA's least-cost planning requirements, please see Section 2.1 of Volume 1.

In the final IRP, Scenario 3, Carbon Legislation, includes a carbon tax which serves as a proxy for current and potential future legislation and/or regulatory actions seeking to reduce greenhouse gas emissions, which is an uncertainty outside of TVA's control. Capacity expansion results as well as environmental metric performance, including CO<sub>2</sub> direct emissions and CO<sub>2</sub> intensity, for scenario 3 portfolios can be found in Chapter 3 of Volume 1.

6. TVA should confirm renewable energy as a priority as an outcome of this IRP and/or set clear minimum goals for solar and storage additions. (*Commenters: Gaylene Sloane, Gil Hough – TenneSEIA, Gabriela Sarri-Tobar – Center for Biological Diversity*)

*Response:* TVA's integrated resource planning is grounded in least-cost planning principles, in alignment with Section 113 of the Energy Policy Act of 1992. These least-cost principles include balancing the following goals: low cost, risk informed, environmentally responsible, reliable and resilient, diverse, and flexible.

In the near term, the IRP Recommendation's Strategic Portfolio Direction states that TVA's IRP analysis reaffirms the importance of adhering to least-cost planning principles to ensure the continued delivery of affordable, reliable, and resilient power to the Tennessee Valley. The results underscore that no single resource will fully meet future system needs; rather, maintaining a diverse portfolio remains essential. In the near-term, TVA should prioritize the addition of firm, dispatchable resources, particularly natural gas and storage, to address capacity requirements. TVA should also continue collaborating with industry and federal partners to prepare for the potential deployment of firm, dispatchable advanced nuclear technologies, which could support long-term load growth while mitigating fuel volatility and regulatory risks. Finally, complementary deployment of solar, demand-side, and distributed generation resources should be used to satisfy capacity requirements, provide economic energy, and/or meet customer needs.

7. The IRP should align with TVA's stated goals in the 2021 Strategic Intent and Guiding Principles and/or its most recent Carbon Report, both which include goals to achieve more carbon reduction than is represented in the draft IRP. (*Commenters: Katherine Brubaker – EDF, Ntale Kajumba – EPA Region 4*)

*Response:* TVA does not set a goal or target for emissions in its IRP based on the requirements of Section 113 of the Energy Policy Act of 1992. TVA's integrated resource planning is grounded in least-cost planning principles, in alignment with the Act. For more on TVA's least-cost planning requirements, please see Section 2.1 of Volume 1.

8. TVA's IRP should do more in the carbon reduction space and should result in a more ambitious decarbonization strategy. (*Commenter: Katherine Brubaker – EDF*)

*Response:* TVA's integrated resource planning is grounded in least-cost planning principles, in alignment with Section 113 of the Energy Policy Act of 1992. These least-cost principles include balancing the following goals: low cost, risk informed, environmentally responsible, reliable and resilient, diverse, and flexible. Specifically, in conducting least-cost planning, TVA must comply with the following requirements in Section 113 of the Energy Policy Act of 1992:

- The least-cost planning program “evaluates the full range of existing and incremental resources (including new power supplies, energy conservation and efficiency, and renewable energy resources) in order to provide adequate and reliable service...at the lowest system cost”;
- System cost encompasses only those costs that are “direct and quantifiable net costs for an energy resource over its available life, including production, transportation, utilization, waste management, and environmental compliance”; and
- In addition to cost, the planning process will also consider “necessary features for system operation,” including diversity of resources, reliability, dispatchability, and other factors of risk.

Based on these requirements, TVA does not set a goal or target for emissions in its IRP. For more on TVA's least-cost planning requirements, please see Section 2.1 of Volume 1.

In the final IRP, Scenario 3, Carbon Legislation, includes a carbon tax which serves as a proxy for current and potential future legislation and/or regulatory actions seeking to reduce greenhouse gas emissions, which is an uncertainty outside of TVA's control. Capacity expansion results as well as environmental metric performance, including CO<sub>2</sub> direct emissions and CO<sub>2</sub> intensity, for scenario 3 portfolios can be found in Chapter 3 of Volume 1.

### **H.2.1.5 Implementation**

9. Please explain how TVA will track performance on IRP recommendations and metrics, movement in signposts that may impact implementation, and/or how future asset-specific decisions will tie back to IRP recommendations. (*Commenters: Jan Berry – Citizens' Climate Education, Kendra Abkowitz - Metropolitan Government of Nashville and Davidson County, Shalin Mody*)

*Response:* The IRP recommendations provide strategic direction for the future power system, establishing a strong planning foundation and informing TVA's next long-range financial plan. Included within the recommendations are the power supply mix ranges through 2040 and 2050 which establish guardrails by which future resource additions will be bound. The Strategic Portfolio Direction outlines recommended actions for TVA staff to pursue in the near-term based on insights gained in the IRP analysis. Finally, TVA identified key signposts to monitor that will provide insights into potential impacts to recommended actions between now and 2040 and will ultimately guide portfolio decisions beyond 2040. Movement in key signposts can signal potential shifts in the portfolio mix and indicate the appropriate timing for the next IRP.

A key next step in implementing the IRP recommendations is translating the IRP's strategic direction into an executable asset strategy from an operational, commercial, and financial perspective. A

successful asset strategy also relies on partnering with TVA customers, especially on the distributed and demand-side aspects of the plan, and with other key stakeholders. Site-specific aspects of actions that are later proposed to implement the IRP strategic direction will be addressed and considered in tiered environmental reviews and subject to any required TVA Board approvals. For more information, please see Chapter 4 of Volume 1.

10. TVA should provide clear market signals for solar and storage procurement. (*Commenter: Gil Hough – TenneSEIA, Farah Mandich – US General Services Administration*)

*Response:* The IRP's Strategic Portfolio Direction includes recommended actions to add firm, dispatchable storage to maintain system reliability and improve system efficiency and pursue solar to reduce total system costs or meet customer needs. Within this guidance, the IRP recommendations provide coverage for 1 to 5 GW (1 to 8 GW nameplate) of storage additions and 2 to 5 GW (3 to 12 GW nameplate) of solar additions through 2040. TVA plans to continue evaluating all storage and solar offers submitted through competitive request-for-proposals. For more information on the IRP Recommendations, please see Chapter 4 of Volume 1.

11. TVA should increase transparency into procurement and interconnection processes. (*Commenter: Zachary Stines – New Leaf Energy*)

*Response:* The IRP's Strategic Portfolio Direction includes recommended actions to add firm, dispatchable storage to maintain system reliability and improve system efficiency and pursue solar to reduce total system costs or meet customer needs. Within this guidance, the IRP recommendations provide coverage for 1 to 5 GW (1 to 8 GW nameplate) of storage additions and 2 to 5 GW (3 to 12 GW nameplate) of solar additions through 2040. TVA plans to continue evaluating all storage and solar offers submitted through competitive request-for-proposals. For more information on the IRP Recommendations, please see Chapter 4 of Volume 1.

TVA is actively working to streamline the process for interconnecting new resources and reduce associated timelines. Reducing interconnection timelines will help support and accelerate the deployment of all power resources.

12. TVA needs to enhance its engagement of communities that are impacted by existing generation resources and/or may be impacted by potential sites for future generation resources. (*Commenter: Maggie Shoher – Southern Alliance for Clean Energy*)

*Response:* TVA looks for ways to expand its outreach to communities that may be impacted by changes and additions to the power generation portfolio. The Regional Energy Resource Council and IRP Working Group both highlighted the importance of continuing to enhance community outreach as the IRP recommendations are implemented, and this will be an increased emphasis for TVA moving forward.

13. TVA should create an annual process for procuring solar and storage resources that is adaptable to updated outlooks for load growth and environmental regulations, similar to that of Duke Energy and Dominion Energy. (*Commenter: Whit Cox – Southern Renewable Energy Association*)

*Response:* The IRP's Strategic Portfolio Direction includes recommended actions to add firm, dispatchable storage to maintain system reliability and improve system efficiency and pursue solar to reduce total system costs or meet customer needs. Within this guidance, the IRP recommendations provide coverage for 1 to 5 (1 to 8 GW nameplate) of storage additions and 2 to 5 (3 to 12 GW nameplate) of solar additions through 2040. TVA plans to continue evaluating all storage and solar offers submitted through competitive request-for-proposals.

Additionally, TVA identified key signposts to monitor that will provide insights into potential impacts to recommended actions between now and 2040 and will ultimately guide portfolio decisions beyond 2040. Changing market conditions, including electricity demand, and evolving policy and regulations are highlighted in the IRP recommendations as key uncertainties to monitor and could signal potential shifts in the portfolio mix. For more information on the IRP Recommendations, please see Chapter 4 of Volume 1.

14. The Alabama Department of Environmental Management (ADEM or the Department) has reviewed TVA's Draft 2025 IRP and programmatic EIS. The Department has no comments at this time. Please submit any additional updates that pertain to TVA's activities in Alabama to the Department. (*Commenter: Alabama Department of Environmental Management*)

*Response:* Thank you for your comment. It has been noted by TVA.

15. Several power purchase agreements for combined cycle gas have expired in 2023 and 2024. Additionally, Zion Energy Center is set to expire in 2025. TVA does not explain plans to replace this purchased power in the IRP EIS Section 3. We recommend that TVA replace these gas contracts with contracts for power that has lower carbon emissions. (*Commenter: Jan Berry – Citizens' Climate Education*)

*Response:* Site-specific or contract-specific actions proposed to implement IRP strategic direction are addressed in tiered environmental reviews. While the IRP recommends resource mixes for the future, plans to replace specific contracts are out of scope of the IRP.

16. The IRP does not clearly show plans for purchased power reflected in the graphics associated with development of scenarios. For example, please clearly describe the segment labeled "Economic Purchases" in IRP EIS Figures 3-5 and 3-7. (*Commenter: Jan Berry – Citizens' Climate Education*)

*Response:* The IRP identifies potential resource types but does not dictate the method of acquiring those types, whether it be through a program, power purchase agreement, or constructing an asset. Site-specific or contract-specific actions proposed to implement IRP strategic direction are addressed in tiered environmental reviews. Additionally, TVA may make economic purchases of market power, and these modeled "spot purchases" are what is represented as Economic Purchases on the total energy charts.

#### **H.2.1.6 IRP Purpose and Need**

17. TVA frames the purpose and need of the IRP as addressing increasing electricity demand and responding to residents' and businesses' demands for carbon reductions and renewable energy options. In accordance with NEPA, TVA should be actively addressing the vital role it plays regarding energy demand, including the ability to drive demand reductions, and the role it should play regarding carbon reductions and clean energy. (*Commenter: Gabriela Sarri-Tobar – Center for Biological Diversity*)

*Response:* TVA's integrated resource planning is grounded in least-cost planning principles, in alignment with Section 113 of the Energy Policy Act of 1992. These least-cost principles include balancing the following goals: low cost, risk informed, environmentally responsible, reliable and resilient, diverse, and flexible.

Pursuant to Section 113, TVA considers the full range of existing and incremental resources in order to provide adequate and reliable service at the lowest system cost. As such, the major resource types evaluated in the IRP include nuclear, hydro, coal, natural gas, renewables, storage, and energy efficiency and demand response (EE and DR). For more on TVA's least-cost planning requirements, please see section 2.1 of Volume 1.



### H.2.1.7 IRP Working Group

18. The Sierra Club appreciates the opportunity to participate with delegates to the TVA IRP Working Group in this IRP cycle. There are ways in which the Working Group could be improved, however. For example, loosening strictures of confidentiality over materials prepared by TVA as part of the process would better enable Working Group delegates to communicate with internal organizational stakeholders; it would also enhance the ability of Working Group members to communicate with the larger public, both to help educate them on TVA's IRP process and progress and to help gather and convey to TVA concerns, information, and insights from the public. Similarly, many IRP Working Group members were constrained from working with external technical experts; this hindered the ability of the Working Group to contribute as fully as might have been otherwise, to the diminishment of the IRP process. *(Commenter: Zachary Fabish – The Sierra Club)*

*Response:* New to this IRP, TVA made summaries of IRP Working Group meetings and materials available to the public on TVA's IRP website. Some information provided to the IRP Working Group was confidential, sensitive, or privileged, and therefore some precautions were taken with respect to that information. Going forward, TVA will continue to look for ways to further leverage the expertise of the Working Group members.

### H.2.1.8 Life Cycle Analysis

19. TVA should provide clarity on its life cycle analysis, specifically about how greenhouse gas emissions were accounted for, which social cost numbers were used in the analysis, and which inflation rate was used to state in 2024 dollars. *(Commenters: Rebecca McGrew – NACCO Natural Resources, Ntale Kajumba – EPA Region 4, Kurtis Weatherford – The Institute for Policy Integrity at NYU School of Law)*

*Response:* Details on how the greenhouse gas (GHG) life cycle analysis (LCA) was developed are included in Volume 2, Section 5.5.2.3 and Appendix D. For its GHG LCA, TVA partnered with the National Laboratory of the Rockies (NLR), which provided technical assistance, verified and generated harmonized LCA emission factors for each resource technology, and validated TVA's results by running select TVA cases through its own GHG LCA model. NLR provided TVA with a technical report which includes documentation of NLR's scope of work as well as documentation of emission factors for each resource type. This report was produced when the laboratory operated as the National Renewable Energy Laboratory (NREL). The laboratory is now the National Laboratory of the Rockies (NLR). A copy of this report is available as a supporting document on TVA's 2026 IRP website ([www.tva.com/irp](http://www.tva.com/irp)).

A social cost analysis is not included in the final EIS.

20. TVA should be more transparent about the discount rate used for the life cycle assessment analysis (LCA). *(Commenter: Zachary Fabish – The Sierra Club)*

*Response:* Details on how the greenhouse gas (GHG) life cycle analysis (LCA) was developed are included in Volume 2, Section 5.5.2.3 and Appendix D. The discount rate referenced in this comment relates to the associated social cost analysis which was included in the Draft EIS but is not included in the Final EIS.

21. The IRP should present direct and indirect emissions for each portfolio combination rather than an average across scenarios and/or include each year. *(Commenters: Lindsay Hanna – The Nature Conservancy, Katherine Brubaker – EDF, Ntale Kajumba – EPA Region 4)*

**Response:** In the draft and final IRP and EIS, TVA included information on direct and indirect greenhouse gas emissions. The IRP CO<sub>2</sub> emissions metrics reported average direct emissions on a mass and intensity basis for 2026-2050 for each portfolio. IRP Volume 1, Appendix J includes trend charts for direct emissions and intensity by year. Volume 2 (EIS) contains additional information on direct emissions, along with information on indirect emissions derived from the life cycle analysis, or LCA (Volume 2, Section 5.5.2.3 and Appendix D). Upon draft and final IRP release, TVA published supporting data files including direct emissions mass and intensity by year for each portfolio and the yearly data associated with the LCA.

22. The life cycle analysis should include other non-carbon pollutants including particulates and/or sulfur hexafluoride. (*Commenters: Rosalie Bright, Ntale Kajumba – EPA Region 4, Nathaniel Bass*)

**Response:** TVA, in consultation with the National Laboratory of the Rockies (NLR), performed a greenhouse gas life cycle analysis (GHG LCA) in order to identify “cradle to grave” GHG emissions forecasts for upstream, operational, and downstream activities for the core portfolios and sensitivities. This analysis included all three primary greenhouse gases of concern, namely CO<sub>2</sub>, N<sub>2</sub>O, and CH<sub>4</sub>. Particulate matter is out of scope for a GHG LCA, but is a criteria pollutant regulated under the Clean Air Act (see Volume 2, Section 4.2).

If some electrical equipment (e.g., electrical switchgear, circuit breakers) contains the GHG sulfur hexafluoride gas there may be a potential for minor leaks, mostly associated with maintenance or long-term equipment degradation. Through routine preventative maintenance programs, leaking equipment would be identified and remedied or replaced. As such, their emissions are expected to be minimal or negligible. In addition, due to newer equipment, more efficient operation and maintenance techniques, and leak detection, these features would minimize sulfur hexafluoride emissions.

#### **H.2.1.9 Metrics**

23. TVA should not include energy curtailment ratio as one of the metrics in the strategy assessment, as the costs of curtailed energy are already included in each portfolio’s projected cost. (*Commenters: Gil Hough – TenneSEIA, Lindsay Hanna – The Nature Conservancy, Farah Mandich – US General Services Administration*)

**Response:** The expected average energy curtailment ratio was a metric used for the first time in this IRP to lend insight into potential operational challenges that would have to be managed at high curtailment levels. The full set of metrics were determined prior to completing the analysis. Curtailment in and of itself is not necessarily bad and associated costs are already considered in the analysis. The energy curtailment ratio metric provided operational insights for consideration when evaluating tradeoffs between IRP strategies.

24. The land use requirement assumption used for solar is inaccurate and should be revised to reflect more reasonable estimates that take into account agrivoltaics, brownfield siting options using existing interconnections, opportunities to site solar on water bodies, etc. (*Commenters: Jamie McClanahan, Drs. Joe and Sarah Schiller, Maggie Shober – Southern Alliance for Clean Energy, Ntale Kajumba – EPA Region 4, Gabriela Sarri-Tobar – Center for Biological Diversity*)

**Response:** While strategy assessments were relative, TVA mistakenly labeled the unit of measure for the land use metric as Acres/MWh instead of Acres/GWh in draft IRP metric tables. Several commenters pointed out the labeling error, and it has been corrected in the final IRP.

Utility-scale solar farms typically require about 7 acres of land per installed megawatt of nameplate capacity. The majority of solar power purchase agreements currently operating and under contract



are sited on greenfield property. TVA strives to leverage brownfield options for siting any resource type when practical and will pursue suitable opportunities for solar as they arise, such as the ongoing project to install solar on the Shawnee fossil plant reservation. Agrivoltaics, or dual-use solar that combines solar energy production with agricultural activities on the same land, is an emerging approach that may reduce solar land use impact in the future.

25. The land use metric and EIS downplay the environmental impact of distributed solar and other distributed resources. The land use metric should account for land required for additional transmission infrastructure that distributed systems require and for land that will be disturbed by others deploying distributed solar. (*Commenter: Rebecca McGrew – NACCO Natural Resources*)

*Response:* The IRP land use metric makes an assumption that distributed solar uses zero land. Distributed solar typically utilizes existing structures, such as residential and business rooftops and facility parking areas, or available land that has already been disturbed. While most distributed solar likely would be implemented in this manner, there would be the potential for some portion to be implemented on undisturbed land. Significant additions of all resource types typically require additional investments in the transmission system. Where possible, TVA prefers to utilize brownfield sites with existing infrastructure and easements. As the IRP is not site-specific, potential land use impacts of related transmission or distribution infrastructure were not included in the land use metric for any resource type.

26. TVA should further define and explain the risk metrics included in the scorecard, as well as provide details of the ranges of values used to calculate them. (*Commenters: Lindsay Hanna – The Nature Conservancy, Rebecca McGrew – NACCO Natural Resources, Jan Berry – Citizens' Climate Education*)

*Response:* In the final IRP, TVA simplified the descriptions of the risk metrics to make them easier to understand. IRP Volume 1, Appendix I contains additional detail on the metrics, including formulas. TVA also has added information on the range of present value of revenue requirements from stochastic analysis to this appendix.

27. TVA should describe how it weighted metrics and/or focused on key metrics in the analysis and in developing recommendations. (*Commenter: Lindsay Hanna – The Nature Conservancy*)

*Response:* Metrics are not weighted, but are rather used to illustrate tradeoffs between the alternative strategies studied. The strategy assessments in Volume 1, Section 3.7 discuss the metrics and tradeoff considerations that TVA found most meaningful and insightful.

28. At minimum, TVA should present the Flex Resource Coverage Ratios for the year 2035 and should adjust its model assumptions to ensure flexibility in the short-term. (*Commenter: Rebecca McGrew – NACCO Natural Resources*)

*Response:* Based on the review of draft results and stakeholder feedback, TVA made the decision to remove the flexible resource coverage ratio in the final IRP. The old metric's results provided confidence that the optimization model was performing well at selecting a resource mix that effectively meets both capacity need and the pattern of energy needs. To best align with the operational goals of diversity, reliability, and flexibility final IRP now includes the P95 Average Unserved Energy Ratio along with Operating Cost Stability and Expected Average Energy Curtailment Ratio.

29. TVA seems to assume that CO<sub>2</sub> metrics can stand in for air pollution and climate change impacts. However, there are other air pollutants to also account for, with differing social and public health

impacts. They were discussed in the DEIS and should be mentioned in the DIRP. (*Commenter: Rosalie Bright*)

*Response:* In IRP metrics, TVA reported CO<sub>2</sub> direct releases, CO<sub>2</sub> intensity, water consumption intensity, waste intensity, and land use intensity. While these metrics are helpful in identifying high-level key tradeoffs between the portfolios, the EIS appropriately goes into further detail on air pollution and climate related emissions.

## **H.2.1.10 Modeling**

### **H.2.1.10.1 Advanced Technologies**

30. Related to carbon capture and sequestration (CCS) and hydrogen cofiring, further analysis and discussion of feasibility is needed to address aspects such as operational effectiveness, retrofitting demands, and the necessary infrastructure to support CCS and hydrogen co-firing. (*Commenters: Rachael Maitland – Tennessee Department of Environment and Conservation, Whit Cox – Southern Renewable Energy Association*)

*Response:* In the IRP analysis, CCS modeling is built on research identifying storage locations near or within the TVA footprint, the necessary pipeline length, and other costs to capture carbon at existing combined cycle sites. Carbon capture technologies have been demonstrated at several sites around the world, and the underlying technologies have been proven at reasonable scales. However, risks do remain in scaleup and sequestration. In order to understand and reduce these risks, TVA is monitoring developments within the industry and exploring test wells to confirm viability in the region. TVA will utilize the findings of this work to make informed decisions on carbon capture, if needed in the future, as both the technology and public policy environment develop.

The strategy assessment in the IRP acknowledges that technological risks are greatest in portfolios with more reliance on emerging technologies, including carbon capture and sequestration.

31. TVA should reexamine the large range of potential costs and risks associated with relying on advanced technologies that are not fully developed, such as small modular reactors (SMR) and/or carbon capture and sequestration (CCS). (*Commenters: Zachary Fabish – The Sierra Club, Cortney Piper – Tennessee Advanced Energy Business Council, James Richards – Nuclear Innovation Alliance, Whit Cox – Southern Renewable Energy Association, Markey and Cohen – Congress of the United States*)

*Response:* In the IRP analysis, TVA modeled several emerging technologies as resource options, including advanced nuclear, advanced storage, and carbon capture and sequestration (CCS) as a control technology for gas or coal. For small modular reactors, TVA used cost estimates informed by direct experience exploring designs for the Clinch River Nuclear Site that reflect all-in costs and a higher level of confidence than NREL moderate case forecasts. For carbon capture and sequestration, TVA used recent project experience, discussions with equipment manufacturers, and insights from R&D efforts to capture both the base natural gas plant cost plus the infrastructure required to capture, transport, and store CO<sub>2</sub> (see response to comment #30). Between the release of the draft and final IRP, TVA updated cost estimates for the CC with CCS expansion option which included an increase in both the forecasted upfront capital cost (for capture equipment) and ongoing fixed O&M (for transportation and storage). The IRP also speaks to the potential portfolio implications of faster or slower progress on technology readiness timelines (see Volume 1, Section 4.4.3).

**H.2.1.10.2 Coal**

32. Coal should not be retired so soon, as coal units are a reliable, low cost, and firm dispatchable resource, including the Red Hills power purchase agreement. TVA should reevaluate its overnight capital cost assumptions for coal and other resources to ensure they appropriately reflect operational capabilities, along with considering reliability performance during extreme weather events.

*(Commenter: Rebecca McGrew – NACCO Natural Resources)*

*Response:* Previously announced coal retirements and planning assumptions have been re-evaluated, including taking steps to continue operations at Cumberland and Kingston to reduce total system cost and reliability risks, subject to permitting and regulatory requirements (see Volume 1, Section 2.4.4). Although the IRP contains expected end of life dates for existing TVA-owned coal units, these dates are subject to additional site-specific TVA Board approval and further environmental review.

TVA's current power purchase agreement with the Red Hills lignite plant expires in 2032. TVA will continue to evaluate future market offers, both for new contracts or extensions, received on a one-off basis in the context of least-cost planning and the IRP's strategic direction.

For new resource needs, IRP modeling considers estimated build costs (overnight capital costs), net dependable capacity, and operating characteristics and costs to derive the least-cost portfolio to meet system needs for each scenario and strategy combination. New coal was not selected in any core portfolios or sensitivities (See Volume 1, Chapter 3).

The IRP includes planning assumptions for coal plant end of life based on anticipated regulatory requirements, age, and/or material condition. As these dates are subject to further environmental review and TVA Board approval, sensitivities evaluating both earlier and later coal end of life dates were studied. The earlier case assumed full coal fleet end of life by 2034, while the later case assumed operation of all existing coal units through the end of 2039. Results show minor impacts to incremental capacity by 2040 and 2050; rather, it is the timing of resource additions that differs (See Volume 1, Section 3.10.2).

33. TVA should lock in the retirement dates for its existing coal assets and not consider extending them to meet future load growth. --- TVA should plan to retire the Shawnee coal plant before January 1, 2032, to avoid investments in co-firing and other environmental compliance equipment that the final 111 rule, or other future carbon regulations, requires. *(Commenter: Zachary Fabish – The Sierra Club)*

*Response:* Previously announced coal retirements and planning assumptions have been re-evaluated, including taking steps to continue operations at Cumberland and Kingston to reduce total system cost and reliability risks, subject to permitting and regulatory requirements (see Volume 1, Section 2.4.4). Although the IRP contains expected end of life dates for existing TVA-owned coal units, these dates are subject to additional site-specific TVA Board approval and further environmental review.

The IRP includes planning assumptions for coal plant end of life based on anticipated regulatory requirements, age, and/or material condition. As these dates are subject to further environmental review and TVA Board approval, sensitivities evaluating both earlier and later coal end of life dates were studied. The earlier case assumed full coal fleet end of life by 2034, while the later case assumed operation of all existing coal units through the end of 2039. Results show minor impacts to incremental capacity by 2040 and 2050; rather, it is the timing of resource additions that differs (See Volume 1, Section 3.10.2).

In 2025, the U.S. Environmental Protection Agency (EPA) announced intentions to provide regulatory relief across multiple rules affecting existing coal and future natural-gas generation. This included a proposed rule to repeal all greenhouse gas emissions standards for the power sector under Section 111 of the Clean Air Act (the “2024 GHG Rule”). To account for the possibility that current regulatory efforts are stalled or new legislation or regulatory actions are taken in the future, Scenario 3 - Carbon Legislation includes a forecasted carbon tax to serve as a proxy for current and potential future legislation and/or regulatory actions seeking to reduce greenhouse gas emissions. (See Volume 1, Section 2.4.4)

34. EDF is concerned that TVA’s IRP includes two coal expansion options to fill expected capacity gaps. These options encompass Supercritical Pulverized Coal (SPC) and SPC with CCS. While this coal expansion is raised as a possibility, the IRP fails to clearly convey which portfolios would pursue SPC with CCS versus strictly SPC. (*Commenter: Katherine Brubaker – EDF*)

*Response:* The IRP allowed for the selection of either Supercritical Pulverized Coal or Supercritical Pulverized Coal with CCS, but neither expansion resource was selected in any of the portfolios or the sensitivity analyses.

#### **H.2.1.10.3 Demand-side Management**

35. TVA should value and promote demand-side management, including energy efficiency (EE) and demand response (DR), in the IRP. In TVA’s draft IRP, the ranges for EE and DR are lower than many other utilities, and TVA should model higher potential for these resources. (*Commenters: Jan Berry – Citizens’ Climate Education, Ann Livingston – Southeast Sustainability Directors Network, Leigh Huffman – Shelby County Government, Leigh Huffman – City of Memphis, Lindsay Hanna – The Nature Conservancy, Nathaniel Bass, Maggie Shober – Southern Alliance for Clean Energy, Trey Bussey – SELC, et al., Grace Levin – City of Knoxville, TN, Gabriela Sarri-Tobar – Center for Biological Diversity, Mark Jorgen Nicoson, Markey and Cohen – Congress of the United States*)

*Response:* TVA leveraged a 2022 Energy Programs Potential Study completed by DNV, a global leader in energy program consulting, as well as subsequent market experience to develop the energy efficiency (EE) and demand response (DR) resource options modeled in the IRP. Within the IRP analysis, strategies B (Innovation) and C (Distributed) both emphasized DR while strategy C also emphasized EE as well. Based on public feedback, TVA also conducted a sensitivity evaluating the potential impact of greater EE availability and deployment beyond what was modeled in the core cases. The IRP analysis indicates the potential for EE deployment to reduce energy needs, particularly between now and 2040, and for DR programs to grow with the system and the use of smart technologies.

The IRP Recommendation’s strategic portfolio direction states that complementary deployment of demand-side resources should also remain central to satisfying capacity requirements, providing economic energy, and/or meeting customer needs. Further, it includes recommended actions to utilize demand response and behind-the-meter resources to enable near-term interconnection of new industrial loads and partner with customers to leverage cost-effective energy efficiency and demand response. For more on IRP recommendations, see Volume 1, Chapter 4.

#### **H.2.1.10.4 Distributed Energy Resources**

36. Distributed generation, especially rooftop solar, should be sufficiently modeled and incentivized. (*Commenters: Carlson Swafford – Eco Demo Law PLLC, Rachael Maitland – Tennessee Department of Environment and Conservation, Tracy O’Neill – Preserve Cheatham County, Jake Duncan – Vote*

*Solar, Gabriela Sarri-Tobar – Center for Biological Diversity, Doug Carlson, Scott Noethen – TenneSEIA – Distributed Committee)*

**Response:** The IRP analysis includes baseline forecasts for distributed generation (DG) adoption for each scenario and forecasts for higher levels of adoption when promoted in the Distributed strategy. To model the varying levels of DG adoption before and after incentives, TVA uses an approach similar to the National Laboratory of the Rockies' Distributed Market Demand Model, which simulates potential adoption of a given resource as a function of payback period. For more information on DG modeling, please see Volume 1, Appendix F.

The IRP Recommendation's strategic portfolio direction includes a recommended action to collaborate with local power companies on the evolution of distributed generation programs. For more on IRP recommendations, see Volume 1, Chapter 4.

#### **H.2.1.10.5 Electric Load and Gas Price Forecasts**

37. TVA should be transparent about load and natural gas price forecasts, as well as account for gas price fluctuations and the potential for higher than forecasted gas prices. (*Commenters: Madison Rollings – City of Chattanooga, Trey Bussey – SELC, et al., Gabriela Sarri-Tobar – Center for Biological Diversity, Leigh Huffman – City of Memphis*)

**Response:** To forecast electricity demand, TVA uses statistical and mathematical models that link electricity sales to several key drivers, including growth in overall economic activity, changes in underlying demographics, energy substitution, and changes in consumer usage through technology. This forecast also considers influences of factors such as regulations, electrification adoption across all sectors, and national energy efficiency adoption. To explore a range of realistically possible and differentiated futures, TVA varied these key uncertainties in alignment with each scenario narrative to create cohesive forecasts. This approach resulted in a range of potential scenarios with varied load forecasts to evaluate. For more on scenario design and load forecasting, see Volume 1, Chapter 2 and Appendix B. After portfolios were generated for each scenario and strategy combination, stochastic analysis quantified the risk associated with fluctuations in electricity demand, fuel and market power prices, generating unit performance, and operating and capital costs for each portfolio. To address the potential for even higher load growth than is included in scenario 2 (High Growth) as well as the potential for a prolonged period of stagnant growth, TVA performed upper and lower bounding sensitivities for load growth (see Volume 1, Section 3.10.1).

Natural gas is an important fuel source for U.S. power generation, and it is also exported to other countries. Forecasts for gas prices are driven by many factors, such as supply and demand, inflation, and export volumes. To create this forecast, TVA uses an industry standard model (GPCM) that simultaneously considers data such as pipeline capacity and transportation costs, expected consumption by sector, and cost of supply by basin. The modeling approach starts with near-term market costs, blending into a fundamental forecast driven by the underlying drivers, and also considers other industry forecast benchmarks. Annual price forecasts reflect the average gas price expected over the course of a year. For more on gas price forecasts, see Volume 1, Section 2.4.5 and Appendix B.5. Prices will fluctuate during the year, primarily due to supply and demand forces that are often weather driven, and fluctuations were evaluated using stochastic analysis. The Operating Cost Stability metric is used to measure the relative expected volatility of each portfolio, and results indicate that portfolios with higher reliance on natural gas expansion have slightly higher volatility in operating costs. Recognizing that fundamental natural gas prices could trend higher or lower than estimated, TVA performed two sensitivities to evaluate the impacts of higher or lower



long-term gas price trajectories on expansion plans. For more on these sensitivities, see Volume 1, Section 3.10.3.

38. TVA should account for near-term load growth driven by data centers in its IRP. (*Commenters: Mark Acker, Zachary Fabish – The Sierra Club, Scott Hendrix – Tombigbee Electric Power Association, Rachael Maitland – Tennessee Department of Environment and Conservation, John E Long Jr, Randy E Carroll*)

*Response:* The Reference case (Scenario 1) and the High Growth case (Scenario 2) do include forecasted growth in electric demand from all sectors, including industrial growth, which includes data centers. During review of draft results, IRP Working Group members and public comments raised questions about more extreme growth in electrification potential, data centers, and other electricity-intensive industries. To address this, TVA conducted a sensitivity, Supercharged Growth, that assumes more rapid and sustained growth in electricity demand above what is already included in the High Growth scenario. (see Volume 1, Section 2.4.2 and Section 3.10.1)

39. Recent events indicate that "weather normal" patterns are no longer the norm. TVA should incorporate extreme weather assumptions into the IRP. (*Commenters: Lauren Wibe, Cortney Piper – Tennessee Advanced Energy Business Council, Kent Minault, Nancy Hardin, Jan Berry – Citizens' Climate Education, Ntale Kajumba – EPA Region 4, Sean M Mcgrath*)

*Response:* The load forecasting process accounts for regional warming trends, which are reflected in the load forecasts for the three scenarios and two load sensitivities in the IRP. The planning reserve margin, the excess capacity that TVA maintains above forecasted peak load to ensure reliability, accounts for variation from normal temperatures, including higher volatility in winter temperatures and temperature-correlated outages. The stochastic analysis, which drives risk informed and operational metrics, also accounts for the potential of much higher than expected load, which could be driven by extreme weather. For more on these topics, see the following sections within Volume 1: Appendix B.4, Appendix D.1, Section 3.7, and Section 3.10.

40. TVA should not model load growth as a fixed outcome of economic growth because load growth can be significantly decoupled from economic growth through aggressive energy efficiency implementation. (*Commenters: William "Bill" Bell – 4-County EPA, Drs. Joe and Sarah Schiller*)

*Response:* TVA forecasters modeled multiple drivers of load, including estimates for household growth, industrial growth, and electrification across all sectors that increase demand as well as growth in behind-the-meter generation and evolving codes and standards that reduce demand. To explore a range of realistically possible and differentiated futures, TVA varied the key uncertainties in alignment with each scenario narrative to create cohesive forecasts. For more on scenario design and load forecasting, see Volume 1, Chapter 2 and Appendix B. IRP modeling also included the option to select TVA-driven energy efficiency programs, as well as demand response programs, to derive the lowest cost portfolio for each scenario and strategy combination.

41. Please describe how the expanding network of electric vehicle charging infrastructure has been incorporated into IRP modeling. (*Commenter: Lauren Wibe*)

*Response:* To forecast electricity demand, TVA uses statistical and mathematical models that link electricity sales to several key drivers, including growth in overall economic activity, changes in underlying demographics, energy substitution, and changes in consumer usage through technology. This forecast also considers influences of factors such as regulations, electrification adoption across all sectors, and national energy efficiency adoption. For more on scenario design and load forecasting, see Volume 1, Chapter 2 and Appendix B.

**H.2.1.10.6 Federal Incentives**

42. TVA should account for risk associated with Inflation Reduction Act (IRA) tax credits for clean energy resources that may not be renewed or may be overridden in the future. (*Commenters: Jan Berry – Citizens' Climate Education, Rebecca McGrew – NACCO Natural Resources, James Richards – Nuclear Innovation Alliance*)

*Response:* The One, Big, Beautiful Bill Act (OBBB) was signed into law on July 4, 2025. OBBB included updates to investment tax credit (ITC) opportunities available for renewable, storage, and nuclear resources. All IRP scenarios reflect the impacts of the OBBB on resource costs and national and regional energy prices.

The IRP Working Group and other stakeholders had questions about how different the results would look if future resource cost trajectories were higher or lower than estimated for key resource types. Some public comments also highlighted a desire to understand the potential impact if the market depth and adoption of energy efficiency programs were higher than estimated. As such, the IRP includes sensitivities exploring lower renewable and storage costs, lower gas resource costs, earlier or later coal end of life, and higher EE availability and deployment. (See Volume 1, Section 3.10.2)

The IRP Recommendations identify a number of key signposts, including evolving policy and regulations. Signposts related to policy and regulations include the potential for higher or lower tax credits and incentives and their implications on the future portfolio. (See Volume 1, Section 4.4.2)

43. I do not understand and/or agree with the assumption that TVA would pursue the Investment Tax Credit rather than the Production Tax Credit (PTC) where available, as the PTC generally results in a lower levelized cost over a project's lifetime. (*Commenter: Farah Mandich – US General Services Administration*)

*Response:* TVA considered and evaluated the relative benefits of utilizing the Investment Tax Credit (ITC) versus Production Tax Credit (PTC). In general, the choice of the ITC versus the PTC depends on capacity factor and capital cost. Due to lower solar irradiance in the Tennessee Valley, TVA determined that it is likely more beneficial to claim the ITC for solar resources, or at least very close to the same cost benefit over the life of the asset. When it comes to implementation, TVA would evaluate each project on a case-by-case basis to ensure the most beneficial tax credit is utilized.

**H.2.1.10.7 Gas**

44. More clarity is needed on which resources were forced in the model. The IRP should not force in new gas builds. (*Commenters: Lindsay Hanna – The Nature Conservancy, Jamie McClanahan, Maggie Shober – Southern Alliance for Clean Energy, Trey Bussey – SELC, et al., Ellen Faby, William "Bill" Bell – 4-County EPA, Drs. Joe and Sarah Schiller, David Bordenkircher, Pam Jones, Mary Cawthorn*)

*Response:* IRP resource additions include several projects that are anticipated to come online over the next few years. TVA Board-approved projects and signed contracts with third-party developers for solar, gas, and storage additions were included as resource additions, along with the first few years of demand-side program volumes. These include 2 GW of combined cycle gas, 2 GW of frame and aeroderivative gas projects, 3 GW (nameplate) of solar projects, and 0.3 GW of battery storage projects. Beyond the near-term assumptions for Board-approved and contracted projects, the IRP optimization model derives the least-cost plan for each scenario and strategy combination.

45. TVA does not fully evaluate the costs and challenges of building the natural gas distribution infrastructure associated with natural gas resource additions, including gas pipelines, laterals, and compressor stations. (*Commenters: Doug Carlson, Maggie Shober – Southern Alliance for Clean*



*Energy, Zachary Fabish – The Sierra Club, Ntale Kajumba – EPA Region 4, Trey Bussey – SELC, et al.)*

**Response:** Additions of new gas-fired resources typically require new or expanded gas pipeline infrastructure. The TVA region has a robust gas pipeline network, and future siting efforts will seek to leverage existing pipelines and minimize the need for infrastructure expansion to the extent possible. Estimated costs that would be passed on to TVA from gas pipeline operators expanding and/or upgrading pipeline networks were included in ongoing fixed costs for gas plants, as these are typically paid for over time as a part of a long-term supply agreement. As the IRP is not site-specific, related costs associated with the balance of other recent gas projects served as the basis for estimates that were added to gas costs and adjusted for inflation. Also, additional information on general impacts of new or expanded pipeline infrastructure has been included in the EIS.

46. Natural gas commodity prices could be higher than modeled and are volatile, which could negatively affect customer's rates. I support specific fuel type alternatives to gas with lower volatility. *(Commenters: Lindsay Hanna – The Nature Conservancy, Ntale Kajumba – EPA Region 4, Ann Livingston – Southeast Sustainability Directors Network, Rebecca McGrew – NACCO Natural Resources, Mark Jorgen Nicoson, Leigh Huffman – City of Memphis, Kendra Abkowitz - Metropolitan Government of Nashville and Davidson County, Madison Rollings, Markey and Cohen – Congress of the United States, Maggie Shober – Southern Alliance for Clean Energy)*

**Response:** Natural gas is an important fuel source for U.S. power generation, and it is also exported to other countries. Forecasts for gas prices are driven by many factors, such as supply and demand, inflation, and export volumes. To create this forecast, TVA uses an industry standard model (GPCM) that simultaneously considers data such as pipeline capacity and transportation costs, expected consumption by sector, and cost of supply by basin. The modeling approach starts with near-term market costs, blending into a fundamental forecast driven by the underlying drivers, and also considers other industry forecast benchmarks. Annual price forecasts reflect the average gas price expected over the course of a year. Prices will fluctuate during a year, primarily due to supply and demand forces that are often weather driven. The Operating Cost Stability metric is used to measure the relative expected volatility of each portfolio, and results indicate that portfolios with higher reliance on natural gas expansion have slightly higher volatility in operating costs. Recognizing that fundamental natural gas prices could trend higher or lower than estimated, TVA performed a sensitivity to evaluate the impacts of higher and lower long-term natural gas prices on expansion plans and total system costs. For more on this sensitivity, see Volume 1, Section 3.10.3.

The IRP risk metrics also include the impacts of natural gas fuel price volatility, see Volume 1 Section 3.7.2 and Appendix I.

47. How has TVA considered the potential for natural gas fuel supply disruptions in its IRP modeling and in its planning and operations? *(Commenters: Ntale Kajumba – EPA Region 4, Jonathan Geldof – ACORE)*

**Response:** TVA's planning reserve margin accounts for variation from normal temperatures, including higher volatility in winter temperatures and temperature-correlated outages which can occur at gas plants or in the gas delivery system during extreme cold temperatures. TVA made significant investments during 2023 to further harden its generating resources, which improved cold weather performance during winter storms in 2024 and 2025 that set new peak records. Weather-related reliability risks also are mitigated through contractual agreements, such as gas firm transportation, or through the use of onsite fuel oil backup.

48. The IRP favors fossil fuel resources by underestimating the financial and environmental costs associated with building fossil fuel generation and pipelines and weather-related reliability risks. The IRP also inadequately assesses the technology risks of hydrogen and carbon capture and sequestration. (*Commenters: Lindsay Hanna – The Nature Conservancy, Markey and Cohen – Congress of the United States, Richard Henighan, Gabriela Sarri-Tobar – Center for Biological Diversity, William "Bill" Bell – 4-County EPA, Trey Bussey – SELC, et al., Jan Berry – Citizens' Climate Education, Zachary Fabish – The Sierra Club*)

*Response:* Gas build costs were estimated based on recent project experience and discussions with equipment manufacturers. The TVA region has a robust gas pipeline network, and future siting efforts will seek to leverage existing pipelines and minimize the need for infrastructure expansion to the extent possible. Estimated costs that would be passed on to TVA from gas pipeline operators expanding and/or upgrading pipeline networks were included in ongoing fixed costs for gas plants, as these are typically paid for over time as a part of a long-term supply agreement. As the IRP is not site-specific, related costs associated with the balance of other recent gas projects served as the basis for estimates that were added to gas costs and adjusted for inflation. Weather-related reliability risks are mitigated through contractual agreements, such as gas firm transportation, or through the use of onsite fuel oil backup. Also, additional information on general impacts of new or expanded pipeline infrastructure has been included in the EIS.

Hydrogen is not included as a fuel source option in the Final IRP; however, based on the evolution of current and future policy or regulatory requirements, it may become necessary to evaluate additional environmental controls at existing or future generation facilities, particularly for coal and gas units. Options to meet future regulatory requirements could include alternative fuel co-firing (such as hydrogen).

For carbon capture and sequestration, TVA used recent project experience, discussions with equipment manufacturers, and insights from R&D efforts to capture both the base natural gas plant cost plus the infrastructure required to capture, transport, and store CO<sub>2</sub> (see response to comment #30). Between the release of the draft and final IRP, TVA updated cost estimates for the CC with CCS expansion option which included an increase in both the forecasted upfront capital cost (for capture equipment) and ongoing fixed O&M (for transportation and storage).

The IRP also speaks to the potential portfolio implications of faster or slower progress on technology readiness timelines (see Volume 1, Section 4.4.3).

49. TVA makes a conservative assumption by modeling CHP for heat only without including the ability for cooling with an absorption chiller. Also, it appears that only industrial CHP is considered without considering CHP for commercial facilities (e.g., hospital complexes, industrial parks). TVA could refine this model input to improve the economics of scenarios that include CHP systems. (*Commenter: Jan Berry – Citizens' Climate Education*)

*Response:* The Final IRP no longer includes forecasted adoption of Combined Heat and Power (CHP) in the Distributed Generation model, as these projects tend to be very specialized and are difficult to forecast accurately. Strategy C, Distributed, emphasizes smaller natural gas generators, which are more modular and can be sized and adapted to meet both local and system needs. A program which bundles CHP generators could be a potential option to meet deployment of distributed, smaller natural gas generators during implementation of the IRP Recommendations.

50. I have some questions that the Draft IRP does not address:

- Are combined cycle (CC) plants not the most fuel-efficient natural gas plants?
- What is the cost to have the CT and aeroderivative plants and its staff on standby?

- What is the cost of building a CT plant compared to a CC plant?
- Is there a cost difference in the indefinite quantity of natural gas required to be available and on standby for the peaking (CT) plants as compared to the fuel required for baseload (CC) plants?
- Factoring in the answers to the above questions, what is the true cost of solar generation? Of Wind Power? (*Commenter: Marty Crowder*)

*Response:* Appendix E includes the key assumptions used to model each of the utility scale resource options. A key assumption contributing to resource selection is the cost to construct a particular resource per installed megawatt, along with fixed and variable operating and maintenance (O&M) costs. Fixed O&M cost would include staff required to operate the plant, including in standby status. Depending on how an asset's dispatch costs compare to others in the fleet determines how much energy a resource will provide, which can vary over time with the changing resource mix and dispatch costs. The model TVA uses to optimize the portfolio considers all these factors to derive the least-cost portfolio for each scenario and strategy combination.

51. TVA does not clearly articulate the modeled build out of natural gas and how those plants will contribute to the grid (baseload vs. peaking). TDEC notes there are potential regulatory, operational, and environmental considerations in building out gas plants intended for base vs. peaking load and requests that TVA provide additional context concerning how the planned gas builds will support the grid. (*Commenter: Rachael Maitland – Tennessee Department of Environment and Conservation*)

*Response:* Please refer to Volume 1, Appendix A.6 "Identifying Resource Options" for a discussion on resource options and dispatch roles, along with Section 3.4 "Energy Plans" that depicts the estimated generation for the nine core portfolios in the IRP.

#### **H.2.1.10.8 General**

52. I do not understand and/or agree with the first year available for selection. Please provide rationale for choosing the first year available for each resource type. (*Commenters: James Richards – Nuclear Innovation Alliance, Maggie Shober – Southern Alliance for Clean Energy, Farah Mandich – US General Services Administration*)

*Response:* First year available assumptions are a modeling vehicle to simulate the practical ability to construct or procure new resources and bring them online, so the analysis will generate executable portfolios. First year available assumptions for all resource types are based on recent experience designing, permitting, and constructing new generating assets and procuring new resources through Request for Proposal processes. While first year available assumptions are useful in modeling, they do not preclude TVA from adding a resource sooner than modeled if an earlier timeline is achievable for a given project.

53. I do not understand and/or agree with the annual build limits for resources, especially for renewables and storage. Please provide rationale for setting this limit and/or consider modifying or removing for each resource type. (*Commenters: Martha Ward, Rebecca Cummings, Roger Stout, Gil Hough – TenneSEIA, Drs. Joe And Sarah Schiller, Lindsay Hanna – The Nature Conservancy, Maggie Shober – Southern Alliance for Clean Energy, Zachary Fabish – The Sierra Club, William "Bill" Bell – 4-County EPA, Trey Bussey – SELC, et al., Whit Cox – Southern Renewable Energy Association, Zachary Stines – New Leaf Energy, Farah Mandich – US General Services Administration, Cortney Piper – Tennessee Advanced Energy Business Council, Markey and Cohen – Congress of the United States*)

*Response:* Best practice in utility planning is to use annual limits as the modeling vehicle for simulating the practical ability to construct or procure new resources, so the analysis will generate executable portfolios. The IRP analysis includes annual limits for all resource types based on recent experience designing, permitting, and constructing new generating assets and procuring new resources through Request for Proposal processes. For example, the market capability for solar has increased, and this is reflected with solar limits that are more than double the limits used in the 2019 IRP. In the High Growth scenario and Supercharged Growth sensitivity, most annual limits were increased to reflect additional build or procurement potential resulting from increased economic productivity at a national level. For additional information on limits, see Volume 1, Section 2.6.4.

TVA's IRP sets overall strategic direction and planning guidance. A key next step in implementing the IRP recommendations is translating the IRP's strategic portfolio direction into an executable asset strategy from an operational, commercial, and financial perspective. Implementation decisions will be made on a site-specific basis, subject to further environmental review and within TVA's least-cost framework. Modeling parameters do not limit the amount of a given resource that actually can be added in a given year if cost-competitive, as long as cumulative additions are within the ranges studied in the IRP.

54. TVA should test a broader view of future resource cost assumptions. (*Commenters: Zachary Fabish – The Sierra Club, James Richards – Nuclear Innovation Alliance*)

*Response:* Volume 1, Section 2.6.5 describes the general methodology for developing resource cost assumptions, and additional details are included in Appendix E. For utility-scale options, TVA utilizes a combination of direct experience with recent projects, market-based request for proposal responses, industry expertise working with equipment manufacturers, and industry forecasts to inform resource costs.

The IRP Working Group and other stakeholders had questions about how different the results would look if future resource cost trajectories were higher or lower than estimated for key resource types. Some public comments also highlighted a desire to understand the potential impact if the market depth and adoption of energy efficiency programs were higher than estimated. As such, the IRP includes sensitivities exploring lower renewable and storage costs, lower gas resource costs, earlier or later coal end of life, and higher EE availability and deployment. (See Volume 1, Section 3.10.2)

55. TVA should reflect the lower costs assumed in the cost promotions in the cost-related metrics. (*Commenters: Zachary Fabish – The Sierra Club, William "Bill" Bell – 4-County EPA*)

*Response:* While the draft IRP used a combination of artificially lower costs and required minimum additions to emphasize resources in a given strategy, the final IRP only uses required minimum additions.

The IRP Working Group and other stakeholders had questions about how different the results would look if future resource cost trajectories were higher or lower than estimated for key resource types. Some public comments also highlighted a desire to understand the potential impact if the market depth and adoption of energy efficiency programs were higher than estimated. As such, the IRP includes sensitivities exploring lower renewable and storage costs, lower gas resource costs, earlier or later coal end of life, and higher EE availability and deployment. (See Volume 1, Section 3.10.2)

56. The IRP misrepresents costs, as renewable energy is becoming cheaper and gas generation is dependent on a volatile commodity market in which costs are likely to increase. TVA should model a more representative range of renewable energy resource costs. (*Commenters: Cortney Piper – Tennessee Advanced Energy Business Council, Zachary Fabish – The Sierra Club, Corinne Rovetti*)

*Response:* For utility-scale options, TVA utilizes a combination of direct experience with recent projects, market-based request for proposal responses, industry expertise working with equipment manufacturers, and industry forecasts to inform resource costs. Gas expansion estimates were based on recent project experience and discussions with equipment manufacturers. Solar and battery storage costs in the near-term are based on market offers submitted through recent, competitive requests for proposal, with long-term forecasts including adjustments for continued technological advancements. Finally, wind expansion costs were sourced from the 2024 National Laboratory of the Rockies' (NLR) (formerly the National Renewable Energy Laboratory, or NREL) Annual Technology Baseline and incorporate transmission wheeling estimates to deliver this energy. For additional information, see Volume 1, Section 2.6.5 and Appendix E.

The final IRP also includes a lower renewable and storage costs sensitivity to evaluate the impact of lower than estimated costs to build or procure renewable and storage resources. See Volume 1, Section 3.10.2.

IRP modeling considers fundamental forecasts for natural gas commodity prices, which were developed for each scenario, when optimizing for lowest cost for each portfolio. Then, a probabilistic analysis was used to vary gas prices to develop risk and operational metrics that provide insights on the potential impact of price volatility. Finally, additional sensitivity analysis was performed that varied fundamental gas prices, which could be higher or lower than estimated. Core portfolio results and their associated metrics, along with the sensitivity analysis, were considered in developing IRP recommendations, which result in a resource portfolio that continues to provide affordable, reliable, and resilient power. Also, TVA executes a financial hedging program with the objective of reducing fuel cost volatility by protecting against natural gas prices fluctuations within established risk tolerances that are reviewed annually by the TVA Board.

57. TVA should revise its resource costs to better align with publicly available sources. (*Commenters: Lindsay Hanna – The Nature Conservancy, Fred Stafford, James Richards – Nuclear Innovation Alliance, Zachary Fabish – The Sierra Club*)

*Response:* Volume 1, Section 2.6.5 describes the general methodology for developing resource cost assumptions, and additional details are included in Appendix E. For utility-scale options, TVA utilizes a combination of direct experience with recent projects, market-based request for proposal responses, industry expertise working with equipment manufacturers, and industry forecasts to inform resource costs.

The IRP Working Group and other stakeholders had questions about how different the results would look if future resource cost trajectories were higher or lower than estimated for key resource types. Some public comments also highlighted a desire to understand the potential impact if the market depth and adoption of energy efficiency programs were higher than estimated. As such, the IRP includes sensitivities exploring lower renewable and storage costs, lower gas resource costs, earlier or later coal end of life, and higher EE availability and deployment. (See Volume 1, Section 3.10.2)

58. The IRP leaves out trends in corporate and consumer preferences. More companies are sensitive to climate change and will relocate elsewhere if TVA does not move away from gas generation and to renewable energy. (*Commenter: Corinne Rovetti*)

*Response:* The IRP speaks to evolving customer expectations related to specific types of generation and/or higher clean energy program demand as a key signpost (see Volume 1, Sections 1.2 and 4.4.1).



59. TVA should explain how firm capacity is accredited to all resource types, and the same methodology should be used to account for firm capacity for all resource types. TVA should lower the net dependable capacity for thermal resources to reflect performance during recent winter reliability events. *(Commenters: Gil Hough – TenneSEIA, Rebecca McGrew – NACCO Natural Resources, Lindsay Hanna – The Nature Conservancy, Gabriela Sarri-Tobar – Center for Biological Diversity, Trey Bussey – SELC, et al., Whit Cox – Southern Renewable Energy Association, Zachary Stines – New Leaf Energy)*

*Response:* Firm capacity is also known as net dependable capacity (NDC). NDC is the maximum dependable capacity at seasonal peak demand times less all known adjustments, such as transmission restrictions, station service needs, and fuel derates. NDC, which is used in TVA's capacity planning models, is typically determined by performance testing during the respective season, because weather conditions and peak coincidence affect generating capability. For variable energy resources like solar and wind, net dependable capacities for each season are determined by looking at the historical output at typical seasonal peak times (late afternoon in the summer and early morning in the winter) as a percentage of nameplate capacity. TVA uses both summer and winter net dependable capacities of units in resource planning analysis, given the dual-peaking nature of the system.

TVA has not risk-adjusted the NDC of gas, or other thermal assets due to several factors. Forced outages for all resource types are captured in TVA's planning reserve margin study, including temperature correlated outages. TVA's gas assets have typically performed well during extreme weather events. TVA made significant investments during 2023 to further harden its generating resources, which improved cold weather performance of assets during winter storms in 2024 and 2025 that set new peak records. To additionally support reliability of gas-fired plants, TVA typically contracts for a high level of fuel delivery priority and/or invests in a backup fuel source on site, depending on the expected operations profile of a particular plant.

60. TVA should evaluate and analyze how increased interregional transfer capability could impact and/or reduce reserve margin requirements and potentially mitigate extreme weather risks. *(Commenters: Whit Cox – Southern Renewable Energy Association, Jonathan Geldof – ACORE, Jan Berry – Citizens' Climate Education)*

*Response:* TVA looks for cost-effective interregional transmission opportunities. TVA is a sponsor in the Southeastern Regional Transmission Planning (SERTP) process and is very involved in the planning and implementation for FERC Orders 890, 1000, and 1920. TVA and other sponsors and stakeholders are actively engaging to develop a plan to ensure we are compliant with Order 1920. Its implementation will guide SERTP as we evaluate regional and interregional transmission solutions/alternatives and ensure that TVA and SERTP are measuring a range of benefits these facilities could provide. We are excited to evaluate multi-valued transmission projects as a part of SERTP and see where this path takes TVA.

Expanded interregional transmission can open up additional opportunities to contract for capacity from outside the system and/or to import additional power purchases on the spot market. TVA's planning reserve margin study considers the ability to import power to support system reliability (see Volume 1, Section D.1 for more information on planning reserve margin).

61. I do not understand and/or agree with the assumption that gas generation is needed to enable more solar. Numerous scientific studies show that solar combined with storage provides just as reliable and resilient a power system as one where solar is paired with gas. *(Commenters: William "Bill" Bell – 4-County EPA, Drs. Joe and Sarah Schiller)*

*Response:* Portfolio optimization in the IRP analysis indicates that adding a combination of gas and storage is the least-cost path to enabling more solar resources and maintaining reliability of the TVA power system. Utilities in other regions that have added significant amounts of solar and storage are also finding the need to add gas resources, especially to ensure reliability.

62. TVA makes substantial assumptions that drive up its planning reserve margin. The load forecast error is higher than some surrounding utilities, and it is unclear if the ability to import market power is fully considered. (*Commenter: Trey Bussey – SELC, et al.*)

*Response:* IRP Volume 1, Section D.1 summarizes the key inputs and results of TVA's planning reserve margin study, and it provides a benchmarking comparison to peer utilities. While the load forecast error from non-weather-related drivers of +/-7% may be somewhat higher than other utilities, it aligns with historical experience in the TVA region. The study also considers the recent experience importing market purchases at times of peak demand, ranging from 1,000 to 4,750 MW during the summer and 0 to 4,500 MW during the winter. As shown in Section D.1, TVA performed a sensitivity analysis to evaluate the impact of imported market purchases. If TVA could import only 50% of historically experienced levels or none at all, the planning reserve margin would be 3% and 8% higher, respectively. Section D.1 also includes a benchmarking comparison that shows that TVA's planning reserve margin is not an industry outlier, and that other utility's reserve margins also reflect a shift towards winter risk.

63. Improve IRP modeling capabilities to better reflect the dynamics of a high renewable energy and storage resource portfolio and shifting reliability needs. TVA should pursue improvements to its modeling capabilities that it can implement in its next IRP study process to better reflect the resource adequacy and operational needs of its system in a future with higher winter reliability risks, more weather-dependent resources, greater storage resources, and higher load growth. (*Commenter: Whit Cox – Southern Renewable Energy Association*)

*Response:* With each IRP, TVA has improved its modeling capabilities and will continue to strive for enhancements over time. For example, TVA upgraded to the EnCompass model to leverage its multi-user functionality and enhanced ability to consider the chronology of energy needs in resource selection. TVA and other utilities are learning more each year about how changes in weather and electricity usage trends are impacting demand. Also, resource adequacy studies that simulate the future planning reserves needed to ensure reliability are informative, but nothing replaces real-world experience operating a power system with a significantly different mix of new resource types in the future that will inform future studies. Additionally, TVA is collaborating and will continue to collaborate with other utilities on storage modeling approach in integrated resource planning.

#### **H.2.1.10.9 Long-duration Storage**

64. TVA should model longer duration storage and correctly capture the value of that in modeling. (*Commenters: Zachary Fabish – The Sierra Club, Trey Bussey – SELC, et al., Gabriela Sarri-Tobar – Center for Biological Diversity*)

*Response:* In the IRP, TVA modeled two forms of long-duration storage resource options, including pumped storage and advanced chemistry batteries. Advanced chemistry batteries were assumed to have 8 hours of storage, and they also served as a proxy for other long-duration storage technologies that are yet to be commercialized. TVA performed a sensitivity to test the potential impacts if future costs for renewable and storage technologies, including advanced storage, were lower than estimated (see Volume 1, Sections 3.9 and 3.10.2).

Form Energy is one of the more advanced emerging long-duration technologies, but TVA has seen



limited pilot/demo performance success to merit specific inclusion. One challenge for storage technologies is storage efficiency (losses) that can detract from the value, and this is one area of focus to improve as emerging storage technologies are developed and scaled for potential commercialization. The IRP analysis indicates value in storage of 8 hours or more, and TVA plans to further study various long-duration storage technologies, including Form Energy and others and potentially support pilot/demo projects. Additionally, TVA is collaborating and will continue to collaborate with other utilities on storage modeling approach in integrated resource planning.

65. In addition to pumped storage, TVA should explore and model a long-duration storage option to reflect emerging technologies that could potentially store energy for longer durations, such as 50 hours or more. (*Commenters: Joyce Blumenshine, David Bezanson, Jan Berry – Citizens' Climate Education, Trey Bussey – SELC, et al., Cortney Piper – Tennessee Advanced Energy Business Council, Sean M Mcgrath, Markey and Cohen – Congress of the United States*)

*Response:* In the IRP, TVA modeled two forms of long-duration storage resource options, including pumped storage and advanced chemistry batteries. Advanced chemistry batteries were assumed to have 8 hours of storage, and they also served as a proxy for other long-duration storage technologies that are yet to be commercialized. TVA performed a sensitivity to test the potential impacts if future costs for renewable and storage technologies, including advanced storage, were lower than estimated (see Volume 1, Sections 3.9 and 3.10.2).

Form Energy is one of the more advanced emerging long-duration technologies, but TVA has seen limited pilot/demo performance success to merit specific inclusion. One challenge for storage technologies is storage efficiency (losses) that can detract from the value, and this is one area of focus to improve as emerging storage technologies are developed and scaled for potential commercialization. The IRP analysis indicates value in storage of 8 hours or more, and TVA plans to further study various long-duration storage technologies, including Form Energy and others and potentially support pilot/demo projects. Additionally, TVA is collaborating and will continue to collaborate with other utilities on storage modeling approach in integrated resource planning.

#### **H.2.1.10.10 Nuclear**

66. There is minimal nuclear expansion by 2035 in the IRP results. Do first year available assumptions influence those results? (*Commenters: Madison Rollings, James Richards – Nuclear Innovation Alliance*)

*Response:* Yes, first year available assumptions influenced the results cited. The process of designing, permitting, licensing, and constructing new nuclear resources is typically lengthy, and recent nuclear additions in the U.S. have exceeded original timeline estimates. However, progress is accelerating on advanced nuclear technologies. The first-of-a-kind light water small modular reactor (SMR) is expected to be available beginning in 2033, with estimated cost and timeline efficiencies on additional installations. The first year available for large advanced reactors is 2038, and the first year available for next-generation SMRs is 2041. The final IRP adjusted the first milestone reporting year from 2035 to 2040, and as such the IRP results overview now reflects the additional nuclear expansion potential available through 2040. First year available assumptions do not preclude nuclear capacity from being added sooner than assumed in modeling, as long as total additions for each resource stay within the bounds of the IRP ranges.

67. With regard to small nuclear reactors and other nuclear generation sources, TVA assumes that some of these will be available for commercial use by 2033. Given the low TRL and ARL scores, the history of regulatory requirements and timeframes of existing nuclear sources, and the remaining

questions related to disposal of spent nuclear fuel, these timelines are not realistic. (*Commenter: Rebecca McGrew – NACCO Natural Resources*)

*Response:* Small modular reactor (SMR) technology for electric utility use is still developing. Leveraging work TVA has done to advance the potential to deploy SMRs at the Clinch River site, light water SMRs are assumed to be available in 2033. The IRP analysis acknowledges and considers that technology risks are greatest in portfolios with more reliance on emerging energy technologies, such as Strategy B. Slower progress on technology and adoption readiness may result in increasing the need for gas, solar, and storage in the long term, as described in Volume 1, Section 4.4.3.

68. [The IRP] Assumes water cooled small modular reactors (SMR) even though the SMR demonstration at Clinch River is a salt-cooled reactor. TVA could refine this model input to improve the economics of scenarios that include SMRs. (*Commenter: Jan Berry – Citizens' Climate Education*)

*Response:* In the IRP analysis, three nuclear expansion options are available to fill the expected capacity gap, including generation III+ advanced pressurized water reactors and light water small modular reactors (SMR) and generation IV SMRs. TVA is currently collaborating with industry partners to advance light water SMR design at Clinch River and partnering with Oak Ridge National Laboratory (ORNL) and Kairos Power to accelerate the next generation of cost-effective nuclear power. Refer to Volume 1, Section 4.3 for more details on IRP recommendations.

#### **H.2.1.10.11 Renewables**

69. TVA's draft IRP made many improvements to how it modeled renewable energy compared to the 2019 IRP. However, some work remains to bring TVA's modeling into a future that can fully benefit from the diversity and reliability of variable resources (i.e. solar and wind) and energy-limited resources (i.e. storage and hydro). (*Commenter: Maggie Shober – Southern Alliance for Clean Energy*)

*Response:* Thank you for your comment. It has been noted by TVA.

#### **H.2.1.10.12 Social Costs**

70. TVA should include social cost of carbon as a part of the financial cost for each modeled portfolio. (*Commenters: Madison Rollings – City of Chattanooga, William "Bill" Bell – 4-County EPA, Nathaniel Bass, Zachary Fabish – The Sierra Club, Markey and Cohen – Congress of the United States, Rosalie Bright, Lauren Wibe, Ann Livingston – Southeast Sustainability Directors Network, Grace Levin – City of Knoxville, TN, Drs. Joe and Sarah Schiller, Jamie McClanahan, Daniel Joranko*)

*Response:* Pursuant to Section 113 of the Energy Policy Act of 1992, portfolio optimization in the IRP analysis evaluates impacts of expansion paths on system cost that encompasses only those costs that are "direct and quantifiable net costs for an energy resource over its available life, including production, transportation, utilization, waste management, and environmental compliance."

#### **H.2.1.10.13 Solar and Storage**

71. TVA should model alternative net dependable capacity (NDC) curves for solar and storage that reflect different load shapes and renewable resource penetration. (*Commenter: Zachary Stines – New Leaf Energy*)

*Response:* A summary of TVA's NDC study for solar, wind, and storage is included in Volume 1, Appendix D. TVA evaluated summer and winter peak performance of solar and wind at various penetration levels to develop the solar and wind NDC curves used in the IRP. TVA also evaluated

summer and winter peak performance of storage with an assumed level of solar penetration and at various levels of storage penetration to develop the storage NDC curves used in the IRP. As TVA's power system evolves, TVA will reevaluate solar, wind, and storage NDCs at increasing levels of penetration.

72. TVA should model solar and storage together in a combined option to capture their synergistic benefit. (*Commenters: Gil Hough – TenneSEIA, Jake Duncan – Vote Solar, Maggie Shober – Southern Alliance for Clean Energy, Gabriela Sarri-Tobar – Center for Biological Diversity, Pam Jones, Lindsay Hanna – The Nature Conservancy, Jan Berry – Citizens' Climate Education, David Bezanson, Markey and Cohen – Congress of the United States*)

*Response:* While solar and storage resource options were modeled separately, the optimization model that TVA uses (EnCompass) is able to evaluate most of their synergistic benefits. In general, portfolios with high levels of renewable expansion also resulted in higher adoption of storage resources. As IRP recommendations are implemented, TVA will continue to consider adding cost-effective co-located solar and storage, similar to several sites already operating or expected to come online over the next several years.

#### **H.2.1.10.14 Storage**

73. The IRP does not properly account for the flexibility benefit of storage. (*Commenters: Gil Hough – TenneSEIA, Trey Bussey – SELC, et al.*)

*Response:* TVA accounted for the flexibility benefit of storage in IRP modeling in two ways. First, the optimization model used recognizes the flexibility benefit of storage at an hourly granularity in a similar manner to how it recognizes the operating characteristics of all resources. TVA recently upgraded to the EnCompass optimization model in part to leverage its enhanced ability to consider the chronology of energy needs in resource selection, which is particularly useful when modeling renewables and storage. Most of the flexibility benefit of storage can be captured at an hourly granularity. Based on a study TVA performed to understand the additional flexibility value of storage to manage sub-hourly fluctuations in load, TVA also applied a sub-hourly flexibility benefit to the ongoing annual fixed cost of storage resource options. Additionally, TVA is continuing to collaborate with other utilities on ways to improve storage modeling approach in integrated resource planning.

74. The IRP should model storage as available sooner than 2029 and/or increase or completely remove the annual build limits. (*Commenters: Trey Bussey – SELC, et al., Maggie Shober – Southern Alliance for Clean Energy*)

*Response:* Best practice in utility planning is to use annual limits as the modeling vehicle for simulating the practical ability to construct or procure new resources, so the analysis will generate executable portfolios. The IRP analysis includes annual limits for all resource types based on recent experience designing, permitting, and constructing new generating assets and procuring new resources through Request for Proposal processes. For example, the market capability for solar has increased, and this is reflected with solar limits that are more than double the limits used in the previous IRP. In the High Growth scenario and Supercharged Growth sensitivity, most annual limits were increased to reflect additional build or procurement potential resulting from increased national economic productivity. For additional information on limits, see Volume 1, Section 2.6.4. While first year available and annual limits are useful in modeling, these assumptions do not preclude TVA from adding a resource sooner than modeled if an earlier timeline is achievable for a given project.

75. The IRP should include an additional option for long-duration storage beyond pumped storage with its own ELCC and NDC. (*Commenter: Maggie Shober – Southern Alliance for Clean Energy*)

*Response:* In the IRP, TVA modeled two forms of long-duration storage resource options, including pumped storage and advanced chemistry batteries. Advanced chemistry batteries were assumed to have 8 hours of storage, and they also served as a proxy for other long-duration storage technologies that are yet to be commercialized. TVA performed a sensitivity to test the potential impacts if future costs for renewable and storage technologies, including advanced storage, were lower than estimated (see Volume 1, Sections 3.9 and 3.10.2).

Form Energy is one of the more advanced emerging long-duration technologies, but TVA has seen limited pilot/demo performance success to merit specific inclusion. One challenge for storage technologies is storage efficiency (losses) that can detract from the value, and this is one area of focus to improve as emerging storage technologies are developed and scaled for potential commercialization. The IRP analysis indicates value in storage of 8 hours or more, and TVA plans to further study various long-duration storage technologies, including Form Energy and others and potentially support pilot/demo projects. Additionally, TVA is collaborating and will continue to collaborate with other utilities on storage modeling approach in integrated resource planning.

#### **H.2.1.10.15 Technology Advancements**

76. TDEC encourages TVA to clarify whether the IRP includes an assumption of technological advancement, including anticipated advancements in solar net capacity, energy storage, and energy efficiency technologies that might impact future load growth projections. (*Commenter: Rachael Maitland – Tennessee Department of Environment and Conservation*)

*Response:* Volume 1, Section 2.6.5 describes the general methodology for developing resource cost assumptions, and additional details are included in Appendix E. For utility-scale options, TVA utilizes a combination of direct experience with recent projects, market-based request for proposal responses, industry expertise working with equipment manufacturers, and industry forecasts to inform resource costs. Solar and battery storage costs in the near-term are based on market offers submitted through recent, competitive requests for proposal, with long-term forecasts including adjustments for continued technological advancements. Demand response program options included a residential smart thermostat program that reflects the impact of evolving technology and adoption in that space.

The IRP Working Group and other stakeholders had questions about how different the results would look if future resource cost trajectories were higher or lower than estimated for key resource types. Some public comments also highlighted a desire to understand the potential impact if the market depth and adoption of energy efficiency programs were higher than estimated. As such, the IRP includes sensitivities exploring lower renewable and storage costs, lower gas resource costs, earlier or later coal end of life, and higher EE availability and deployment. (See Volume 1, Section 3.10.2) In practice, the costs studied in these sensitivity cases could be the result of additional technology improvements.

#### **H.2.1.10.16 Wind**

77. External wind assumptions need to be adjusted to include the recent award from DOE's Grid Resilience and Innovation Partnerships (GRIP) program. (*Commenters: Maggie Shober – Southern Alliance for Clean Energy, Jonathan Geldof – ACORE, Ann Livingston – Southeast Sustainability Directors Network*)

*Response:* TVA's DOE GRIP award funding will be used to support investments in transmission grid capacity, reduce outage times, and create the first interconnection tie between TVA and the Southwest Power Pool (SPP). It will also be used to support distribution-level reliability and resiliency projects, in partnership with TVA's local power companies. Transmission system upgrades, in

particular the tie-line connection to SPP, could allow TVA access to more sources of competitively-priced market power. TVA will continue to evaluate future market offers received on a one-off basis in the context of least-cost planning and the IRP's strategic direction.

78. TVA should calculate the flexibility benefits of various levels of wind penetration and include those benefits in its modeling of wind energy resources. *(Commenter: Maggie Shober – Southern Alliance for Clean Energy)*

*Response:* The optimization model recognizes the cost and operating characteristics of wind as it determines the least-cost portfolio to meet system needs in each scenario and strategy combination. Per IRP analysis results, the IRP's Recommended Actions include limiting new wind resources given cost and portfolio fit challenges.

### **H.2.1.11 Power Supply Mix**

79. Reviewing the draft IRP, it seems that fossil fuel use is still the dominant source of energy production and plans seem to establish that fossil fuels will continue their domination. On page 59 in TVA's SEC 10-K document, it was reported that as of September 30, 2023, the summer net energy capability was calculated to include 25.6 % nuclear, 18.1 % coal, 39.3% gas-oil, and 16.9% hydro. The 57.4 % use of fossil fuels does not comport with positive work on the climate crisis. Renewable energy was not mentioned in this table. *(Commenter: Mary Ellen DeClue)*

*Response:* TVA's 10-K reports summer net capability, which is similar to capacity, and it includes a table showing capacity associated with renewable and non-renewable power purchases. The 10-K also reports the power supply, which represents the energy generated by each major resource type. TVA's portfolio has evolved over the years to a more diverse and reliable mix of generation resources. As reported in the 10-K, in Fiscal Year (FY) 2025, TVA delivered nearly 168 billion kilowatt-hours of electricity to customers from a power supply that was 33% nuclear, 35% natural gas, 18% coal-fired, 10% hydro, and 4% wind and solar. Additionally, TVA programmatic energy efficiency efforts reduced power demand by approximately 257 GWh of net incremental savings.

### **H.2.1.12 Process**

80. Which strategy/scenario combination will TVA choose out of the 30 cases? How are the recommendations going to be chosen? *(Commenters: Madison Rollings – City of Chattanooga, Ann Livingston – Southeast Sustainability Directors Network)*

*Response:* To develop IRP recommendations, TVA considered the results from the nine core portfolios, metrics, sensitivities, and environmental review to identify the strategic portfolio direction. Metrics assessed how the strategies performed across the scenarios, helping to identify a set of recommended actions that are grounded in least-cost planning and performs well in a constantly changing business environment.

For more on 2026 IRP recommendations, please see Volume 1, Chapter 4.

81. TVA should incorporate integrated system planning into its approach to merge transmission planning into the IRP planning process. TVA should also take into account distributed resource planning. Integrated system planning can help drive increasingly efficient and resilient solutions. *(Commenters: Jan Berry – Citizens' Climate Education, Gil Hough – TenneSEIA, Jake Duncan – Vote Solar, Jonathan Geldof – ACORE, Maggie Shober – Southern Alliance for Clean Energy, Zachary Fabish – The Sierra Club, Curtis Landry Baysinger, Ntale Kajumba – EPA Region 4, Scott Dunbar – Clean Energy Buyers Association, Tracy O'Neill – Preserve Cheatham County, Farah Mandich – US General Services Administration)*



*Response:* Preparing for local and regional load growth, as well as understanding when and where retirements will likely occur and new generation will be needed, are key inputs into transmission planning. TVA has initiated development of a more strategic transmission process, that will incorporate stakeholder input. This process will consider strategic direction from the IRP, along with the locational aspects of connecting load and generation, to enable the efficient evolution of the power system. TVA will incorporate additional elements of transmission planning into future IRPs to more fully integrate system planning.

In 2020, TVA and local power companies began a multi-year collaborative effort to transform the region's existing transmission and distribution grids into a more flexible, resilient, and integrated system to meet customer expectations and changing market conditions. This initiative focused on foundational capabilities for grid transformation, regional guidelines, enhanced operational coordination and end-user experience, and integrated planning.

82. TVA should publish an interim report, which should include the results of additional analysis based on draft IRP public comments and a recommended near-term action plan, and then give the public an opportunity to review and provide additional comments before the IRP is finalized.

*(Commenters: Gabriela Sarri-Tobar – Center for Biological Diversity, Leah McCord – CleanUpTVA Coalition, Markey and Cohen – Congress of the United States, Shirley Moulton, Lindsay Hanna – The Nature Conservancy, Maggie Shoher – Southern Alliance for Clean Energy, Anonymous 11, Ellen Faby)*

*Response:* TVA's IRP process entails engaging stakeholders and the public throughout the process, along with completing an environmental review that meets the requirements of the National Environmental Policy Act (NEPA). After public scoping, TVA produced a scoping report to summarize public input that helped frame the effort. TVA then developed the IRP approach, key assumptions, and analysis with feedback from the IRP Working Group, a group of stakeholders with wide-ranging viewpoints that reviewed and challenged IRP inputs and assumptions, analyzed outputs, designed evaluation criteria, and evaluated results. Public comments on the draft IRP helped inform additional analysis that was considered in developing the IRP recommendations. The additional analysis and preliminary recommendations were reviewed by the IRP Working Group and the Regional Energy Resource Council, and when finalized, were included in the final IRP and EIS for Board review and consideration.

IRP recommendations incorporate power supply mix ranges, strategic portfolio direction, and key signposts and implications. The strategic portfolio direction includes a set of recommended actions, as well as additional information on planned actions for existing resources and mature resource additions. In this IRP, TVA expanded the discussion of key signposts to include directional implications to the resource mix.

83. TVA should delay the IRP and revise it based on the current administration's goals and policies. *(Commenters: Jack Keeling, Rebecca McGrew – NACCO Natural Resources)*

*Response:* Timely IRPs are important to ensure that TVA is positioned to make resource decisions when needed. TVA's integrated resource planning is grounded in least-cost planning principles, in alignment with Section 113 of the Energy Policy Act of 1992. These least-cost principles include balancing the following goals: low cost, risk informed, environmentally responsible, reliable and resilient, diverse, and flexible. For more on TVA's least-cost planning requirements, please see Section 2.1 of Volume 1.

As noted in Section 2.2 of Volume 1, throughout the Spring and Summer of 2025 a number of key

changes in electric utility landscape occurred, such as updated tax credit phase-outs under the One Big Beautiful Bill Act, Executive Orders and regulatory relief actions, and strong electricity demand growth. All of these changes to U.S. energy policy and the external landscape have been reflected in the final IRP analysis.

84. TVA should choose a preferred portfolio and/or identify a near-term action plan that identifies near-term resource needs, procurement plans, transmission considerations, and risk analysis. *(Commenters: Kent Minault, Ann Livingston – Southeast Sustainability Directors Network, Joanne Logan, Richard Henighan, Audra Morelock, Gabriela Sarri-Tobar – Center For Biological Diversity, Farah Mandich – US General Services Administration, Leah McCord – CleanUpTVA Coalition, Maggie Shoher – Southern Alliance for Clean Energy, Lindsay Hanna – The Nature Conservancy, Zachary Fabish – The Sierra Club, Trey Bussey – SELC, et al., Brant Miller, Patricia Miller, Katherine Brubaker – EDF, Zachary Stines – New Leaf Energy, Scott Dunbar – Clean Energy Buyers Association, Jake Duncan – Vote Solar, Markey and Cohen – Congress of the United States, Gil Hough – TenneSEIA, Whit Cox – Southern Renewable Energy Association)*

*Response:* In the near term, the IRP Recommendation's Strategic Portfolio Direction states that TVA's IRP analysis reaffirms the importance of adhering to least-cost planning principles to ensure the continued delivery of affordable, reliable, and resilient power to the Tennessee Valley. The results underscore that no single resource will fully meet future system needs; rather, maintaining a diverse portfolio remains essential. In the near-term, TVA should prioritize the addition of firm, dispatchable resources, particularly natural gas and storage, to address capacity requirements. TVA should also continue collaborating with industry and federal partners to prepare for the potential deployment of firm, dispatchable advanced nuclear technologies, which could support long-term load growth while mitigating fuel volatility and regulatory risks. Finally, complementary deployment of solar, demand-side, and distributed generation resources should be used to satisfy capacity requirements, provide economic energy, and/or meet customer needs.

TVA's Strategic Portfolio Direction also contains a set of Recommended Actions addressing the existing resource fleet, supply-side resource additions, demand-side resource additions, and grid and innovation enablement. For more on the IRP recommendations, see Volume 1, Chapter 4.

85. The Center's Scoping Comments specifically explained that TVA must meaningfully address the climate crisis, greenhouse gas emissions reductions, and impacts on protected species. Yet, the Draft IRP/DEIS fails to adequately address these matters or explain why TVA has chosen to ignore the Center's comments. *(Commenter: Gabriela Sarri-Tobar – Center for Biological Diversity)*

*Response:* TVA's integrated resource planning is grounded in least-cost planning principles, in alignment with Section 113 of the Energy Policy Act of 1992. These least-cost principles include balancing the following goals: low cost, risk informed, environmentally responsible, reliable and resilient, diverse, and flexible. Pursuant to Section 113 of the Energy Policy Act of 1992, portfolio optimization in the IRP analysis evaluates impacts of expansion paths on system cost that encompasses only those costs that are "direct and quantifiable net costs for an energy resource over its available life, including production, transportation, utilization, waste management, and environmental compliance." For more on TVA's least-cost planning requirements, please see Section 3.1 of Volume 1.

In the draft and final IRP and EIS, TVA included information on direct and indirect greenhouse gas emissions (see Volume 1, Chapter 3 and Appendix J and Volume 2, Section 5.5.2.3 and Appendix D). Information related to endangered and threatened species can be found in Volume 2, Chapters 4 and 5. Volume 2 is a programmatic environment analysis that does not itself authorize any site-specific actions. While site- and implementing action-specific impact analyses are not possible at this



time, the EIS quantifies the land area requirements for implementing the alternative strategies. The land area requirements associated with power generation facilities provide an indicator of the potential for impact to many biological resources. Threatened and endangered species were highlighted in the discussion given the additional mandate TVA has to consider effects to these species.

TVA has added text to Section 4.5.3 to clarify that TVA has made a broad no effect determination at the programmatic EIS level because of both the inability to quantify effects across the entire TVA region and the conceptual (i.e., not site specific) nature of the proposed actions in the programmatic EIS. As the IRP is implemented with site-specific actions, TVA would conduct site-specific analysis and consult with the U.S. Fish and Wildlife Service per Section 7 of the Endangered Species Act procedures as warranted. TVA will conduct the appropriate detailed impact analyses when it proposes actions to implement the IRP. TVA will consider mitigation of any impacts through siting and facility design processes at the time additional environmental reviews are conducted for site-specific actions implementing the IRP.

86. The IRP modeling process is not objective. (*Commenters: Drs. Joe and Sarah Schiller*)

*Response:* Thank you for your comment. It has been noted by TVA.

87. The TVA Board should secure an independent consultant for future IRPs to provide the Board impartial technical analysis and advice in order to make an informed decision. This independent consultant should emulate the role filled by state consumer advocate offices in regulated IRP proceedings. (*Commenter: Jake Duncan – Vote Solar*)

*Response:* Thank you for your comment. It has been noted by TVA.

88. I urge TVA board members to look to the future of our collective well-being and abandon this IRP. (*Commenter: Bonnie Swinford – Sierra Club*)

*Response:* Thank you for your comment. It has been noted by TVA.

89. TVA should be commended for the significant amount of work it has invested in the IRP process. TDEC appreciates the outreach that TVA has provided to date and hopes the engagement with stakeholders will continue as TVA works to finalize the IRP and implement future energy strategies. We encourage TVA to continue considering the environmental, regulatory, and technological factors impacting Tennessee's energy landscape. (*Commenter: Rachael Maitland – Tennessee Department of Environment and Conservation*)

*Response:* Thank you for your comment. It has been noted by TVA.

90. You have my full support for the project. It's comprehensible and thoughtful, making smart use of the resources God gave us. (*Commenter: Barbara Britton*)

*Response:* Thank you for your comment. It has been noted by TVA.

91. Please continue doing whatever it is that you're doing. I moved to the Shoals in 2020 from Texas where we were part of a system that used fossils, wind farms and solar. Our electric bill was twice as high as it is here. (*Commenter: Paul Brevard*)

*Response:* Thank you for your comment. It has been noted by TVA.

92. You will be the future -kudos to you for your courage and commitment. (*Commenter: Diana M. Williams*)

*Response:* Thank you for your comment. It has been noted by TVA.

### H.2.1.13 Process and Public Involvement

93. TVA should be more transparent throughout the IRP process, including clarity on assumptions behind key scenario and resource inputs, access to modeling data for independent analysis, and/or cost assessments for all new projects. *(Commenters: Ann Livingston – Southeast Sustainability Directors Network, Cortney Piper – Tennessee Advanced Energy Business Council, Trey Bussey – SELC, et al., Jonathan Geldof – ACORE, Maggie Shober – Southern Alliance for Clean Energy)*

*Response:* TVA utilized the proprietary EnCompass capacity expansion and production cost simulation package, licensed through Yes Energy, as the primary modeling tool for the IRP analysis. EnCompass is also used as the primary resource planning tool by a number of other utilities in the Southeast and across the nation. Additional information on how the model works is included in Volume 1, Section 2.7.

Based on public input during the previous IRP and during scoping, TVA proactively provided additional information and data tables for the 2026 IRP. Information related to scenarios, strategies, and resource options was shared publicly during IRP public webinars and Regional Energy Resource Council (RERC) meetings, and TVA shared additional detail in the draft IRP report. In addition to energy and peak demand forecast charts, the draft IRP report included corresponding data tables. An expanded list of resource cost and characteristic assumptions also was included, along with links to supporting studies and/or study summaries. To supplement information in the reports, TVA provided corresponding data tables on the IRP website coincident with draft IRP release for public review. Informed by public comments on the draft IRP, TVA shared additional information on sensitivities and preliminary IRP recommendations during an RERC meeting and a public webinar. Coincident with final IRP release, TVA provided updated information on TVA's IRP website.

94. TVA should increase transparency in how stakeholder feedback influences TVA's analysis and recommendations as the IRP is finalized. Demonstrating how feedback has influenced the IRP will increase trust in TVA's stakeholder engagement process, especially from draft to final. *(Commenters: Ann Livingston – Southeast Sustainability Directors Network, Leigh Huffman – Shelby County Government, Leigh Huffman – City of Memphis, Kendra Abkowitz - Metropolitan Government of Nashville and Davidson County, Farah Mandich – US General Services Administration, Jake Duncan – Vote Solar)*

*Response:* In the 2026 IRP, TVA added a sub-section in Volume 1, Section 2.2.2 to highlight key areas where stakeholder input influenced the IRP approach and analysis. Informed by public comments during scoping and draft IRP review, along with IRP Working Group and RERC input during IRP development, TVA incorporated additional elements into this IRP. Key areas of influence were related to expanding engagement efforts, exploring potential impacts of substantial electrification, expanding solar and storage resource potential, understanding opportunities and risks of emerging energy technologies, ensuring diverse resource portfolios, and evaluating key planning assumption risks through sensitivity analysis. Public comments were particularly useful in informing sensitivity analysis focused on electricity demand changes, resource costs and availability, and natural gas commodity prices. For more on sensitivity analysis, see Volume 1, Sections 3.9 and 3.10. The full set of IRP results - including the nine core portfolios, metrics, sensitivities, and EIS - provided robust analysis to consider in forming the IRP recommendations.

95. TVA should host a public hearing to present the draft IRP and allow the public, expert witnesses, and stakeholders to provide statements that will be considered and incorporated into the final IRP. *(Commenters: Jake Duncan – Vote Solar, Jonathan Geldof – ACORE, Gabriela Sarri-Tobar – Center For Biological Diversity, Leah McCord – CleanUpTVA Coalition, Zachary Fabish – The Sierra Club,*

*Dennis Lynch, Audra Morelock, Pam Jones, Brant Miller, Patricia Miller, Farah Mandich – US General Services Administration)*

**Response:** The IRP Working Group, a group of 24 stakeholders with broad-ranging viewpoints, met approximately monthly to provide input on all key aspects of the IRP. Members were selected to provide input into the process and technical aspects of the project from their differing perspectives. A smaller working group was beneficial to facilitating deeper discussions and open dialogue. The Working Group members provided input that influenced the scenarios and strategies, challenged assumptions, refined the resource options, and strengthened the analysis and recommendations, and they also kept their constituents informed.

During IRP development, TVA hosted public webinars and participated in Regional Energy Resource Council meetings to provide progress updates on the IRP and opportunities for public involvement, including question and answer sessions in the webinars. The public is also invited to provide input during TVA Board public listening sessions. Upon draft IRP release, TVA held 10 open houses across all seven states and two public webinars to share draft analysis and results, provide ample opportunity for questions, and encourage the public to provide comments on the draft IRP. All input received was reviewed and considered as the IRP analysis and recommendations were finalized.

96. TVA should allow for anyone interested to attend IRP Working Group meetings. (*Commenters: Dennis Lynch, Gabriela Sarri-Tobar – Center for Biological Diversity, Zachary Fabish – The Sierra Club, Farah Mandich – US General Services Administration, Whit Cox – Southern Renewable Energy Association*)

**Response:** TVA established the IRP Working Group to represent a various stakeholder interests. The 24 members represented local power companies, customer associations, academia and research, state governments, environmental non-government organizations, community stakeholders, and special interests. Members were selected to provide input into the process and technical aspects of the project from their differing perspectives. A smaller working group was beneficial to facilitating deeper discussions and open dialogue. Summaries of meetings were posted on TVA's IRP website for the public to view and follow the progress of IRP development. The public also was able to ask questions about these materials at public webinars and provide input at other public meetings.

97. TVA should release an interim report including additional analysis and allow for public comments on the interim report that will be considered before finalizing the IRP. (*Commenters: Audra Morelock, Pam Jones, Brant Miller, Patricia Miller, Farah Mandich – US General Services Administration*)

**Response:** TVA's IRP process entails engaging stakeholders and the public throughout the process, along with completing an environmental review that meets the requirements of the National Environmental Policy Act (NEPA). After public scoping, TVA produced a scoping report to summarize public input that helped frame the effort. TVA then developed the IRP approach, key assumptions, and analysis with feedback from the IRP Working Group, a group of stakeholders with wide-ranging viewpoints that reviewed and challenged IRP inputs and assumptions, analyzed outputs, designed evaluation criteria, and evaluated results. Public comments on the draft IRP helped inform additional analysis that was considered in developing the IRP recommendations. The additional analysis and preliminary recommendations were reviewed by the IRP Working Group and the Regional Energy Resource Council, and when finalized, were included in the final IRP and EIS for Board review and consideration.

98. TVA should perform IRPs more often. Most utilities develop IRPs every 1-3 years, which allows utilities to be more flexible in responding to changes in the sector and allows regulators to be more

responsive to changes and public input. (*Commenter: Maggie Shober – Southern Alliance for Clean Energy*)

*Response:* TVA explores a wider range of potential future scenarios in its IRPs than most utilities do, which increases their longevity. TVA's IRP includes key signposts related to changing market conditions, evolving policy and regulations, and emerging technologies. Movement in key signposts can signal potential shifts in the portfolio mix and indicate the appropriate timing for the next IRP.

99. TVA should streamline and extend its public comment period, making it easier for stakeholders to ask questions and request documentation throughout the entire process. (*Commenter: Maggie Shober – Southern Alliance for Clean Energy*)

*Response:* For the draft IRP, TVA extended the comment period from 60 to 75 days. Based on public input on prior IRPs, TVA provided additional information in the draft IRP and in supporting data files made available on the IRP website upon draft IRP release to facilitate public review of key assumptions and portfolio results. TVA responded to clarifying questions during the comment period as soon as possible and will continue to look for ways to streamline responses to clarifying questions in future IRPs. TVA also has included some clarifying information in the final IRP based on public comments received, which will also enhance future IRPs.

#### **H.2.1.14 Public Involvement**

100. Provide ample opportunity for public involvement during the IRP and particularly during future site selection for system resources, so that communities that may be potentially affected can meaningfully engage in the decision-making process. (*Commenters: Anonymous 8, Tracy O'Neill – Preserve Cheatham County, Nathaniel Bass, Maggie Shober – Southern Alliance for Clean Energy, Jake Duncan – Vote Solar*)

*Response:* TVA offered multiple avenues for public involvement during the IRP. Engagement opportunities included public scoping to help frame the effort, public webinars with Q&A during IRP development, RERC and Board meetings with public listening sessions, and ten open houses across the seven-state region and public webinars with Q&A to present the draft IRP for public comment. TVA also leveraged ongoing regional engagements to personalize interactions and utilize local forums to convey information about the IRP to the public. TVA strives to reach and gain valuable input from all the communities we serve so their opinions on the future power system can be considered. Site specific aspects of actions that are later proposed to implement the IRP will be addressed in tiered analysis and environmental reviews.

101. Increase public access to IRP data, such as modeling data, supporting studies, and portfolio and CO<sub>2</sub> emissions data. (*Commenters: Jake Duncan – Vote Solar, Maggie Shober – Southern Alliance for Clean Energy, Simon Mahan – Southern Renewable Energy Association, Katherine Brubaker – EDF, Ann Livingston – Southeast Sustainability Directors Network, Shalin Mody, Lindsay Hanna – The Nature Conservancy*)

*Response:* TVA utilized the proprietary EnCompass capacity expansion and production cost simulation package, licensed through Yes Energy, as the primary modeling tool for the IRP analysis. EnCompass is also used as the primary resource planning tool by a number of other utilities in the Southeast and across the nation. Additional information on how the model works is included in Volume 1, Section 2.7.

Based on public input during the previous IRP and during scoping, TVA proactively provided additional information and data tables for the 2026 IRP. Information related to scenarios, strategies, and resource options was shared publicly during IRP public webinars and Regional Energy Resource

Council (RERC) meetings, and TVA shared additional detail in the draft IRP report. In addition to energy and peak demand forecast charts, the draft IRP report included corresponding data tables. An expanded list of resource cost and characteristic assumptions also was included, along with links to supporting studies and/or study summaries. To supplement information in the reports, TVA provided corresponding data tables on the IRP website coincident with draft IRP release for public review. Informed by public comments on the draft IRP, TVA shared additional information on sensitivities and preliminary IRP recommendations during an RERC meeting and a public webinar. Coincident with final IRP release, TVA provided updated information on TVA's IRP website.

102. We request that TVA explain how public and stakeholder feedback will influence its siting decisions for major new energy investments. (*Commenter: Ann Livingston – Southeast Sustainability Directors Network*)

*Response:* TVA looks for ways to expand its outreach to communities that may be impacted by changes and additions to the power generation portfolio. The Regional Energy Resource Council and IRP Working Group both highlighted the importance of continuing to enhance community outreach as the IRP recommendations are implemented, and this will be an increased emphasis for TVA moving forward.

103. Any chance for public involvement with new infrastructure? (*Commenter: Shalin Mody*)

*Response:* TVA added general information related to infrastructure needs associated with IRP recommendations to the IRP executive summary and Volume 1, Chapter 4. Site-specific aspects of actions that are later proposed to implement the IRP will be addressed in tiered environmental reviews. These tiered reviews will include more specific information on infrastructure related to proposed alternatives for public review and comment.

#### **H.2.1.15 Scenarios**

104. The scenarios and ranges studied in the IRP are too broad to inform planning decisions, making it difficult for stakeholders to provide comments on TVA's plan. TVA should identify which scenarios are more or less probable and/or consider weighting the portfolio outcomes to inform planning decisions. (*Commenters: Brant Miller, Patricia Miller, Vicki Christensen, Emily Cathcart, Joe Franklin, David Bordenkircher, Jan Berry – Citizens' Climate Education, Lindsay Hanna – The Nature Conservancy, Katherine Brubaker – EDF, Ellen Faby, Leigh Huffman – Shelby County Government, Shirley Moulton, Maggie Shoher – Southern Alliance for Clean Energy, Gabriela Sarri-Tobar – Center for Biological Diversity, Drs. Joe and Sarah Schiller*)

*Response:* Exploring potential scenarios and strategies in the IRP is fundamental to ensuring TVA is well prepared to meet the region's energy needs however the future unfolds between now and 2050. The scenarios project varying rates of load growth, which when taken together, along with the Low Load and Supercharged Growth sensitivities, reflect expectations for growth and continued electrification of the economy. To account for the possibility that current regulatory relief efforts are rolled back or stalled or that new legislation or regulatory actions are taken in the future, TVA included Scenario 3, Carbon Legislation. Metrics assessed how the strategies performed across the scenarios, helping to identify tradeoffs and a long-range plan that is grounded in least-cost planning and performs well in a constantly changing business environment. Public comments helped inform the additional analysis performed and were considered in developing the IRP's strategic direction.

105. TVA should develop a systematic approach to use this scenario-based planning framework for transmission projects. (*Commenter: Jonathan Geldof – ACORE*)



*Response:* TVA has used scenarios to some extent in transmission planning, such as higher load scenarios. TVA plans to utilize the IRP scenarios and recommendations more fully in its nascent strategic transmission planning process to further integrate system planning.

106. TVA should comply with the official greenhouse gas (GHG) regulations that are modeled in Scenario 6. Other scenarios should be updated to reflect the letter of the law. (*Commenters: Ntale Kajumba – EPA Region 4, Drs. Joe and Sarah Schiller, William "Bill" Bell – 4-County EPA, Lindsay Hanna – The Nature Conservancy, Scott Dunbar – Clean Energy Buyers Association*)

*Response:* As a result of key changes in the electric utility landscape in 2025 (see Section 2.2 of Volume 1), TVA updated baseline IRP assumptions which included a streamlined set of scenarios. One of these key changes was the U.S. EPA announcing intentions to provide regulatory relief across several rules, including the GHG Rule. As such, the Scenario 6 referenced in this comment is no longer included in the IRP analysis.

In the final IRP, Scenario 3, Carbon Legislation, includes a carbon tax which serves as a proxy for current and potential future legislation and/or regulatory actions seeking to reduce greenhouse gas emissions, which is an uncertainty outside of TVA's control. See Volume 1, Section 2.4.4 for additional information.

107. TVA should make scenario inputs more readily available to the public, especially related to economic drivers, and provide further details on the methods and analysis used to develop them. TVA should describe how scenario inputs inform likely or representative scenarios. (*Commenters: Ntale Kajumba – EPA Region 4, Lindsay Hanna – The Nature Conservancy*)

*Response:* IRP Volume 1, Appendix B includes information on scenario design and development. To develop the scenarios to explore in the IRP, TVA considered IRP Working Group feedback and public input to brainstorm and refine possible scenarios. Scenarios were influenced by key uncertainties such as electricity demand, environmental policy and regulations, macro-economic trends, and other factors. Appendix B includes forecasts for the key uncertainties identified, along with rationale for how the forecasts were developed and how they differed from the reference case.

Volume 1, Appendix A includes information on the fundamentals of integrated resource planning, and some details have been added to explain methodology for developing economic forecasts. To inform electricity demand forecasts, TVA first develops forecasts for economic and demographic variables that are key drivers of demand. Key macroeconomic variables include U.S. Gross Domestic Product (GDP) and measures of inflation, such as the U.S. GDP – Implicit Price Deflator and U.S. Treasury rates. To develop a consensus forecast, TVA looks at several sources, including Moody's Analytics, the Congressional Budget Office (CBO), the Federal Reserve, the Conference Board, and other publicly available sources. Only Moody's and CBO provide long-term forecasts, while other sources inform the short-term outlook. Only Moody's provides regional and county level data projections. Key regional demographic and economic variables include population, number of households, and employment. TVA utilizes Moody's forecasts at the regional and county level, adjusted for recent Bureau of the Census updates, to forecast demographic trends for districts within the TVA region and for the region as a whole. In some cases, regional projections are adjusted to be consistent with consensus macroeconomic forecasts and to reflect TVA economic development customer expansions.

108. In scenarios 4 (Net-Zero Regulation) and 5 (Net-Zero Regulation Plus Growth), the TVA uses the Interagency Working Group (IWG) and the EPA's (2023) social cost (SC) of GHG as a proxy for future regulations that would be needed to achieve net-zero goals. Specifically, these SC-GHG estimates are used as the basis of a carbon emissions tax, which the TVA uses to reach Net-Zero.

Although the SC-GHG are not intended for that purpose, the EPA recognizes the utility of using a carbon price for planning of these scenarios and that the SC-GHG could help inform this approach. Recommendations: a) Include a consistent methodology across scenarios when using a proxy approach.

b) Clarify why the carbon tax only appears after 2034 in scenarios 4 and 5 (IRP page 3-9).

c) Clarify why scenarios 4 and 5 use two different SC-GHG values to estimate the future carbon emissions tax, and why scenario 4 uses the EPA SC-GHG, while scenario 5 uses the IWG SC-GHG.

d) Clarify why the discount rates used are not consistent between the application of the SC-GHG as a basis for a carbon emissions tax in Scenarios 4 and 5 and the calculation of the net present value (NPV) of the social costs of emissions in Section 5 of the draft EIS. For example, the carbon tax for scenario 4 uses a 2.5% discount rate, while the draft EIS uses a 2% discount rate to monetize impacts using the SC-GHG. If the TVA continues to use the SC-GHG as a proxy for future regulation, the EPA recommends that the TVA include further justification of the application and decisions about timeline and discount rates.

e) If the TVA plans to use a carbon tax for planning, it should use one that is more consistent across scenarios and in line with the literature, internal discounting practices, net-zero goals, and modeling. (*Commenter: Ntale Kajumba – EPA Region 4*)

*Response:* As a result of key changes in the electric utility landscape in 2025 (see Section 2.2 of Volume 1), TVA updated baseline IRP assumptions which included a streamlined set of scenarios. One of these key changes was the U.S. EPA announcing intentions to provide regulatory relief across several rules, including the GHG Rule. As such, scenarios 4 and 5 referenced in this comment are no longer included in the IRP analysis.

In the final IRP, Scenario 3, Carbon Legislation, includes a carbon tax which serves as a proxy for current and potential future legislation and/or regulatory actions seeking to reduce greenhouse gas emissions, which is an uncertainty outside of TVA's control. The carbon tax assumptions used in the Carbon Legislation scenario are not based on any specific forecasts, regulations, or legislative proposals. Rather, the carbon tax forecast uses the same trajectory studied in TVA's 2019 IRP (from the Double Decarbonization sensitivity), with adjustments to start in 2032 and ramp-up five years later. Given current U.S. energy policy and priorities, a 2032 start date for this carbon tax was seen as the earliest possible effective date of future regulatory or legislative action. See Volume 1, Section 2.4.4 for additional information.

109. The IRP mentioned the EPA release of the final Greenhouse House Rule, you can scratch that one off. The Trump administration is going to eliminate burdensome regulations. (*Commenter: Stephen Gustav Weber*)

*Response:* Thank you for your comment. It has been noted by TVA.

### **H.2.1.16      Sensitivity Analysis**

110. TVA should explore the potential impacts of changes in resource costs and availability that could be driven by higher or lower than estimated costs and/or changes in the ability to realize IRA tax credits. (*Commenter: James Richards – Nuclear Innovation Alliance*)

*Response:* Please refer to Volume 1, Sections 3.9 and 3.10.2 for a summary and discussion of sensitivity analysis results that explored the impacts of differences in resources costs and availability.

111. Model several additional sensitivity cases that better reflect the future power system related to the entry of renewable energy and storage resources. Run additional scenarios that include the Final EPA GHG Rule for a range of lower and higher load projections, similar to Scenarios 2, 3 and 4.



These scenarios should not include an assumed CO<sub>2</sub> price and should include reasonable limits and costs for hydrogen-fired CC and CC with CCS. (*Commenter: Whit Cox – Southern Renewable Energy Association*)

*Response:* Please refer to Volume 1, Sections 3.9 and 3.10 for a summary and discussion of the various sensitivity analyses that TVA performed related to electricity demand changes, resource costs and availability, and natural gas commodity prices.

112. Model several additional sensitivity cases that better reflect the future power system related to the entry of renewable energy and storage resources. Run sensitivities with limited or no availability of hydrogen-fired gas CCs and CC with CCS in Strategies A, C, D and E across all scenarios to reflect the significant uncertainty about the technological development and costs of these technologies and the risks of relying on not-yet-available resources to serve future demand; (*Commenter: Whit Cox – Southern Renewable Energy Association*)

*Response:* Please refer to Volume 1, Sections 3.9 and 3.10 for a summary and discussion of the various sensitivity analyses that TVA performed related to electricity demand changes, resource costs and availability, and natural gas commodity prices. Specifically, the Lower Renewable and Storage Costs sensitivity explores the portfolio impacts if renewable and storage costs decline faster than forecasted and/or tax credits are extended. Hydrogen was not included as an alternative fuel in the Final IRP. Finally, Scenario 3, Carbon Legislation, reflects the impact of potential future carbon legislation designed to reduce power sector emissions.

113. It would be beneficial for TVA to describe further what it believes is the appropriate response when discussing the impact of increased weather risk and resulting increased PRMs [planning reserve margins].

TVA needs to provide a clearer description of how the PRM is applied and how it interacts with specific resources' capacity contributions in its modeling. (*Commenter: Farah Mandich – US General Services Administration*)

*Response:* In optimization modeling, TVA applied 18% summer and 26% winter reserve margins, and each modeled resource option received credit for its net dependable capacity (NDC) in a given year towards meeting the reserve margins in each season. Solar, wind, and storage resources have curves to reflect changing NDC over time as installation of each resource on the TVA power system increases. See Volume 1, Appendix D for additional information on the planning reserve margin study and net dependable capacity study.

114. Question: How will the factors considered in the sensitivity analysis be weighted?

- Load variations
- Weather risk
- TVA net-zero aspirations
- Variations in carbon regulations and emissions
- Commodity price risks
- Variations in resource costs and deployment (*Commenter: Jan Berry – Citizens' Climate Education*)

*Response:* Please refer to Section 3.9 and 3.10 in Volume 1 of the IRP for a summary and discussion of the sensitivities performed as a part of this IRP process. These sensitivities included electricity demand changes, resource costs and availability, and natural gas commodity prices. The full set of IRP results - including the nine portfolios, metrics, sensitivities, and EIS - provided robust analysis to consider in forming IRP recommendations.

115. Throughout SACE's comments we include recommendations for additional analyses. Here is a list of these analyses and sensitivities in one place:

- A Strategy that combines renewable energy, storage, and distributed technologies. We recommend TVA do this by combining all the promotions used in Strategies C and D to observe the variations in the optimized mix of all of these commercial-ready technologies and programs across all six Scenarios.
- Calculate an ELCC and thus NDC for a resource that combines solar and storage, and rerun all Strategy and Scenario combinations with that solar plus storage as an additional option while maintaining the standalone solar and standalone storage as options.
- Sensitivity on at least Scenarios 1, 3, 5, and 6 that removed the annual build limits on solar and storage and makes both resources available starting in 2026.
- Sensitivity on at least Scenarios 1, 3, 5, and 6 that removes all near-term gas builds that were forced into the model, including all capacity at Cumberland, Kingston, New Caledonia, Allen, and Cheatham County.
- A further sensitivity that combines the two previous sensitivity: no annual limits on solar and storage, solar and storage available in 2026, and no gas forced into the model.
- Sensitivity that includes the 800 MW intertie with SPP and adjusts the cost for Midwest wind accordingly.
- Sensitivity that includes a long-duration storage technology other than pumped hydro, and to run that sensitivity that TVA calculates the ELCC and NDC for that long-duration storage technology.
- Sensitivity that updates key wind resource assumptions: a flexibility benefit based on its generation profile complementing solar resources, and a calculation of an additional wind PPA resource based on the PTC.
- A sensitivity that assumes TVA achieves and then sustains energy efficiency levels of at least 1% of retail sales, after a reasonable ramp rate from current levels. (*Commenter: Maggie Shoher – Southern Alliance for Clean Energy*)

*Response:* As a result of key changes in the electric utility landscape in 2025 (see Section 2.2 of Volume 1), TVA updated baseline IRP assumptions which included a streamlined set of strategies. As such, strategies C and D referenced in this comment are no longer included in the IRP analysis. TVA considered feedback received throughout the IRP process, including from the IRP Working Group, RERC, and the public when refining these updated strategies. In effect, the final IRP's Distributed strategy, Strategy C, includes elements from both strategies C and D included in the draft IRP.

A summary of TVA's NDC study for solar, wind, and storage is included in Volume 1, Appendix D. TVA evaluated summer and winter peak performance of solar and wind at various penetration levels to develop the solar and wind NDC curves used in the IRP. TVA also evaluated summer and winter peak performance of storage with an assumed level of solar penetration and at various levels of storage penetration to develop the storage NDC curves used in the IRP. By modeling solar and storage as separate resources, it provided the capacity expansion model with the maximum flexibility to optimize the selection of all resources. As TVA's power system evolves, TVA will reevaluate solar, wind, and storage NDCs at increasing levels of penetration.

In the IRP, TVA modeled two forms of long-duration storage resource options, including pumped storage and advanced chemistry batteries. Advanced chemistry batteries were assumed to have 8 hours of storage, and they also served as a proxy for other long-duration storage technologies that

are yet to be commercialized. TVA performed a sensitivity to test the potential impacts if future costs for renewable and storage technologies, including advanced storage, were lower than estimated (see Volume 1, Sections 3.9 and 3.10.2).

Form Energy is one of the more advanced emerging long-duration technologies, but TVA has seen limited pilot/demo performance success to merit specific inclusion. One challenge for storage technologies is storage efficiency (losses) that can detract from the value, and this is one area of focus to improve as emerging storage technologies are developed and scaled for potential commercialization. The IRP analysis indicates value in storage of 8 hours or more, and TVA plans to further study various long-duration storage technologies, including Form Energy and others and potentially support pilot/demo projects. Additionally, TVA is collaborating and will continue to collaborate with other utilities on storage modeling approach in integrated resource planning.

Best practice in utility planning is to use annual limits as the modeling vehicle for simulating the practical ability to construct or procure new resources, so the analysis will generate executable portfolios. The IRP analysis includes annual limits for all resource types based on recent experience designing, permitting, and constructing new generating assets and procuring new resources through Request for Proposal processes. For example, the market capability for solar has increased, and this is reflected with solar limits that are more than double the limits used in the 2019 IRP. These limits should be viewed as long-term, average annual limitations as unique circumstances or future project timing may allow TVA to exceed these limits in some years during implementation of TVA's Asset Strategy. Cumulative limits for the entire study period also apply to model physical limitations for certain resources, such as uprate potential at existing hydro plants.

Furthermore, sections 3.9 and 3.10 in Volume 1 of the IRP include a summary and discussion of the sensitivities performed as a part of this IRP process. These sensitivities included electricity demand changes, resource costs and availability, and natural gas commodity prices. Within resource costs and availability, TVA explored the potential for lower renewable and storage costs as well as higher EE availability and deployment, which were both added in response to public feedback. The full set of IRP results - including the nine portfolios, metrics, sensitivities, and EIS - provided robust analysis to consider in forming IRP recommendations.

116. Do you have [extreme rainfall or flooding events] planning in your data bank? (*Commenter: Gary Hughes*)

*Response:* As it relates to the power system planning performed in the IRP, the stochastic risk-analysis varies hydro-electric generation to simulate both lower and higher than expected hydro generation as a result of drought or heavy rainfall conditions.

As a part of its overall mission, TVA manages a system of dams across the entire Tennessee River and its tributaries to control flooding and reduce flood-related damages. In addition to flood control, TVA utilizes these dams to balance the additional priorities of navigation, power generation, water supply, water quality, and river-based recreation.

### **H.2.1.17 Strategies**

117. TVA should pursue Strategy C (Carbon-free Commercial Ready Focus) as it has lower cost and less risk, and it is the most environmentally responsible. (*Commenters: Mary Cawthorn, Richard Cawthorn, Karen L. Mason, Vicki Christensen, Paul Slentz, Emma Rushton, Mary Tankersley, Cortney Piper – Tennessee Advanced Energy Business Council, Melissa Harris, Irene Boyd, Laura Edwards, Elizabeth C. Garber, Hannah E Cruse, Jim and Paula Grout, Lindsay Hanna – The Nature Conservancy, Marybeth Stone, David And Tish Rainey, Daniel Joranko, Whit Cox – Southern*

*Renewable Energy Association, Zachary Fabish – The Sierra Club, Pam Jones, Sandra Smith, Bonnie Swinford – Sierra Club, Joyce Blumenshine, Angelica Lance, Scott Dunbar – Clean Energy Buyers Association)*

*Response:* The full set of IRP results - including the nine portfolios, metrics, sensitivities, and EIS - provided robust analysis to consider in forming IRP recommendations. In the near term, the IRP Recommendation's Strategic Portfolio Direction states that TVA's IRP analysis reaffirms the importance of adhering to least-cost planning principles to ensure the continued delivery of affordable, reliable, and resilient power to the Tennessee Valley. The results underscore that no single resource will fully meet future system needs; rather, maintaining a diverse portfolio remains essential. In the near-term, TVA should prioritize the addition of firm, dispatchable resources, particularly natural gas and storage, to address capacity requirements. TVA should also continue collaborating with industry and federal partners to prepare for the potential deployment of firm, dispatchable advanced nuclear technologies, which could support long-term load growth while mitigating fuel volatility and regulatory risks. Finally, complementary deployment of solar, demand-side, and distributed generation resources should be used to satisfy capacity requirements, provide economic energy, and/or meet customer needs. For more on the IRP recommendations, please see Volume 1, Chapter 4.

118. TVA should pursue Strategy D (Distributed and Demand-side Focus). *(Commenters: Lindsay Hanna – The Nature Conservancy, Jake Duncan – Vote Solar, Ann Livingston – Southeast Sustainability Directors Network, Scott Noethen – TenneSEIA – Distributed Committee, Blake Elder – Coalition for Community Solar Access)*

*Response:* The full set of IRP results - including the nine portfolios, metrics, sensitivities, and EIS - provided robust analysis to consider in forming IRP recommendations. In the near term, the IRP Recommendation's Strategic Portfolio Direction states that TVA's IRP analysis reaffirms the importance of adhering to least-cost planning principles to ensure the continued delivery of affordable, reliable, and resilient power to the Tennessee Valley. The results underscore that no single resource will fully meet future system needs; rather, maintaining a diverse portfolio remains essential. In the near-term, TVA should prioritize the addition of firm, dispatchable resources, particularly natural gas and storage, to address capacity requirements. TVA should also continue collaborating with industry and federal partners to prepare for the potential deployment of firm, dispatchable advanced nuclear technologies, which could support long-term load growth while mitigating fuel volatility and regulatory risks. Finally, complementary deployment of solar, demand-side, and distributed generation resources should be used to satisfy capacity requirements, provide economic energy, and/or meet customer needs. For more on the IRP recommendations, please see Volume 1, Chapter 4.

119. TVA should analyze and/or pursue a strategy that combines Strategy C (Commercial Ready Carbon-free Focus) and Strategy D (Distributed and Demand-side Focus). *(Commenters: Maddie Petty, Kent Minault, David Bordenkircher, William "Bill" Bell – 4-County EPA, Jake Duncan – Vote Solar, Gabriela Sarri-Tobar – Center For Biological Diversity, Jamie McClanahan, Maggie Shober – Southern Alliance for Clean Energy, Zachary Fabish – The Sierra Club, Zachary Stines – New Leaf Energy, Scott Dunbar – Clean Energy Buyers Association, Farah Mandich – US General Services Administration, Markey and Cohen – Congress of the United States, Lindsay Hanna – The Nature Conservancy, Drs. Joe And Sarah Schiller, Ellen Faby, Ntale Kajumba – EPA Region 4, Gil Hough – TenneSEIA)*

*Response:* As a result of key changes in the electric utility landscape in 2025 (see Section 2.2 of Volume 1), TVA updated baseline IRP assumptions which included a streamlined set of strategies.

As such, strategies C and D referenced in this comment are no longer included in the IRP analysis. TVA considered feedback received throughout the IRP process, including from the IRP Working Group, RERC, and the public when refining these updated strategies. In effect, the final IRP's Distributed strategy, Strategy C, includes elements from both strategies C and D included in the draft IRP.

Strategy C, Distributed, emphasizes distributed technologies such as batteries, renewables, and demand-side programs to reduce reliance on central station generation and utilize virtual power plants. At the utility scale, this strategy would emphasize battery storage and smaller natural gas generators, such as aeroderivative combustion turbines and reciprocating internal combustion engines, which are more modular and can be sized and adapted to meet both local and system needs. This strategy also emphasizes utility scale solar where individual solar farms are often smaller in capacity compared to traditional thermal generation and are therefore more distributed across the service territory. Finally, this strategy includes increased incentives to encourage customers to install distributed generation and participate in demand-side management (DSM) programs. Distributed generation includes distributed solar and storage while DSM options include energy efficiency and demand response programs.

120. Strategy B is an infeasible strategy, as the carbon-free innovation resources are unlikely to ever be economically viable. (*Commenters: Drs. Joe and Sarah Schiller*)

*Response:* As a result of key changes in the electric utility landscape in 2025 (see Section 2.2 of Volume 1), TVA updated baseline IRP assumptions which included a streamlined set of strategies. As such, strategy B referenced in this comment is no longer included in the IRP analysis. TVA considered feedback received throughout the IRP process, including from the IRP Working Group, RERC, and the public when refining these updated strategies. While the final IRP's strategy B, Innovation, is similar to the draft IRP's strategy B, it does remove emphasis on carbon capture and sequestration (CCS) technologies.

Informed by direct experience exploring designs for potential small modular reactors (SMRs) at the Clinch River Nuclear Site, TVA used refined forecasts for new nuclear resources that reflect all-in costs plus risk contingencies and may be higher than some industry estimates. The refined nuclear forecasts utilize information from structured estimate determination efforts. Additionally, the IRP also speaks to the potential portfolio implications of faster or slower progress on technology readiness timelines (see Volume 1, Section 4.4.3). Finally, the IRP analysis acknowledges and considers that technological risks are greatest in portfolios with more reliance on emerging energy technologies, such as strategy B.

121. TVA should analyze and/or pursue a strategy that combines Strategy C (Commercial Ready Carbon-free Focus) and the nuclear elements of Strategy B to promote nuclear alongside commercial-ready renewable and storage options. (*Commenters: Andrew Callender, Scott Dunbar – Clean Energy Buyers Association, Francis Lamberts*)

*Response:* The full set of IRP results - including the nine portfolios, metrics, sensitivities, and EIS - provided robust analysis to consider in forming IRP recommendations. In the near term, the IRP Recommendation's Strategic Portfolio Direction states that TVA's IRP analysis reaffirms the importance of adhering to least-cost planning principles to ensure the continued delivery of affordable, reliable, and resilient power to the Tennessee Valley. The results underscore that no single resource will fully meet future system needs; rather, maintaining a diverse portfolio remains essential. In the near-term, TVA should prioritize the addition of firm, dispatchable resources, particularly natural gas and storage, to address capacity requirements. TVA should also continue collaborating with industry and federal partners to prepare for the potential deployment of firm,



dispatchable advanced nuclear technologies, which could support long-term load growth while mitigating fuel volatility and regulatory risks. Finally, complementary deployment of solar, demand-side, and distributed generation resources should be used to satisfy capacity requirements, provide economic energy, and/or meet customer needs. For more on the IRP recommendations, please see Volume 1, Chapter 4.

122. I support incorporating elements of Strategy E (Resiliency Focus) in IRP recommendations. *(Commenter: Rosalie Bright)*

*Response:* The full set of IRP results - including the nine portfolios, metrics, sensitivities, and EIS - provided robust analysis to consider in forming IRP recommendations. In the near term, the IRP Recommendation's Strategic Portfolio Direction states that TVA's IRP analysis reaffirms the importance of adhering to least-cost planning principles to ensure the continued delivery of affordable, reliable, and resilient power to the Tennessee Valley. The results underscore that no single resource will fully meet future system needs; rather, maintaining a diverse portfolio remains essential. In the near-term, TVA should prioritize the addition of firm, dispatchable resources, particularly natural gas and storage, to address capacity requirements. TVA should also continue collaborating with industry and federal partners to prepare for the potential deployment of firm, dispatchable advanced nuclear technologies, which could support long-term load growth while mitigating fuel volatility and regulatory risks. Finally, complementary deployment of solar, demand-side, and distributed generation resources should be used to satisfy capacity requirements, provide economic energy, and/or meet customer needs. For more on the IRP recommendations, please see Volume 1, Chapter 4.

123. Which of the strategies has the highest risk for technology maturity and which has the highest risk for successful maintenance? *(Commenter: Shalin Mody)*

*Response:* As noted in the IRP's strategy assessment, technological risks are greatest in portfolios with more reliance on emerging energy technologies, such as Strategy B. The expected maintenance costs associated with each resource option were estimated and considered in modeling.

124. The IRP has too many Strategies that functionally overlap and are not independent. *(Commenters: Drs. Joe and Sarah Schiller)*

*Response:* As a result of key changes in the electric utility landscape in 2025 (see Section 2.2 of Volume 1), TVA updated baseline IRP assumptions which included a streamlined set of strategies. TVA considered feedback received throughout the IRP process, including from the IRP Working Group, RERC, and the public when refining these updated strategies. See Volume 1, Section 2.5.2 and Appendix C for more information on strategy design and differentiation across strategies.

### **H.2.1.18 Strategy Assessment and Implementation**

125. Consider environmental justice (EJ) in how IRP strategies are evaluated, including how they support EJ aspects such as mitigating energy burdens, balancing residential and business needs, and prioritizing environmental equity. As site-specific actions are contemplated, integrate EJ into planning processes from the beginning and solicit EJ community input. Consider site-specific consequences such as air and water quality impacts and other social disparities to refine plans.

*(Commenters: Gabriela Sarri-Tobar – Center for Biological Diversity, Leigh Huffman – City of Memphis, Ntale Kajumba – EPA Region 4, Jake Duncan – Vote Solar, Joe Franklin, Tracy O'Neill – Preserve Cheatham County, Leigh Huffman – Shelby County Government, Kendra Abkowitz - Metropolitan Government of Nashville and Davidson County, Mary Ellen DeClue, Maggie Shober – Southern Alliance for Clean Energy, Ann Livingston – Southeast Sustainability Directors Network)*

*Response:* While the IRP is not site-specific, the IRP and EIS provide insights into potential impacts to communities across the region. For example, the average system cost metric is directionally indicative of overall trends in customer bills (Strategy A is the lowest cost strategy overall), and metrics related to CO<sub>2</sub> are directionally indicative of air quality trends in the region (Strategies B and C have the lowest air emissions). Site-specific aspects of actions that are later proposed to implement the IRP strategic direction will be addressed and considered in tiered environmental reviews. TVA will engage with communities that may be affected at that time so that they can meaningfully participate in the decision-making process.

For additional information, see response to comment #318 below.

## **H.2.2 Energy Resource Options**

### **H.2.2.1 Carbon Capture and Sequestration**

126. TVA should avoid investing in or deploying nascent carbon capture and sequestration technology as it is ineffective and prohibitively expensive. Carbon storage relies on specific types of geology and expensive pipelines, and it is showing early signs of problems. (*Commenters: Gabriela Sarri-Tobar – Center for Biological Diversity, Zachary Fabish – The Sierra Club, Zdravka Tzankova, PhD, Maggie Shober – Southern Alliance for Clean Energy, Daniel Joranko*)

*Response:* In the IRP analysis, CCS modeling is built on research identifying storage locations near or within the TVA footprint, the necessary pipeline length, and other costs to capture carbon at existing combined cycle sites. Carbon capture technologies have been demonstrated at several sites around the world, and the underlying technologies have been proven at reasonable scales. However, risks do remain in scaleup and sequestration. In order to understand and reduce these risks, TVA is monitoring developments within the industry and exploring test wells to confirm viability in the region. TVA will utilize the findings of this work to make informed decisions on carbon capture, if needed in the future, as both the technology and public policy environment develop.

The strategy assessment in the IRP acknowledges that technological risks are greatest in portfolios with more reliance on emerging technologies, including carbon capture and sequestration.

#### **H.2.2.2 Coal**

127. TVA should not build additional coal resources and take all existing coal resources offline as quickly as possible due to concerns regarding climate change, air and water pollution, harmful coal combustion byproducts, impacts of coal mining, and other environmental impacts. (*Commenters: Mary Larrabee, Rev. Aline Gaston Russell, D.Min., Katherine Brubaker – EDF, Joyce Blumenshine, David Bordenkircher, David Yoder, Lindsay Hanna – The Nature Conservancy*)

*Response:* Pursuant to Section 113 of the Energy Policy Act of 1992, TVA considers the full range of existing and incremental resources in order to provide adequate and reliable service at the lowest system cost. As such, the major resource types evaluated in the IRP include nuclear, hydro, coal, natural gas, renewables, storage, and energy efficiency and demand response (EE and DR). For more on TVA's least-cost planning requirements, please see section 3.1 of Volume 1.

No new coal plants were selected in any of the IRP portfolios.

In February 2026, the TVA Board authorized TVA to take steps to allow for the continued operation of the Cumberland and Kingston fossil plants, subject to compliance with applicable permitting and regulatory requirements, to meet rapidly increasing demand for electricity and address associated reliability concerns in the TVA region. TVA also re-evaluated and updated planning assumptions



related to end-of-life expectations for all coal units, alongside updates to resource cost assumptions across all technologies, as applicable. See Volume 1, Section 2.4.4 for more information.

128. I am grateful for your commitment to retiring coal plants by 2035 and decreasing coal usage to 14%, but selling TVA rights to coal companies will only further contribute to climate change. Please hold onto these rights and do what you can to keep coal in the ground! (*Commenters: Coal Form Letter Commenters*)

*Response:* Thank you for your comment, it has been noted by TVA

129. TVA should refrain from retiring coal plants prematurely before new, cost-effective generation is online to ensure TVA can continue to meet growing electricity demand. (*Commenters: Scott Hendrix – Tombigee Electric Power Association, Eric Coons, Mitch Brown, David Beckler, John E Long Jr, Rebecca McGrew – NACCO Natural Resources*)

*Response:* In February 2026, the TVA Board authorized TVA to take steps to allow for the continued operation of the Cumberland and Kingston fossil plants, subject to compliance with applicable permitting and regulatory requirements, to meet rapidly increasing demand for electricity and address associated reliability concerns in the TVA region. TVA also re-evaluated and updated planning assumptions related to end-of-life expectations for all coal units, alongside updates to resource cost assumptions across all technologies, as applicable. See Volume 1, Section 2.4.4 for more information.

130. TVA should not retire existing coal plants, as they provide fuel security and have relatively stable fuel prices, and should explore opportunities in traditional and/or clean coal technologies that are cost-effective and reliable. (*Commenters: Rebecca McGrew – NACCO Natural Resources, Gene Acree, Charles Fletcher, Wesley Howell, William Roy*)

*Response:* In February 2026, the TVA Board authorized TVA to take steps to allow for the continued operation of the Cumberland and Kingston fossil plants, subject to compliance with applicable permitting and regulatory requirements, to meet rapidly increasing demand for electricity and address associated reliability concerns in the TVA region. TVA also re-evaluated and updated planning assumptions related to end-of-life expectations for all coal units, alongside updates to resource cost assumptions across all technologies, as applicable. See Volume 1, Section 2.4.4 for more information.

The IRP study includes a supercritical pulverized coal expansion resource option, both with and without carbon capture and sequestration (see Volume 1, section 2.6). Including these resource options meets TVA's requirements under Section 113 of the Energy Policy Act of 1992 to "evaluate the full range of existing and incremental resources." New coal was not selected in any core portfolios or sensitivities (See Volume 1, Chapter 3).

131. None of TVA's five strategies includes the Red Hills Project after the expiration of the current Power Purchase Agreement in 2032, and an extension option should be modeled. In fact, coal is not contemplated in the IRP at all after 2035. But the Red Hills Project provides reliable power with no fuel delivery disruptions. The Red Hills Project was commissioned in 2001 and should not be considered part of an "aging coal fleet," it has cost advantages relative to new-build alternatives, and it should remain a critical component of the TVA system. (*Commenter: Rebecca McGrew – NACCO Natural Resources*)

*Response:* Supercritical pulverized coal and supercritical pulverized coal with and/or without carbon capture were available for selection in all cases, but none were selected in portfolio optimization.

TVA's current power purchase agreement with the Red Hills lignite plant expires in 2032. The IRP looks broadly at generation types and costs based on available market and industry data. It does not evaluate any specific power purchase agreement offers. TVA will continue to evaluate future market offers, both for new contracts or extensions, received on a one-off basis in the context of least-cost planning and the IRP's strategic direction.

132. Convert Coal plants into Natural Gas Plants with large storage batteries to level out the energy demands and the utility Duck Curve. (*Commenter: Greg Johanson*)

*Response:* As noted in the IRP Recommendations chapter: based on the evolution of current and future policy or regulatory requirements, it may become necessary to evaluate additional environmental controls at existing or future generation facilities, particularly for coal and gas units. Options to meet future regulatory requirements could include technologies such as carbon capture and sequestration, alternative fuel co-firing (such as hydrogen), or natural gas co- or re-firing of existing coal burners. TVA should continue to monitor advancements in these technologies and evaluate their potential future use if needed to meet regulatory requirements or as a cost-effective method of preserving existing infrastructure (i.e., co- or re-firing of existing coal burners with natural gas). See Volume 1, Section 4.3.3 for additional information.

IRP Recommended Actions include adding firm, dispatchable storage to maintain system reliability and improve system efficiency. See Volume 1, Section 4.3.1 for additional information.

133. TVA should lock in the retirement dates for its existing coal assets and not consider extending them to meet future load growth. TVA should plan to retire the Shawnee coal plant before January 1, 2032, to avoid investments to enable gas co-firing that the final 111 rule would otherwise require. (*Commenter: Zachary Fabish – The Sierra Club*)

*Response:* In 2025, the U.S. Environmental Protection Agency (EPA) announced intentions to provide regulatory relief across multiple rules affecting existing coal and future natural-gas generation. This included a proposed rule to repeal all greenhouse gas emissions standards for the power sector under Section 111 of the Clean Air Act (the “2024 GHG Rule”), as well as a final rule authorizing state permit writers to extend compliance deadlines under the Effluent Limitation Guidelines (ELG) for steam electric generating units.

In February 2026, the TVA Board authorized TVA to take steps to allow for the continued operation of the Cumberland and Kingston fossil plants, subject to compliance with applicable permitting and regulatory requirements, to meet rapidly increasing demand for electricity and address associated reliability concerns in the TVA region. TVA also re-evaluated and updated planning assumptions related to end-of-life expectations for all coal units, alongside updates to resource cost assumptions across all technologies, as applicable. See Volume 1, Section 2.4.4 for more information.

The 2026 IRP includes planning assumptions for coal plant end of life based on anticipated regulatory requirements, age, and/or material condition. As these dates are subject to further environmental review and TVA Board approval, sensitivities evaluating both earlier and later coal end of life dates were studied. The earlier case assumed full coal fleet end of life by 2034, while the later case assumed operation of all existing coal units through the end of 2039. Results show minor impacts to incremental capacity by 2040 and 2050; rather, it is the timing of resource additions that differs. See Volume 1, Section 3.10.2 for more information.

### H.2.2.3 Demand-side Management

134. TVA should invest significantly more in energy efficiency and demand response programs, as the cheapest and cleanest megawatts are the ones that are never produced. (*Commenters: Kent Minault, Gabriela Sarri-Tobar – Center for Biological Diversity*)

*Response:* TVA leveraged a 2022 Energy Programs Potential Study completed by DNV, a global leader in energy program consulting, and subsequent market experience to develop the energy efficiency (EE) and demand response (DR) resource options modeled in the IRP. TVA also conducted a sensitivity evaluating the potential impact of greater EE market depth beyond what was modeled in the core cases. The IRP analysis indicates the potential for EE deployment to reduce energy needs, particularly between now and 2040, and for DR programs to grow with the system and the use of smart technologies.

TVA is in the process of ramping up investments in residential, commercial, and industrial EE and DR programs using insights from the potential study. The IRP recommends partnering with TVA customers to leverage cost-effective EE and DR program potential. For more on IRP recommendations, see Volume 1, Chapter 4.

### H.2.2.4 Distributed Energy Resources

135. I support rooftop solar. (*Commenters: Haskell Crow, Art Levin, Daniel G Avery, Karyl Stoia, Rev. Clifford Bahlinger, Dianne G Brause, Donna Ciolli*)

*Response:* IRP Recommended Actions include collaborating with local power companies on the evolution of distributed generation programs, which could include distributed solar. See Volume 1, Section 4.3.1 for additional information.

136. I support TVA promoting and incentivizing distributed solar deployment (e.g., residential, commercial, rooftop, etc.) paired with onsite storage, which reduces customer bills, is good for the environment, provides local resiliency, and doesn't require additional land use. (*Commenters: Rev. Clifford Bahlinger, Sheila Bowers, John Christensen, Gabriela Sarri-Tobar – Center for Biological Diversity*)

*Response:* The IRP analysis includes baseline forecasts for distributed generation (DG) adoption for each scenario and forecasts for higher levels of adoption when promoted in the Distributed strategy. To model the varying levels of DG adoption before and after incentives, TVA uses an approach similar to the National Laboratory of the Rockies' Distributed Market Demand Model, which simulates potential adoption of a given resource as a function of payback period. For more information on DG modeling, please see Volume 1, Appendix F.

IRP Recommended Actions include collaborating with local power companies on the evolution of distributed generation programs, which could include distributed solar. See Volume 1, Section 4.3.1 for additional information.

In the near term, the IRP Recommendation's Strategic Portfolio Direction states that TVA's IRP analysis reaffirms the importance of adhering to least-cost planning principles to ensure the continued delivery of affordable, reliable, and resilient power to the Tennessee Valley. The results underscore that no single resource will fully meet future system needs; rather, maintaining a diverse portfolio remains essential. In the near-term, TVA should prioritize the addition of firm, dispatchable resources, particularly natural gas and storage, to address capacity requirements. TVA should also continue collaborating with industry and federal partners to prepare for the potential deployment of firm, dispatchable advanced nuclear technologies, which could support long-term load growth while

mitigating fuel volatility and regulatory risks. Finally, complementary deployment of solar, demand-side, and distributed generation resources should be used to satisfy capacity requirements, provide economic energy, and/or meet customer needs. For more on the IRP recommendations, please see Volume 1, Chapter 4.

137. I support TVA encouraging deployment of distributed solar (e.g., residential, commercial, rooftop, etc.), which reduces customer bills and the need for centralized resources, is good for the environment, provides local resiliency, and doesn't require additional land use. *(Commenters: Philip Johnston, Roger Kurtz, Taffy Williams, Don and Cindy Davis, John Flynn, Shannon Stoney, Cheryl Haywood, Bonnie Swinford – Sierra Club, Dr. Marhta Wetteman, Pete McCarthy, Maureen C Johnson, Regina Brayer, Anonymous 10, Rev. Clifford Bahlinger, Clean Energy Form Letter Commenters, Ann Livingston – Southeast Sustainability Directors Network)*

**Response:** The IRP analysis includes baseline forecasts for distributed generation (DG) adoption for each scenario and forecasts for higher levels of adoption when promoted in the Distributed strategy. To model the varying levels of DG adoption before and after incentives, TVA uses an approach similar to the National Laboratory of the Rockies' Distributed Market Demand Model, which simulates potential adoption of a given resource as a function of payback period. For more information on DG modeling, please see Volume 1, Appendix F.

IRP Recommended Actions include collaborating with local power companies on the evolution of distributed generation programs, which could include distributed solar. See Volume 1, Section 4.3.1 for additional information.

In the near term, the IRP Recommendation's Strategic Portfolio Direction states that TVA's IRP analysis reaffirms the importance of adhering to least-cost planning principles to ensure the continued delivery of affordable, reliable, and resilient power to the Tennessee Valley. The results underscore that no single resource will fully meet future system needs; rather, maintaining a diverse portfolio remains essential. In the near-term, TVA should prioritize the addition of firm, dispatchable resources, particularly natural gas and storage, to address capacity requirements. TVA should also continue collaborating with industry and federal partners to prepare for the potential deployment of firm, dispatchable advanced nuclear technologies, which could support long-term load growth while mitigating fuel volatility and regulatory risks. Finally, complementary deployment of solar, demand-side, and distributed generation resources should be used to satisfy capacity requirements, provide economic energy, and/or meet customer needs. For more on the IRP recommendations, please see Volume 1, Chapter 4.

### **H.2.2.5 Diverse Portfolio**

138. TVA should utilize and deploy all forms of energy, such as nuclear, renewables, natural gas, and storage, to ensure a diverse and reliable electricity supply at the lowest cost. *(Commenters: Nathan Janeway, Stephen Gustav Weber, Sean M Mcgrath, Rebecca McGrew – NACCO Natural Resources, Randy E Carroll, Larry Bruff Sanders – 4-County EPA, Jay Gilliland – 4-County EPA, Johnny Johnson – 4-County EPA, Thomas "Marty" Crowder – 4-County EPA, Michael Ray Banks – 4-County EPA, William Russell Dodds – 4-County EPA, Cynthia Willett, Justin Hatcher)*

**Response:** Pursuant to Section 113 of the Energy Policy Act of 1992, TVA considers the full range of existing and incremental resources in order to provide adequate and reliable service at the lowest system cost. As such, the major resource types evaluated in the IRP include nuclear, hydro, coal, natural gas, renewables, storage, and energy efficiency and demand response (EE and DR). For more on TVA's least-cost planning requirements, please see section 2.1 of Volume 1.

Maintaining resource mix diversity is fundamental to TVA's ability to provide affordable, reliable, and resilient energy to the residents, businesses, and industries in the region. A diverse portfolio reduces fuel price risk and reliability risks associated with single modes of failure. The major resource types evaluated in the IRP include nuclear, hydro, coal, natural gas, renewables, storage, and energy efficiency and demand response (EE and DR). They were available for selection in all cases, resulting in a varied mix of diverse portfolios for evaluation.

139. I support a diverse mix of energy resources and carbon capture innovation. (*Commenters: Nathaniel Bass, Rebecca McGrew – NACCO Natural Resources*)

*Response:* Pursuant to Section 113 of the Energy Policy Act of 1992, TVA considers the full range of existing and incremental resources in order to provide adequate and reliable service at the lowest system cost. As such, the major resource types evaluated in the IRP include nuclear, hydro, coal, natural gas, renewables, storage, and energy efficiency and demand response (EE and DR). For more on TVA's least-cost planning requirements, please see section 2.1 of Volume 1.

Maintaining resource mix diversity is fundamental to TVA's ability to provide affordable, reliable, and resilient energy to the residents, businesses, and industries in the region. A diverse portfolio reduces fuel price risk and reliability risks associated with single modes of failure. The major resource types evaluated in the IRP include nuclear, hydro, coal, natural gas, renewables, storage, and energy efficiency and demand response (EE and DR). Coal and natural gas resources included options for carbon capture and sequestration. They were available for selection in all cases, resulting in a varied mix of diverse portfolios for evaluation.

In the IRP analysis, CCS modeling is built on research identifying storage locations near or within the TVA footprint, the necessary pipeline length, and other costs to capture carbon at existing combined cycle sites. Carbon capture technologies have been demonstrated at several sites around the world, and the underlying technologies have been proven at reasonable scales. However, risks do remain in scaleup and sequestration. In order to understand and reduce these risks, TVA is monitoring developments within the industry and exploring test wells to confirm viability in the region. TVA will utilize the findings of this work to make informed decisions on carbon capture, if needed in the future, as both the technology and public policy environment develop.

140. The power system is not currently set up for solar, and solar can be costly. I support the resource additions that TVA says are needed. (*Commenter: Brian Weaver*)

*Response:* In the near term, the IRP Recommendation's Strategic Portfolio Direction states that TVA's IRP analysis reaffirms the importance of adhering to least-cost planning principles to ensure the continued delivery of affordable, reliable, and resilient power to the Tennessee Valley. The results underscore that no single resource will fully meet future system needs; rather, maintaining a diverse portfolio remains essential. In the near-term, TVA should prioritize the addition of firm, dispatchable resources, particularly natural gas and storage, to address capacity requirements. TVA should also continue collaborating with industry and federal partners to prepare for the potential deployment of firm, dispatchable advanced nuclear technologies, which could support long-term load growth while mitigating fuel volatility and regulatory risks. Finally, complementary deployment of solar, demand-side, and distributed generation resources should be used to satisfy capacity requirements, provide economic energy, and/or meet customer needs. For more on the IRP recommendations, please see Volume 1, Chapter 4.

141. TVA should develop its long-term resource plan with a more holistic view of resource options—both supply- and demand-side. (*Commenter: Zachary Fabish – The Sierra Club*)



*Response:* Pursuant to Section 113 of the Energy Policy Act of 1992, TVA considers the full range of existing and incremental resources in order to provide adequate and reliable service at the lowest system cost. Maintaining resource mix diversity is fundamental to TVA's ability to provide affordable, reliable, and resilient energy to the residents, businesses, and industries in the region. A diverse portfolio reduces fuel price risk and reliability risks associated with single modes of failure. To help accomplish this, the IRP analysis considered a wide range of supply-side, distributed, and demand-side resources. The major resource types evaluated in the IRP include nuclear, hydro, coal, natural gas, renewables, storage, and energy efficiency and demand response (EE and DR). For more on the resource options considered in the IRP, see Volume 1, section 2.6.2.

142. The US needs to use ALL forms of energy. (*Commenter: Charles F Niccum*)

*Response:* Thank you for your comment, it has been noted by TVA.

143. All need electricity - thank you. (*Commenter: Suzanne P. Lamborn*)

*Response:* Thank you for your comment, it has been noted by TVA.

144. My parents were young when the TVA was created, one of Roosevelt's gifts to the nation. They rejoiced in his ability to ground this country in positive infrastructure building to assure a healthy future for their children and successors. These days we must act, as never before, as agents for clean water and air, and as ombudsmen for the health of nature. The Integrated Resource Plan is yet another step toward our more secure future. (*Commenter: Lee Hirstein*)

*Response:* Thank you for your comment, it has been noted by TVA.

### **H.2.2.6 Energy Efficiency**

145. TVA should allow for and commit to implement higher annual levels of energy efficiency in its modeling and planning. (*Commenter: Bonnie Swinford – Sierra Club*)

*Response:* Achievable energy program potential varies with evolving codes and standards and from region to region. To better understand achievable potential, TVA commissioned DNV, a global leader in energy program consulting, to perform a study for the region in 2022. Energy program resource options for the IRP were developed based on the study, subsequent market experience, and other program knowledge. The study indicated 10-year energy efficiency (EE) potential ranging from 2-7% of sales, which was less than the 1% of annual sales industry norm that is sometimes quoted. Reporting of utility programmatic EE impacts is not fully consistent across the industry, as some utilities appear to report a portion of market-driven impacts (or naturally occurring impacts with evolving codes and standards) in their numbers.

Furthermore, sections 3.9 and 3.10 in Volume 1 of the IRP include a summary and discussion of the sensitivities performed as a part of this IRP process. These sensitivities included electricity demand changes, resource costs and availability, and natural gas commodity prices. Within resource costs and availability, TVA explored the potential for higher EE availability and deployment, which was added in response to public feedback. The full set of IRP results - including the nine portfolios, metrics, sensitivities, and EIS - provided robust analysis to consider in forming IRP recommendations.

### **H.2.2.7 Energy Transition and Decarbonization**

146. TVA should be a national leader by transitioning away from fossil fuels and moving to 100% clean energy, including nuclear, hydro, solar, wind, storage, energy efficiency, and demand response. I support substantially increasing clean energy deployment to save consumers money,

reduce emissions, improve public health, and/or protect the planet from the impacts of climate change. *(Commenters: Chuck Rocco, Joan Marx Woodward, Wendy Martin, Donna Z Carswell, Dana Burke, Carole Nadler, Kathryn, Sally Carlson-Bancroft, Kenneth Jobe, Bill Kingston, Michael Bleicher, Constance Minerovic, William Schmidt, Mary A Weber, Crys Zinkiewicz, Aimee Jackson, Bonnie Swinford – Sierra Club, Clean Energy Form Letter Commenters, Gabriela Sarri-Tobar – Center for Biological Diversity, Joyce Blumenshine, Jamie McClanahan)*

*Response:* TVA's integrated resource planning is grounded in least-cost planning principles, in alignment with Section 113 of the Energy Policy Act of 1992. These least-cost principles include balancing the following goals: low cost, risk informed, environmentally responsible, reliable and resilient, diverse, and flexible. Specifically, in conducting least-cost planning, TVA must comply with the following requirements in Section 113 of the Energy Policy Act of 1992:

- The least-cost planning program “evaluates the full range of existing and incremental resources (including new power supplies, energy conservation and efficiency, and renewable energy resources) in order to provide adequate and reliable service...at the lowest system cost”;
- System cost encompasses only those costs that are “direct and quantifiable net costs for an energy resource over its available life, including production, transportation, utilization, waste management, and environmental compliance”; and
- In addition to cost, the planning process will also consider “necessary features for system operation,” including diversity of resources, reliability, dispatchability, and other factors of risk.

Based on these requirements, TVA does not set a goal or target for emissions in its IRP. For more on TVA's least-cost planning requirements, please see Section 2.1 of Volume 1.

In the final IRP, Scenario 3, Carbon Legislation, includes a carbon tax which serves as a proxy for current and potential future legislation and/or regulatory actions seeking to reduce greenhouse gas emissions, which is an uncertainty outside of TVA's control. Capacity expansion results as well as environmental metric performance, including CO<sub>2</sub> direct emissions and CO<sub>2</sub> intensity, for scenario 3 portfolios can be found in Chapter 3 of Volume 1.

147. TVA should adopt a plan that aggressively decarbonizes its generation portfolio by transitioning away from fossil fuels and increasing the use of all forms of clean energy generation such as nuclear, hydro, solar, wind, biofuels, storage, energy efficiency. This will benefit the environment, and savings can be passed along to ratepayers. *(Commenters: Elizabeth Mooney, Paul, Nancy Munro, Anonymous 4, Rebecca Jackson, Anne Curtis, Courtney Shea, Stella Melton, Pamela F. Hindle, ML Linn, Claudio Mosse, Josh Dohmen, Roxanne O'Guin, Jane Donelon, Margaret Traina, Ruth Moore, Barbara D. Gholz, Jan Jones, Nancy and Sam Bills, Jared Sullivan, Diane Banks, Andrew Callender, Debra Owens, Albert T Tahhan, Gary Overby, David L Isaacs, Bob, Mary Ellen Weiner, Anonymous 1, Christa Bergman Brown, Jim Wells, Rebecca Canright, Cornelia Teed, Darcy Skarada, Evergreen Form Letter Commenters, Paul Gregg, Daniel Joranko, Corinne Rovetti, Elizabeth Rowland, Willis, Bonnie Swinford – Sierra Club)*

*Response:* TVA's integrated resource planning is grounded in least-cost planning principles, in alignment with Section 113 of the Energy Policy Act of 1992. These least-cost principles include balancing the following goals: low cost, risk informed, environmentally responsible, reliable and resilient, diverse, and flexible. Specifically, in conducting least-cost planning, TVA must comply with the following requirements in Section 113 of the Energy Policy Act of 1992:



- The least-cost planning program “evaluates the full range of existing and incremental resources (including new power supplies, energy conservation and efficiency, and renewable energy resources) in order to provide adequate and reliable service...at the lowest system cost”;
- System cost encompasses only those costs that are “direct and quantifiable net costs for an energy resource over its available life, including production, transportation, utilization, waste management, and environmental compliance”; and
- In addition to cost, the planning process will also consider “necessary features for system operation,” including diversity of resources, reliability, dispatchability, and other factors of risk.

Based on these requirements, TVA does not set a goal or target for emissions in its IRP. For more on TVA's least-cost planning requirements, please see Section 2.1 of Volume 1.

In the final IRP, Scenario 3, Carbon Legislation, includes a carbon tax which serves as a proxy for current and potential future legislation and/or regulatory actions seeking to reduce greenhouse gas emissions, which is an uncertainty outside of TVA's control. Capacity expansion results as well as environmental metric performance, including CO<sub>2</sub> direct emissions and CO<sub>2</sub> intensity, for scenario 3 portfolios can be found in Chapter 3 of Volume 1.

148. We support TVA's overall goal of decarbonization and its three-pronged mission of power generation, environmental stewardship, and economic development. This requires investment in advanced energy technologies - both commercial ready and emerging - as well as in expanding energy efficiency and demand response programs. Decarbonization is crucial not only for environmental reasons but also for economic competitiveness, particularly as businesses and communities increasingly prioritize sustainability. (*Commenter: Cortney Piper – Tennessee Advanced Energy Business Council*)

*Response:* TVA's integrated resource planning is grounded in least-cost planning principles, in alignment with Section 113 of the Energy Policy Act of 1992. These least-cost principles include balancing the following goals: low cost, risk informed, environmentally responsible, reliable and resilient, diverse, and flexible. Specifically, in conducting least-cost planning, TVA must comply with the following requirements in Section 113 of the Energy Policy Act of 1992:

- The least-cost planning program “evaluates the full range of existing and incremental resources (including new power supplies, energy conservation and efficiency, and renewable energy resources) in order to provide adequate and reliable service...at the lowest system cost”;
- System cost encompasses only those costs that are “direct and quantifiable net costs for an energy resource over its available life, including production, transportation, utilization, waste management, and environmental compliance”; and
- In addition to cost, the planning process will also consider “necessary features for system operation,” including diversity of resources, reliability, dispatchability, and other factors of risk.

Based on these requirements, TVA does not set a goal or target for emissions in its IRP. For more on TVA's least-cost planning requirements, please see Section 2.1 of Volume 1.

As TVA implements IRP recommendations, TVA will seek to support customer needs through existing, expanded, and/or new programs. The discussion of signposts in Volume 1, section 4.4.1 notes that if TVA experiences higher clean energy program demand, the resource portfolio is likely to

have more programmatic solar and storage, potential to expand existing programs, and/or potential for advanced nuclear partnerships.

149. TVA has an obligation to rapidly decarbonize based on various federal regulations (e.g., Energy Act of 2020) and orders (e.g., Executive Orders 13990 and 14008) which commit federal agencies to "reduce climate pollution" and "deploy clean energy technologies and infrastructure" and commit the nation to "a carbon pollution-free electricity sector no later than 2035." (*Commenters: Ntale Kajumba – EPA Region 4, Gabriela Sarri-Tobar – Center for Biological Diversity, Joe Franklin, Corinne Rovetti, Elizabeth Rowland*)

*Response:* The Energy Act of 2020 contains no legal mandate to decarbonize and Executive Orders 13990 and 14008 have been revoked. Nevertheless, TVA notes that under all strategies analyzed in the IRP, the long-term intensity of TVA greenhouse gas emissions decrease.

150. TVA should be a national leader by transitioning away from fossil fuels and moving to 100% renewable energy. I support substantially increasing renewable and energy storage deployment and expanding energy efficiency programs to save consumers money, reduce emissions, improve public health, and/or protect the planet from the impacts of climate change. (*Commenters: Emma Owens, Angela T Kantola, Sharon Hart, Donald W. Henderson, Ph.D., Judy Frazer Brouillette, Donna Brown, d'Anne Y Macneil, Jeffrey V Wilson, Tony Guzdial, Linda Sullivan, L Sen, Connie Schmidt, Ellen T Wright, Rebecca Canright, Michael R Marquardt, William Claiborn, Christopher Hamilton, Marge Heggison, Penelope Andrews, Margaret Speer Goodwin, Joe Galliani, Candace Colby, Kathleen Maffei, Nancy Power, Sandra Gardiner, David Crim, Anne M Cassebaum, Robert Stuart, Tom Scheel, Rita Heinz, Clifford Spencer, Russell Novkov, Nicole Taylor, Margo Salone, Don Kelley, Jane Fleishman, Ivan Fuentes, Lee H., Richard Cawthorn, Charlene M. Woodcock, Anonymous 8, Amy Smart, Claire Shoun, Suzanne Wedekind, Michele Panucci, Brant Miller, Patricia Miller, Thomas Jackson, Christopher Brooks, Russell Buchi, Valetta Seymour, Crys Zinkiewicz, Maureen Linda May, Elizabeth C. Hunley, Carolyn Nevin, Lynn Billingham, Francis Lamberts, Clean Energy Form Letter Commenters, William Vanderveer, Bonnie Swinford – Sierra Club, Ann Ercelawn, Illinois Coal Form Letter Commenters, Warren Clay Hodgkiss, Paul Slentz, Emma Rushton, Melissa Harris, Irene Boyd, Laura Edwards, Hannah E Cruse, Jim and Paula Grout, Marybeth Stone, David And Tish Rainey, Gabriela Sarri-Tobar – Center for Biological Diversity, Nathaniel Bass*)

*Response:* TVA's integrated resource planning is grounded in least-cost planning principles, in alignment with Section 113 of the Energy Policy Act of 1992. These least-cost principles include balancing the following goals: low cost, risk informed, environmentally responsible, reliable and resilient, diverse, and flexible. Specifically, in conducting least-cost planning, TVA must comply with the following requirements in Section 113 of the Energy Policy Act of 1992:

- The least-cost planning program "evaluates the full range of existing and incremental resources (including new power supplies, energy conservation and efficiency, and renewable energy resources) in order to provide adequate and reliable service...at the lowest system cost";
- System cost encompasses only those costs that are "direct and quantifiable net costs for an energy resource over its available life, including production, transportation, utilization, waste management, and environmental compliance"; and
- In addition to cost, the planning process will also consider "necessary features for system operation," including diversity of resources, reliability, dispatchability, and other factors of risk.

Based on these requirements, TVA does not set a goal or target for emissions in its IRP. For more on TVA's least-cost planning requirements, please see Section 2.1 of Volume 1.

In the final IRP, Scenario 3, Carbon Legislation, includes a carbon tax which serves as a proxy for current and potential future legislation and/or regulatory actions seeking to reduce greenhouse gas emissions, which is an uncertainty outside of TVA's control. Capacity expansion results as well as environmental metric performance, including CO<sub>2</sub> direct emissions and CO<sub>2</sub> intensity, for scenario 3 portfolios can be found in Chapter 3 of Volume 1.

151. TVA should adopt a plan that aggressively decarbonizes its generation portfolio by transitioning away from fossil fuels and increasing the use of renewables (utility and distributed) and energy storage, along with expanding energy efficiency programs. *(Commenters: Brenda, James S Powers, Jordan Williams, Rebecca Cummings, Dwayne R Thomas, Mindy Phypers, Margie Lachman, Richard Frye, Julie Turner, Jill Stephenson, Piotr Sliwka, Robert Stine, Lorraine Stehn, Jane Donelon, Michael Goldberg, Susan Fleming, Cecelia Byrnes, Anonymous 2, William Kadish, Stephen Weissman, Philip A. Lefcourt, Thomas E. Hoffman, Janet Stanko, Dana Ginn, M'lou Christ, David Berney Needleman, Mary Ann Harmon, Michael Begley, David Dietrich, Jan Jennings, Susan Henning, Joyce Holdread, Richard Hassinger, Joseph A Duvivier, Richard S Nadler, Alfred Jonas Md, Jennifer Parker, Adrienne Hudson, Katherine Jain, Lucille Serody, Joe Galliani, Morris Applebaum, Linda Look, Karen Jaques, Joanne L Gates, Ann Ercelawn, Sita Jamieson, Lyle Courtsal, Joe Franklin, Karen Orton Hodges, Joaquim M Pujals, Anonymous 8, Caleb Haynes, Anthony Prince, Valetta Seymour, Mary Tankersley, Peter J Cowley, Magdalen Mitchel, Joan Tomlinson, Anne Hoos, Miriam Mimms, Carol F Smith, Karen McIntyre, Janice Speck, Bonnie Swinford – Sierra Club, Evergreen Form Letter Commenters, David Rouse, Joseph M Staples, John Pike, Patrick Bosold, Ellen Faby, Timothy Dwight, Alan Leiserson, Rebecca Jackson, John Beirs, Corinne Rovetti, Elizabeth Rowland, John Goeke, Dennis Lynch, Gail Troy, Sara Bielaczyc, Claire Broome, Ophelia Paine, Katherine Brubaker – EDF, Trey Bussey – SELC, et al., Mitch Carpen, Marjorie McCloy, Doug Carlson, Rev. Aline Gaston Russell, D.Min., Travis Donoho, Susan Isaacs, Lisa Scharin)*

*Response:* Please see the response to comment 150.

152. TVA should adopt a plan that aggressively decarbonizes its generation portfolio by transitioning away from fossil fuels and increasing the use of energy efficiency and renewables, such as solar (rooftop and utility-scale), wind, and energy storage. *(Commenters: Elizabeth C. Garber, Karen McIntyre, Michele Panucci, Bonnie Swinford – Sierra Club, Markey and Cohen – Congress of the United States, Joyce Blumenshine, Katherine Brubaker – EDF, Holley E Roberts, Marilyn Long, William Rueth, Brian Cribbs, Gabriela Sarri-Tobar – Center for Biological Diversity)*

*Response:* Please see the response to comment 150.

153. Use a Clean Energy Performance Plan, which is now used in 4 states, to incentivize utilities and CCAs to generate more clean energy and less dirty while decreasing electric rates/kWh. *(Commenter: David Bezanson)*

*Response:* Please see the response to comment 150.

154. Please continue to LISTEN to those you serve whose health depends on your decisions. *(Commenter: Mary Tankersley)*

*Response:* Thank you for your comment. It has been noted by TVA.

### **H.2.2.8 Fossil Fuels**

155. TVA should not build new fossil fuel plants, including coal and natural gas plants and supporting infrastructure, as these resources contribute to climate change and expose customers to harmful air emissions and regulatory uncertainties. *(Commenters: John Goeke, Marilyn Long, Barbara Arko)*

*Hargrove, Sofia Montemayor-Thomas, Ellyn Z Musser, George Gatcomb, Sandra Cobb, John S Sonin, David Christman, Ray Batch, Harvey Hild, Thomas Morrow, Hannah E Cruse, Jessica Gibbons-Benton, Holley E Roberts, James Holtslag, Peggy Phelps, Lee Crowe, Gabriela Sarri-Tobar – Center For Biological Diversity, Nancy Stetten, Carolyn Nevin, Rosalie Bright, Mary Ellen DeClue, Bonnie Swinford – Sierra Club, Lindsay Hanna – The Nature Conservancy, D. J. Rosebaugh)*

*Response:* Pursuant to Section 113 of the Energy Policy Act of 1992, TVA considers the full range of existing and incremental resources in order to provide adequate and reliable service at the lowest system cost. As such, the major resource types evaluated in the IRP include nuclear, hydro, coal, natural gas, renewables, storage, and energy efficiency and demand response (EE and DR). For more on TVA's least-cost planning requirements, please see section 3.1 of Volume 1.

156. TVA should not build new natural gas-powered plants as these resources expose customers to volatile commodity prices and higher electric bills. (*Commenters: Cheryl Haywood, Mary Cawthorn, Evergreen Form Letter Commenters, Rebecca McGrew – NACCO Natural Resources, David Bordenkircher, Lindsay Hanna – The Nature Conservancy, D. J. Rosebaugh, Emma Owens, Gabriela Sarri-Tobar – Center for Biological Diversity*)

*Response:* When optimizing for lowest cost for each portfolio, IRP modeling considers the total costs associated with each resource technology. These include costs to construct or procure a resource, as well as fixed operating costs and variable operating costs like fuel. Modeling includes fundamental forecasts for natural gas commodity prices, which were developed for each scenario. Then, a probabilistic analysis was used to vary gas prices to develop risk metrics that provide insights on the potential impact of price volatility. Finally, additional sensitivity analysis was performed that varied fundamental gas prices, which could be higher or lower than estimated. Core portfolio results and their associated metrics, along with the sensitivity analysis, were considered in developing IRP recommendations, which result in a resource portfolio that continues to provide affordable, reliable, and resilient power. Also, TVA executes a financial hedging program with the objective of reducing fuel cost volatility by protecting against natural gas prices fluctuations within established risk tolerances that are reviewed annually by the TVA Board.

157. TVA does not acknowledge the multiple risks associated with building new fossil gas infrastructure. A general risk is that future carbon-limiting technologies such as green hydrogen and carbon capture and storage might not be available in a timely and affordable manner to meet CAA section 111 requirements for combustion turbines. (*Commenters: Maggie Shober – Southern Alliance for Clean Energy*)

*Response:* The TVA region has a robust gas pipeline network, and future siting efforts will seek to leverage existing pipelines and minimize the need for infrastructure expansion to the extent possible. Estimated costs that would be passed on to TVA from gas pipeline operators expanding and/or upgrading pipeline networks were included in ongoing fixed costs for gas plants, as these are typically paid for over time as a part of a long-term supply agreement.

In 2025, the U.S. Environmental Protection Agency (EPA) announced intentions to provide regulatory relief across multiple rules affecting existing coal and future natural-gas generation. This included a proposed rule to repeal all greenhouse gas emissions standards for the power sector under Section 111 of the Clean Air Act (the “2024 GHG Rule”), as well as a final rule authorizing state permit writers to extend compliance deadlines under the Effluent Limitation Guidelines (ELG) for steam electric generating units.

In the final IRP, Scenario 3, Carbon Legislation, includes a carbon tax which serves as a proxy for current and potential future legislation and/or regulatory actions seeking to reduce greenhouse gas

emissions, which is an uncertainty outside of TVA's control. Capacity expansion results as well as environmental metric performance, including CO<sub>2</sub> direct emissions and CO<sub>2</sub> intensity, for scenario 3 portfolios can be found in Chapter 3 of Volume 1.

The strategy assessment in the IRP acknowledges that technological risks are greatest in portfolios with more reliance on emerging technologies, including carbon capture and sequestration.

158. TVA should include costs to society at large, such as the social cost of greenhouse gas emissions, when performing least-cost analysis. (*Commenters: Nathaniel Bass, Rosalie Bright, Doug Carlson, Joyce Blumenshine, Marjorie McCloy*)

*Response:* Pursuant to Section 113 of the Energy Policy Act of 1992, portfolio optimization in the IRP analysis evaluates impacts of expansion paths on system cost that encompasses only those costs that are "direct and quantifiable net costs for an energy resource over its available life, including production, transportation, utilization, waste management, and environmental compliance."

159. TVA should utilize gas and coal resources to ensure low cost and reliable electricity, which are critical elements of least-cost planning. (*Commenters: Joyce Elaine Phillips, Thomas Christopher, Michael Pendergrass, Rebecca McGrew – NACCO Natural Resources*)

*Response:* Pursuant to Section 113 of the Energy Policy Act of 1992, TVA considers the full range of existing and incremental resources in order to provide adequate and reliable service at the lowest system cost. As such, the major resource types evaluated in the IRP include nuclear, hydro, coal, natural gas, renewables, storage, and energy efficiency and demand response (EE and DR). For more on TVA's least-cost planning requirements, please see section 3.1 of Volume 1.

In February 2026, the TVA Board authorized TVA to take steps to allow for the continued operation of the Cumberland and Kingston fossil plants, subject to compliance with applicable permitting and regulatory requirements, to meet rapidly increasing demand for electricity and address associated reliability concerns in the TVA region. TVA also re-evaluated and updated planning assumptions related to end-of-life expectations for all coal units, alongside updates to resource cost assumptions across all technologies, as applicable. See Volume 1, Section 2.4.4 for more information.

In the near term, the IRP Recommendation's Strategic Portfolio Direction states that TVA's IRP analysis reaffirms the importance of adhering to least-cost planning principles to ensure the continued delivery of affordable, reliable, and resilient power to the Tennessee Valley. The results underscore that no single resource will fully meet future system needs; rather, maintaining a diverse portfolio remains essential. In the near-term, TVA should prioritize the addition of firm, dispatchable resources, particularly natural gas and storage, to address capacity requirements. TVA should also continue collaborating with industry and federal partners to prepare for the potential deployment of firm, dispatchable advanced nuclear technologies, which could support long-term load growth while mitigating fuel volatility and regulatory risks. Finally, complementary deployment of solar, demand-side, and distributed generation resources should be used to satisfy capacity requirements, provide economic energy, and/or meet customer needs. For more on the IRP recommendations, please see Volume 1, Chapter 4.

### **H.2.2.9 Geothermal**

160. TVA should explore renewable geothermal technologies as a part of its energy mix. (*Commenters: Tom Valente, Lawrence Emerson, G Ann Campbell*)

*Response:* Geothermal is a viable emerging technology that is gaining traction in certain geographic areas. Additional technological advancement in drilling to improve the costs is needed. Deployment is expected in the Western part of the U.S. where the geography is more favorable. It is uncertain if and



when the technology would be deployed in the TVA region, which would generally require significantly deeper wells for reasonable production.

#### **H.2.2.10 Hydroelectricity**

161. TVA should expand hydroelectricity production, which could include exploring water-to-motion devices. *(Commenters: R Jins, Ronald B. Borgquist, Mike Peek)*

*Response:* IRP recommendations include the potential for up to 1 GW of hydro additions. TVA is currently investing to extend the life of the hydro fleet, leveraging cost-effective ways to increase output. TVA also routinely evaluates market opportunities, which could include hydro options. TVA provides flood control, navigation, land management, and natural resource stewardship for the Tennessee River watershed, and hydroelectric generation is one of several objectives of managing the river system. As water supply is a limited resource, TVA evaluated hydro uprates as the most impactful options to expand hydroelectricity production in the region. The IRP range for hydro additions does provide latitude for other cost-effective ways to increase hydro output that may be identified as the IRP is implemented.

162. The Tennessee Valley Authority led the nation in capturing hydroelectric energy for the people, not for-profit corporations. I urge TVA to continue its honorable dedication to power FOR the people! Thank you. *(Commenter: Meryle A. Korn)*

*Response:* Thank you for your comment, it has been noted by TVA.

#### **H.2.2.11 Hydrogen**

163. TVA should future-proof all new gas turbines to be compatible with hydrogen as a potential fuel source. *(Commenter: Jan Berry – Citizens' Climate Education)*

*Response:* Hydrogen is not included as a fuel source option in the final IRP; however, based on the evolution of current and future policy or regulatory requirements, it may become necessary to evaluate additional environmental controls at existing or future generation facilities, particularly for coal and gas units. Options to meet future regulatory requirements could include alternative fuel co-firing (such as hydrogen). TVA will monitor advancements in this technology and evaluate its future use if needed to meet regulatory requirements or as a cost-effective method of preserving existing infrastructure. See Volume 2, Section 5.6 for more information.

164. TVA should not rely on hydrogen in its plans. Hydrogen is a potent greenhouse gas with 100 times the warming power of CO<sub>2</sub> over a 10-year period and is net-energy negative, meaning it takes more energy to produce than the hydrogen itself generates when combusted. Even the EPA has expressed doubt that hydrogen combustion will be a feasible option for carbon reduction by 2035. Currently, more than 99% of hydrogen is made from fossil fuels, otherwise known as "blue hydrogen." Hydrogen use for co-firing also poses serious public safety concerns related to leakage during transportation and health harming nitrogen oxides (NO<sub>x</sub>) that are produced from combustion. *(Commenters: Gabriela Sarri-Tobar – Center for Biological Diversity, Zdravka Tzankova, PhD, Maggie Shoher – Southern Alliance for Clean Energy)*

*Response:* Hydrogen was not included as an alternative fuel in the final IRP. However, based on the evolution of current and future policy or regulatory requirements, it may become necessary to evaluate additional environmental controls at existing or future generation facilities, particularly for coal and gas units. Options to meet future regulatory requirements could include alternative fuel co-firing (such as hydrogen). TVA will monitor advancements in this technology and evaluate its future

use if needed to meet regulatory requirements or as a cost-effective method of preserving existing infrastructure. See Volume 2, Section 5.6 for more information.

165. Consider options to explore hydrogen potential, such as pilot projects or agreements related to producing hydrogen from excess nuclear or renewable generation. (*Commenters: Martha Ward, Rebecca Cummings, Roger Stout, Wayne Stroessner, Jan Berry – Citizens' Climate Education*)

*Response:* Hydrogen is not included as a fuel source option in the final IRP; however, based on the evolution of current and future policy or regulatory requirements, it may become necessary to evaluate additional environmental controls at existing or future generation facilities, particularly for coal and gas units. Options to meet future regulatory requirements could include alternative fuel co-firing (such as hydrogen). TVA will monitor advancements in this technology and evaluate its future use if needed to meet regulatory requirements or as a cost-effective method of preserving existing infrastructure. See Volume 2, Section 5.6 for more information.

### **H.2.2.12 Least-cost Planning**

166. TVA improperly elevates a desire for “decarbonization” over keeping rates “as low as are feasible.” TVA cannot properly fulfill its statutory mission of supplying adequate and reliable power by limiting itself to power sources with admittedly poor Net Dependable Capacities and ignoring the proven reliability of coal. (*Commenter: Rebecca McGrew – NACCO Natural Resources*)

*Response:* Pursuant to Section 113 of the Energy Policy Act of 1992, TVA considers the full range of existing and incremental resources in order to provide adequate and reliable service at the lowest system cost. As such, the major resource types evaluated in the IRP include nuclear, hydro, coal, natural gas, renewables, storage, and energy efficiency and demand response (EE and DR). For more on TVA's least-cost planning requirements, please see section 3.1 of Volume 1.

### **H.2.2.13 Natural Gas**

167. I would like to see less reliance on natural gas over time. (*Commenters: Steven G. Driese, John Wright, Bonnie Swinford – Sierra Club*)

*Response:* In the near term, the IRP Recommendation's Strategic Portfolio Direction states that TVA's IRP analysis reaffirms the importance of adhering to least-cost planning principles to ensure the continued delivery of affordable, reliable, and resilient power to the Tennessee Valley. The results underscore that no single resource will fully meet future system needs; rather, maintaining a diverse portfolio remains essential. In the near-term, TVA should prioritize the addition of firm, dispatchable resources, particularly natural gas and storage, to address capacity requirements. TVA should also continue collaborating with industry and federal partners to prepare for the potential deployment of firm, dispatchable advanced nuclear technologies, which could support long-term load growth while mitigating fuel volatility and regulatory risks. Finally, complementary deployment of solar, demand-side, and distributed generation resources should be used to satisfy capacity requirements, provide economic energy, and/or meet customer needs. For more on the IRP recommendations, please see Volume 1, Chapter 4.

168. I'm concerned that TVA's draft integrated resource plan could lead to the buildout of more natural gas power plants that would increase pollution in my community, resulting in impacts to air quality, water quality, and public health. (*Commenters: Zdravka Tzankova, PhD, Katherine Brubaker – EDF, Gabriela Sarri-Tobar – Center for Biological Diversity, Markey and Cohen – Congress of the United States, Cheryl Haywood, Mary Cawthorn, Evergreen Form Letter Commenters, Travis Donoho, Emma Owens*)



*Response:* In the near term, the IRP Recommendation's Strategic Portfolio Direction states that TVA's IRP analysis reaffirms the importance of adhering to least-cost planning principles to ensure the continued delivery of affordable, reliable, and resilient power to the Tennessee Valley. The results underscore that no single resource will fully meet future system needs; rather, maintaining a diverse portfolio remains essential. In the near-term, TVA should prioritize the addition of firm, dispatchable resources, particularly natural gas and storage, to address capacity requirements. TVA should also continue collaborating with industry and federal partners to prepare for the potential deployment of firm, dispatchable advanced nuclear technologies, which could support long-term load growth while mitigating fuel volatility and regulatory risks. Finally, complementary deployment of solar, demand-side, and distributed generation resources should be used to satisfy capacity requirements, provide economic energy, and/or meet customer needs. For more on the IRP recommendations, please see Volume 1, Chapter 4.

The IRP EIS is a programmatic environment analysis that does not itself authorize any site-specific actions, such as the construction and operation of new generating facilities. Consequently, the EIS does not contain site-specific analyses of the potential impacts of each of the IRP alternatives on these resources. Rather, the EIS includes general discussions of resources within the TVA region. These descriptions are followed by a discussion of how impacts to these resources would be addressed during facility siting and review processes when specific proposals to implement the IRP are considered.

TVA will conduct the appropriate detailed impact analyses, when it proposes actions to implement the IRP. TVA will consider mitigation of any impacts through siting and facility design processes at the time additional environmental reviews are conducted for site-specific actions implementing the IRP. Additionally, TVA will coordinate and consult with federal and state agencies pursuant to requirements.

169. I oppose the proposed natural gas buildout proposed in the IRP due to environmental impacts and methane leakage concerns. (*Commenters: Zdravka Tzankova, PhD, Miranda Tidwell, Emily Cathcart, Martha Ward, Holley E Roberts, Rebecca Cummings, Roger Stout, Ira Kaplan, Leah McCord – CleanUpTVA Coalition, Nathaniel Bass, Markey and Cohen – Congress of the United States, Lawrence McConnell, Joyce Blumenshine, David Bordenkircher, Susan Isaacs*)

*Response:* In the near term, the IRP Recommendation's Strategic Portfolio Direction states that TVA's IRP analysis reaffirms the importance of adhering to least-cost planning principles to ensure the continued delivery of affordable, reliable, and resilient power to the Tennessee Valley. The results underscore that no single resource will fully meet future system needs; rather, maintaining a diverse portfolio remains essential. In the near-term, TVA should prioritize the addition of firm, dispatchable resources, particularly natural gas and storage, to address capacity requirements. TVA should also continue collaborating with industry and federal partners to prepare for the potential deployment of firm, dispatchable advanced nuclear technologies, which could support long-term load growth while mitigating fuel volatility and regulatory risks. Finally, complementary deployment of solar, demand-side, and distributed generation resources should be used to satisfy capacity requirements, provide economic energy, and/or meet customer needs. For more on the IRP recommendations, please see Volume 1, Chapter 4.

The IRP EIS is a programmatic environment analysis that does not itself authorize any site-specific actions, such as the construction and operation of new generating facilities. Consequently, the EIS does not contain site-specific analyses of the potential impacts of each of the IRP alternatives on these resources. Rather, the EIS includes general discussions of resources within the TVA region. These descriptions are followed by a discussion of how impacts to these resources would be

addressed during facility siting and review processes when specific proposals to implement the IRP are considered.

TVA will conduct the appropriate detailed impact analyses, when it proposes actions to implement the IRP. TVA will consider mitigation of any impacts through siting and facility design processes at the time additional environmental reviews are conducted for site-specific actions implementing the IRP. Additionally, TVA will coordinate and consult with federal and state agencies pursuant to requirements.

170. TVA should not build new gas plants that will accelerate the climate crisis and reduce air and water quality. TVA should instead add renewable energy resources that are lower cost, have less risk, and/or will help achieve net-zero sooner. *(Commenters: Ben Cornfield, David Riall, Brigid Cannon, Alan Leiserson, Zdravka Tzankova, PhD, Gabriela Sarri-Tobar – Center for Biological Diversity, Doug Carlson)*

*Response:* TVA's integrated resource planning is grounded in least-cost planning principles, in alignment with Section 113 of the Energy Policy Act of 1992. These least-cost principles include balancing the following goals: low cost, risk informed, environmentally responsible, reliable and resilient, diverse, and flexible. Specifically, in conducting least-cost planning, TVA must comply with the following requirements in Section 113 of the Energy Policy Act of 1992:

- The least-cost planning program “evaluates the full range of existing and incremental resources (including new power supplies, energy conservation and efficiency, and renewable energy resources) in order to provide adequate and reliable service...at the lowest system cost”;
- System cost encompasses only those costs that are “direct and quantifiable net costs for an energy resource over its available life, including production, transportation, utilization, waste management, and environmental compliance”; and
- In addition to cost, the planning process will also consider “necessary features for system operation,” including diversity of resources, reliability, dispatchability, and other factors of risk.

Based on these requirements, TVA does not set a goal or target for emissions in its IRP. For more on TVA's least-cost planning requirements, please see Section 2.1 of Volume 1.

In the near term, the IRP Recommendation's Strategic Portfolio Direction states that TVA's IRP analysis reaffirms the importance of adhering to least-cost planning principles to ensure the continued delivery of affordable, reliable, and resilient power to the Tennessee Valley. The results underscore that no single resource will fully meet future system needs; rather, maintaining a diverse portfolio remains essential. In the near-term, TVA should prioritize the addition of firm, dispatchable resources, particularly natural gas and storage, to address capacity requirements. TVA should also continue collaborating with industry and federal partners to prepare for the potential deployment of firm, dispatchable advanced nuclear technologies, which could support long-term load growth while mitigating fuel volatility and regulatory risks. Finally, complementary deployment of solar, demand-side, and distributed generation resources should be used to satisfy capacity requirements, provide economic energy, and/or meet customer needs. For more on the IRP recommendations, please see Volume 1, Chapter 4.

171. TVA should not construct the proposed gas plant at Cheatham County. *(Commenters: Lawrence McConnell, Tracy O'Neill – Preserve Cheatham County, Joyce Blumenshine, Valetta Seymour, Elen Roser, Virginia Gaylord)*

*Response:* Based upon feedback received during TVA's public scoping process and listening sessions with the Board of Directors, TVA is exploring alternatives to the 900-megawatt simple cycle combustion project proposed for Cheatham County. With input from the TVA Board of Directors, the site off Lockertsville Road is no longer TVA's preferred alternative. TVA is evaluating other sites that will support economic development and address the increasing power demand across the system.

172. New pipelines to support natural gas generation can cause damage to impacted ecosystems, farms, and homes, so I hope TVA will avoid new pipelines when possible and minimize the impacts of current and new pipelines. (*Commenters: Nathaniel Bass, Nancy Hardin*)

*Response:* Additions of new gas-fired resources typically require new or expanded gas pipeline infrastructure. The TVA region has a robust gas pipeline network, and future siting efforts will seek to leverage existing pipelines and minimize the need for infrastructure expansion to the extent possible.

173. The future of energy requires that old, inefficient natural gas plants must be replaced with modern, flexible engine or aero power plants, which are significantly more efficient, produce fewer emissions and can run on a variety of fuels. (*Commenter: Cortney Piper – Tennessee Advanced Energy Business Council*)

*Response:* TVA employs a diverse resource mix to meet the region's energy demand. New combined cycle, frame combustion turbine, and aeroderivative capacity is being added by 2028 to address capacity requirements, provide grid support, and enhance system flexibility. Actions that are later proposed to implement the IRP strategic direction will evaluate future system needs to support reliability, flexibility, and resiliency.

174. I support TVA's use of natural gas-fired power plants as this is a proven technology with an abundant fuel source, helps meet growing energy needs, provides flexibility, reduces emissions compared to coal, and is low cost. (*Commenters: Hoyt Smith, Linda Murphy, Ramsey Abbott, Harry Eich, Alex Crowell, Robert Winland, Dean Knight, Floyd Miller, Gbol Long*)

*Response:* In the near term, the IRP Recommendation's Strategic Portfolio Direction states that TVA's IRP analysis reaffirms the importance of adhering to least-cost planning principles to ensure the continued delivery of affordable, reliable, and resilient power to the Tennessee Valley. The results underscore that no single resource will fully meet future system needs; rather, maintaining a diverse portfolio remains essential. In the near-term, TVA should prioritize the addition of firm, dispatchable resources, particularly natural gas and storage, to address capacity requirements. TVA should also continue collaborating with industry and federal partners to prepare for the potential deployment of firm, dispatchable advanced nuclear technologies, which could support long-term load growth while mitigating fuel volatility and regulatory risks. Finally, complementary deployment of solar, demand-side, and distributed generation resources should be used to satisfy capacity requirements, provide economic energy, and/or meet customer needs. For more on the IRP recommendations, please see Volume 1, Chapter 4.

175. Only use methane coming from landfills where it is an anaerobic byproduct of food and yard waste decomposing after they have been buried. This "beneficial" use of landfill methane is occurring at many landfills across the United States. (*Commenter: Bonnie Swinford – Sierra Club*)

*Response:* Thank you for your comment, it has been noted by TVA.

#### **H.2.2.14      Nuclear**

176. I oppose nuclear energy due to its extremely high costs to build. (*Commenters: Karen Jaques, Paul, Joyce Blumenshine, Francis Lamberts, Richard Henighan*)

*Response:* The resource planning optimization model that TVA uses (EnCompass) seeks to determine the lowest cost resource plan, considering key inputs and constraints such as expected load growth, planning reserve margins, existing resources, and the costs and operating characteristics of new resource options. Nuclear resource additions can be a good fit to support long-term load growth while mitigating fuel volatility and regulatory risks. While nuclear units have high build and fixed costs, they are dispatchable, have low operating costs, and large energy output. For more on the IRP recommendations, please see Volume 1, Chapter 4.

177. I oppose nuclear energy due to safety and environmental concerns. (*Commenters: Michelle Kurtz, Marge Heggison, Robert Stuart, Jan Berry – Citizens' Climate Education, Gabriela Sarri-Tobar – Center for Biological Diversity, Karen Jaques, Paul, Joyce Blumenshine, Francis Lamberts, Beth Jane Freeman*)

*Response:* Nuclear plants generate large amounts of electricity in a safe, reliable, and cost-effective way. Nuclear power also provides environmentally friendly electricity. TVA nuclear plants have multiple safety systems in place to keep our workforce and the communities we serve safe. Safety systems include physical barriers that protect against radiation release and multiple layers of redundant and diverse backup power systems to keep reactors sufficiently cooled, even in the most extreme or unlikely events. The nuclear industry is among the most thoroughly tested and regulated industries in the world. TVA nuclear plants operate with oversight by the U.S. Nuclear Regulatory Commission, which has inspectors physically stationed at each site. Industry organizations, such as the Institute of Nuclear Power Operations and the World Association of Nuclear Operators, work to ensure that the industry achieves the highest level of safety and reliability through plant evaluations, training, accreditation, events analysis, and information exchange.

Safety and environmental protocols are strictly followed for spent nuclear fuel. During refueling outages that occur about every two years, about one-third of the nuclear fuel in a reactor needs to be replaced. Like all U.S. nuclear power plants, TVA stores used nuclear fuel in spent fuel pools where the fuel continues to cool before being moved to dry storage. These pools are robust constructions made of reinforced concrete several feet thick, with steel liners. The water is typically about 40 feet deep and serves both to shield the radiation and cool the fuel rods. As the pools near capacity, all utilities, including TVA, move some of the older used fuel into dry cask storage. In dry cask storage, fuel that has been cooled in the pool for several years is surrounded by inert gas inside a container called a cask, or steel cylinder that contains the spent fuel. Each cylinder is surrounded by additional steel, concrete, or other material to provide radiation shielding to workers and members of the public. Also, information about risks and best management practices around nuclear plant wastewater and thermal plant cooling systems can be found in section 4.4.2.3 of the EIS.

178. I support TVA building additional nuclear plants. (*Commenters: Brian Ueleke, Gary H Hensley, Harry Eich, Randall Dillehay, David Mcglumphy, Rachael Maitland – Tennessee Department of Environment and Conservation, Robert Winland, Scott Hendrix – Tombigee Electric Power Association, Dus Rigers, Mike Peek, Thad Huff, Mary Larrabee, Willis, Mark Acker*)

*Response:* In the IRP analysis, three nuclear expansion options are available to fill the expected capacity gap, including generation III+ advanced pressurized water reactors and light water small modular reactors (SMR) and generation IV SMRs.

As stated in the IRP's strategic portfolio direction, TVA should continue collaborating with industry and federal partners to pursue the potential deployment of advanced nuclear technologies, which could support long-term load growth while mitigating fuel volatility and regulatory risks. For more on the IRP recommendations, please see Volume 1, Chapter 4.

179. TVA should collaborate and work to deploy advanced nuclear technologies like small modular reactors (SMRs) that support growing load and are carbon-free, safe, and reliable. (*Commenters: Charles Thomas, Rachael Maitland – Tennessee Department of Environment and Conservation, Cortney Piper – Tennessee Advanced Energy Business Council, Mark Kirshe, Stella Melton*)

*Response:* In the IRP analysis, three nuclear expansion options are available to fill the expected capacity gap, including generation III+ advanced pressurized water reactors and light water small modular reactors (SMR) and generation IV SMRs.

As stated in the IRP's strategic portfolio direction, TVA should continue collaborating with industry and federal partners to pursue the potential deployment of advanced nuclear technologies, which could support long-term load growth while mitigating fuel volatility and regulatory risks. For more on the IRP recommendations, please see Volume 1, Chapter 4.

180. TVA should finish the Bellefonte nuclear plant to increase the contribution of clean nuclear power on the TVA system. (*Commenters: Thomas Wiser, John McGay, Mark Kirshe, Dus Rigers, John Wright*)

*Response:* In the IRP analysis, three nuclear expansion options are available to fill the expected capacity gap, including generation III+ advanced pressurized water reactors and light water small modular reactors (SMR) and generation IV SMRs.

As stated in the IRP's strategic portfolio direction, TVA should continue collaborating with industry and federal partners to pursue the potential deployment of advanced nuclear technologies, which could support long-term load growth while mitigating fuel volatility and regulatory risks. For more on the IRP recommendations, please see Volume 1, Chapter 4.

IRP recommendations are strategic and at a system level rather than site specific. Site-specific aspects of actions that are later proposed to implement the IRP will be addressed in tiered environmental reviews.

181. I support nuclear fusion technology. (*Commenters: Madison, Thomas Morrow*)

*Response:* Nuclear fusion is a promising technology, but its technology readiness level remains too low to be included in the IRP study. In order to prepare for this emerging technology, TVA is collaborating with Type One Energy on Project Infinity to potentially deploy a pilot stellarator fusion power plant, named Infinity Two, at its former Bull Run Fossil site. TVA plans to continue industry partnerships to advance the development of next-generation nuclear technologies, including Generation IV reactors and fusion energy systems.

182. TVA should construct gigawatt-scale advanced nuclear plants, such as an AP1000, which are licensed and proven to provide clean, safe, and reliable baseload energy. (*Commenters: Michael Mclean, Mark Kirshe*)

*Response:* In the IRP analysis, three nuclear expansion options are available to fill the expected capacity gap, including generation III+ advanced pressurized water reactors and light water small modular reactors (SMR) and generation IV SMRs.

As stated in the IRP's strategic portfolio direction, TVA should continue collaborating with industry and federal partners to pursue the potential deployment of advanced nuclear technologies, which could support long-term load growth while mitigating fuel volatility and regulatory risks. For more on the IRP recommendations, please see Volume 1, Chapter 4.



### H.2.2.15 Nuclear and Gas

183. I support TVA adding nuclear and gas resources. (*Commenters: James Mitchell, William Roy*)

*Response:* In the near term, the IRP Recommendation's Strategic Portfolio Direction states that TVA's IRP analysis reaffirms the importance of adhering to least-cost planning principles to ensure the continued delivery of affordable, reliable, and resilient power to the Tennessee Valley. The results underscore that no single resource will fully meet future system needs; rather, maintaining a diverse portfolio remains essential. In the near-term, TVA should prioritize the addition of firm, dispatchable resources, particularly natural gas and storage, to address capacity requirements. TVA should also continue collaborating with industry and federal partners to prepare for the potential deployment of firm, dispatchable advanced nuclear technologies, which could support long-term load growth while mitigating fuel volatility and regulatory risks. Finally, complementary deployment of solar, demand-side, and distributed generation resources should be used to satisfy capacity requirements, provide economic energy, and/or meet customer needs. For more on the IRP recommendations, please see Volume 1, Chapter 4.

### H.2.2.16 Renewables

184. I oppose TVA overinvesting or focusing on solar and wind resources as they cost more, provide less power, and generate no power when the sun or wind are not present. Solar and wind also require large amounts of land, including prime farmland. (*Commenters: Larry Bruff Sanders – 4-County EPA, Jay Gilliland – 4-County EPA, Johnny Johnson – 4-County EPA, Thomas "Marty" Crowder – 4-County EPA, Michael Ray Banks – 4-County EPA, William Russell Dodds – 4-County EPA, Harry Eich, Anthony Szabo, Stephen Gustav Weber, Shawn Edmondson, Alex Crowell, Bill Mahathey, Justin Hatcher*)

*Response:* Maintaining resource mix diversity is fundamental to TVA's ability to provide affordable, reliable, and resilient energy to the residents, businesses, and industries in the region. A diverse portfolio reduces fuel price risk and reliability risks associated with single modes of failure. The major resource types evaluated in the IRP include nuclear, hydro, coal, natural gas, renewables, storage, and energy efficiency and demand response (EE and DR). They were available for selection in all cases, resulting in a varied mix of diverse portfolios for evaluation. All resource types have relative advantages and considerations, as summarized in Volume 1, section 2.6.2.

In the near term, the IRP Recommendation's Strategic Portfolio Direction states that TVA's IRP analysis reaffirms the importance of adhering to least-cost planning principles to ensure the continued delivery of affordable, reliable, and resilient power to the Tennessee Valley. The results underscore that no single resource will fully meet future system needs; rather, maintaining a diverse portfolio remains essential. In the near-term, TVA should prioritize the addition of firm, dispatchable resources, particularly natural gas and storage, to address capacity requirements. TVA should also continue collaborating with industry and federal partners to prepare for the potential deployment of firm, dispatchable advanced nuclear technologies, which could support long-term load growth while mitigating fuel volatility and regulatory risks. Finally, complementary deployment of solar, demand-side, and distributed generation resources should be used to satisfy capacity requirements, provide economic energy, and/or meet customer needs.

The IRP's strategic portfolio direction also includes recommended actions to pursue solar to reduce total system costs or meet customer needs and further states that given cost and portfolio fit challenges, suspend wind additions until relative economics improve. For more on the IRP recommendations, please see Volume 1, Chapter 4.

185. I support TVA adding more renewables. *(Commenters: Dan Silver, George Waybright, Cristian Pantano, Vivian J. Elliott, Harry Harrison, Jim Neal, Jeff Twine, KGH Nicholes, Judith Ciani, John Pasqua, Ken Canty, Eugene Falik, Lisa Scharin, Bhasker Patel, Amy Anderson, Jack E Strasburg, Lawrence Emerson, Jo Boyd, Gia Murray, Anonymous 7, Jane McColgan, Dr. William M Smith Jr., Pa Pire, Jeffry Graham Roush, Wendy Henry, Angela Schieferecke, Joyce Frohn, Michelle Darbro, Mark Spinner, Emil Kirberg, Richard Miller, Gary Bushey, Joshua Angelus, Larry Little, Virginia M. Jones, Jessica Gibbons-Benton, Gayle Ray, Joan Tomlinson, Dale Tomlinson, Coal Form Letter Commenters)*

*Response:* In the near term, the IRP Recommendation's Strategic Portfolio Direction states that TVA's IRP analysis reaffirms the importance of adhering to least-cost planning principles to ensure the continued delivery of affordable, reliable, and resilient power to the Tennessee Valley. The results underscore that no single resource will fully meet future system needs; rather, maintaining a diverse portfolio remains essential. In the near-term, TVA should prioritize the addition of firm, dispatchable resources, particularly natural gas and storage, to address capacity requirements. TVA should also continue collaborating with industry and federal partners to prepare for the potential deployment of firm, dispatchable advanced nuclear technologies, which could support long-term load growth while mitigating fuel volatility and regulatory risks. Finally, complementary deployment of solar, demand-side, and distributed generation resources should be used to satisfy capacity requirements, provide economic energy, and/or meet customer needs.

The IRP's strategic portfolio direction also includes recommended actions to pursue solar to reduce total system costs or meet customer needs and further states that given cost and portfolio fit challenges, suspend wind additions until relative economics improve. For more on the IRP recommendations, please see Volume 1, Chapter 4.

186. I support TVA adding more renewable resources, such as solar and wind, which contribute to a cleaner environment and lower utility bills for customers. *(Commenters: Vetrel E Degraphenreed Smith, Valetta Seymour, Phil Heinlein, Cindy Davenport, Zdravka Tzankova, PhD, Stephen Serafino, Valerie, Patricia Dion, Kathryn Hill, Paul Levesque, Tom Valente, Tom Butch, James N Herther, Alec And Sandy McDougall, Edward J Costello, Lynne Firestone, Caleb Merendino, Mark Smith, Karen Spradlin, Leslie Weinberg, Jered Cargman, Hartson Doak, Kendall Nygard, Matilda Phillips, Pam Nelson, Wayne Stroessner, Jennifer T. Schultz, Carole Goldfarb, John Ordway, Beth Jane Freeman, Jim Stack, Ruth Swenson, Marianna Mejia, Robert New, Alex Stavis, Beverly Ann Conroy, Timothy D Birthisel, Mark Hughes, Hillary Straus, Lisa Scharin, Robert Moore, Dan Doepker, Daniel Schwartz, John Ailey, Ray Batch, Duane Gore, William Shirey, Wilson Knox Bagwell, Sandie Popiel, Sandra Carman, Theresa Acerro, Sari Rose Schneider, Gabriel J. Gomes, John T Voehringer, Connie Skvir, Mercedes Lackey, Beau Bennett, Gabriele Holland, Doug, Deborah Mazzaferro, Ernie, Dennis Knaack, Veronica Blake, Milton Naylor, Roxanne O'Guin, Alan Fister, Elisa Friedman, Gray Kay, Rosanne Lovely, Cynthia Willett, Bonnie Swinford – Sierra Club, Valerie Fulcher – Virginia Department of Environmental Quality, Francis Lamberts, Dr. Marhta Wetteman)*

*Response:* In the near term, the IRP Recommendation's Strategic Portfolio Direction states that TVA's IRP analysis reaffirms the importance of adhering to least-cost planning principles to ensure the continued delivery of affordable, reliable, and resilient power to the Tennessee Valley. The results underscore that no single resource will fully meet future system needs; rather, maintaining a diverse portfolio remains essential. In the near-term, TVA should prioritize the addition of firm, dispatchable resources, particularly natural gas and storage, to address capacity requirements. TVA should also continue collaborating with industry and federal partners to prepare for the potential deployment of firm, dispatchable advanced nuclear technologies, which could support long-term load growth while mitigating fuel volatility and regulatory risks. Finally, complementary deployment of solar, demand-



side, and distributed generation resources should be used to satisfy capacity requirements, provide economic energy, and/or meet customer needs.

The IRP's strategic portfolio direction also includes recommended actions to pursue solar to reduce total system costs or meet customer needs and further states that given cost and portfolio fit challenges, suspend wind additions until relative economics improve. For more on the IRP recommendations, please see Volume 1, Chapter 4.

187. I support TVA adding more renewable resources, such as wind and solar, battery storage, and geothermal, which result in a cleaner environment and lower, more stable utility bills for customers. *(Commenters: Eric Spray, Bonnie Swinford – Sierra Club, G Ann Campbell)*

*Response:* In the near term, the IRP Recommendation's Strategic Portfolio Direction states that TVA's IRP analysis reaffirms the importance of adhering to least-cost planning principles to ensure the continued delivery of affordable, reliable, and resilient power to the Tennessee Valley. The results underscore that no single resource will fully meet future system needs; rather, maintaining a diverse portfolio remains essential. In the near-term, TVA should prioritize the addition of firm, dispatchable resources, particularly natural gas and storage, to address capacity requirements. TVA should also continue collaborating with industry and federal partners to prepare for the potential deployment of firm, dispatchable advanced nuclear technologies, which could support long-term load growth while mitigating fuel volatility and regulatory risks. Finally, complementary deployment of solar, demand-side, and distributed generation resources should be used to satisfy capacity requirements, provide economic energy, and/or meet customer needs.

The IRP's strategic portfolio direction also includes recommended actions to pursue solar to reduce total system costs or meet customer needs; add firm, dispatchable storage to maintain system reliability and improve system efficiency; and further states that given cost and portfolio fit challenges, suspend wind additions until relative economics improve. For more on the IRP recommendations, please see Volume 1, Chapter 4.

Geothermal is a viable emerging technology that is gaining traction in certain geographic areas. Additional technological advancement in drilling to improve the costs is needed. Deployment is expected in the Western part of the U.S. where the geography is more favorable. It is uncertain if and when the technology would be deployed in the TVA region, which would generally require significantly deeper wells for reasonable production.

### **H.2.2.17 Renewables and Energy Efficiency**

188. I support TVA adding more renewable resources, such as wind and solar, battery storage, and energy efficiency which result in a cleaner environment and lower, more stable utility bills for customers. *(Commenter: Lawrence McConnell)*

*Response:* In the near term, the IRP Recommendation's Strategic Portfolio Direction states that TVA's IRP analysis reaffirms the importance of adhering to least-cost planning principles to ensure the continued delivery of affordable, reliable, and resilient power to the Tennessee Valley. The results underscore that no single resource will fully meet future system needs; rather, maintaining a diverse portfolio remains essential. In the near-term, TVA should prioritize the addition of firm, dispatchable resources, particularly natural gas and storage, to address capacity requirements. TVA should also continue collaborating with industry and federal partners to prepare for the potential deployment of firm, dispatchable advanced nuclear technologies, which could support long-term load growth while mitigating fuel volatility and regulatory risks. Finally, complementary deployment of solar, demand-

side, and distributed generation resources should be used to satisfy capacity requirements, provide economic energy, and/or meet customer needs.

The IRP's strategic portfolio direction also includes recommended actions to pursue solar to reduce total system costs or meet customer needs; add firm, dispatchable storage to maintain system reliability and improve system efficiency; partner with customers to leverage cost-effective energy efficiency and demand response; and further states that given cost and portfolio fit challenges, suspend wind additions until relative economics improve. For more on the IRP recommendations, please see Volume 1, Chapter 4.

### **H.2.2.18 Renewables and Storage**

189. TVA should allow for and commit to implement higher annual levels of clean energy technologies such as solar, wind, and battery storage (including hybrid options such as solar plus storage) in its planning. (*Commenters: Lindsay Hanna – The Nature Conservancy, Bonnie Swinford – Sierra Club*)

*Response:* Best practice in utility planning is to use annual limits as the modeling vehicle for simulating the practical ability to construct or procure new resources, so the analysis will generate executable portfolios. The IRP analysis includes annual limits for all resource types based on recent experience designing, permitting, and constructing new generating assets and procuring new resources through Request for Proposal processes. For example, the market capability for solar has increased, and this is reflected with solar limits that are more than double the limits used in the previous IRP. In the High Growth scenario and Supercharged Growth sensitivity, most annual limits were increased to reflect additional build or procurement potential resulting from increased national economic productivity. For additional information on limits, see Volume 1, Section 2.6.4.

TVA's IRP sets overall strategic direction and planning guidance. A key next step in implementing the IRP recommendations is translating the IRP's strategic portfolio direction into an executable asset strategy from an operational, commercial, and financial perspective. Implementation decisions will be made on a site-specific basis, subject to further environmental review and within TVA's least-cost framework. Modeling parameters do not limit the amount of a given resource that actually can be added in a given year if cost-competitive, as long as cumulative additions are within the ranges studied in the IRP.

190. TVA should pursue more robust renewable and storage targets in IRP recommendations, as the ranges included in the draft IRP make it unclear how TVA plans to proceed. (*Commenters: Katherine Brubaker – EDF, Zachary Fabish – The Sierra Club, Maggie Shober – Southern Alliance for Clean Energy, Dr. Marhta Wetteman*)

*Response:* In the near term, the IRP Recommendation's Strategic Portfolio Direction states that TVA's IRP analysis reaffirms the importance of adhering to least-cost planning principles to ensure the continued delivery of affordable, reliable, and resilient power to the Tennessee Valley. The results underscore that no single resource will fully meet future system needs; rather, maintaining a diverse portfolio remains essential. In the near-term, TVA should prioritize the addition of firm, dispatchable resources, particularly natural gas and storage, to address capacity requirements. TVA should also continue collaborating with industry and federal partners to prepare for the potential deployment of firm, dispatchable advanced nuclear technologies, which could support long-term load growth while mitigating fuel volatility and regulatory risks. Finally, complementary deployment of solar, demand-side, and distributed generation resources should be used to satisfy capacity requirements, provide economic energy, and/or meet customer needs.

The IRP's strategic portfolio direction also includes recommended actions to pursue solar to reduce total system costs or meet customer needs; add firm, dispatchable storage to maintain system reliability and improve system efficiency; and further states that given cost and portfolio fit challenges, suspend wind additions until relative economics improve. TVA will evaluate new solar addition proposals to either lower system costs or meet customer needs utilizing regular procurement cycles. For more on the IRP recommendations, please see Volume 1, Chapter 4.

191. I am against TVA using renewable energy sources like solar, wind, and battery storage due to their high costs, negative impacts to wildlife, and the environmental impacts associated with raw materials extraction. (*Commenters: Linda Murphy, Ghol Long*)

**Response:** Pursuant to Section 113 of the Energy Policy Act of 1992, TVA considers the full range of existing and incremental resources in order to provide adequate and reliable service at the lowest system cost. As such, the major resource types evaluated in the IRP include nuclear, hydro, coal, natural gas, renewables, storage, and energy efficiency and demand response (EE and DR). For more on TVA's least-cost planning requirements, please see section 2.1 of Volume 1.

Maintaining resource mix diversity is fundamental to TVA's ability to provide affordable, reliable, and resilient energy to the residents, businesses, and industries in the region. A diverse portfolio reduces fuel price risk and reliability risks associated with single modes of failure. The major resource types evaluated in the IRP include nuclear, hydro, coal, natural gas, renewables, storage, and energy efficiency and demand response (EE and DR). They were available for selection in all cases, resulting in a varied mix of diverse portfolios for evaluation. All resource types have relative advantages and considerations, as summarized in Volume 1, section 2.6.2. Impacts to the natural environment are discussed in Chapter 4 of the EIS.

In the near term, the IRP Recommendation's Strategic Portfolio Direction states that TVA's IRP analysis reaffirms the importance of adhering to least-cost planning principles to ensure the continued delivery of affordable, reliable, and resilient power to the Tennessee Valley. The results underscore that no single resource will fully meet future system needs; rather, maintaining a diverse portfolio remains essential. In the near-term, TVA should prioritize the addition of firm, dispatchable resources, particularly natural gas and storage, to address capacity requirements. TVA should also continue collaborating with industry and federal partners to prepare for the potential deployment of firm, dispatchable advanced nuclear technologies, which could support long-term load growth while mitigating fuel volatility and regulatory risks. Finally, complementary deployment of solar, demand-side, and distributed generation resources should be used to satisfy capacity requirements, provide economic energy, and/or meet customer needs.

### **H.2.2.19      Solar**

192. TVA should give priority to substantially increasing solar power generation. Solar is better for the environment than fossil fuels, which contribute to climate change, and it is cost-effective.

(*Commenters: Valerie Fulcher – Virginia Department of Environmental Quality, Chris Constantine, Caroline Chesebrough, Michelle Linakis, Nancy LaPlaca, Jay Blackman, Holly Pope, Pam Zimmerman, Lorella Howard, Jason A Carney, Bonnie Swinford – Sierra Club, Mike Peek, Thad Huff, Mary Larrabee, Sheila Bowers, Genette Foster, Zachary Fabish – The Sierra Club*)

**Response:** Pursuant to Section 113 of the Energy Policy Act of 1992, TVA considers the full range of existing and incremental resources in order to provide adequate and reliable service at the lowest system cost. As such, the major resource types evaluated in the IRP include nuclear, hydro, coal,

natural gas, renewables, storage, and energy efficiency and demand response (EE and DR). For more on TVA's least-cost planning requirements, please see section 2.1 of Volume 1.

Maintaining resource mix diversity is fundamental to TVA's ability to provide affordable, reliable, and resilient energy to the residents, businesses, and industries in the region. A diverse portfolio reduces fuel price risk and reliability risks associated with single modes of failure. The major resource types evaluated in the IRP include nuclear, hydro, coal, natural gas, renewables, storage, and energy efficiency and demand response (EE and DR). They were available for selection in all cases, resulting in a varied mix of diverse portfolios for evaluation. All resource types have relative advantages and considerations, as summarized in Volume 1, section 2.6.2. Impacts to the natural environment are discussed in Chapter 4 of the EIS.

In the near term, the IRP Recommendation's Strategic Portfolio Direction states that TVA's IRP analysis reaffirms the importance of adhering to least-cost planning principles to ensure the continued delivery of affordable, reliable, and resilient power to the Tennessee Valley. The results underscore that no single resource will fully meet future system needs; rather, maintaining a diverse portfolio remains essential. In the near-term, TVA should prioritize the addition of firm, dispatchable resources, particularly natural gas and storage, to address capacity requirements. TVA should also continue collaborating with industry and federal partners to prepare for the potential deployment of firm, dispatchable advanced nuclear technologies, which could support long-term load growth while mitigating fuel volatility and regulatory risks. Finally, complementary deployment of solar, demand-side, and distributed generation resources should be used to satisfy capacity requirements, provide economic energy, and/or meet customer needs.

193. I support TVA adding more solar. (*Commenters: Elizabeth Queener, Karen Fedorov, Joe Franklin, Lee Bartell, Don Bronkema, Victoria Coursey, Philip Johnson, Myles Davis, Susan Welsford, Alice Gem, Julie Smith, Robyn Reichert, Kathryn Davidson, Helen Swartzfager, Jane Leatherman Van Praag, Tom Pielach's, Shelley Pierucci, James S Roberts, Martha R. O'Kennon, Annie McCann, Diane Jones, Anonymous 10*)

*Response:* In the near term, the IRP Recommendation's Strategic Portfolio Direction states that TVA's IRP analysis reaffirms the importance of adhering to least-cost planning principles to ensure the continued delivery of affordable, reliable, and resilient power to the Tennessee Valley. The results underscore that no single resource will fully meet future system needs; rather, maintaining a diverse portfolio remains essential. In the near-term, TVA should prioritize the addition of firm, dispatchable resources, particularly natural gas and storage, to address capacity requirements. TVA should also continue collaborating with industry and federal partners to prepare for the potential deployment of firm, dispatchable advanced nuclear technologies, which could support long-term load growth while mitigating fuel volatility and regulatory risks. Finally, complementary deployment of solar, demand-side, and distributed generation resources should be used to satisfy capacity requirements, provide economic energy, and/or meet customer needs.

194. I installed solar in 2013 and my TEP bill was \$100 this month because of you. Outrageous. (*Commenter: Anne Clock*)

*Response:* Thank you for your comment, it has been noted by TVA

### **H.2.2.20      Storage**

195. Finding a suitable site for pumped storage is difficult. Raccoon Mountain has a natural bowl at the top, which is rare and it helps prevent risk of flooding in nearby valleys. (*Commenter: Stephen Gustav Weber*)

*Response:* The IRP analysis includes the option of an additional pumped storage plant, similar to Raccoon Mountain, available beginning in the mid-2030s. This resource option was based on recent environmental review related to suitable pumped storage sites in the region.

196. TVA should add storage to capture excess electricity during periods of low demand and meet peak demand needs, which will offset the need for fossil fuels which saves customers money and is better for the environment. (*Commenter: James Stuart Kantor, Beau Bennett*)

*Response:* The IRP analysis recognizes the benefits of storage. In the near term, the IRP Recommendation's Strategic Portfolio Direction states that TVA's IRP analysis reaffirms the importance of adhering to least-cost planning principles to ensure the continued delivery of affordable, reliable, and resilient power to the Tennessee Valley. The results underscore that no single resource will fully meet future system needs; rather, maintaining a diverse portfolio remains essential. In the near-term, TVA should prioritize the addition of firm, dispatchable resources, particularly natural gas and storage, to address capacity requirements. TVA should also continue collaborating with industry and federal partners to prepare for the potential deployment of firm, dispatchable advanced nuclear technologies, which could support long-term load growth while mitigating fuel volatility and regulatory risks. Finally, complementary deployment of solar, demand-side, and distributed generation resources should be used to satisfy capacity requirements, provide economic energy, and/or meet customer needs.

The IRP's strategic portfolio direction also includes the recommended action to add firm, dispatchable storage to maintain system reliability and improve system efficiency. TVA will evaluate new storage options to support reliability, resiliency, and system flexibility. For more on the IRP recommendations, please see Volume 1, Chapter 4.

197. TVA should add significant amounts of storage to complement renewables. (*Commenters: Sheila Bowers, Genette Foster, Zachary Fabish – The Sierra Club, Jan Berry – Citizens' Climate Education, Cortney Piper – Tennessee Advanced Energy Business Council, Doug, John T Voehringer, Milton Naylor, Bonnie Swinford – Sierra Club*)

*Response:* The IRP analysis recognizes the benefits of storage. In the near term, the IRP Recommendation's Strategic Portfolio Direction states that TVA's IRP analysis reaffirms the importance of adhering to least-cost planning principles to ensure the continued delivery of affordable, reliable, and resilient power to the Tennessee Valley. The results underscore that no single resource will fully meet future system needs; rather, maintaining a diverse portfolio remains essential. In the near-term, TVA should prioritize the addition of firm, dispatchable resources, particularly natural gas and storage, to address capacity requirements. TVA should also continue collaborating with industry and federal partners to prepare for the potential deployment of firm, dispatchable advanced nuclear technologies, which could support long-term load growth while mitigating fuel volatility and regulatory risks. Finally, complementary deployment of solar, demand-side, and distributed generation resources should be used to satisfy capacity requirements, provide economic energy, and/or meet customer needs.

The IRP's strategic portfolio direction also includes the recommended action to add firm, dispatchable storage to maintain system reliability and improve system efficiency. TVA will evaluate new storage options to support reliability, resiliency, and system flexibility. For more on the IRP recommendations, please see Volume 1, Chapter 4.



### **H.2.2.21 Wind**

198. TVA should add more wind generation, which provides more output in the winter when TVA has a greater need for capacity. (*Commenter: Jonathan Geldof – ACORE*)

*Response:* In the near term, the IRP Recommendation's Strategic Portfolio Direction states that TVA's IRP analysis reaffirms the importance of adhering to least-cost planning principles to ensure the continued delivery of affordable, reliable, and resilient power to the Tennessee Valley. The results underscore that no single resource will fully meet future system needs; rather, maintaining a diverse portfolio remains essential. In the near-term, TVA should prioritize the addition of firm, dispatchable resources, particularly natural gas and storage, to address capacity requirements. TVA should also continue collaborating with industry and federal partners to prepare for the potential deployment of firm, dispatchable advanced nuclear technologies, which could support long-term load growth while mitigating fuel volatility and regulatory risks. Finally, complementary deployment of solar, demand-side, and distributed generation resources should be used to satisfy capacity requirements, provide economic energy, and/or meet customer needs.

The IRP's strategic portfolio direction also includes a recommended action which concludes that given cost and portfolio fit challenges, suspend wind additions until relative economics improve. For more on the IRP recommendations, please see Volume 1, Chapter 4.

## **H.2.3 Energy Infrastructure**

### **H.2.3.1 Building Codes**

199. TVA could insist that state and local building codes require that buildings be placed on a site for maximum solar effectiveness. Further, those codes could require maximum insulation and window installations. (*Commenter: Ken Rawn*)

*Response:* Building codes are established by state and local governments and are not under the jurisdiction of TVA.

### **H.2.3.2 Demand Response**

200. TVA should focus its demand response programs on the industrial and commercial sectors because they provide higher value. (*Commenter: Jan Berry – Citizens' Climate Education*)

*Response:* The IRP analysis evaluated demand response resource (DR) options for the residential, commercial, and industrial sectors. Based on the options modeled, a mix of residential, commercial, and industrial DR was selected across the portfolios, with the largest potential impact anticipated to be in the commercial and industrial sectors. For more information on demand response in portfolio results and how demand response was modeled, see Volume 1, Section 3.5 and Appendix G.

### **H.2.3.3 Demand-Side Management**

201. TVA should consider avoided costs and grid benefits associated with peak demand reduction, along with opportunities for other end-use customer arrangements that support the grid. (*Commenter: Carlson Swafford – Eco Demo Law PLLC*)

*Response:* The IRP analysis evaluated energy efficiency and demand response resource options for the residential, commercial, and industrial sectors. The analysis considered the potential avoided costs at different levels of deployment across the portfolios. For more information on how energy efficiency and demand response were modeled in the IRP, see Volume 1, Appendix G. Also, TVA is collaborating with customers on the evolution of demand-side and distributed resource programs.



202. I support expanding energy efficiency and/or demand response programs across all sectors, which would reduce the need for centralized power resources. (*Commenters: Ophelia Paine, Gabriela Sarri-Tobar – Center for Biological Diversity*)

*Response:* In the near term, the IRP Recommendation's Strategic Portfolio Direction states that TVA's IRP analysis reaffirms the importance of adhering to least-cost planning principles to ensure the continued delivery of affordable, reliable, and resilient power to the Tennessee Valley. The results underscore that no single resource will fully meet future system needs; rather, maintaining a diverse portfolio remains essential. In the near-term, TVA should prioritize the addition of firm, dispatchable resources, particularly natural gas and storage, to address capacity requirements. TVA should also continue collaborating with industry and federal partners to prepare for the potential deployment of firm, dispatchable advanced nuclear technologies, which could support long-term load growth while mitigating fuel volatility and regulatory risks. Finally, complementary deployment of solar, demand-side, and distributed generation resources should be used to satisfy capacity requirements, provide economic energy, and/or meet customer needs.

The IRP's strategic portfolio direction also includes recommended actions to utilize demand response and behind-the-meter resources to enable near-term interconnection of new industrial loads; and partner with customers to leverage cost-effective energy efficiency and demand response. For more on the IRP recommendations, please see Volume 1, Chapter 4.

203. TVA should align its expectations for demand-side management with industry best practices and norms across all sectors (commercial, industrial, and residential). (*Commenters: Lindsay Hanna – The Nature Conservancy, Carlson Swafford – Eco Demo Law PLLC, Maggie Shober – Southern Alliance for Clean Energy*)

*Response:* Achievable energy program potential varies with evolving codes and standards and from region to region. To better understand achievable potential, TVA commissioned DNV, a global leader in energy program consulting, to perform a study for the region in 2022. Energy program resource options for the IRP were developed based on the study, subsequent market experience, and other program knowledge. The study indicated 10-year energy efficiency (EE) potential ranging from 2-7% of sales, which was less than the 1% of annual sales industry norm that is sometimes quoted. Reporting of utility programmatic EE impacts is not fully consistent across the industry, as some utilities appear to report a portion of market-driven impacts (or naturally occurring impacts with evolving codes and standards) in their numbers.

The IRP analysis evaluated demand-side management program options for the residential, commercial, and industrial sectors. Based on public comments, TVA also conducted a sensitivity to understand the impacts if EE availability and deployment were greater than forecasted. TVA has been ramping up investments in residential, commercial, and industrial EE and DR programs using insights from the potential study.

The IRP's strategic portfolio direction includes recommended actions to utilize demand response and behind-the-meter resources to enable near-term interconnection of new industrial loads; and partner with customers to leverage cost-effective energy efficiency and demand response. For more on the IRP recommendations, please see Volume 1, Chapter 4.

204. TVA's IRP did not include appropriate levels of energy efficiency and/or demand response that would lower costs and risks, improve reliability, reduce emissions, improve aging housing stock and public health, and/or strengthen the local economy. (*Commenters: Lindsay Hanna – The Nature Conservancy, Kendra Abkowitz - Metropolitan Government of Nashville and Davidson County, Grace*

*Levin – City of Knoxville, TN, Leigh Huffman – Shelby County Government, Leigh Huffman – City of Memphis, Katherine Brubaker – EDF)*

**Response:** Achievable energy program potential varies with evolving codes and standards and from region to region. To better understand achievable potential, TVA commissioned DNV, a global leader in energy program consulting, to perform a study for the region in 2022. Energy program resource options for the IRP were developed based on the study, subsequent market experience, and other program knowledge. The study indicated 10-year energy efficiency (EE) potential ranging from 2-7% of sales, which was less than the 1% of annual sales industry norm that is sometimes quoted. Reporting of utility programmatic EE impacts is not fully consistent across the industry, as some utilities appear to report a portion of market-driven impacts (or naturally occurring impacts with evolving codes and standards) in their numbers.

The IRP analysis evaluated demand-side management program options for the residential, commercial, and industrial sectors. Based on public comments, TVA also conducted a sensitivity to understand the impacts if EE availability and deployment were greater than forecasted. TVA has been ramping up investments in residential, commercial, and industrial EE and DR programs using insights from the potential study.

The IRP's strategic portfolio direction includes recommended actions to utilize demand response and behind-the-meter resources to enable near-term interconnection of new industrial loads; and partner with customers to leverage cost-effective energy efficiency and demand response. For more on the IRP recommendations, please see Volume 1, Chapter 4.

205. We request that the \$1.5 billion allocation for DSM be detailed, with specifics on how this investment will be spent across EE and DR efforts. (*Commenter: Ann Livingston – Southeast Sustainability Directors Network*)

**Response:** The FY24-FY28 budget allocation of spend for energy efficiency (EE) and demand response (DR) efforts totals \$1.5 billion, with \$841 million for DR programs, \$637 million for EE programs, and \$46 million for electrification programs. This funding supports expansion of demand-side management programs across the business and industry and residential sectors, and it also supports low-income EE programs.

#### **H.2.3.4 Distributed Energy Resources**

206. Distributed energy resources, such as solar and storage, provide local resiliency and are immune to physical and cyber attacks. (*Commenter: John Pike*)

**Response:** The IRP analysis evaluated distributed solar and storage, as well as smaller gas turbines such as reciprocating internal combustion engines and aeroderivative CTs. These distributed resources were emphasized as a part of Strategy C, Distributed. Distributed resources can play a role in enhancing local resiliency and they can offset the need for some centralized power resources.

207. TVA should provide guidance to local power companies in rural communities on how best to build local resilience by adding distributed generation, such as community solar, energy storage, and microgrid projects. (*Commenter: Shannon Stoney*)

**Response:** The construction and interconnection of small scale solar is primarily focused on the local level, with end use customers and local power companies being the concerned parties. TVA aided local power companies with small scale solar support from 2020 – 2025, which was an effort to assist with the early adoption period of residential rooftop solar. The tools developed during that period have been made available to local power companies for their use and include contractor vetting standards, solar installation best practices, interconnection processes, and commissioning requirements. Small scale solar adopters are encouraged to

work with their local power companies to understand contractors with the best reputation within their service footprint.

The IRP's strategic portfolio direction includes a recommended action to collaborate with local power companies on the evolution of distributed generation programs. For more on the IRP recommendations, please see Volume 1, Chapter 4.

208. TVA should expand the Generation Flexibility program above 5% so that local power companies could increase deployment of distributed generation and storage to increase resiliency and reliability. *(Commenters: Jake Duncan – Vote Solar, Blake Elder – Coalition for Community Solar Access, Gabriela Sarri-Tobar – Center for Biological Diversity, Francis Lamberts, Zachary Stines – New Leaf Energy, Scott Dunbar – Clean Energy Buyers Association, Maggie Shober – Southern Alliance for Clean Energy, Rachael Maitland – Tennessee Department of Environment and Conservation, Markey and Cohen – Congress of the United States, Gil Hough – TenneSEIA)*

*Response:* TVA has provided local power company partners the flexibility to generate up to 5% of their own energy to meet consumer demand for new renewables and address other local needs. The IRP analysis includes baseline forecasts for distributed generation (DG) adoption for each scenario and forecasts for higher levels of adoption when promoted in the Distributed strategy. The Generation Flexibility program is a mechanism that could be used to achieve this DG adoption. To model the varying levels of DG adoption before and after incentives, TVA uses an approach similar to the National Laboratory of the Rockies' Distributed Market Demand Model, which simulates potential adoption of a given resource as a function of payback period. For more information on DG modeling, please see Volume 1, Appendix F.

The IRP's strategic portfolio direction includes a recommended action to collaborate with local power companies on the evolution of distributed generation programs. For more on the IRP recommendations, please see Volume 1, Chapter 4.

209. TVA should assess and restructure existing programs for distributed generation and storage to ensure these resources are appropriately valued and effective incentives and program options are available to end-use consumers for projects they may be considering. *(Commenters: Scott Noethen – TenneSEIA – Distributed Committee, Maggie Shober – Southern Alliance for Clean Energy)*

*Response:* The IRP analysis includes baseline forecasts for distributed generation (DG) adoption for each scenario and forecasts for higher levels of adoption when promoted in the Distributed strategy. To model the varying levels of DG adoption before and after incentives, TVA uses an approach similar to the National Laboratory of the Rockies' Distributed Market Demand Model, which simulates potential adoption of a given resource as a function of payback period. For more information on DG modeling, please see Volume 1, Appendix F.

The IRP's strategic portfolio direction includes a recommended action to collaborate with local power companies on the evolution of distributed generation programs. For more on the IRP recommendations, please see Volume 1, Chapter 4.

210. TVA should prioritize and pursue higher amounts of distributed energy resources to relieve pressure from growing demand, as well reduce the need for centralized power resources and transmission upgrades that have longer lead times. Distributed resources leverage private investment and provide resiliency and environmental benefits. *(Commenters: David Bezanson, Shannon Stoney, Scott Noethen – TenneSEIA – Distributed Committee, Lee Brown, Rebecca Cummings, Tim Berarducci, Barry McLaughlin, Tracy O'Neill – Preserve Cheatham County, Brant Miller, Patricia Miller, Shalin Mody, Scott, Anonymous 8, Taffy Williams, Nathaniel Bass, Cortney*

*Piper – Tennessee Advanced Energy Business Council, Maggie Shober – Southern Alliance for Clean Energy, Jamie McClanahan, Gabriela Sarri-Tobar – Center for Biological Diversity)*

**Response:** The IRP analysis evaluated distributed solar and storage, as well as smaller gas turbines such as reciprocating internal combustion engines and aeroderivative CTs. These distributed resources were emphasized as a part of Strategy C, Distributed. Distributed resources can play a role in enhancing local resiliency and they can offset the need for some centralized power resources.

The IRP analysis includes baseline forecasts for distributed generation (DG) adoption for each scenario and forecasts for higher levels of adoption when promoted in the Distributed strategy. To model the varying levels of DG adoption before and after incentives, TVA uses an approach similar to the National Laboratory of the Rockies' Distributed Market Demand Model, which simulates potential adoption of a given resource as a function of payback period. For more information on DG modeling, please see Volume 1, Appendix F.

The IRP's strategic portfolio direction includes a recommended action to collaborate with local power companies on the evolution of distributed generation programs. For more on the IRP recommendations, please see Volume 1, Chapter 4.

211. TVA should support and/or subsidize community solar to distribute energy burden, contribute to decarbonization, and enable broader access to renewables. *(Commenters: Kathryn, Blake Elder – Coalition for Community Solar Access, Jordan Williams)*

**Response:** The IRP analysis evaluated distributed solar and storage as resource options. These distributed resources were emphasized as a part of Strategy C, Distributed. Distributed resources can play a role in enhancing local resiliency and they can offset the need for some centralized power resources.

The IRP analysis includes baseline forecasts for distributed generation (DG) adoption for each scenario and forecasts for higher levels of adoption when promoted in the Distributed strategy. To model the varying levels of DG adoption before and after incentives, TVA uses an approach similar to the National Laboratory of the Rockies' Distributed Market Demand Model, which simulates potential adoption of a given resource as a function of payback period. For more information on DG modeling, please see Volume 1, Appendix F.

The IRP's strategic portfolio direction includes a recommended action to collaborate with local power companies on the evolution of distributed generation programs. For more on the IRP recommendations, please see Volume 1, Chapter 4.

Community solar is one of the options for deploying distributed solar, where local power companies see interest in and demand for this application in their area.

212. For solar additions, TVA should maximize the use of structures already available, such as roofs of parking areas and commercial buildings, residential roofs, offshore floating barges, barns, and garages for these panels, rather than use vast acres of undisturbed land. *(Commenters: Cheryl Haywood, Rosalie Bright, Kendra Abkowitz - Metropolitan Government of Nashville and Davidson County)*

**Response:** While distributed solar can be installed on already existing structures or smaller areas of already disturbed land, a significant portion of solar will be at utility scale. Utility-scale solar farms typically require about 7 acres of land per installed megawatt of nameplate capacity. The majority of solar power purchase agreements currently operating and under contract are sited on greenfield property. TVA strives to leverage brownfield options for siting any resource type when practical and will pursue suitable opportunities for solar as they arise, such as the ongoing project to install solar

on the Shawnee fossil plant reservation. Agrivoltaics, or dual-use solar that combines solar energy production with agricultural activities on the same land, is an emerging approach that may reduce solar land use impact in the future.

213. Every home should be energy independent! (*Commenter: Victoria Coursey*)

*Response:* Thank you for your comment. It has been noted by TVA.

### **H.2.3.5 Distributed Energy Resources and Demand-side Management**

214. TVA should promote virtual power plants to offset load growth, reduce utility investment and emissions, and enhance local resiliency to avoid power interruptions. TVA should work with vendors of distributed solar and battery storage and smart appliances to explore what is achievable.

(*Commenters: David Bezanson, Maggie Shober – Southern Alliance for Clean Energy, Dennis Lynch, Gabriela Sarri-Tobar – Center for Biological Diversity*)

*Response:* The IRP analysis evaluated distributed solar, storage, and gas resources, along with demand-side management opportunities through energy efficiency and demand response programs. These distributed resources were emphasized as a part of Strategy C, Distributed. Distributed resources can play a role in enhancing local resiliency and they can offset the need for some centralized power resources. These resources could be managed as virtual power plants in some applications. The IRP's strategic portfolio direction includes a recommended action to collaborate with local power companies on the evolution of distributed generation programs. For more on the IRP recommendations, please see Volume 1, Chapter 4.

215. The TVA's 2025 Draft IRP and EIS does not adequately examine distributed energy resources, energy efficiency, and demand management sufficient to satisfy NEPA's EIS requirements.

(*Commenter: Carlson Swafford – Eco Demo Law PLLC*)

*Response:* The IRP analysis includes baseline forecasts for distributed generation (DG) adoption for each scenario and forecasts for higher levels of adoption when promoted in the Distributed strategy. To model the varying levels of DG adoption before and after incentives, TVA uses an approach similar to the National Laboratory of the Rockies' Distributed Market Demand Model, which simulates potential adoption of a given resource as a function of payback period. For more information on DG modeling, please see Volume 1, Appendix F.

Achievable energy program potential varies with evolving codes and standards and from region to region. To better understand achievable potential, TVA commissioned DNV, a global leader in energy program consulting, to perform a study for the region in 2022. Energy program resource options for the IRP were developed based on the study, subsequent market experience, and other program knowledge. The study indicated 10-year energy efficiency (EE) potential ranging from 2-7% of sales, which was less than the 1% of annual sales industry norm that is sometimes quoted. Reporting of utility programmatic EE impacts is not fully consistent across the industry, as some utilities appear to report a portion of market-driven impacts (or naturally occurring impacts with evolving codes and standards) in their numbers.

The IRP analysis evaluated demand-side management program options for the residential, commercial, and industrial sectors. Based on public comments, TVA also conducted a sensitivity to understand the impacts if EE availability and deployment were greater than forecasted. TVA has been ramping up investments in residential, commercial, and industrial EE and DR programs using insights from the potential study.

The IRP's strategic portfolio direction includes recommended actions to utilize demand response and behind-the-meter resources to enable near-term interconnection of new industrial loads; and partner



with customers to leverage cost-effective energy efficiency and demand response. For more on the IRP recommendations, please see Volume 1, Chapter 4.

#### **H.2.3.6 Electric Vehicles**

216. TVA should pursue research, development, and deployment of bidirectional charging and generation of electric vehicle batteries. (*Commenters: John Beirs, David Bezanson*)

*Response:* TVA has participated in collaborative research led by the Electric Power Research Institute (EPRI) and other entities that explores how electric vehicle batteries might be used in a bidirectional manner and leveraged as a grid resource in the future. TVA will continue to monitor technology advancements and potential in this regard.

#### **H.2.3.7 Electrification**

217. TVA should encourage and appropriately plan for electrification in the region, as well as provide increasingly cleaner electricity to support growing electric vehicle and industry uses. (*Commenters: Cortney Piper – Tennessee Advanced Energy Business Council, Rosanne Lovely, Lawrence Emerson, Anonymous 9*)

*Response:* All IRP scenarios include growing load driven by population, employment, and industrial (primarily data center) growth as well as continued adoption of EVs. TVA explored different levels of demand growth across the three scenarios and two additional load sensitivities (see Volume 1, Sections 2.4 and 3.10.1). Also, TVA will continue to work with industries in the region that are looking to increase the electrification and efficiency of their processes and make strategic investments in the transmission system that prepare for growth.

#### **H.2.3.8 Emerging Technology Research**

218. TVA is encouraged to continue to collaborate with higher education institutions and the Oak Ridge National Laboratory (ORNL) to advance research in energy storage, grid modernization, and efficiency technologies to foster the region's leadership in sustainable energy technologies and align TVA's resources with broader advancements in the energy sector. (*Commenter: Rachael Maitland – Tennessee Department of Environment and Conservation*)

*Response:* TVA is partnering with ORNL to accelerate the next generation of cost-effective nuclear power and sponsoring promising advanced storage startup companies. TVA also is participating in industry partnerships, such as those led by EPRI, and exploring long-duration storage through participation in utility collaborations. TVA looks forward to continuing its collaborations with higher education institutions in the region on research and accelerator programs for emerging energy technologies.

#### **H.2.3.9 Energy Efficiency**

219. TVA's Energy Programs Potential Study summary report is too broad and significantly undervalues the potential of industrial, commercial, and residential energy efficiency. (*Commenter: Maggie Shoher – Southern Alliance for Clean Energy*)

*Response:* TVA leveraged a 2022 Energy Programs Potential Study completed by DNV, a global leader in energy program consulting, and subsequent market experience to develop the energy efficiency (EE) and demand response (DR) resource options modeled in the IRP. TVA also conducted a sensitivity evaluating the potential impact of greater EE market depth beyond what was modeled in the core cases. The IRP analysis indicates the potential for EE deployment to reduce



energy needs, particularly between now and 2040, and for DR programs to grow with the system and the use of smart technologies.

TVA is in the process of ramping up investments in residential, commercial, and industrial EE and DR programs using insights from the potential study. The IRP recommends partnering with TVA customers to leverage cost-effective EE and DR program potential. For more on IRP recommendations, see Volume 1, Chapter 4.

220. TVA should maximize the development and support of energy efficiency programs.  
(Commenters: Dennis Lynch, Richard Henighan, Francis Lamberts, Bonnie Swinford – Sierra Club, Dr. Martha Wetteman, Valetta Seymour)

**Response:** TVA leveraged a 2022 Energy Programs Potential Study completed by DNV, a global leader in energy program consulting, and subsequent market experience to develop the energy efficiency (EE) and demand response (DR) resource options modeled in the IRP. TVA also conducted a sensitivity evaluating the potential impact of greater EE market depth beyond what was modeled in the core cases. The IRP analysis indicates the potential for EE deployment to reduce energy needs, particularly between now and 2040, and for DR programs to grow with the system and the use of smart technologies.

TVA is in the process of ramping up investments in residential, commercial, and industrial EE and DR programs using insights from the potential study. The IRP recommends partnering with TVA customers to leverage cost-effective EE and DR program potential. For more on IRP recommendations, see Volume 1, Chapter 4.

221. TVA should increase its efforts to reduce energy demand through public education and/or by striving to increase current LPC participation in EnergyRight programs up to as high as 100%.  
(Commenters: Martha Ward, Rebecca Cummings, Roger Stout, Ann Livingston – Southeast Sustainability Directors Network, Amy Smart)

**Response:** TVA leveraged a 2022 Energy Programs Potential Study completed by DNV, a global leader in energy program consulting, and subsequent market experience to develop the energy efficiency (EE) and demand response (DR) resource options modeled in the IRP. TVA also conducted a sensitivity evaluating the potential impact of greater EE market depth beyond what was modeled in the core cases. The IRP analysis indicates the potential for EE deployment to reduce energy needs, particularly between now and 2040, and for DR programs to grow with the system and the use of smart technologies.

TVA is in the process of ramping up investments in residential, commercial, and industrial EE and DR programs using insights from the potential study. The IRP recommends partnering with TVA customers to leverage cost-effective EE and DR program potential. For more on IRP recommendations, see Volume 1, Chapter 4.

#### **H.2.3.10 Extreme Weather**

222. TVA should maximize distributed generation and/or storage in order to increase resiliency in the face of extreme weather. (Commenters: Gabriela Sarri-Tobar – Center for Biological Diversity, Markey and Cohen – Congress of the United States)

**Response:** The IRP analysis evaluated distributed solar and storage as resource options. These distributed resources were emphasized as a part of Strategy C, Distributed. Distributed resources

can play a role in enhancing local resiliency and they can offset the need for some centralized power resources.

The IRP analysis includes baseline forecasts for distributed generation (DG) adoption for each scenario and forecasts for higher levels of adoption when promoted in the Distributed strategy. To model the varying levels of DG adoption before and after incentives, TVA uses an approach similar to the National Laboratory of the Rockies' Distributed Market Demand Model, which simulates potential adoption of a given resource as a function of payback period. For more information on DG modeling, please see Volume 1, Appendix F.

The IRP's strategic portfolio direction includes a recommended action to collaborate with local power companies on the evolution of distributed generation programs. For more on the IRP recommendations, please see Volume 1, Chapter 4.

223. TVA should account for risks to the system related to gas resource performance in extreme weather in its planning. (*Commenters: Lindsay Hanna – The Nature Conservancy, Ntale Kajumba – EPA Region 4, Gabriela Sarri-Tobar – Center for Biological Diversity*)

*Response:* Forced outages for all resource types are captured in TVA's planning reserve margin study, including temperature correlated outages. TVA's gas assets have typically performed well during extreme weather events. TVA made significant investments during 2023 to further harden its generating resources, which improved cold weather performance of gas assets during winter storms in 2024 and 2025 that set new peak records. To additionally support reliability of gas-fired plants, TVA typically contracts for a high level of fuel delivery priority and/or invests in a backup fuel source on site, depending on the expected operations profile of a particular plant. Based on all these factors, TVA has not risk-adjusted the net dependable capacity of gas assets.

#### **H.2.3.11 Fossil Site Repurposing**

224. TVA should convert TVA and TVA-contracted coal and gas plant sites to sites that could host solar, wind, and battery storage resources. (*Commenter: Edward Main*)

*Response:* As coal and gas plants reach end of life, the potential to utilize sites for replacement generation is considered. TVA strives to leverage brownfield options for siting any resource type when practical and will pursue suitable opportunities for solar as they arise, such as the ongoing project to install solar on the Shawnee fossil plant reservation. Utility-scale solar farms typically require about 7 acres of land per installed megawatt of nameplate capacity, so opportunities to utilize retiring fossil sites for new solar installations will be somewhat limited. Siting of storage resources considers brownfield opportunities, optimal siting to support the transmission system, and other factors.

#### **H.2.3.12 Implementation**

225. In regard to the never-used Phipps Bend power plant site -- although TVA froze construction decades ago, might it finally be opened in some capacity. (*Commenter: Bella Croton*)

*Response:* The IRP evaluates the resources TVA might employ over the next 25 years to meet the energy needs of the TVA region based on least-cost planning principles. TVA considers the option to utilize existing sites, and site-specific actions that are later proposed to implement the IRP will be addressed in tiered environmental reviews.

226. It is critical that every ratepayer has access to TVA's suite of programs to maximize individual and systemic benefit. We encourage TVA to work with local stakeholders to support increased

participation in current and future program offerings. (*Commenter: Grace Levin – City of Knoxville, TN*)

*Response:* The IRP's strategic portfolio direction includes recommended actions to partner with customers to leverage cost-effective energy efficiency and demand response and to collaborate with local power companies on the evolution of distributed generation programs. For more on the IRP recommendations, please see Volume 1, Chapter 4. LPCs have local expertise from ongoing interactions with ratepayers to help inform the evolution of demand-side and distributed resource programs.

227. TDEC encourages TVA to consider legal provisions [related to wind installation locations in Tennessee] within the IRP and to address how they may impact the feasibility, siting, and development of wind energy projects in the state. (*Commenter: Rachael Maitland – Tennessee Department of Environment and Conservation*)

*Response:* IRP recommendations are strategic and at a system level rather than site specific. Site-specific aspects of actions that are later proposed to implement the IRP will be addressed in tiered environmental reviews, which will consider legal provisions that pertain to siting for a particular resource.

The IRP's strategic portfolio direction includes a recommended action which states that given cost and portfolio fit challenges, suspend wind additions until relative economics improve. For more on the IRP recommendations, please see Volume 1, Chapter 4.

### **H.2.3.13 Large Customers**

228. TVA should deprioritize incoming high-energy users (data centers, bitcoin mining, etc.) and prioritize lower system cost and reduced environmental impacts for its residential and other customers. (*Commenters: Robert Stuart, Wren, Francis Lamberts, Gabriela Sarri-Tobar – Center for Biological Diversity, Tracy O'Neill – Preserve Cheatham County*)

*Response:* TVA's mission includes economic development and TVA remains focused on efforts to enable job creation across the region. TVA does not recruit data centers or related industries. TVA has an obligation to serve our customers, such as in the case of Memphis Light, Gas and Water (MLGW) that serves xAI. TVA works closely with local power companies and communities when a business is interested in locating in the Valley region. TVA can establish when and under what system conditions we can serve a new large energy user. For instance, a customer could enroll in a demand response program where the customer agrees to reduce their load at peak times.

Additionally, high-energy use customers are financially motivated to become more efficient energy users over time, as energy is typically one of their largest business expenses.

### **H.2.3.14 Large Customers and/or LPCs**

229. TVA should allow and plan for additional opportunities for large customers and/or LPCs to pursue renewable and clean energy resources. This could be accomplished through expansion of the Green Invest program, allowing customers to enter into sleeved PPA contracts, and/or allowing customers to contract directly for these resources. A program could also be developed for other commercial and industrial customers that is less focused on additionality. (*Commenters: Cortney Piper – Tennessee Advanced Energy Business Council, Scott Dunbar – Clean Energy Buyers Association, Maggie Shober – Southern Alliance for Clean Energy, Whit Cox – Southern Renewable Energy Association, Scott Dunbar – Clean Energy Buyers Association*)

*Response:* About half of TVA's current solar capacity comes from its Green Invest program, connecting large customers with large-scale solar developers, and some of the Green Invest solar

sites also have battery storage. Green Invest and other programs will continue to evolve to meet changing customer and system needs.

The IRP Recommendation's strategic portfolio direction includes a recommended action to collaborate with local power companies on the evolution of distributed generation programs. For more on IRP recommendations, see Volume 1, Chapter 4.

### **H.2.3.15 Municipality Sustainability Goals**

230. The success of municipality sustainability goals depend on TVA continuing to decrease the emission intensity of grid energy through increased investment in lower-carbon generation, grid infrastructure, and demand-side efficiency. (*Commenters: Madison Rollings – City of Chattanooga, Grace Levin – City of Knoxville, TN, Kendra Abkowitz – Metropolitan Government of Nashville and Davidson County, Leigh Huffman – Shelby County Government*)

*Response:* In the near term, the IRP Recommendation's Strategic Portfolio Direction states that TVA's IRP analysis reaffirms the importance of adhering to least-cost planning principles to ensure the continued delivery of affordable, reliable, and resilient power to the Tennessee Valley. The results underscore that no single resource will fully meet future system needs; rather, maintaining a diverse portfolio remains essential. In the near-term, TVA should prioritize the addition of firm, dispatchable resources, particularly natural gas and storage, to address capacity requirements. TVA should also continue collaborating with industry and federal partners to prepare for the potential deployment of firm, dispatchable advanced nuclear technologies, which could support long-term load growth while mitigating fuel volatility and regulatory risks. Finally, complementary deployment of solar, demand-side, and distributed generation resources should be used to satisfy capacity requirements, provide economic energy, and/or meet customer needs.

### **H.2.3.16 Natural Gas Pipelines**

231. I am in favor of natural gas pipelines where needed. (*Commenters: David Chastain, Fred Christoffer*)

*Response:* Thank you for your comment. It has been noted by TVA.

### **H.2.3.17 Nuclear Licensing and Operations**

232. TVA should consider infrastructure updates required for the safe operation of its nuclear fleet beyond license extensions in future IRPs. TVA also should further explore the longer-term implications of the Accelerating Deployment Versatile Advanced Nuclear Clean Energy Act (ADVANCE Act) in its future IRPs, particularly regarding licensing, spent fuel, and radioactive waste management, which are crucial to sustaining a safe and resilient nuclear energy sector in the region. (*Commenter: Rachael Maitland – Tennessee Department of Environment and Conservation*)

*Response:* Safety of nuclear plant operations is a top priority for TVA. Inherent in license renewals is continued investment in the units and related infrastructure to ensure safe operation based on the latest guidance from the Nuclear Regulatory Commission and global nuclear organizations. TVA will consider the implications of the ADVANCE Act on potential future nuclear deployment and operations and in future planning.

### **H.2.3.18 Pipeline Infrastructure**

233. The IRP did not adequately account for the financial and environmental costs or the safety concerns and risks associated with pipelines for natural gas, hydrogen, and/or carbon capture and

sequestration (CCS). (*Commenters: Nathaniel Bass, Gabriela Sarri-Tobar – Center for Biological Diversity, Rachael Maitland – Tennessee Department of Environment and Conservation, Lindsay Hanna – The Nature Conservancy*)

*Response:* The final IRP includes general information on how TVA will seek to work with pipeline operators to leverage existing pipelines and minimize the need for infrastructure expansion to the extent possible (see Volume 1, section 4.3.2), and additional information also is included in the EIS. Site-specific aspects of actions that are later proposed to implement the IRP strategic direction will be addressed and considered in tiered environmental reviews including information related to pipelines where relevant. The CCS resource options assume general estimates for costs associated with capturing, transporting, and storing captured carbon emissions. The strategy assessment in the IRP acknowledges that technological risks are greatest in portfolios with more reliance on emerging technologies, which would include carbon capture and sequestration.

234. I am opposed to additional natural gas pipelines and support clean energy resource additions. (*Commenter: Bonnie Swinford – Sierra Club*)

*Response:* The final IRP includes general information on how TVA will seek to work with pipeline operators to leverage existing pipelines and minimize the need for infrastructure expansion to the extent possible (see Volume 1, section 4.3.2), and additional information also is included in the EIS. Site-specific aspects of actions that are later proposed to implement the IRP strategic direction will be addressed and considered in tiered environmental reviews including information related to pipelines where relevant.

In the near term, the IRP Recommendation's Strategic Portfolio Direction states that TVA's IRP analysis reaffirms the importance of adhering to least-cost planning principles to ensure the continued delivery of affordable, reliable, and resilient power to the Tennessee Valley. The results underscore that no single resource will fully meet future system needs; rather, maintaining a diverse portfolio remains essential. In the near-term, TVA should prioritize the addition of firm, dispatchable resources, particularly natural gas and storage, to address capacity requirements. TVA should also continue collaborating with industry and federal partners to prepare for the potential deployment of firm, dispatchable advanced nuclear technologies, which could support long-term load growth while mitigating fuel volatility and regulatory risks. Finally, complementary deployment of solar, demand-side, and distributed generation resources should be used to satisfy capacity requirements, provide economic energy, and/or meet customer needs.

#### **H.2.3.19 Power System**

235. TVA should prioritize reliability and minimize the possibility of power disruptions by ensuring sufficient amounts of generation capacity, particularly baseload and dispatchable resources. (*Commenters: Rebecca McGrew – NACCO Natural Resources, Frankie L Moorman, Randy E Carroll, Marty Crowder, Donald Wallace, Sean M Mcgrath*)

*Response:* TVA places a high priority on power reliability, which is modeled in the IRP. To accommodate rapid load growth in the TVA region, TVA has been adding and continues to add a diverse mix of new power resources to meet power demand. TVA also has been ramping up investments in energy efficiency and demand management programs for the region's residents and businesses. To address risks from extreme winter events, TVA made significant investments during 2023 to further harden its generating resources, which improved cold weather performance during winter storms in 2024 and 2025.



**H.2.3.20 Power System - National**

236. I support development of a modernized network of high-voltage utility transmission lines across the nation, combined with smart grid technology, to interconnect the nation's renewable energy sources and enable a national market for buying and selling. (*Commenter: Greg Johanson*)

*Response:* TVA looks for cost-effective interregional transmission opportunities. TVA is a sponsor in the Southeastern Regional Transmission Planning (SERTP) process and is very involved in the planning and implementation for FERC Orders 890, 1000, and 1920. TVA and other sponsors and stakeholders are actively engaging to develop a plan to ensure we are compliant with Order 1920. Its implementation will guide SERTP as we evaluate regional and interregional transmission solutions/alternatives and ensure that TVA and SERTP are measuring a range of benefits these facilities could provide. We are excited to evaluate multi-valued transmission projects as a part of SERTP and see where this path takes TVA.

237. Privatize the National Renewable energy industry removing the utilities control over the industrial scale project. (*Commenter: Greg Johanson*)

*Response:* Thank you for your comment. It has been noted by TVA.

**H.2.3.21 Power System - TVA**

238. TVA should share and coordinate with adjacent utilities to allow balancing of supply and demand across "boundaries." (*Commenter: Dennis Lynch*)

*Response:* TVA is able to purchase power from neighboring utilities on the spot market if necessary. TVA analyzes the risk associated with import capability in its periodic reserve margin study. Planning reserve margin is the excess capacity that TVA maintains beyond forecasted peak load to provide reliable service to customers while keeping rates low. Maintaining additional capacity accounts for uncertainty in the amount of load and available generation on a future peak day.

239. Power curtailments should be a last resort, and TVA should communicate proactively with stakeholders regarding capacity challenges and contingency plans to minimize disruptions. (*Commenter: Sean M Mcgrath*)

*Response:* TVA agrees that power curtailments are the last resort during emergency conditions. TVA has a proactive communications process with customers, elected officials, and stakeholders during high load events. This process ensures transparency and helps minimize possible disruptions, and it has been successfully used during summer heat waves and winter storms.

240. TVA should create a program that allows access to the TVA transmission system, so that other utilities can benefit from use of the public resource. (*Commenter: Dennis Lynch*)

*Response:* As defined in section 1.15 of TVA's Transmission Service Guidelines, any "Eligible Customer" can request transmission service on the TVA transmission system. TVA's Transmission Service Guidelines are posted on TVA's publicly available OASIS (open access same time information system) site (<https://www.oasis.oati.com/tva/>).

241. I would like to see TVA generating excess power for sale and distribution to the grid. (*Commenter: Eric Coons*)

*Response:* TVA's ability to generate excess power for sale and distribution to the grid is limited by the TVA Act. Section 15d(a) of the Act restricts the territory in which TVA can sell or deliver TVA power. TVA can only engage in the construction and/or the purchase of generating capacity as needed to supply electricity demands in the service area. As a result, any other sales permitted under 15d(a)



are limited to the generation from power system resources that is not needed to meet native load obligations.

242. TVA is on the same trail that California blazed and that Texas is following. California and Texas are reducing emissions, but at a high price of unreliability. And the electric bills have not gone down but have increased in both states. *(Commenter: Marty Crowder)*

*Response:* Thank you for your comment. It has been noted by TVA.

### **H.2.3.22 Process for Adding New Resources**

243. To meet increasing electricity demand, TVA will need to invest in new generating and transmission capacity quickly and efficiently to provide affordable, reliable, resilient, and increasingly cleaner power to its customers. *(Commenters: David Beckler, James Mitchell, Cody Durham, Mitch Brown, Jonathan Geldof – ACORE, Sean M Mcgrath, Scott Noethen – TenneSEIA – Distributed Committee)*

*Response:* To accommodate rapid load growth in the TVA region, TVA has been adding and continues to add a diverse mix of new power resources to meet power demand. TVA also has been ramping up investments in energy efficiency and demand management programs for the region's residents and businesses. TVA is making strategic investments in the transmission system to enable growth and new power generation resources. To complement transmission investments, TVA is actively working to streamline the process for interconnecting new resources and reduce associated timelines. Reducing interconnection timelines will help support and accelerate the deployment of all power resources.

244. TVA needs to streamline its development and approval processes for all generation types and invest to create transmission capacity to keep up with growing demand. *(Commenters: Sean M Mcgrath, Scott Noethen – TenneSEIA – Distributed Committee)*

*Response:* To accommodate rapid load growth in the TVA region, TVA has been adding and continues to add a diverse mix of new power resources to meet power demand. TVA also has been ramping up investments in energy efficiency and demand management programs for the region's residents and businesses. TVA is making strategic investments in the transmission system to enable growth and new power generation resources. To complement transmission investments, TVA is actively working to streamline the process for interconnecting new resources and reduce associated timelines. Reducing interconnection timelines will help support and accelerate the deployment of all power resources.

245. Interconnection timelines are challenging, making it difficult to address near-term resource needs, so TVA needs to streamline the interconnection process and related transmission and NEPA processes. *(Commenters: David Bezanson, Whit Cox – Southern Renewable Energy Association, Maggie Shoher – Southern Alliance for Clean Energy, Zachary Stines – New Leaf Energy, Jonathan Geldof – ACORE, Sean M Mcgrath, Scott Noethen – TenneSEIA – Distributed Committee, Markey and Cohen – Congress of the United States, Gil Hough – TenneSEIA)*

*Response:* TVA is making strategic investments in the transmission system to enable growth and new power generation resources. To complement transmission investments, TVA is actively working to streamline the process for interconnecting new resources and reduce associated timelines. Reducing interconnection timelines will help support and accelerate the deployment of all power resources.

### **H.2.3.23 Renewables for Local Communities**

246. TVA should ensure that renewable energy projects also serve local communities and are not exclusive to industrial demands. (*Commenter: Tracy O'Neill – Preserve Cheatham County*)

*Response:* In the near term, the IRP Recommendation's Strategic Portfolio Direction states that TVA's IRP analysis reaffirms the importance of adhering to least-cost planning principles to ensure the continued delivery of affordable, reliable, and resilient power to the Tennessee Valley. The results underscore that no single resource will fully meet future system needs; rather, maintaining a diverse portfolio remains essential. In the near-term, TVA should prioritize the addition of firm, dispatchable resources, particularly natural gas and storage, to address capacity requirements. TVA should also continue collaborating with industry and federal partners to prepare for the potential deployment of firm, dispatchable advanced nuclear technologies, which could support long-term load growth while mitigating fuel volatility and regulatory risks. Finally, complementary deployment of solar, demand-side, and distributed generation resources should be used to satisfy capacity requirements, provide economic energy, and/or meet customer needs.

The IRP Recommendation's strategic portfolio direction includes recommended actions to pursue solar to reduce total system costs or meet customer needs and to collaborate with local power companies on the evolution of distributed generation programs. For more on IRP recommendations, see Volume 1, Chapter 4.

### **H.2.3.24 River System Management**

247. The lake operating guide has lake levels going down starting at Labor Day, going to winter pool and not recovering to summer pool until mid April. With increasing demand for power I would suggest only dropping the water from mid November to recovering to summer pool in late March would increase water availability for power generation and still allow the dropping for environmental needs in the coldest months. More people enjoy fall on the water when the kids are back in school but may currently be unable to do so, especially since you are currently dropping even earlier than the operating guide. (*Commenter: Jim Diehl*)

*Response:* TVA manages to certain pool levels across the year to meet the multipurpose mission of the river system including flood control, navigation, recreation, and power generation. TVA will continue to explore cost-effective and practical ways to increase output of the hydro system while balancing these priorities.

### **H.2.3.25 Transmission and Distribution Planning**

248. TVA should work with local power companies and large customers to enable microgrids that improve grid resilience and reduce environmental impacts. (*Commenters: Pam Nelson, Wayne David Wallace, Sheila Bowers, William Rueth, Cortney Piper – Tennessee Advanced Energy Business Council, Gabriela Sarri-Tobar – Center for Biological Diversity*)

*Response:* The IRP analysis evaluated distributed solar and storage as resource options. These distributed resources were emphasized as a part of Strategy C, Distributed. Distributed resources can play a role in enhancing local resiliency and they can offset the need for some centralized power resources.

The IRP analysis includes baseline forecasts for distributed generation (DG) adoption for each scenario and forecasts for higher levels of adoption when promoted in the Distributed strategy. To model the varying levels of DG adoption before and after incentives, TVA uses an approach similar to the National Laboratory of the Rockies' Distributed Market Demand Model, which simulates potential

adoption of a given resource as a function of payback period. For more information on DG modeling, please see Volume 1, Appendix F.

The IRP's strategic portfolio direction includes a recommended action to collaborate with local power companies on the evolution of distributed generation programs. For more on the IRP recommendations, please see Volume 1, Chapter 4.

### **H.2.3.26 Transmission Planning**

249. The IRP should account for line losses in the IRP analysis and find ways to invest in improving system efficiency. *(Commenters: Gabriela Sarri-Tobar – Center for Biological Diversity, Carlson Swafford – Eco Demo Law PLLC)*

*Response:* Electric load forecasts for each IRP scenario include an estimate for energy losses during transmission from power generation sources to power consumers. For the purpose of the IRP, TVA assumed these line losses remain constant at current levels. However, TVA is always looking for cost-effective ways to minimize transmission losses as the power system evolves, and local power companies also are always considering ways to make their distribution systems more efficient.

250. TVA should speak to the actions it will take to allow for more wind on its grid, such as studies of barriers to the technology and the transmission needs to enable Southeast high-hub and Midwest wind. *(Commenter: Maggie Shober – Southern Alliance for Clean Energy)*

*Response:* TVA has initiated development of a more strategic transmission process, that will incorporate stakeholder input. This process will consider strategic direction from the IRP, along with the locational aspects of connecting load and generation, to enable the efficient evolution of the power system. TVA will incorporate additional elements of transmission planning into future IRPs to more fully integrate system planning. As part of evaluating wind options specifically, TVA considers the transmission upgrades and ongoing reservation costs which may be required.

The IRP's strategic portfolio direction includes a recommended action which states that given cost and portfolio fit challenges, suspend wind additions until relative economics improve. For more on the IRP recommendations, please see Volume 1, Chapter 4.

251. While TVA is not FERC-jurisdictional, TVA should continue to follow FERC guidelines for transmission planning and investment, which offers economic and reliability benefits to its ratepayers. *(Commenters: Jonathan Geldof – ACORE, Zachary Fabish – The Sierra Club)*

*Response:* While TVA is not FERC-jurisdictional, TVA follows FERC guidelines for transmission planning and investment. TVA is investing in the transmission system for anticipated needs, expanding the use of grid-enhancing and grid-supporting technologies, and streamlining processes for interconnecting new resources. TVA will realize benefits from these efforts, as well as expand regional ties where cost-competitive.

252. TVA should invest in modernizing the grid and leverage grid-enhancing technologies. *(Commenters: Maggie Shober – Southern Alliance for Clean Energy, Gabriela Sarri-Tobar – Center for Biological Diversity, Sean M McGrath, Cortney Piper – Tennessee Advanced Energy Business Council, Scott Dunbar – Clean Energy Buyers Association, Tracy O'Neill – Preserve Cheatham County, Jonathan Geldof – ACORE, Gia Murray)*

*Response:* As demand and supply change, TVA is optimizing existing and new infrastructure and expanding the use of grid-enhancing and grid-supporting technologies, such as advanced conductors and STATCOMS, as well as exploring dynamic line ratings, to manage more complex two-way flows and support the grid of the future.

253. The IRP should account for the cost of maintaining grid reliability and/or grid stability through the energy transition. (*Commenters: Rebecca McGrew – NACCO Natural Resources, Ntale Kajumba – EPA Region 4*)

*Response:* TVA places a high priority on power reliability and grid stability and follows North American Electric Reliability Corporation (NERC) guidelines. The IRP analysis modeled meeting planning reserve margin requirements in all portfolios.

Additionally, TVA performed a study to evaluate the Net Dependable Capacity (NDC) of solar, wind, and storage resources. NDC is a measurement of a resource's ability to produce energy at times of peak demand, expressed as a percentage of nameplate capacity. NDC decreases over time with increasing installation of solar, wind, and battery storage resources on the system. Solar output is relatively high at the typical summer peak late in the afternoon but is substantially less at the typical winter peak early in the morning. Wind generation is more variable overall and is generally higher in winter than in summer. Battery storage NDC is generally higher with more hours of storage duration.

254. TVA should proactively explore where additional interregional transmission can benefit its system. (*Commenter: Jonathan Geldof – ACORE*)

*Response:* TVA looks for cost-effective interregional transmission opportunities. TVA is a sponsor in the Southeastern Regional Transmission Planning (SERTP) process and is very involved in the planning and implementation for FERC Orders 890, 1000, and 1920. TVA and other sponsors and stakeholders are actively engaging to develop a plan to ensure we are compliant with Order 1920. Its implementation will guide SERTP as we evaluate regional and interregional transmission solutions/alternatives and ensure that TVA and SERTP are measuring a range of benefits these facilities could provide. We are excited to evaluate multi-valued transmission projects as a part of SERTP and see where this path takes TVA.

Expanded interregional transmission can open up additional opportunities to contract for capacity from outside the system and/or to import additional power purchases on the spot market. TVA's planning reserve margin study considers the ability to import power to support system reliability (see Volume 1, section D.1 for more information on planning reserve margin).

255. TVA should consider areas of load growth on the system and opportunities to site generating assets in locations that best support that growth, contribute to grid resilience and stability, and mitigate risks during power outages. (*Commenter: Rachael Maitland – Tennessee Department of Environment and Conservation*)

*Response:* Preparing for local and regional load growth, as well as understanding when and where retirements will likely occur and new generation will be needed, are key inputs into transmission planning. TVA has initiated development of a more strategic transmission process, that will incorporate stakeholder input. This process will consider strategic direction from the IRP, along with the locational aspects of connecting load and generation, to enable the efficient evolution of the power system. As demand and supply change, TVA is optimizing existing and new infrastructure and expanding the use of grid-enhancing and grid-supporting technologies, such as advanced conductors and STATCOMS, as well as exploring dynamic line ratings, to manage more complex two-way flows and support the grid of the future.

256. TVA should implement proactive local and regional transmission planning processes that identify cost-effective backbone network upgrades needed to support new generation resources and higher load in advance of need. TVA should also consider working with other RTO and energy companies throughout the Southeast to promote grid stability and transmission upgrades.

*(Commenters: Jonathan Geldof – ACORE, Whit Cox – Southern Renewable Energy Association, Markey and Cohen – Congress of the United States)*

**Response:** TVA has traditionally utilized an annual load forecast and generation resource plan to analyze transmission needs over a 10-year horizon, identifying constraints on the power system and addressing them through corrective action plans like network upgrades. In the past few years, TVA extended studies of the power system up to 15 years out to incorporate anticipated major system changes, such as large resource retirements and additions. The analysis identifies large transmission projects to help interconnect future generation, both planned and unplanned, and to increase TVA's capability to serve future load growth and economic development. TVA has initiated development of a more strategic transmission process, that will incorporate stakeholder input. This process will consider strategic direction from the IRP, along with the locational aspects of connecting load and generation, to enable the efficient evolution of the power system. TVA will incorporate additional elements of transmission planning into future IRPs to more fully integrate system planning.

In addition, TVA is a sponsor in the Southeastern Regional Transmission Planning (SERTP) process and is very involved in the planning and implementation for FERC Orders 890, 1000, and 1920. TVA and other sponsors and stakeholders are actively engaging to develop a plan to ensure we are compliant with Order 1920. Its implementation will guide SERTP as we evaluate regional and interregional transmission solutions/alternatives and ensure that TVA and SERTP are measuring a range of benefits these facilities could provide. We are excited to evaluate multi-valued transmission projects as a part of SERTP and see where this path takes TVA.

257. TVA should pursue transmission investments in order to optimize existing infrastructure, decrease future system costs, increase grid reliability, enable the expansion of solar and storage, and/or avoid new generation construction. *(Commenters: Richard Henighan, Tracy O'Neill – Preserve Cheatham County, Ntale Kajumba – EPA Region 4, Gabriela Sarri-Tobar – Center for Biological Diversity)*

**Response:** Additions of new energy resources of all types typically require additional investments in the transmission system. Generally, these investments include optimizing existing infrastructure through projects such as reconductoring transmission lines and upgrading substations, along with building new transmission infrastructure such as transmission lines, substations, and other devices that support system reliability and stability. Where possible, TVA prefers to utilize brownfield sites with existing infrastructure and easements. TVA is also expanding its use of grid-enhancing and grid-supporting technologies, such as advanced conductors and STATCOMS, as well as dynamic line ratings, to greater leverage the existing transmission system when adding new generation and storage to the system. TVA is also working to streamline processes for interconnecting new resources and will expand regional ties where cost competitive.

258. TVA should utilize zonal modeling and identify renewable energy zones to facilitate interconnecting clean energy resources and new load, optimize transmission investments, and reduce interconnection costs and timelines. *(Commenter: Jonathan Geldof – ACORE)*

**Response:** Preparing for local and regional load growth, as well as understanding when and where retirements will likely occur and new generation will be needed, are key inputs into transmission planning. TVA has initiated development of a more strategic transmission process, that will incorporate stakeholder input. This process will consider strategic direction from the IRP, along with the locational aspects of connecting load and generation, to enable the efficient evolution of the power system. TVA will incorporate additional elements of transmission planning into future IRPs to more fully integrate system planning. TVA is making strategic investments in the transmission system



to enable growth and new power generation resources. To complement transmission investments, TVA is actively working to streamline the process for interconnecting new resources and reduce associated timelines. Reducing interconnection timelines will help support and accelerate the deployment of new generation of all types over the coming years.

259. Recognize that the period of system upgrade under the 2025 IRP and installation of new or replacement switchgears represents the ideal time to switch to SF6 free switchgears given that the life of a switchgear is over 30 years. (*Commenter: Ntale Kajumba – EPA Region 4*)

*Response:* TVA uses switchgear units that are manufactured to meet industry standards. While some older existing electrical equipment may contain SF6 gas, which could have minor leaks, mostly associated with maintenance or long-term equipment degradation, newer switchgear and breakers would be installed with more efficient operation and maintenance techniques and leak detection, and these features would minimize SF6 emissions. TVA is not aware of an SF6-free alternative that is a proven mature technology and is readily available for high voltage levels. A system-wide review of SF6 switchgear conversion would be outside the scope of this analysis; however, TVA actively monitors evolving technology for future consideration and for demonstrated market experience would like to see some experience on the market with proven reliability at these voltages before implementation.

### **H.2.3.27 TVA and LPC Coordination**

260. Both the Tennessee Valley Authority and Mississippi Power Company are working to build the needed generation and transmission assets to meet the loads of the future. We constantly work with our wholesale energy suppliers to be sure a balance between availability and affordability remains. (*Commenter: Randy E Carroll*)

*Response:* Thank you for your comment. It has been noted by TVA.

## **H.2.4 Economics**

### **H.2.4.1 Advanced Energy Innovation**

261. TVA could work more closely with startups by creating innovation grants or partnering on pilot projects, like it did with the Spark Cleantech Accelerator at the 2024 Opportunities in Energy event. (*Commenter: Courtney Piper – Tennessee Advanced Energy Business Council*)

*Response:* TVA is sponsoring promising startup companies through Oak Ridge National Laboratory (ORNL), Electric Power Research Institute (EPRI), and other innovation programs to spur development of advanced energy projects. As noted in Chapter 1 of Volume 1, Strategic Partnerships are a key enabler and foundational element to providing affordable, reliable, and resilient energy.

### **H.2.4.2 American Energy Future**

262. It is time for Americans to stop supporting foreign nations with our purchase of oil. These nations have horrible human rights violations! (*Commenter: Mary Strom*)

*Response:* Thank you for your comment. It has been noted by TVA.

### **H.2.4.3 Financial Plan and Debt Ceiling**

263. With growing energy demand, TVA will likely experience debt ceiling pressure and may need to pursue alternative methods for financing. To alleviate pressure, TVA should pursue investment partnerships and/or other avenues for large customers, whether served through a local power



company or directly by TVA, to drive additional clean energy and advanced energy deployment with shared cost/benefit. (*Commenters: Michael Scalf, Cortney Piper – Tennessee Advanced Energy Business Council, Scott Dunbar – Clean Energy Buyers Association, Jonathan Geldof – ACORE, Trey Bussey – SELC, et al.*)

*Response:* The IRP will inform TVA's next long-range financial plan. TVA must balance a number of key financial factors when considering how to meet demand growth in the future. Our least-cost planning principle of low-cost considers overall rate competitiveness and affordability for the end-use customer. The TVA Act has set a statutory debt ceiling of \$30 billion, and TVA will comply with that requirement. Traditionally, TVA has issued bonds, notes, and other evidences of indebtedness to fund investments in new generation resources, then passes those costs on to customers over a period of time generally aligned with a risk-informed view of the operating life of those assets. TVA has and could leverage other forms of financing that do not count against the statutory debt limit, and TVA could explore new programs with customers and/or third parties as a method to deliver on the electricity needs of the region.

#### **H.2.4.4 Incentives - Federal**

264. TVA should take advantage of the Inflation Reduction Act and other federal incentives for clean energy resources. (*Commenters: Rebecca Cummings, Bonnie Swinford – Sierra Club, Evergreen Form Letter Commenters, Markey and Cohen – Congress of the United States, Gabriela Sarri-Tobar – Center for Biological Diversity*)

*Response:* All IRP scenarios reflect the impacts of the One, Big, Beautiful Bill Act (OBBB), which included updates to investment tax credit (ITC) opportunities available for renewable, storage, and nuclear resources. For more information of how ITC incentives were modeled, see Volume 1, section 2.4.4. As power resources are constructed or procured, TVA is pursuing avenues that leverage federal incentives such as the OBBB.

#### **H.2.4.5 Incentives - TVA**

265. It would be helpful if TVA could provide support to property owners looking for reputable contractors for rooftop solar installations. (*Commenter: Joanne Groshardt*)

*Response:* The construction and interconnection of small scale solar is primarily focused on the local level, with end use customers and local power companies being the concerned parties. TVA aided local power companies with small scale solar support from 2020 – 2025, which was an effort to assist with the early adoption period of residential rooftop solar. The tools developed during that period have been made available to local power companies for their use and include contractor vetting standards, solar installation best practices, interconnection processes, and commissioning requirements. Small scale solar adopters are encouraged to work with their local power companies to understand contractors with the best reputation within their service footprint.

266. TVA should provide strong incentives to promote distributed energy resources, including some as microgrid installations, that can support demand at peak times and during outages. (*Commenters: Martha Ward, Rebecca Cummings, Roger Stout*)

*Response:* The IRP analysis evaluated distributed solar and storage as resource options. These distributed resources were emphasized as a part of Strategy C, Distributed. Distributed resources can play a role in enhancing local resiliency and they can offset the need for some centralized power resources.

The IRP analysis includes baseline forecasts for distributed generation (DG) adoption for each scenario and forecasts for higher levels of adoption when promoted in the Distributed strategy. To model the varying levels of DG adoption before and after incentives, TVA uses an approach similar to the National Laboratory of the Rockies' Distributed Market Demand Model, which simulates potential adoption of a given resource as a function of payback period. For more information on DG modeling, please see Volume 1, Appendix F.

The IRP's strategic portfolio direction includes a recommended action to collaborate with local power companies on the evolution of distributed generation programs. For more on the IRP recommendations, please see Volume 1, Chapter 4.

267. TVA should explore policies and incentives that encourage more widespread adoption of distributed resources such as solar, storage, wind, and geothermal. This could reduce demand on the central grid, increase the amount of clean energy, and provide more localized energy resilience. *(Commenters: Martha Ward, Rebecca Cummings, Roger Stout, Dennis Lynch, Sara Bielaczyc, Nathaniel Bass, Nancy Hardin, Carlson Swafford – Eco Demo Law PLLC, Jon Hamilton, Cortney Piper – Tennessee Advanced Energy Business Council)*

*Response:* The IRP analysis evaluated distributed solar and storage as resource options. These distributed resources were emphasized as a part of Strategy C, Distributed. Distributed resources can play a role in enhancing local resiliency and they can offset the need for some centralized power resources.

The IRP analysis includes baseline forecasts for distributed generation (DG) adoption for each scenario and forecasts for higher levels of adoption when promoted in the Distributed strategy. To model the varying levels of DG adoption before and after incentives, TVA uses an approach similar to the National Laboratory of the Rockies' Distributed Market Demand Model, which simulates potential adoption of a given resource as a function of payback period. For more information on DG modeling, please see Volume 1, Appendix F.

The IRP's strategic portfolio direction includes a recommended action to collaborate with local power companies on the evolution of distributed generation programs. For more on the IRP recommendations, please see Volume 1, Chapter 4.

Geothermal is a viable emerging technology that is gaining traction in certain geographic areas. Additional technological advancement in drilling to improve the costs is needed. Deployment is expected in the Western part of the U.S. where the geography is more favorable. It is uncertain if and when the technology would be deployed in the TVA region, which would generally require significantly deeper wells for reasonable production.

268. TVA should financially incentivize consumers to make energy efficiency improvements and reduce demand at peak times. *(Commenters: C. B. Folks, Ken Rawn)*

*Response:* Achievable energy program potential varies with evolving codes and standards and from region to region. To better understand achievable potential, TVA commissioned DNV, a global leader in energy program consulting, to perform a study for the region in 2022. Energy program resource options for the IRP were developed based on the study, subsequent market experience, and other program knowledge. The study indicated 10-year energy efficiency (EE) potential ranging from 2-7% of sales, which was less than the 1% of annual sales industry norm that is sometimes quoted. Reporting of utility programmatic EE impacts is not fully consistent across the industry, as some utilities appear to report a portion of market-driven impacts (or naturally occurring impacts with evolving codes and standards) in their numbers.

The IRP analysis evaluated demand-side management program options for the residential, commercial, and industrial sectors. Based on public comments, TVA also conducted a sensitivity to understand the impacts if EE availability and deployment were greater than forecasted. TVA has been ramping up investments in residential, commercial, and industrial EE and DR programs using insights from the potential study.

The IRP's strategic portfolio direction includes recommended actions to utilize demand response and behind-the-meter resources to enable near-term interconnection of new industrial loads; and partner with customers to leverage cost-effective energy efficiency and demand response. For more on the IRP recommendations, please see Volume 1, Chapter 4.

269. Advertise your incentive program much better. a. Work with local utilities to promote the program more aggressively. b. Create a lottery system with multiple prizes at different levels for anyone who participates in the program. c. Incentivize local communities to promote the incentives by providing awards to each county and/or municipality based on participation rates. (*Commenters: Martha Ward, Rebecca Cummings, Roger Stout*)

*Response:* Thank you for your comment. It has been noted by TVA.

270. TVA should consider TVA Flex 3.0, in which it allows the States and local governments to promulgate their own incentives, or decline to do so, and let the economics speak for themselves. (*Commenter: Carlson Swafford – Eco Demo Law PLLC*)

*Response:* Thank you for your comment. It has been noted by TVA.

271. TVA should encourage consumers to make rooftop solar and other distributed resource investments by offering incentives such as rebates, financing, and other programs to improve affordability, along with implementing net-metering (individual and/or group) to enable customers to sell excess solar power back to TVA. (*Commenters: Scott, Sharon K Ammons, Rev. Clifford Bahlinger, Stephanie McDaniel-Gilman, Mark Jorgen Nicoson, Tyler Oliveira, Kathryn, Carlson Swafford – Eco Demo Law PLLC, Jan Berry – Citizens' Climate Education, Gabriela Sarri-Tobar – Center for Biological Diversity, Tracy O'Neill – Preserve Cheatham County, Madison Rollings, Nancy Mitchell, Beau Bennett, Ray Batch, Tom Scheel, Patrick Belton, Anonymous 10, Joe Franklin*)

*Response:* The IRP analysis evaluated distributed solar and storage as resource options. These distributed resources were emphasized as a part of Strategy C, Distributed. Distributed resources can play a role in enhancing local resiliency and they can offset the need for some centralized power resources.

The IRP analysis includes baseline forecasts for distributed generation (DG) adoption for each scenario and forecasts for higher levels of adoption when promoted in the Distributed strategy. To model the varying levels of DG adoption before and after incentives, TVA uses an approach similar to the National Laboratory of the Rockies' Distributed Market Demand Model, which simulates potential adoption of a given resource as a function of payback period. For more information on DG modeling, please see Volume 1, Appendix F.

The IRP's strategic portfolio direction includes a recommended action to collaborate with local power companies on the evolution of distributed generation programs. For more on the IRP recommendations, please see Volume 1, Chapter 4.

End-use customer hosted generation, such as rooftop solar, must align with TVA's current net-metering policy. This policy states that any compensation for electricity produced by an electric consumer from an eligible onsite generation source that is delivered to the local distribution facilities, or otherwise to TVA, may only be made under, and in accordance with, rates, metering, and billing

arrangements approved by TVA and determined by TVA to be consistent with its regulatory and wholesale power contract requirements. Additionally, residential customers have the option to enroll in TVA's Dispersed Power Production program, which compensates customers for energy at TVA's avoided cost.

272. TVA should incentivize farmers to install solar with battery on their properties and collaborate on the best way to utilize the land for power generation and agriculture. (*Commenters: Martha Ward, Rebecca Cummings, Roger Stout*)

*Response:* Utility-scale solar farms typically require about 7 acres of land per installed megawatt of nameplate capacity. The majority of solar power purchase agreements currently operating and under contract are sited on greenfield (undisturbed) property. TVA strives to leverage brownfield (previously disturbed) options for siting any resource type when practical and will pursue suitable opportunities for solar as they arise, such as the ongoing project to install solar on the Shawnee fossil plant reservation. Agrivoltaics, or dual-use solar that combines solar energy production with agricultural activities on the same land, is an emerging approach that may reduce land impacts of solar installations in the future.

273. I had solar panels put on my roof only to have my electric bill go down from \$149 to \$139. This is by far less than I thought it would be. Ameren sent me an email when I was having the solar panels put on my roof. They said "don't expect your electric bill to go down much" and it definitely didn't. (*Commenter: Mark Hartnagel*)

*Response:* Thank you for your comment. It has been noted by TVA.

#### **H.2.4.6 Large Customers**

274. Data centers and other high energy use customers should pay commensurately for their energy and/or supply their own energy to avoid overburdening other customers. (*Commenters: Nathaniel Bass, Dennis Lynch, Tracy O'Neill – Preserve Cheatham County, Bonnie Swinford – Sierra Club, Trey Bussey – SELC, et al., Gabriela Sarri-Tobar – Center for Biological Diversity*)

*Response:* TVA's mission includes economic development and TVA remains focused on efforts to enable job creation across the region. TVA does not recruit data centers or related industries. TVA has an obligation to serve our customers, such as in the case of Memphis Light, Gas and Water (MLGW) that serves xAI. TVA works closely with local power companies and communities when a business is interested in locating in the Valley region. TVA can establish when and under what system conditions we can serve a new large energy user. For instance, a customer could enroll in a demand response program where the customer agrees to reduce their load at peak times.

Additionally, high-energy use customers are financially motivated to become more efficient energy users over time, as energy is typically one of their largest business expenses.

275. Many large commercial and industrial customers have sustainability goals, and an expansion emphasizing clean energy would encourage them to expand or locate in the region. Additionally, TVA should leverage the opportunity to collaborate with these customers through vehicles like investment partnerships to significantly expand the use of clean energy resources in the region and minimize environmental impacts. (*Commenters: Tracy O'Neill – Preserve Cheatham County, Zdravka Tzankova, PhD, Cortney Piper – Tennessee Advanced Energy Business Council, Nathaniel Bass, Scott Dunbar – Clean Energy Buyers Association, Ntale Kajumba – EPA Region 4, Mark Acker*)

*Response:* The alternative strategies studied in the IRP, Strategy B - Innovation and Strategy C - Distributed, both offer opportunities to leverage partnerships to facilitate deployment of their emphasized resources. In the long-form narrative associated with the Innovation strategy TVA states

that, “TVA would increase efforts in research and development to advance and deploy [technologies like advanced nuclear and long duration storage]...[which] could be executed through partnerships with the federal government or other organizations” (see Volume 1, Appendix C, page C-1). Additionally, the narrative associated with the Distributed strategy notes that “this strategy would require the use of existing and potentially expanded customer partnerships and programmatic solutions to increase uptake of these distributed resources.” (see Volume 1, Appendix C, page C-2). In all cases, TVA must ensure that customer partnerships offer balanced and fair incentive structures that do not disrupt grid reliability or lead to higher costs for other non-participating customers. For additional information on Strategy Design, please see Volume 1, Appendix C.

Additionally, the IRP Recommendation’s Strategic Portfolio Direction notes that Complementary deployment of solar, demand-side, and distributed generation resources should be used to satisfy capacity requirements, provide economic energy, and/or meet customer needs. Finally, the discussion of signposts in Volume 1, section 4.4 notes that if TVA experiences higher clean energy program demand, then the resource portfolio is likely to have more programmatic solar and storage, potential to expand existing programs, and/or potential for advanced nuclear partnerships.

#### **H.2.4.7 Rate Structure**

276. Eliminate the discriminatory Grid Access Charge, which is designed to discourage investments in distributed energy. TVA should reverse its 2018 rate changes, which unfairly discourage businesses and homeowners from rooftop solar projects. (*Commenter: Gabriela Sarri-Tobar – Center for Biological Diversity*)

*Response:* The IRP is a strategic planning effort to understand how the TVA power system will need to evolve to meet the region's future energy needs, and rate structure is out of scope for the IRP. A key next step in implementing the IRP recommendations is translating the IRP's strategic direction into an executable asset strategy and financial plan, which would reflect the most recent Board-approved rate structure.

277. Devise a tiered rate structure for all users (government, business, nonprofits, individuals) that has a mid-tier rate that is double that of the lowest tier. And the highest tier would have a rate that is double that of the mid tier. Tier would be determined by usage history and income level. (*Commenter: David Bezanson*)

*Response:* The IRP is a strategic planning effort to understand how the TVA power system will need to evolve to meet the region's future energy needs, and rate structure is out of scope for the IRP. A key next step in implementing the IRP recommendations is translating the IRP's strategic direction into an executable asset strategy and financial plan, which would reflect the most recent Board-approved rate structure.

#### **H.2.4.8 Renewable Programs**

278. TDEC recommends that TVA include information on current programs and policies to promote residential, commercial, and industrial solar growth both for direct customers and those served by LPCs. EPA programs such as the Greenhouse Gas Reduction Fund (GGRF) and Solar for All support behind-the-meter solar installations, which could positively impact power demand and load management across TVA’s territory. By highlighting these efforts and assessing their future impact, TVA could offer stakeholders a more accurate view of the renewable energy landscape at different scales. (*Commenter: Rachael Maitland – Tennessee Department of Environment and Conservation*)

*Response:* Thank you for your comment. It has been noted by TVA.



279. Revamp your current rebate system that requires the contractor to do the paperwork.

*(Commenters: Martha Ward, Rebecca Cummings, Roger Stout)*

*Response:* Thank you for your comment. It has been noted by TVA.

#### **H.2.4.9 Socioeconomics**

280. Rural, disadvantaged and energy communities especially stand to gain the most from these advancements and from federal grants and incentives; but they need technical support and a framework so projects get done safely, efficiently and within a reasonable timeframe. *(Commenter: Jon Hamilton)*

*Response:* Thank you for your comment. It has been noted by TVA.

281. First and foremost, TVA must prioritize providing low-cost and reliable power to their customers to support a healthy economy and keep the lights on. *(Commenters: Harry Eich, Rebecca McGrew – NACCO Natural Resources, Frankie L Moorman, Lynn Billingham)*

*Response:* TVA's integrated resource planning is grounded in least-cost planning principles, in alignment with Section 113 of the Energy Policy Act of 1992. These least-cost principles include balancing the following goals: low cost, risk informed, environmentally responsible, reliable and resilient, diverse, and flexible. For more on TVA's least-cost planning requirements, please see section 3.1 of Volume 1.

282. TVA should invest in affordable clean energy sources, such as renewables, distributed resources, and energy efficiency, to enable cost reductions to ratepayers and align with least-cost planning. *(Commenters: Anonymous 8, Lynn Billingham, Gabriela Sarri-Tobar – Center for Biological Diversity, Susan Henning, Francis Lamberts, Evergreen Form Letter Commenters, Jordan Williams)*

*Response:* TVA's integrated resource planning is grounded in least-cost planning principles, in alignment with Section 113 of the Energy Policy Act of 1992. These least-cost principles include balancing the following goals: low cost, risk informed, environmentally responsible, reliable and resilient, diverse, and flexible. For more on TVA's least-cost planning requirements, please see section 3.1 of Volume 1.

In the near term, the IRP Recommendation's Strategic Portfolio Direction states that TVA's IRP analysis reaffirms the importance of adhering to least-cost planning principles to ensure the continued delivery of affordable, reliable, and resilient power to the Tennessee Valley. The results underscore that no single resource will fully meet future system needs; rather, maintaining a diverse portfolio remains essential. In the near-term, TVA should prioritize the addition of firm, dispatchable resources, particularly natural gas and storage, to address capacity requirements. TVA should also continue collaborating with industry and federal partners to prepare for the potential deployment of firm, dispatchable advanced nuclear technologies, which could support long-term load growth while mitigating fuel volatility and regulatory risks. Finally, complementary deployment of solar, demand-side, and distributed generation resources should be used to satisfy capacity requirements, provide economic energy, and/or meet customer needs.

283. TVA's gas expansion is increasing the price of energy for all ratepayers, and it is particularly affecting communities of color and low-income communities that experience some of the highest energy burdens. *(Commenters: Susan Henning, Anonymous 8, Francis Lamberts, Evergreen Form Letter Commenters, Leah McCord – CleanUpTVA Coalition, Gabriela Sarri-Tobar – Center for Biological Diversity, Markey and Cohen – Congress of the United States)*



*Response:* It is necessary for TVA to add or procure new power generation resources to meet the growing energy needs of the region. Currently, TVA is adding a mix of gas, storage, and solar based on least-cost planning principles (low cost, risk informed, environmentally responsible, reliable and resilient, diverse, and flexible). TVA executes a financial hedging program with the objective of reducing fuel cost volatility by protecting against natural gas prices fluctuations within established risk tolerances that are reviewed annually by the TVA Board.

While TVA's demand-side portfolio serves customers across all segments, TVA also maintains targeted support for households and communities with higher energy burdens. TVA introduced its Home Uplift program in 2018, in partnership with local power companies and communities. By FY 2019, about 1,300 Valley residences were retrofitted with more energy efficient technology for heating and cooling, water heating, and insulation. This number grew to about 7,900 retrofitted residences by the end of FY 2025, reducing system energy needs by more than 28,000 megawatt hours, benefitting low-income households. TVA provides matching funds for local power companies and local communities to support this program. Additionally, the School Uplift program provides education and efficiency improvements to schools within TVA's service territory, which has especially benefited low-income communities. These initiatives complement TVA's broader EE strategy and remain part of TVA's base-level EE investments.

284. Prioritizing renewable energy resources like solar and wind will not only reduce carbon footprint but will also drive economic growth and create jobs in the region. (*Commenters: Valerie, Dan Silver, Raymond Holder, Taffy Williams, Mitch Carpen*)

*Response:* TVA's integrated resource planning is grounded in least-cost planning principles, in alignment with Section 113 of the Energy Policy Act of 1992. These least-cost principles include balancing the following goals: low cost, risk informed, environmentally responsible, reliable and resilient, diverse, and flexible. For more on TVA's least-cost planning requirements, please see section 3.1 of Volume 1.

In the near term, the IRP Recommendation's Strategic Portfolio Direction states that TVA's IRP analysis reaffirms the importance of adhering to least-cost planning principles to ensure the continued delivery of affordable, reliable, and resilient power to the Tennessee Valley. The results underscore that no single resource will fully meet future system needs; rather, maintaining a diverse portfolio remains essential. In the near-term, TVA should prioritize the addition of firm, dispatchable resources, particularly natural gas and storage, to address capacity requirements. TVA should also continue collaborating with industry and federal partners to prepare for the potential deployment of firm, dispatchable advanced nuclear technologies, which could support long-term load growth while mitigating fuel volatility and regulatory risks. Finally, complementary deployment of solar, demand-side, and distributed generation resources should be used to satisfy capacity requirements, provide economic energy, and/or meet customer needs.

The IRP Recommendation's strategic portfolio direction includes recommended actions to pursue solar to reduce total system costs or meet customer needs and to collaborate with local power companies on the evolution of distributed generation programs. For more on IRP recommendations, see Volume 1, Chapter 4.

## **H.2.5 Environmental Impacts**

### **H.2.5.1 Air Quality and Emissions**

285. TVA must act in accordance with applicable federal, state, and local laws and regulations, and recommended best management practices for TVA to take regarding its facilities and actions. These

actions and recommendations covered the topics addressed in the IRP EIS including Air Quality and Emissions, Cultural Resources, Land Use, Solid and Hazardous Waste, Water Resources, and Wildlife. (*Commenter: Valerie Fulcher – Virginia Department of Environmental Quality*)

*Response:* The IRP EIS is a programmatic environment analysis that does not itself authorize any site-specific actions, such as the construction and operation of new generating facilities. Consequently, the EIS does not contain site-specific analyses of the potential impacts of each of the IRP alternatives on these resources. Rather, the EIS includes general discussions of resources within the TVA region. These descriptions are followed by a discussion of how impacts to these resources would be addressed during facility siting and review processes when specific proposals to implement the IRP are considered.

TVA will conduct the appropriate detailed impact analyses, when it proposes actions to implement the IRP. TVA will consider mitigation of any impacts through siting and facility design processes at the time additional environmental reviews are conducted for site-specific actions implementing the IRP. Additionally, TVA will coordinate and consult with federal and state agencies pursuant to requirements.

286. CCS can have negative air quality impacts in some circumstances. While sulfur dioxide and particulate matter in a generator's exhaust stream must be strictly controlled for post-combustion CCS equipment to function correctly, increased fuel burning due to the CCS energy penalty can increase emissions of other air pollutants such as nitrogen oxide. CCS can also result in increased emissions of ammonia, which can result in formation of secondary particulate matter, depending on factors such as location and weather. (*Commenter: Zachary Fabish – The Sierra Club*)

*Response:* Carbon capture and sequestration benefits and current affected environments are addressed in Section 4.5.1.1 (Geologic Carbon Dioxide Sequestration Potential) of Volume 2. Potential emissions reductions given different resource uses are addressed in Section 5.5.2.3 (Life Cycle GHG Emissions). Volume 1 Appendix J.3 and J.4 also cover CO<sub>2</sub> Emissions and CO<sub>2</sub> Intensity, respectively.

Further effects of CCS and air quality impacts will be addressed, as appropriate, with regard to future projects at the time those projects are being proposed.

287. The Draft IRP/DEIS considers “five gas expansion options . . . to fill the expected capacity gap,” one of which is a combined cycle (“CC”) unit with carbon capture and sequestration (“CCS”) with an assumed 90% capture rate for CO<sub>2</sub> emissions, and two others which assume a “robust hydrogen market develops by the early 2030s.” Many of the basic assumptions underlying the Draft IRP analysis are fundamentally flawed and render its conclusions untenable. TVA's sea change in relying upon these technologies is particularly surprising given that just last year TVA joined utilities and trade associations in expressing profound concern about their ability to comply with CCS and hydrogen blending guidelines in EPA's draft greenhouse gas emission standards rule. (*Commenter: Gabriela Sarri-Tobar – Center for Biological Diversity*)

*Response:* For carbon capture and sequestration, TVA used recent project experience, discussions with equipment manufacturers, and insights from R&D efforts to capture both the base natural gas plant cost plus the infrastructure required to capture, transport, and store CO<sub>2</sub> (see response to comment #30). Between the release of the draft and final IRP, TVA updated cost estimates for the CC with CCS expansion option which included an increase in both the forecasted upfront capital cost (for capture equipment) and ongoing fixed O&M (for transportation and storage).

The IRP also speaks to the potential portfolio implications of faster or slower progress on technology readiness timelines (see Volume 1, Section 4.4.3). The strategy assessment in the IRP acknowledges that technological risks are greatest in portfolios with more reliance on emerging technologies, which would include carbon capture and sequestration.

288. The Draft IRP/DEIS fails to substantively grapple with the social cost of carbon capture, namely the resulting air pollution, potential health problems, economic costs and overall contributions to climate change. (*Commenter: Gabriela Sarri-Tobar – Center for Biological Diversity*)

*Response:* Pursuant to Section 113 of the Energy Policy Act of 1992, portfolio optimization in the IRP analysis evaluates impacts of expansion paths on system cost that encompasses only those costs that are "direct and quantifiable net costs for an energy resource over its available life, including production, transportation, utilization, waste management, and environmental compliance."

Carbon capture and sequestration benefits and current affected environments are addressed in Section 4.5.1.1 (Geologic Carbon Dioxide Sequestration Potential) of Volume 2. Potential emissions reductions given different resource uses are addressed in Section 5.5.2.3 (Life Cycle GHG Emissions). Volume 1 Appendix J.3 and J.4 also cover CO<sub>2</sub> Emissions and CO<sub>2</sub> Intensity, respectively.

Further effects of CCS and air quality impacts will be addressed, as appropriate, with regard to future projects at the time those projects are being proposed.

289. Instead of creating long-range plans to mitigate carbon emissions and sacrifice reliability based on climate models that contradict observed data, I request that TVA do additional research into man-made impacts on climate change. Create its own model with reliable emissions and climate data. Then present it to your customers, the citizens that live in the areas served by the local power companies. The 2025 Integrated Resource Plan needs to take care of the needs that we are sure of: We need affordable, safe, and reliable power now. Utilize proven technology and available [sic] and our abundant natural resources to provide that power. (*Commenter: Marty Crowder*)

*Response:* TVA uses the output of widely used climate models such as the Fifth National Climate Assessment (USGCRP 2023) and the Intergovernmental Panel on Climate Change Assessment Reports that follow the best practices and standards set forth by the World Climate Research Programme, The World Climate Research Programme runs the Coupled Model Intercomparison Project that makes sure all models use the same data, and compares their results, which are relatively similar. These models use data and provide results on a regional level allowing for better understanding of what is and may be impacted by changing conditions. Use of these models eliminates the need for TVA to create its own model. Climate change effects and model outputs are addressed in Volume 2, Sections 4.3.1 (climate normals and trends), 4.3.4 (climate adaptation), 5.2.1 (effects of fossil fuel generation), 5.5.2 (climate and greenhouse gases), and Appendix D (life cycle analysis).

290. Provide a more detailed evaluation of climate resilience/adaptation planning, such as including discussion of specific measures that the TVA will consider in the planning process, like scour monitoring, flood protections such as control reservoirs, recirculating water for cooling, underground transmission lines, and other designs to increase robustness. (*Commenter: Ntale Kajumba – EPA Region 4*)

*Response:* Section 5.5.2.5 of the EIS provides an overview of TVA's consideration of climate change and adaptation. It is not intended to be a detailed discussion of potential measures that would be

considered during project planning. Specific measures would be identified in subsequent environmental reviews when projects that would implement the IRP strategic direction are proposed.

291. In its final EIS, TVA should primarily use the 2023 EPA estimates for the social cost of greenhouse gases (SC-GHG) analysis because they are the best available government climate-damage estimates; because the Working Group and the White House Council on Environmental Quality encouraged agencies to use values that reflect the best available evidence; and because other federal agencies are already using these estimates to monetize the climate damages associated with their actions. If the Working Group estimates remain in the final EIS, they should only be used in a sensitivity analysis to provide context for the primary analysis. TVA should also include language on why it is using the 2023 EPA estimates and amend one sentence where it misleadingly states that it will use the estimates at a 2.5% discount rate. (*Commenters: Jason A. Schwartz – Institute for Policy Integrity at NYU School of Law*)

*Response:* Pursuant to Section 113 of the Energy Policy Act of 1992, portfolio optimization in the IRP analysis evaluates impacts of expansion paths on system cost that encompasses only those costs that are "direct and quantifiable net costs for an energy resource over its available life, including production, transportation, utilization, waste management, and environmental compliance."

Details on how the greenhouse gas (GHG) life cycle analysis (LCA) was developed are included in Volume 2, Section 5.5.2.3 and Appendix D. For its GHG LCA, TVA partnered with the National Laboratory of the Rockies (NLR), which provided technical assistance, verified and generated harmonized LCA emission factors for each resource technology, and validated TVA's results by running select TVA cases through its own GHG LCA model. NLR provided TVA with a technical report which includes documentation of NLR's scope of work as well as documentation of emission factors for each resource type. This report was produced when the laboratory operated as the National Renewable Energy Laboratory (NREL). The laboratory is now the National Laboratory of the Rockies (NLR). A copy of this report is available as a supporting document on TVA's 2026 IRP website ([www.tva.com/irp](http://www.tva.com/irp)).

A social cost analysis is not included in the Final EIS.

292. The EIS fails to consider the carbon intensity of all of the above [resources in front of or behind the meter], effectively only analyzing scenarios based on TVA's Scope I emissions. (*Commenter: Carlson Swafford – Eco Demo Law PLLC*)

*Response:* In the IRP analysis, distributed generation resources are modeled as supply-side resources to ensure that they are treated on a consistent and integrated basis. Distributed generation, such as rooftop solar, reduces generation that would otherwise be required from TVA facilities. Distributed solar facilities, for example, do not generate combustion emissions and this is captured within the analysis in Volume 2, Section 5.5.2.

293. Recommendation: Increase transparency and add additional detail to the presentation of emissions in chapter 5. The GHG emissions are only presented as averages across scenarios, and not by strategy/scenario combination. In describing the alternatives (page 3-1), the TVA notes "Multiple strategies, which represent business decisions within TVA's control, are modeled against multiple scenarios, which represent uncertain futures outside of TVA's control." The text should more clearly describe differences across strategies and scenarios that are caused by factors that the TVA controls. The use of averages across scenarios makes it difficult to determine if differences between alternatives are caused by the TVA decisions or uncertain future conditions. (*Commenter: Ntale Kajumba – EPA Region 4*)

*Response:* Section 2.7.3 and Appendix J of Volume 1 include a review of environmental metrics across each of the strategies studied. Within Appendix J, Sections J.6 and J.7 include graphs outlining expected CO<sub>2</sub> emissions for each of the nine core portfolios through time, both in mass emissions and intensity (lbs/MWh). As a part of Volume 2's greenhouse gas life cycle assessment (Volume 2, Section 5.5.2.3 and Appendix D), TVA is providing a detailed data file at [www.tva.com/IRP](http://www.tva.com/IRP) which outlines each portfolios full forecasted life cycle emissions for CO<sub>2</sub>, N<sub>2</sub>O, and CH<sub>4</sub>.

294. Carbon Dioxide Equivalents: In the draft EIS, discussions about GHG emissions focus primarily on CO<sub>2</sub>. For example, page 5-30 reads “Total and annual direct combustion emissions of GHG in terms of CO<sub>2</sub>...” It is unclear from this discussion if only CO<sub>2</sub> emissions are being quantified, or if emissions of other GHGs (methane (CH<sub>4</sub>) and Nitrogen dioxide (N<sub>2</sub>O)) are being quantified and converted into CO<sub>2</sub> equivalent(e).

*Recommendation:* Quantify all GHGs emissions and identify when emissions have been converted into CO<sub>2</sub>e. (*Commenter: Ntale Kajumba – EPA Region 4*)

*Response:* Greenhouse gas (GHG) emission analysis in Volume 2, Section 5.5.2.1 focuses on CO<sub>2</sub>, not CO<sub>2</sub>e. In addition to the forecasted direct combustion CO<sub>2</sub> emissions, TVA also developed life cycle GHG emissions forecasts for CO<sub>2</sub>, N<sub>2</sub>O, and CH<sub>4</sub> to include upstream, ongoing non-combustion, and downstream GHG emissions for each studied alternative and select sensitivities in Volume 2, Section 5.5.2.3.

295. The draft EIS provides a discussion of regional and local climate change impacts and briefly mentions resilience and hardening measures in section 5.5.2.5. However, the following statement on page 4-17 of the draft EIS, which discusses the predicted impacts of climate change in the Southeast, appears misleading: “the 4th NCA report, however, notes that Southeast temperatures have not increased in the last century, contrary to climate model projections of what should have happened with the increase in atmospheric GHG concentrations that has already occurred.”

Additionally, a statement later in the same paragraph says hot days have decreased in the Southeast over the past century. This language can be interpreted to imply that climate change is not affecting the temperatures in the Southeast. This statement is inconsistent with data presented in chapter 2 of the 4th National Climate Assessment (NCA) which states, “since the early 1960s, the Southeast has been warming at a similar rate as the rest of the United States”<sup>9</sup> and includes data supporting this in figure 2.4.

For further perspective, note Figure 22.17 in the updated 5th NCA: “The Southeast faces some of the highest economic risks related to energy infrastructure damage without proactive adaptation measures in place—such as energy utilities and policymakers’ anticipating climate risks to electrical grid infrastructure and investing upfront in strengthening these systems in advance of any damages. As shown in the [Figure 22.17] maps, in 2050 under an intermediate scenario (RCP4.5), proactive adaptation (a) could save as much as twice the total costs (in 2017 dollars) of no adaptation (b). These costs could be passed onto consumers. Adapted from Fant et al. 2020.” We recommend that TVA amend the language referencing the 4th NCA report to more accurately represent the effects of climate change on the Southeast. Use the more recent 5th NCA wherever applicable. (*Commenter: Ntale Kajumba – EPA Region 4*)

*Response:* TVA acknowledges in Section 4.3.3 of the EIS that climate change is affecting the region and that trends predict that the region faces very high economic risks and costs due to climate change. Additional information from the 5<sup>th</sup> NCA report was also included in the section.



296. TVA's conclusion violates NEPA. It is well-established that NEPA requires a robust consideration of the impacts of a project's GHG emissions in relation to climate change. Thus, although some "speculation is . . . implicit in NEPA," agencies may not "shirk their responsibilities under NEPA by labeling any and all discussion of future environmental effects as crystal ball inquiry." (*Commenter: Gabriela Sarri-Tobar – Center for Biological Diversity*)

*Response:* The IRP EIS is a programmatic environment analysis that does not itself authorize any site-specific actions, such as the construction and operation of new generating facilities. Consequently, the EIS does not contain site-specific analyses of the potential impacts of each of the IRP alternatives on these resources. While TVA did not use air pollution modeling to analyze air quality impacts, the long-term intensity of greenhouse gas emissions decrease under all strategies. Further effects to air and water quality will be addressed, as appropriate, with regard to future projects at the time those projects are being proposed.

297. Moving away from fossil fuels is necessary to decrease pollution and lower emissions, thereby improving the ecosystem by allowing for clean air and water. (*Commenters: Michael Whitten, Shirley McCarthy, Juliet Cunningham*)

*Response:* TVA's integrated resource planning is grounded in least-cost planning principles, in alignment with Section 113 of the Energy Policy Act of 1992. These least-cost principles include balancing the following goals: low cost, risk informed, environmentally responsible, reliable and resilient, diverse, and flexible. For more on TVA's least-cost planning requirements, please see section 3.1 of Volume 1.

In the near term, the IRP Recommendation's Strategic Portfolio Direction states that TVA's IRP analysis reaffirms the importance of adhering to least-cost planning principles to ensure the continued delivery of affordable, reliable, and resilient power to the Tennessee Valley. The results underscore that no single resource will fully meet future system needs; rather, maintaining a diverse portfolio remains essential. In the near-term, TVA should prioritize the addition of firm, dispatchable resources, particularly natural gas and storage, to address capacity requirements. TVA should also continue collaborating with industry and federal partners to prepare for the potential deployment of firm, dispatchable advanced nuclear technologies, which could support long-term load growth while mitigating fuel volatility and regulatory risks. Finally, complementary deployment of solar, demand-side, and distributed generation resources should be used to satisfy capacity requirements, provide economic energy, and/or meet customer needs.

Potential emissions reductions given different resource uses, strategies and scenarios are addressed primarily in Volume 2, Sections 4.2 and 5.5.1 (Air Quality), and 4.3 and 5.5.2 (Climate and Greenhouse Gases), along with their environmental impacts, with other data included in Appendix J of Volume 1. Further effects to air and water quality will be addressed, as appropriate, with regard to future on-site projects at the time those projects are being proposed.

298. There is too much carbon in the atmosphere; there is too much disinformation on the subject also. I support my national government doing everything it can including the Integrated Resource Plan to solve these problems and turn around the continuing natural disasters if it isn't too late. (*Commenter: Cheryl Herr-Rains*)

*Response:* Thank you for your comment. It has been noted by TVA.

299. It is a horrible idea to turn what was originally a facility for producing electricity into one that will produce an environmentally disastrous CO<sub>2</sub> producing gas fuel. (*Commenter: Don C. Price*)

*Response:* Thank you for your comment. It has been noted by TVA.



300. I demand and expect that TVA comply with federal rules on cutting harmful emissions.

*(Commenter: Jane Fleishman)*

**Response:** TVA complies with all applicable state and federal laws, rules, and regulations relating to air emissions.

301. TVA attempts to minimize the impact of its fossil fuel-heavy portfolio by comparing its own GHG emissions to the national average. TVA tries to dwarf its already unacceptable emissions rate to give itself a free pass for building more fossil gas and to slow walk the transition away from fossil fuels. TVA should be doing all that it can to cut emissions by speeding up the retirement of its coal plants and planning an energy future free of fossil gas and false solutions. *(Commenter: Gabriela Sarri-Tobar – Center for Biological Diversity)*

**Response:** TVA's integrated resource planning is grounded in least-cost planning principles, in alignment with Section 113 of the Energy Policy Act of 1992. These least-cost principles include balancing the following goals: low cost, risk informed, environmentally responsible, reliable and resilient, diverse, and flexible. For more on TVA's least-cost planning requirements, please see section 3.1 of Volume 1.

In the near term, the IRP Recommendation's Strategic Portfolio Direction states that TVA's IRP analysis reaffirms the importance of adhering to least-cost planning principles to ensure the continued delivery of affordable, reliable, and resilient power to the Tennessee Valley. The results underscore that no single resource will fully meet future system needs; rather, maintaining a diverse portfolio remains essential. In the near-term, TVA should prioritize the addition of firm, dispatchable resources, particularly natural gas and storage, to address capacity requirements. TVA should also continue collaborating with industry and federal partners to prepare for the potential deployment of firm, dispatchable advanced nuclear technologies, which could support long-term load growth while mitigating fuel volatility and regulatory risks. Finally, complementary deployment of solar, demand-side, and distributed generation resources should be used to satisfy capacity requirements, provide economic energy, and/or meet customer needs.

Potential emissions reductions given different resource uses, strategies and scenarios are addressed primarily in Volume 2, Sections 4.2 and 5.5.1 (Air Quality), and 4.3 and 5.5.2 (Climate and Greenhouse Gases), along with their environmental impacts, with other data included in Appendix J of Volume 1. Further effects to air quality will be addressed, as appropriate, with regard to future on-site projects at the time those projects are being proposed.

302. On page 5-2, in the Climate and Greenhouse Gases section, it's good that the entire life cycle of the combusted energy sources was included, although there is a confusing last sentence. Please clarify whether the full life cycle impacts were calculated for all combusted energy sources.

*(Commenter: Rosalie Bright)*

**Response:** Yes, the greenhouse gas life cycle analysis (Volume 2, Section 5.5.2.3) includes the entire life cycle for all power generating resources, both combustion and non-combustion. For more information, see Volume 2, Section 5.5.2.3.

303. The Draft 2025 IRP also claims that TVA has lowered power system CO<sub>2</sub> emissions by around 60% since 1995 because of coal plant retirements. Draft EIS at 4-16. While this is welcome progress, TVA's fixation on carbon emissions overlooks other dangerous climate-warming emissions like methane that have a material impact on the region, thereby distorting the harm of an increasingly methane gas-filled future. *(Commenter: Gabriela Sarri-Tobar – Center for Biological Diversity)*

*Response:* To complement the portfolio optimization in the IRP, TVA engaged experts at the National Laboratory of the Rockies (NLR) to develop a best-in-class approach for greenhouse gas (GHG) life cycle analysis, or LCA. The LCA identifies full “cradle to grave” GHG emissions forecasts for upstream, operational, and downstream activities for the nine core portfolios and sensitivities. This analysis included all three primary greenhouse gases of concern, namely CO<sub>2</sub> (carbon dioxide), N<sub>2</sub>O (nitrous oxide), and CH<sub>4</sub> (methane). GHG emissions associated with the “fuel cycle,” which would include upstream methane leakage, is included in the ongoing non-combustion phase of the analysis. (See Volume 2, Section 5.5.2.3 for more information).

The IRP EIS is a programmatic environment analysis that does not itself authorize any site-specific actions, such as the construction and operation of new generating facilities and supporting infrastructure such as gas pipelines. IRP implementation projects would be the subject of a separate environmental review for the site-specific action with opportunities for public involvement.

304. On page 5-2, the Air Quality section mentions the major non-carbon air pollutants: sulfur dioxide (SO<sub>2</sub>), nitrogen oxides (NO<sub>x</sub>), and mercury. It should also include particulates. The generation of these pollutants throughout the life cycle should be considered. (*Commenter: Rosalie Bright*)

*Response:* TVA addresses criteria air pollutants such as particulate matter in Section 4.2.2 of the EIS. The IRP EIS is a programmatic environment analysis that does not itself authorize any site-specific actions, such as the construction and operation of new generating facilities. IRP implementation projects would be the subject of a separate environmental review for the site-specific action with opportunities for public involvement. The site-specific review would include information on particulates, if relevant. See also TVA’s response to comment 22 above.

305. Section 5.5: Air Quality, Climate, and Greenhouse Gases / Section 5.5.2.2 Direct GHG Emissions Reduction and GHG Emissions Impact on Climate Change-. The first section states “The variation among strategies for both CO<sub>2</sub> emissions and emissions rates is relatively small and much less than the variation among the scenarios associated with each strategy” and both of these sections state “the reduction in CO<sub>2</sub> emissions would have small but beneficial impacts on the potential for associated climate change”. These statements minimize the role that TVA plays in decarbonizing the utility sector in the United States and downplays the 2% of total United States Electricity Emissions that TVA contributes. TNC recommends that TVA further describe what would be defined as minimal vs. material difference in emissions between strategies. (*Commenter: Lindsay Hanna – The Nature Conservancy*)

*Response:* TVA’s statement in the EIS that the variation among the alternative strategies is relatively small does not, as asserted by the commenter, minimize the importance of TVA’s emissions reductions; nor does the statement that anticipated reductions by TVA in CO<sub>2</sub> emissions would have small effects on climate change, which is a problem that is global in scale that results from global GHG emissions. The differences of emissions between strategies are displayed and quantified in tables and figures in Section 5.5.2.1.

306. Air Quality Impacts: The sentences, “The actual effects on climate in the TVA region and elsewhere would be small and difficult to quantify,” on page 5-34, and “The effects are likely to be relatively modest over the next decade and increase in magnitude by mid-century,” on page 5-45, inappropriately downplay the impact on climate change.

The second sentence in the following discussion on page 5-34, “The Southeast frequently faces costly disasters related to weather and climate threats such as flooding, tropical storms, and hurricanes, which impact its infrastructure and agriculture. Health inequities are further exacerbated due to climate-related risks, and rising air pollution also threatens human health,” is incorrect,

because criteria air pollutant emissions are on a downward trend since the 1980s, as discussed on the EPA's Air Quality—National Summary webpage.

Recommendation: Amend the referenced sentences to avoid inappropriately characterizing air quality and climate change conditions. (*Commenter: (Ntale Kajumba – EPA Region 4)*)

*Response:* TVA has reviewed each of the sentences cited in this comment and made revisions in the final EIS for clarity.

307. TNC recommends modifying the description of Scope 1 emissions by identifying the source of the emissions, including energy resources owned and operated by TVA. (*Commenter: Lindsay Hanna – The Nature Conservancy*)

*Response:* See Volume 2, Section 5.5.2.2 for a full definition of Scope 1 emissions.

### **H.2.5.2 Climate Change**

308. Recommendation: Clarify the sentence regarding the decrease in “hot days” on page 4-17 to provide additional context by including information from the 5th NCA that provides more information on the decrease in very hot days in central and eastern regions: “This does not, however, mean the central and eastern US are not affected by heat. The impacts of extreme high temperatures are more severe if such conditions persist for several days, and overall, multiday heatwaves have become hotter, more frequent, larger, and longer lasting in recent decades.” (*Commenter: Ntale Kajumba – EPA Region 4*)

*Response:* Section 4.3.3 of the final EIS has been updated to incorporate this information.

### **H.2.5.3 Energy Mix**

309. The EIS does not distinguish between resources in front of and behind the meter. (*Commenter: Carlson Swafford – Eco Demo Law PLLC*)

*Response:* The IRP analysis evaluated distributed solar and storage resources, as well as programmatic energy efficiency and demand response. Distributed resources would be installed behind the meter by end-use consumers, along with investments in measures that make businesses and homes more energy efficient. All of these resources would be considered behind-the-meter but are modeled as supply-side resources in the IRP for evaluation purposes.

### **H.2.5.4 Energy Transition and Decarbonization**

310. TVA should not seek to aggravate this unfortunate trend [of increasing extreme weather disasters]... (*Commenter: Francis Lamberts*)

*Response:* The draft EIS considers CO<sub>2</sub> and global warming impacts, and portfolios have been evaluated against metrics to determine the environmental impact. The programmatic EIS broadly addresses the effects of power production on the environment, including climate change, the effects of climate change on the Valley, and air emissions and water use in TVA's power operations.

311. TVA stated that the IRP was prepared considering “weather-normal trends.” What is weather-normal in 2024 and what is expected through 2023? The IRP needs to include not only plans for power production but for remediation and for restoring facilities that have been and may be damaged due to climate change-related weather events through 2035. (*Commenter: Dr. Marhta Wetteman*)

*Response:* Weather is a key driver of electric load. Electricity demand forecasts are typically expressed in terms of normal weather conditions. Normalizing for typical weather conditions allows load forecasters to identify the relationship between trends in electricity demand and long-term

drivers, including economic activity, population changes, and climate trends. TVA normalizes the load forecast for weather based on data from 23 weather stations located across the region with proportional load weights. The weather normalization process accounts for regional trends that show an increase in Cooling Degree Days (CDD) and a decrease in Heating Degree Days (HDD) over the period from 1960 to 2020. CDD and HDD represent the total number of degrees above 65°F or below 65°F, respectively, across all days for a given period, which drives space conditioning needs. This trend is incorporated in all IRP scenarios. For more information, see Volume 1, Appendix B.

In optimization modeling, TVA applied 18% summer and 26% winter reserve margins, and each modeled resource option received credit for its net dependable capacity (NDC) in a given year towards meeting the reserve margins in each season. Solar, wind, and storage resources have curves to reflect changing NDC over time as penetration on the TVA power system increases. TVA performed a sensitivity analysis to test the potential impact of increasing winter risk that could drive a higher winter reserve margin. See Volume 1, Sections 4.10 and 4.11.3 for a discussion of this sensitivity.

312. The world has changed since the 2019 IRP. The climate crisis has deepened, with historic droughts threatening the Duck River, rolling blackouts during Winter Storm Elliott, record-breaking tornado damage in Kentucky, and devastating flooding in Waverly, Tennessee in 2021 and across the Southeast during Hurricane Helene. Between 1980 and 2000, there were 25 billion-dollar disasters in Tennessee. Since 2019, Tennessee has faced 40. Since the 2019 IRP, TVA has pursued one of the largest buildouts of methane gas plants in the country. TVA has proposed 9 new methane gas plants while slow- walking growth on solar, wind, battery storage, energy efficiency, and demand response. As a result, the proportion of total electricity TVA generates from carbon- free sources is lower than in 2019. And since 2023, despite promises to hold rates flat, TVA has raised rates twice—totaling nearly 10%—partly to pay for new methane gas plants. These rate hikes exacerbate the already-high energy burden communities across the region face. Even before the latest rate hikes, 40% of all households in Shelby County, Tennessee experienced high energy burden, which disproportionately harms Black and low-wealth communities. (*Commenter: Trey Bussey – SELC, et al.*)

*Response:* TVA's integrated resource planning is grounded in least-cost planning principles, in alignment with Section 113 of the Energy Policy Act of 1992. These least-cost principles include balancing the following goals: low cost, risk informed, environmentally responsible, reliable and resilient, diverse, and flexible. Specifically, in conducting least-cost planning, TVA must comply with the following requirements in Section 113 of the Energy Policy Act of 1992:

- The least-cost planning program “evaluates the full range of existing and incremental resources (including new power supplies, energy conservation and efficiency, and renewable energy resources) in order to provide adequate and reliable service...at the lowest system cost”;
- System cost encompasses only those costs that are “direct and quantifiable net costs for an energy resource over its available life, including production, transportation, utilization, waste management, and environmental compliance”; and
- In addition to cost, the planning process will also consider “necessary features for system operation,” including diversity of resources, reliability, dispatchability, and other factors of risk.

Based on these requirements, TVA does not set a goal or target for emissions in its IRP. For more on TVA's least-cost planning requirements, please see Section 2.1 of Volume 1.

In the final IRP, Scenario 3, Carbon Legislation, includes a carbon tax which serves as a proxy for current and potential future legislation and/or regulatory actions seeking to reduce greenhouse gas emissions, which is an uncertainty outside of TVA's control. Capacity expansion results as well as environmental metric performance, including CO<sub>2</sub> direct emissions and CO<sub>2</sub> intensity, for scenario 3 portfolios can be found in Chapter 3 of Volume 1.

While TVA's demand-side portfolio serves customers across all segments, TVA also maintains targeted support for households and communities with higher energy burdens. TVA introduced its Home Uplift program in 2018, in partnership with local power companies and communities. By FY 2019, about 1,300 Valley residences were retrofitted with more energy efficient technology for heating and cooling, water heating, and insulation. This number grew to about 7,900 retrofitted residences by the end of FY 2025, reducing system energy needs by more than 28,000 megawatt hours, benefitting low-income households. TVA provides matching funds for local power companies and local communities to support this program. Additionally, the School Uplift program provides education and efficiency improvements to schools within TVA's service territory, which has especially benefited low-income communities. These initiatives complement TVA's broader EE strategy and remain part of TVA's base-level EE investments.

### H.2.5.5 Environmental Impacts

313. TVA must acknowledge its responsibility for the massive, irrevocable harm caused by the greenhouse gasses it generates – and what this IRP plans to continue generating. TVA must also acknowledge its responsibility for its share of upstream methane leakage, which makes fracked gas as harmful to the climate than the coal it's replacing. (*Commenter: John Todd Waterman*)

*Response:* To complement the portfolio optimization in the IRP, TVA engaged experts at the National Laboratory of the Rockies (NLR) to develop a best-in-class approach for greenhouse gas (GHG) life cycle analysis, or LCA. The LCA identifies full "cradle to grave" GHG emissions forecasts for upstream, operational, and downstream activities for the nine core portfolios and sensitivities. This analysis included all three primary greenhouse gases of concern, namely CO<sub>2</sub> (carbon dioxide), N<sub>2</sub>O (nitrous oxide), and CH<sub>4</sub> (methane). GHG emissions associated with the "fuel cycle," which would include upstream methane leakage, is included in the ongoing non-combustion phase of the analysis. (See Volume 2, Section 5.5.2.3 for more information).

314. Federal Code provides direction to Federal Agencies for EIS requirements and code 40 CFR 1502.10(a)1 states that agencies shall use a format for EIS that will encourage good analysis and clear presentation of the alternatives, including the proposed action. The Draft EIS does not identify a proposed action, and therefore does not provide that clear presentation. While Appendix C provides the sort of cross cutting analysis that is necessary to compare portfolio options, there is lacking an overall comparison across categories. TNC recommends that for the Final IRP, TVA provides the required Summary that outlines the environmental impacts of each portfolio option, including the environmentally preferable portfolio options. (*Commenter: Lindsay Hanna – The Nature Conservancy*)

*Response:* The programmatic EIS considers each Strategy (A-C) as potential Action Alternatives. The final EIS identifies a Preferred Alternative in Section 3.4 which includes the Power Supply Mix Ranges through 2040 and through 2050 and Strategic Portfolio Direction. Section 3.5 includes a summary comparison of environmental impacts of the alternatives.

315. Please include soil erosion prevention environmental requirements for all aspects of the IRP that result in disturbing soil as a clear part of implementing the 2025 Integrated Resource Plan. (*Commenter: Doug Colclasure*)



*Response:* The IRP EIS is a programmatic environment analysis that does not itself authorize any site-specific actions, such as the construction and operation of new generating facilities. Consequently, the EIS does not contain site-specific analyses of the potential impacts of each of the IRP alternatives on these resources. A site-specific environmental review will be conducted when a new generation project is planned, alongside the project planning process and typically would include an opportunity for public involvement.

316. TVA also ignores the large land losses caused by fossil methane gas extraction in its analyses. (*Commenters: Drs. Joe and Sarah Schiller, William "Bill" Bell – 4-County EPA*)

*Response:* As noted in Section 5.2 of the EIS ("Land Resources" discussion, page 5-3), TVA quantifies "land requirements" by both the facility land requirements and life cycle land requirements. The life cycle land requirement is a measure of the land area transformed during the life cycle of a generating facility, expressed in terms of units of area per amount of electricity generated. This land measure includes lands used for fuel extraction or production, processing, and transportation.

317. There is no mention of all the water, land and air these projects will harm - not to mention the fact that we know these pipelines leak. (*Commenter: Holley E Roberts*)

*Response:* TVA will conduct the appropriate detailed impact analyses when it proposes actions to implement the IRP. While site- and implementing action-specific impact analyses are not possible at this time, the EIS generally describes the water, land and air impacts associated with the alternative generation resources. TVA addresses environmental impacts of the IRP actions to water resources (Section 5.5.3), land resources (Section 5.5.4), and air quality (Section 5.5.1) in Volume 2 (EIS).

TVA is not responsible for the siting and operation of natural gas pipelines that may have to be built to serve new natural gas plants. Instead, TVA purchases natural gas service from pipeline companies that are responsible for constructing and operating the pipeline. Construction and operation of natural gas pipelines are subject to various state and federal environmental requirements, depending on how and where constructed. Typically, when a pipeline is built specifically to serve a new TVA plant, TVA would evaluate the potential environmental impacts.

318. TVA does not appear to consider Environmental Justice or equity impacts in its strategy evaluations. Can TVA explain how it plans to integrate EJ considerations into its decision-making process for future power plants or major facility projects. Also, we would like for TVA to adopt a more comprehensive siting strategy that truly reflects TVA's duty as a public resource steward.

(*Commenters: Ann Livingston – Southeast Sustainability Directors Network, Gabriela Sarri-Tobar – Center for Biological Diversity, Maggie Shober – Southern Alliance for Clean Energy, Curtis Landry Baysinger, Ntale Kajumba – EPA Region 4, Madison Rollings*)

*Response:* In early 2025, Executive Orders addressing Environmental Justice were revoked and the CEQ regulations that implemented those orders were rescinded. As required by NEPA, TVA will continue to evaluate the environmental effects of future projects on all communities. When siting for generation projects and transmission line, TVA considers a wide variety of land options, including brownfields. For new projects, TVA has an established set of criteria that includes environmental, socioeconomic, economic development and energy/ transmission considerations. TVA works to avoid flood hazards, forested areas, national parks and forests, endangered species and critical habitats, historic places, streams and wetlands. In addition, TVA considers farmland protection, cultural resources and heritage sensitivity, and visual and sound implications on nearby communities.

TVA conducts a comprehensive environmental review under the National Environmental Policy Act for each new generation project in order to identify, avoid, minimize or mitigate any impacts to



biological, cultural, community and socioeconomic resources. For new generation sites, TVA would prioritize the use of pre-disturbed brownfields over greenfield sites. For transmission line projects, TVA considers multiple route segment options and applies these criteria, then combines the route segments to choose the route.

319. On page 5-24, in Socioeconomic and Environmental Justice, TVA should consider more than individual incomes and employment. Social justice communities are also heavily concerned with impacts on property values, smells, noise (which can impact health), and their health. (*Commenter: Doug Colclasure*)

*Response:* When actions that would implement the IRP are proposed by TVA in the future, TVA would conduct site-specific environmental reviews to consider the potential impacts of those proposals on communities. In the tiered reviews, TVA would consider social and economic impacts to communities, including effects relating to economics, aesthetics, and public health.

320. By hardening infrastructure—in other words, reinforcing the region’s reliance on polluting and fragile fossil fuel systems—TVA fails to minimize climate risk. Instead, TVA is putting lives at risk by delaying the transition to a distributed, renewable energy system. TVA’s fossil fuel-centered approach to disaster response sends communities, disproportionately rural, low-income communities and communities of color, into a cycle of climate disasters and energy injustice. They will continue to be overburdened by increased exposure to pollution that exacerbate health conditions like respiratory illnesses, frequent and longer-lasting blackouts, and higher utility costs that lead to debt and potentially life-threatening utility disconnections. (*Commenter: Gabriela Sarri-Tobar – Center for Biological Diversity*)

*Response:* TVA’s integrated resource planning is grounded in least-cost planning principles, in alignment with Section 113 of the Energy Policy Act of 1992. These least-cost principles include balancing the following goals: low cost, risk informed, environmentally responsible, reliable and resilient, diverse, and flexible. Specifically, in conducting least-cost planning, TVA must comply with the following requirements in Section 113 of the Energy Policy Act of 1992:

- The least-cost planning program “evaluates the full range of existing and incremental resources (including new power supplies, energy conservation and efficiency, and renewable energy resources) in order to provide adequate and reliable service...at the lowest system cost”;
- System cost encompasses only those costs that are “direct and quantifiable net costs for an energy resource over its available life, including production, transportation, utilization, waste management, and environmental compliance”; and
- In addition to cost, the planning process will also consider “necessary features for system operation,” including diversity of resources, reliability, dispatchability, and other factors of risk.

Based on these requirements, TVA does not set a goal or target for emissions in its IRP. For more on TVA’s least-cost planning requirements, please see Section 2.1 of Volume 1.

In the near term, the IRP Recommendation’s Strategic Portfolio Direction states that TVA’s IRP analysis reaffirms the importance of adhering to least-cost planning principles to ensure the continued delivery of affordable, reliable, and resilient power to the Tennessee Valley. The results underscore that no single resource will fully meet future system needs; rather, maintaining a diverse portfolio remains essential. In the near-term, TVA should prioritize the addition of firm, dispatchable resources, particularly natural gas and storage, to address capacity requirements. TVA should also continue collaborating with industry and federal partners to prepare for the potential deployment of

firm, dispatchable advanced nuclear technologies, which could support long-term load growth while mitigating fuel volatility and regulatory risks. Finally, complementary deployment of solar, demand-side, and distributed generation resources should be used to satisfy capacity requirements, provide economic energy, and/or meet customer needs.

321. Limit dumping of recycled materials in lands that have no means to deal with these issues. *(Commenter: Lee Crowe)*

*Response:* When actions that would implement the IRP are proposed by TVA in the future, TVA would conduct site-specific environmental reviews to address the potential impacts of those proposals. During construction and operation of its facilities, TVA properly disposes of waste materials consistent with applicable regulations and requirements.

322. Section 4.9.5 identifies communities with EJ concerns near TVA power plants, but only 16 plants are included in the analysis without an explanation for why these plants were selected. The TVA currently has more plants, and the draft EIS outlines operational changes for some plants not included in the analysis. Further, this list of current plant locations may not be indicative of where the TVA's future operations may be sited. In short, this analysis does not contextualize the impacts of actions the draft EIS takes as given on communities with EJ concerns (e.g., coal plant retirements), nor does it attempt to contextualize potential impacts from the more uncertain aspects of the TVA's IRP. *(Commenter: Ntale Kajumba – EPA Region 4)*

*Response:* As noted in Section 4.8.2.3 of the EIS, the sixteen power plants addressed in the analysis are those that have communities nearby with demographic characteristics that differ from the regional norms. In early 2025, Executive Orders addressing the consideration of environmental justice in federal agency decision making were revoked. In addition, EO 14154 (Unleashing American Energy) directed the Council on Environmental Quality to remove their NEPA implementing regulations, including provisions addressing environmental justice communities; the rescission of CEQ regulations was finalized in early 2026. As required by NEPA, TVA will continue to evaluate the environmental effects of future projects on all communities.

### **H.2.5.6 Environmental Protection**

323. Many commenters expressed general concern for the environment, earth and natural world, or support and/or opposition in relation to actions that impact the environment, lead to changes in weather and/or climate, and lead to conservation actions. *(Commenters: Carolyn Nieland, Thomas Nieland, Joanne, Sharon Baker, Jacqueline Knable, Paul J Palla, H Ande, Laura I Fries, Barbara Leinbachl, Deirdre Sandstrom, Patricia Rowell, Karmaletha Brown, John Bloom, Eugenia Stoker, Rachel Mercedes Verdugo, KGH Nicholes, Elaina Valzania, Carol Ann Brady, Helen Hays, Noel Parenti, Sharon Paltin, Priscilla Martinez, Margo Wyse, Lisa Scharin, Bob Bartlett, Barbara Coy, Lynda Daniels, Key Gloria, Charles Fletcher, Peter Scott, Cecile Lemay, Jane Foster, Sister Carol, Felipe Alvarez, Pawiter Singh Parhar, Vicki Smith, Robby Robinson, Derek Benedict, Paul Slentz, Valetta Seymour, Melissa Harris, Laura Edwards, Hannah E Cruse, Jim and Paula Grout, David And Tish Rainey, Rosanne Lovely, Rev. Aline Gaston Russell, D.Min., Evergreen Form Letter Commenters)*

*Response:* TVA's integrated resource planning is grounded in least-cost planning principles, in alignment with Section 113 of the Energy Policy Act of 1992. These least-cost principles include balancing the following goals: low cost, risk informed, environmentally responsible, reliable and resilient, diverse, and flexible. Specifically, in conducting least-cost planning, TVA must comply with the following requirements in Section 113 of the Energy Policy Act of 1992:

- The least-cost planning program “evaluates the full range of existing and incremental resources (including new power supplies, energy conservation and efficiency, and renewable energy resources) in order to provide adequate and reliable service...at the lowest system cost”;
- System cost encompasses only those costs that are “direct and quantifiable net costs for an energy resource over its available life, including production, transportation, utilization, waste management, and environmental compliance”; and
- In addition to cost, the planning process will also consider “necessary features for system operation,” including diversity of resources, reliability, dispatchability, and other factors of risk.

Based on these requirements, TVA does not set a goal or target for emissions in its IRP. For more on TVA's least-cost planning requirements, please see Section 2.1 of Volume 1.

In the near term, the IRP Recommendation's Strategic Portfolio Direction states that TVA's IRP analysis reaffirms the importance of adhering to least-cost planning principles to ensure the continued delivery of affordable, reliable, and resilient power to the Tennessee Valley. The results underscore that no single resource will fully meet future system needs; rather, maintaining a diverse portfolio remains essential. In the near-term, TVA should prioritize the addition of firm, dispatchable resources, particularly natural gas and storage, to address capacity requirements. TVA should also continue collaborating with industry and federal partners to prepare for the potential deployment of firm, dispatchable advanced nuclear technologies, which could support long-term load growth while mitigating fuel volatility and regulatory risks. Finally, complementary deployment of solar, demand-side, and distributed generation resources should be used to satisfy capacity requirements, provide economic energy, and/or meet customer needs.

### H.2.5.7 Health and Safety

324. On page 5-4, coal ash should be described as "toxic coal ash" due to its large concentrations of heavy metals. This would be analogous to TVA's listing of "high-level radioactive waste".

*(Commenter: Rosalie Bright)*

*Response:* The term is well understood. It is not necessary to revise them with additional descriptors, as suggested.

325. On page 5-6, section 5.2.1.1, the last paragraph should summarize the problems with storing coal ash or converting it into other products: ongoing risks of heavy metals and other toxins leaking or leaching from either storage or the items, such as roadbeds and building supplies, that coal ash is used for [2-3]. *(Commenter: Rosalie Bright)*

*Response:* The paragraph has been updated to address TVA's management of these materials, which is subject to extensive requirements to ensure such impacts do not occur.

326. On page 3-14, in Figure 3-13, under Considerations, please:

- For Nuclear, change "Spent fuel disposal" to "Radioactive spent fuel disposal" to reflect the real long term harms that can come from radioactive spent fuel.
- For Hydro, add "Ecological impacts from dams and heated water".
- For Nuclear, Coal, and Gas, add "Ecological impacts from heated water" and "Dependence on unreliable water supply".
- For Coal, change "Waste disposal" to "Toxic Waste disposal", since one major problem with coal ash (the waste after coal combustion) is heavy metals and other toxins [2-3].

- For both Coal and Gas, add "Harmful air pollutants", to reflect the public health problems with emissions of particulates, NO<sub>x</sub>, etc., as summarized in the DEIS.
- Under Advantages, please:
- For Renewables, add "Resiliency of widespread small installations".
- For Renewables and Storage Advantages, add "Rapidly developing technology to improve performance". (*Commenter: Rosalie Bright*)

*Response:* Because the terms used by TVA in its EIS (cited in the comment) are well understood, it is not necessary to revise them with additional descriptors, as suggested.

#### **H.2.5.8 Land Use**

327. Please do not sacrifice prime farmland and disrupt food production. Support responsible agricultural practices. (*Commenters: Harry Eich, Timothy D Birthisel*)

*Response:* Land use and agricultural land changes are addressed in Sections 4.5 (current land and agricultural uses) and 5.5.4 (effects to land resources) in Volume 2, and metrics are also addressed in Appendix J.3 of Volume 1. A full list of average land use requirements for each of the nine portfolios can be found in Volume 2, Appendix C.

See Sections 5.2.3.5 and 5.2.3.6 in Volume 2 for a more detailed discussion of the impacts of constructing and operating solar facilities, including possible benefits.

Utility-scale solar farms typically require about 7 acres of land per installed megawatt of nameplate capacity. The majority of solar power purchase agreements currently operating and under contract are sited on greenfield property. TVA strives to leverage brownfield options for siting any resource type when practical and will pursue suitable opportunities for solar as they arise, such as the ongoing project to install solar on the Shawnee fossil plant reservation. Agrivoltaics, or dual-use solar that combines solar energy production with agricultural activities on the same land, is an emerging approach that may reduce solar programs and land use impact in the future.

TVA will consider best practices for land use, including possible use of already disturbed land, such as brownfield sites, when it proposes actions to implement the IRP.

328. Commonwealth of Virginia Department of Environmental Quality submitted numerous recommendations and requirements for activities conducted in the state to address environmental impacts to natural resources, state parks, dam safety, transportation, flood risk, and energy efficiency issues. (*Commenter: Valerie Fulcher – Virginia Department of Environmental Quality*)

*Response:* Because the IRP does not identify specific actions to be implemented, the EIS does not specify the types of mitigation measures, best management practices, and procedures that will be implemented by TVA to address potential environmental impacts. When actions that would implement the IRP are proposed by TVA in the future, TVA would conduct additional environmental review and identify relevant mitigation measures, BMPs, and other actions to address environmental impacts. TVA would also coordinate with the Commonwealth of Virginia to ensure that transportation, flood risk, and energy efficiency issues are appropriately considered and addressed during future TVA decision making processes.

329. TVA should explore land reuse opportunities for solar installations, such as brownfields, former generation sites, and capped landfills. Reusing these areas for solar not only leverages existing infrastructure but also minimizes new land impacts and promotes sustainable redevelopment.

*(Commenters: David Stiles, Rachael Maitland – Tennessee Department of Environment and Conservation, Valerie Fulcher – Virginia Department of Environmental Quality, Roselie Bright)*

**Response:** TVA prioritizes the use of current TVA generation sites for new generation, while also considering regulatory and technical constraints at a given site.

TVA is evaluating opportunities to repurpose coal combustion residual (CCR) units at our former and current fossil sites for solar generation. This program is currently piloting the first of these types of solar deployments (Project Phoenix) at Shawnee Fossil Plant in Paducah, KY. In addition to evaluating the efficacy of this pilot, TVA is also working with regulators to finalize the closure strategy for these units, which would impact potential solar generation.

330. Lastly, the reliance upon solar generation in several of the models, does not seem to fully take into account the impact on land usage and availability. We would hope that this impact would be fully taken into account. While we are agnostic on the utility of solar energy as part of the generation mix, it should be considered at what costs to the land and region as a whole, both now and in the future. We ask that this issue be revisited and weighed properly in consideration. *(Commenter: Scott Hendrix – Tombigbee Electric Power Association)*

**Response:** TVA considered these impacts in its review. TVA assessed the potential impacts of solar facilities on land usage in Sections 5.2.3.5 (Solar - Existing Facilities) and 5.2.3.6 (Solar - New Facilities) of Volume 2. Table 5-9 (Generic Construction Effects of Solar Generation Facilities (TVA Projects 2014-2023)) provides a summary of effects identified in environmental reviews of solar projects, including land use effects.

331. We don't want any solar panel utilities or battery storage facilities or wind utilities on farmland or within 1000 feet of residences. Keep solar and battery storage facilities and wind power plants on previously zoned industrial sites! *(Commenters: Millington Form Letter Commenters)*

**Response:** When selecting a site for any new generating facility, TVA considers a wide variety of land options, including brownfields. TVA has an established set of criteria that includes environmental, economic development and energy/ transmission considerations. TVA works to avoid flood hazards, forested areas, national parks, critical habitats, historic places, streams and wetlands. In addition, TVA considers farmland protection, cultural/heritage sensitivity, visual and sound implications on nearby communities. TVA conducts a comprehensive environmental review under the National Environmental Policy Act for each solar project in order to identify, avoid, minimize or mitigate any impacts to biological, cultural and socioeconomic resources. TVA would prioritize the use of pre-disturbed brownfields; however, as is the case for many brownfields, there is a cost to recover the site that sometimes precludes it from being acceptable.

TVA is in the process of assessing the effectiveness of constructing utility-scale solar on closed ash storage areas near our coal plants. The first of these would be at Shawnee Fossil Plant near Paducah, Kentucky. TVA is also currently analyzing the best ways to repurpose closed fossil plants, which may include the addition of some solar/storage technologies.

331.b TVA should account for transmission land use requirements of distributed solar in the land use metric. *(Commenter: Rebecca McGrew – NACCO Natural Resources)*

**Response:** The land use metric measures land associated with the generating resource footprint. Transmission is a shared resource and not included in land use for any generation type. Distributed solar is assumed to be co-located on multi-use properties (see Volume 2, Section 5.2.3.6 and Section 5.5.4).



### H.2.5.9 Mitigation Measures

332. Expand the discussion of mitigation in section 5.6 of the draft EIS to include “best management practices, standard operating procedures, adaptive management practices, and comprehensive mitigation measures” as recommended by the December 18, 2014, memo from the Council on Environmental Quality (CEQ) on the Effective Use of Programmatic NEPA Reviews. (*Commenter: Ntale Kajumba – EPA Region 4*)

*Response:* TVA has added additional text to Section 5.6 and a link to a TVA.com webpage that includes links to *TVA Environmental Protection and Best Management Practices for TVA Construction and Maintenance Activities* and related guidelines and specifications for environmental protection specifications for construction, modification and maintenance of TVA facilities and transmission lines.

333. Identify, consider, and commit to reasonable mitigation measures to avoid, minimize, or compensate for potential adverse environmental effects (e.g., GHG emissions and climate change effects), including those that go beyond regulatory compliance and permitting requirements, such as Best Available Control Technology level controls at all replacement generation projects and mitigation for SF6 emissions. (*Commenter: Ntale Kajumba – EPA Region 4*)

*Response:* Because the IRP does not identify specific actions to be implemented, the programmatic EIS does not specify the types of mitigation measures, best management practices, and procedures that will be implemented by TVA to address potential environmental effects to GHG emissions and climate change effects. When actions that would implement the IRP are proposed by TVA in the future, TVA would conduct additional environmental review and identify relevant mitigation measures, BMPs, and other actions to address those environmental impacts.

334. Describe how mitigation will influence selection of alternatives and be identified and monitored in subsequent project phases that tier from the IRP, consistent with the CEQ guidance. (*Commenter: Ntale Kajumba – EPA Region 4*)

*Response:* When actions that would implement the IRP are proposed by TVA in the future, TVA would conduct site-specific environmental reviews that tier from the IRP EIS. The environmental reviews will identify routine and non-routine mitigation measures. TVA tracks and monitors non-routine mitigation measures to ensure compliance, consistent with CEQ guidance.

335. We (the Commonwealth of Virginia Department of Environmental Quality) have several pollution prevention recommendations that may be helpful in constructing or operating this facility: DEQ’s Office of Pollution Prevention provides information and technical assistance relating to pollution prevention techniques and EMS. (*Commenter: Valerie Fulcher – Virginia Department of Environmental Quality*)

*Response:* The Commonwealth of Virginia Department of Environmental Quality submitted numerous recommendations regarding pollution and outlined requirements for activities in the state that may result in pollution. TVA has an Environmental Management System and appreciates the recommendations for additional pollution prevention for future actions. When actions that implement the IRP are proposed by TVA in the future, TVA will conduct additional site-specific environmental reviews that tier from the IRP EIS and identify relevant mitigation measures, BMPs, and other actions to address environmental impacts.



### H.2.5.10 Public Health and Safety

336. The Objectives of Resource Planning and the IRP metrics should include the estimated costs and benefits of the impacts of the plans on public health. A plan that costs the least may actually turn out to be the most expensive for the resulting healthcare cost, lost work productivity, and deaths suffered by impacted people. The DEIS analyzed "social costs", which included health costs, and that analysis should be reflected here. Further, because public health and other social costs are direct and quantifiable, they should be included, as they were in the DEIS. *(Commenter: Rosalie Bright)*

*Response:* Pursuant to Section 113 of the Energy Policy Act of 1992, portfolio optimization in the IRP analysis evaluates impacts of expansion paths on system cost that encompasses only those costs that are "direct and quantifiable net costs for an energy resource over its available life, including production, transportation, utilization, waste management, and environmental compliance."

TVA's integrated resource planning is grounded in least-cost planning principals, in alignment with Section 113 of the Energy Policy Act of 1992. These least cost principles include balancing the following goals: low cost, risk informed, environmentally responsible, reliable and resilient, diverse, and flexible. For more on TVA's least cost-planning requirements, please see Section 3.1 of Volume 1.

337. As there are Environmental Justice implications in resource selection, an assessment of the public health impacts of different resource strategies should be included in the NEPA review.

*(Commenter: Gil Hough – TenneSEIA)*

*Response:* The IRP EIS is a programmatic environment analysis that does not itself authorize any site-specific actions, such as the construction and operation of new generating facilities. Consequently, the EIS does not contain site-specific analyses of the potential impacts of each of the IRP alternatives on these resources. Rather, the EIS includes general discussions of resources within the TVA region. TVA will conduct the appropriate detailed impact analyses when it proposes actions to implement the IRP.

338. On page 5-4, for Environmental Justice, TVA says it will do an assessment of potential health impact to communities. It is implied that it will only consider direct exposures. I'm confident the communities also want an assessment of the indirect health effects of overall air pollution and greenhouse gases because they will be at risk from them, as well. In fact, the health and social effects (as described in the DEIS) of each energy source, in the quantities of energy proposed, are of interest to everyone and should be reported here. *(Commenter: Rosalie Bright)*

*Response:* The IRP EIS is a programmatic environment analysis that does not itself authorize any site-specific actions, such as the construction and operation of new generating facilities. Consequently, the EIS does not contain site-specific analyses of the potential impacts of each of the IRP alternatives on these resources. Rather, the EIS includes general discussions of resources within the TVA region. TVA will conduct the appropriate detailed impact analyses when it proposes actions to implement the IRP.

339. Beginning on page 5-42, TVA includes human health in its calculations of the social costs of greenhouse gases. Please mention much earlier in the DEIS, and also in the DIRP, that TVA is addressing human health, even if it is combined with other types of impacts. *(Commenter: Rosalie Bright)*

*Response:* Human health is an important consideration and was addressed in several sections of the IRP environmental analysis. In addition to addressing human health in its Climate and Greenhouse Gases section (Section 5.5.2), human health is addressed in other sections of the EIS, including

Section 4.2.4 (Hazardous Air Pollutants), Section 4.4.2 (Surface Water), Section 4.5.2 (Vegetation and Wildlife), and Section 5.5.7 (Socioeconomics).

340. Please consider your TVA residents and the added harms from burning millions more tons of coal and increasing use of methane gas plants and adjust your 2025 IRP for a cleaner and safer energy future. (*Commenters: Illinois Coal Form Letter Commenters*)

*Response:* TVA's integrated resource planning is grounded in least-cost planning principles, in alignment with Section 113 of the Energy Policy Act of 1992. These least-cost principles include balancing the following goals: low cost, risk informed, environmentally responsible, reliable and resilient, diverse, and flexible. Specifically, in conducting least-cost planning, TVA must comply with the following requirements in Section 113 of the Energy Policy Act of 1992:

- The least-cost planning program “evaluates the full range of existing and incremental resources (including new power supplies, energy conservation and efficiency, and renewable energy resources) in order to provide adequate and reliable service...at the lowest system cost”;
- System cost encompasses only those costs that are “direct and quantifiable net costs for an energy resource over its available life, including production, transportation, utilization, waste management, and environmental compliance”; and
- In addition to cost, the planning process will also consider “necessary features for system operation,” including diversity of resources, reliability, dispatchability, and other factors of risk.

Based on these requirements, TVA does not set a goal or target for emissions in its IRP. For more on TVA's least-cost planning requirements, please see Section 2.1 of Volume 1.

In the near term, the IRP Recommendation's Strategic Portfolio Direction states that TVA's IRP analysis reaffirms the importance of adhering to least-cost planning principles to ensure the continued delivery of affordable, reliable, and resilient power to the Tennessee Valley. The results underscore that no single resource will fully meet future system needs; rather, maintaining a diverse portfolio remains essential. In the near-term, TVA should prioritize the addition of firm, dispatchable resources, particularly natural gas and storage, to address capacity requirements. TVA should also continue collaborating with industry and federal partners to prepare for the potential deployment of firm, dispatchable advanced nuclear technologies, which could support long-term load growth while mitigating fuel volatility and regulatory risks. Finally, complementary deployment of solar, demand-side, and distributed generation resources should be used to satisfy capacity requirements, provide economic energy, and/or meet customer needs.

### **H.2.5.11 Public Involvement**

341. Finally, the Sierra Club encourages TVA to make public in a docket or other publicly available online resource all public comments and testimony it receives on the IRP as soon as possible and before issuance of the final IRP. By making such material available without being requested, TVA could help ensure that commenters in particular and the general public at large are better able to see commonalities and points of divergence among people submitting information to TVA as part of the Draft IRP process. (*Commenter: Zachary Fabish – The Sierra Club*)

*Response:* TVA has made all public comments and testimony received during the draft IRP and EIS public comment period available on the [tva.com/irp](https://www.tva.com/irp) webpage.

### H.2.5.12 Socioeconomics

342. TVA's EIS does not adequately address potential impacts to communities with environmental justice concerns. TVA's analysis is not as detailed as it should be. (*Commenter: Ntale Kajumba – EPA Region 4*)

*Response:* The discussion on impacts to low-income communities, minority communities, and Tribes are addressed in the final EIS in Section 5.5.7. In the discussion, TVA explains that because the IRP is programmatic, the plan and EIS do not address the future siting and construction of generating facilities nor provide site-specific analyses of the potential impacts to nearby communities of a proposal. In the section, TVA describes the general impacts associated with various generation resources, including the potential system average costs of the nine different core portfolios.

In January 2025, Executive Orders addressing the consideration of environmental justice in federal agency decision making were revoked. In addition, EO 14154 (Unleashing American Energy) directed the Council on Environmental Quality to remove their NEPA implementing regulations, including provisions addressing environmental justice communities. CEQ's rescission of its procedures were finalized in early 2026. As required by NEPA, TVA will continue to evaluate the environmental effects of future projects on all communities. For future site-specific projects to implement the IRP, TVA will conduct a comprehensive environmental review for each new project in order to identify, avoid, minimize or mitigate any impacts to biological, cultural, community and socioeconomic resources.

### H.2.5.13 Solar Siting

343. Plan agrivoltaics on crop and grazing pastures. (*Commenter: David Bezanson*)

*Response:* TVA is open to what might be possible for additional use of solar farms. Currently there are no plans for concurrent use of solar farms, but TVA works closely with research partners and solar developers to vet ideas in the future. Some of TVA's existing solar projects where TVA purchases the power utilize sheep grazing as a method of site maintenance. This practice is implemented by the solar developer and/or owner.

344. Among [TVA's false assumptions] is the assertion that commercially ready renewable energy strategies have the largest impact on land resources. This statement mistakenly assumes that all the land on which solar development occurs is lost to agriculture. This completely ignores the growing agrivoltaics movement that is finding ways to leverage solar to keep land in agriculture. It also ignores the nascent and rapidly expanding opportunity to site solar on water bodies—a resource TVA has in abundance. (*Commenter: William "Bill" Bell – 4-County EPA*)

*Response:* TVA is open to what might be possible for additional use of solar farms, including agrivoltaics and water body siting. Currently there are no plans for concurrent use of solar farms, but TVA works closely with research partners and solar developers to vet ideas in the future.

345. TNC recommends that TVA acknowledge in the EIS that smart solar siting has the potential to reduce impacts to wildlife by following the mitigation hierarchy:

- Avoidance: Using natural resource mapping data to avoid areas of conservation concern;
- Minimization: Designing utility-scale solar facilities with wildlife-friendly fencing or unfenced wildlife passageways; retaining or planting vegetation/trees in buffers; buffering streams and wetlands; planting native and pollinator vegetation; and protecting and restoring onsite wildlife habitat features (e.g., wetlands); and

- Compensatory mitigation: Offsetting impacts by undertaking conservation activities elsewhere. (*Commenter: Lindsay Hanna – The Nature Conservancy*)

*Response:* TVA reviews all solar sites prior to awarding purchase power agreements and approving solar projects for construction by third party solar companies. TVA's subject matter experts conduct a project screening review of all proposed solar projects to determine potential on-site constraints and sensitive resources. TVA's Transmission organization also reviews to determine upgrade needs and feasibility. The project screening and Transmission reviews inform TVA's decision-making process by outlining potential impacts, which helps determine which projects receive a purchase power agreement. The NEPA environmental review is also critical in informing developers of additional site constraints identified during field studies and mitigation requirements after a purchase power agreement is signed during the design phase.

#### **H.2.5.14 Solid and Hazardous Waste**

346. We encourage all construction projects and facilities to implement pollution prevention principles, including the reduction, reuse, and recycling of all solid wastes generated. All generation of hazardous wastes should be minimized and handled appropriately. This includes securing and preventing leakage from coal ash "lagoons." (*Commenter: Valerie Fulcher – Virginia Department of Environmental Quality*)

*Response:* TVA will follow all applicable state and federal regulations and include best management practices for pollution and solid waste management when it proposes actions to implement the IRP. Solid and hazardous waste is addressed in Volume 1, Appendix J.5 (Waste Intensity), and Volume 2, Sections 4.7 (Affected Environment - Solid and Hazardous Waste), 5.5.5 (Fuel Consumption Anticipated), and 5.5.6 (Waste Impacts Anticipated).

347. TVA should clarify the safe and secure storage and "disposal" of spent fuel rods, including those already in facilities. (*Commenters: Jan Berry – Citizens' Climate Education, Robert Stuart, Rachael Maitland – Tennessee Department of Environment and Conservation*)

*Response:* Solid and hazardous waste is addressed in Volume 1, Appendix J.5 (Waste Intensity), and Volume 2, Sections 4.7 (solid and hazardous waste affected environment), 5.5.5 (fuel consumption anticipated), and 5.5.6 (waste impacts anticipated), with nuclear waste being specifically addressed in Sections 4.7.2 (current) and 5.2.2 (anticipated impacts).

After it is removed from the reactor, spent fuel is stored at the nuclear plants in pools (steel lined, concrete vaults filled with water) inside the plant. Currently, TVA, like other utilities, stores spent fuel at all three nuclear plants in above-ground dry storage casks constructed of concrete and metal and placed on concrete pads inside of the plant security perimeter.

TVA anticipates continuing to store spent fuel, after material is significantly cooled, on the nuclear plant sites in spent fuel pools and dry casks until a centralized facility for long-term disposal and/or reprocessing is operating. TVA has constructed additional dry cask storage capacity to store more spent fuel on its nuclear plant sites. The production of low-level nuclear waste is expected to remain relatively constant, but could grow in portfolios with nuclear expansion.

348. IRP EIS pp.4-55, Mixed Waste. After stating that there is no place to dispose of mixed waste, the table shows that mixed waste was disposed of in 2017. This narrative begs two questions: 1) where was the waste sent for disposal; 2) what is done with the waste that can't be disposed of? (*Commenter: Jan Berry – Citizens' Climate Education*)

*Response:* TVA states in its mixed waste discussion that it is "extremely difficult" to find a permitted outlet for disposal of mixed wastes (Section 4.7.2), not that there is no place for mixed waste disposal. TVA disposes of these wastes consistent with state and federal laws, rules, and regulations.

349. The IRP analysis includes five metrics related to environmental responsibility—direct CO<sub>2</sub> emissions, CO<sub>2</sub> intensity, waste consumption intensity, waste intensity, and land use intensity. Waste intensity is similar across all portfolios given similar assumptions regarding end-of-life dates for coal plants and a limited analysis of waste byproducts. TDEC recommends that TVA expand its waste considerations to include waste associated with non-coal energy sources, recognizing that as coal is phased out, other energy technologies, including renewable and nuclear, will require comprehensive waste management strategies. Currently, the IRP's focus on coal combustion residuals limits TVA's ability to adequately plan for future waste from decommissioned solar panels, batteries, and nuclear materials. (*Commenter: Rachael Maitland – Tennessee Department of Environment and Conservation*)

*Response:* Comment noted. TVA disposes of waste consistent with state and federal laws, rules and regulations. The IRP EIS is a programmatic environment analysis that does not itself authorize any site-specific actions, such as the construction, operation of new generating facilities. Consequently, the EIS does not contain site-specific analyses of the potential impacts of each of the IRP alternatives on these resources. Rather, the EIS includes general discussions of resources within the TVA region. TVA will conduct the appropriate detailed impact analyses, when it proposes actions to implement the IRP, including waste management.

### **H.2.5.15 Threatened and Endangered Species**

350. The Center for Biological Diversity (CBD) submitted comments regarding TVA's handling of listed species and impacts to wildlife species in general.

In its comments, CBD states that in its Draft IRP/DEIS, TVA neglected to:

- Adequately address the impacts of TVA's ongoing operations on threatened and endangered species;
- Analyze the impacts of any of the activities contemplated in the IRP to any specific listed or proposed-listed species, or to any specific species' proposed or designated critical habitat;
- Address any specific impacts to countless non-listed species of conservation concern for any impacts arising from TVA's programmatic activities as reflected in the IRP;
- Perform any impacts analysis to any specific species or its habitat whatsoever;
- Include a section on species impacts in Chapter 5 ("Anticipated Environmental Impacts"), only providing one page of content describing in the most abstract generalities topics related to the broad swath of imperiled species in the TVA operating region.

Because TVA's operations "may affect" numerous listed species, CBD states that TVA must, at minimum, obtain a Biological Opinion concerning/evaluating the adverse impacts of its operations on these species that will include measures TVA is required to take to minimize harms/those impacts, as well as insure that TVA's activities are not likely to jeopardize any listed species or adversely modify critical habitat.

CBD states that TVA has failed to carry out any conference or consultation duties in conjunction with the preparation of the IRP and DEIS. Before issuing a FEIS, TVA must remedy these omissions by, at a minimum, preparing a programmatic biological assessment for listed species and their critical habitat. For programmatic planning actions such as TVA's IRP, the BA is an appropriate first step in



determining whether formal consultation with federal wildlife agencies may be required. Without a programmatic biological assessment, TVA cannot meet its obligation to insure that its actions are not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of critical habitat.

Additionally, CBD suggests TVA's duties to prepare a programmatic biological assessment and confer with the Services must be carried out simultaneously with the preparation of the IRP's EIS. TVA also:

- Must confer with the Services regarding the impacts of agency action to species proposed for listing under the ESA, and for impacts to proposed critical habitat;
- Should perform a similarly thorough examination of the impacts of every other aspect of the IRP to determine on which species Section 7 consultation is required;
- Must confer and consult on all species indicated by the U.S. Fish and Wildlife Service's IPaC system as being potentially present, for example, in the coal mining regions from which TVA derives its coal; and
- TVA should preemptively initiate the ESA Section 7 conference process for these species because of the likelihood of a listing decision and critical habitat designation being made by the Services before TVA has a chance to act on its final IRP.

Finally, TVA's search for potentially affected species and habitats must be broad and all-encompassing. CBD recommends that the FEIS must fully explore/analyze the reasonably foreseeable environmental impacts/effects of:

- Cradle-to-the-grave operations on listed and proposed species and their habitat and designated or proposed critical habitat areas at every stage along TVA's supply chain and energy production and distribution infrastructure;
- Dam and impoundment construction and operation, and the coal industry's activities, and specific impacts of the construction, maintenance and operation of utility infrastructure and road infrastructure on each species and on all others for which impacts can be reasonably foreseen;
- Road construction and operation activities resulting from and occurring due to TVA's operations, or coal and fracked gas energy sources, on all amphibians present in the TVA region;
- [TVA's] full suite of activities on species among many other impacted species and critical habitats; and
- Unavoidable adverse impacts to all species and their habitat including listed or proposed species, and non-listed species, and their designated and proposed critical habitat within TVA's sphere of influence. (*Commenter: Gabriela Sarri-Tobar – Center for Biological Diversity*)

**Response:** The IRP EIS (Volume 2) is a programmatic environment analysis that does not itself authorize any site-specific actions, such as the construction and operation of new generating facilities. Consequently, the EIS does not contain site-specific analyses of the potential impacts of each of the IRP alternatives on these resources. Rather, the EIS includes general discussions of aquatic life (Section 4.4.4), vegetation and wildlife (Section 4.5.2), and threatened and endangered species (Section 4.5.3) within the TVA region. These descriptions are followed by a discussion of how impacts to these resources would be addressed during facility siting and review processes when specific proposals to implement the IRP are considered (Section 5.1). Threatened and endangered species were highlighted in the discussion given the additional mandate TVA has to consider effects



to these species.

TVA has revised Section 4.5.3 to clarify that TVA has made a broad no effect determination at the programmatic EIS level because of both the inability to quantify effects across the entire TVA region and the conceptual (i.e., not site specific) nature of the proposed actions in the programmatic EIS. As the IRP is implemented with site-specific actions, TVA would conduct site-specific analysis and consult with the U.S. Fish and Wildlife Service per Section 7 of the Endangered Species Act procedures as warranted.

TVA will consider mitigation of any impacts through siting and facility design processes at the time additional environmental reviews are conducted for site-specific actions implementing the IRP.

### **H.2.5.16 Water Resources**

351. In addition to risks posed by the capture equipment, there is a risk that carbon dioxide injected into saline aquifers could migrate into groundwater or induce seismicity in surrounding areas. Moreover, as carbon dioxide is injected into geologic formations, the increased pressure will necessitate the removal of brine which may be contaminated with heavy metals, naturally occurring radioactive material, or other contaminants. (*Commenter: Gabriela Sarri-Tobar – Center for Biological Diversity*)

*Response:* Carbon capture and sequestration is addressed in Volume 2, Section 4.5.1.1 (Geologic Carbon Dioxide Sequestration Potential). When the CO<sub>2</sub> capacity of the formation into which it is being injected has been reached or when the pressure of the formation or injection well has reached a pre-determined level, CO<sub>2</sub> injection stops and the wells are permanently sealed and monitored (NETL 2010a, NETL 2015). The suitability of a particular underground formation for CO<sub>2</sub> storage is described for several different geologic formations in the text. Further effects of sequestration will be addressed, as appropriate, with regard to future projects at the time those projects are being proposed.

352. On April 24, 2024, the EPA issued a final rule: Supplemental Effluent Limitations Guidelines (ELG) and Standards for the Electric Power Generating Point Source Category...update references to and quotations of language from the proposed ELG rule to reflect the final rule and its contents. (*Commenter: Ntale Kajumba – EPA Region 4*)

*Response:* The text in the final EIS has been updated to reflect the latest USEPA rulemaking relating to ELGs.

353. TVA acknowledges in its Draft IRP/DEIS lifecycle emissions analysis that the extraction, processing and transportation of fossil fuels harms water quality. The process of extracting gas through fracking requires massive amounts of water, depleting vital water resources that communities near extraction sites rely on. Furthermore, chemicals used in fracking pollute aquifers and drinking water with dangerous toxins such as petroleum hydrocarbons, including benzene and xylene. About 55 fracking chemicals could cause cancer. (*Commenter: Gabriela Sarri-Tobar – Center for Biological Diversity*)

*Response:* Natural gas units play an important part in ensuring reliability of the bulk electric system and enhancing system flexibility. IRP implementation projects would be the subject of a separate environmental review for the site-specific action with opportunities for public involvement.

354. TNC recommends that TVA expand this section to consider not just GHG impacts of pumped storage, but all potential ecosystem and social impacts. (*Commenter: Lindsay Hanna – The Nature Conservancy*)

*Response:* TVA will conduct tiered NEPA reviews for future site-specific actions to implement the IRP. These reviews will include analyses of the site-specific effects of those proposed actions, tiering from this IRP EIS only to the extent that the information necessary to conduct any site-specific analysis is already covered in the EIS. TVA has prepared an EIS to assess the potential impacts of proposed pumped storage facilities. The final EIS was released in November 2025.

#### **H.2.5.17 Wildlife**

355. Best management practices need to be put in place to protect natural resources including: planting of native pollinator plants in the buffer areas of the planned facilities (E9), development of an invasive species management plan for these projects (E9), placement of wind turbines where they will not harm birds (107), and a bird deterrent system on wind turbines. (*Commenters: Valerie, Valerie Fulcher – Virginia Department of Environmental Quality*)

*Response:* Because the IRP does not identify specific actions to be implemented, the EIS is a programmatic review and does not specify the types of mitigation measures, best management practices, and procedures that will be implemented by TVA to address potential environmental impacts. When actions that would implement the IRP are proposed by TVA in the future, TVA would conduct additional environmental review and identify relevant mitigation measures, BMPs, and other actions to address environmental impacts.

TVA has implemented special measures to improve habitat for certain projects and will consider best practices to protect natural resources in the site-specific environmental reviews that will be completed when it proposes actions to implement the IRP. TVA also considers mitigation of any impacts through siting and facility design processes at the time additional environmental reviews are conducted for site-specific actions.

#### **H.2.6 Other**

356. Please do not succumb to political pressure for the latest woke agenda or political crony that will line the pockets of China or some other foreign adversary. (*Commenter: Harry Eich*)

*Response:* Thank you for your comment.

357. Common Sense !!!! (*Commenter: Larry Benvenuti*)

*Response:* Thank you for your comment.

358. Please make decisions based on Sustainability & Integrity rather than greed & deceit. (*Commenter: Scott Laxier*)

*Response:* Thank you for your comment.

359. PLEASE, DO THE RIGHT THING (YOU'LL FEEL SOOOO GOOD!!!) (*Commenter: Alene Carol Burrell*)

*Response:* Thank you for your comment.

360. Please Listen to Us. Thanks (*Commenter: Tina Brown*)

*Response:* Thank you for your comment.

361. My Transition Pasadena and Foothills Citizens Climate Lobby groups are calling for all our communities to support each other's goals of ecological changes in government, corporations and hyperlocal economies. *(Commenter: Mary Fitzgerald)*

*Response:* Thank you for your comment.

362. Climate Crisis Deniers CANNOT claim to love their Children, OR their Children's Children!!!  
*(Commenter: Sven Erik Pedersen)*

*Response:* Thank you for your comment.

363. Electricity for buildings has been the return of profit from services across the land as long as I could remember but starting it's run was a hardship for property owners on that which would have been a homeplace to setting goods to be like a light upon a hill to the townspeople within the dark. Time and space helped Electricity to work worldwide outside to inside a cell captured a theory vital to all. A light, a generator, and a line of a special end plugs currently compatibility components taking innovation into a profitable turn. Perhaps the overture from foreigners to the ship leading to World War 1 helped along future needs but it was also the want to of dominant men. Those people and these people including us have been alive but as I have been away from great health I had been always placing payments to KUB. Time doesn't wait when space becomes filled in to turn over more generations I hope the Electricity Company continues to profit marginal to setting goods and then to services world wide at a low cost. Thank you. *(Commenter: Angel)*

*Response:* Thank you for your comment.

364. Debris should have a place to walk across into Arkansas *(Commenter: Mary Ann Bell)*

*Response:* Thank you for your comment.

365. Disaster Preparedness Need: Natural and Terrorist Attack  
Use recent disasters as a guide.

- North Carolina, Hurricane Helene
  - FEMA failure.
    - Politicization. Ignored Trump supporters
    - Unprepared urbanize staff (didn't drive down "bad" roads)
  - Water was initial primary (!) need. Wells were contaminated.
  - There was no mention of sewer lift stations being damaged, but damaged lift stations will quickly required maintenance for health and safety reasons.
  - No electronic transactions, unable to purchase goods
  - Local volunteers
    - Public agencies projected long term reconstruction plans
    - Constructed temporary roads and paths

## RECOMMENDATIONS

Emergency Health and Safety Electricity Needs:

- Seek immediate funding from the incoming Trump Administration to safeguard TVA's (and partners?) electronics from EMPs.
- TVA: Harden all basic electronics which support electricity generation from the plant to the local level.
  - Power plant operation
  - Dams, general operation
  - Maintenance Vehicles
  - Transfer stations

- Emergency Vehicles
- Supply chain operations vehicles (Planes, trains, automobiles)

Work with all Local Utilities to safeguard the following

- Water: Local/Regional pumps for water towers. Essential needs:
  - Drinking
  - Residential sewer operation
  - Fire fighting
- Sewer: Local sewer pump stations
- Transfer stations

Work with State/County/Regional Public Safety to safeguard

- All vehicles need hardening
  - Police
  - Fire
  - Utilities
  - Other disaster preparedness (Admin/managers/staff)

Work with communications to safeguard

- Cell towers
- TV/Radio Stations
- Emergency Broadcast

Work with Military and National Guard to safeguard their vehicles and communications. (*Commenter: David Nelson*)

*Response:* Thank you for your comment. Public safety and the protection of TVA facilities and infrastructure remains a TVA priority.

366. I am asking for your support for taking to stop big oil and please take action and as soon as possible. (*Commenter: Bonnie Swinford – Sierra Club*)

*Response:* Thank you for your comment.

#### **H.2.6.1 Comments Out of Scope**

367. Federal regulations and incentives for green energy are fine. However, I think it's time to privatize the TVA. (*Commenter: Michael Ball*)

*Response:* Thank you for your comment. This subject is outside the scope of this review.

368. Please either build a miniature Golod Energy Pyramid, &/or initiate The Venus Project. (*Commenter: Anonymous 6*)

*Response:* Thank you for your comment. This subject is outside the scope of this review.

369. Like our manatee,s [sic] these underwater giants simply want to co-exist with mankind. Please remember that the maker of us all created these creatures and gave them their territory. Mankind is the invader and we should be the party who makes it possible for us to co-exist. (*Commenter: Christine Barwick*)

*Response:* Thank you for your comment. This subject is outside the scope of this review.

370. Does TVA, as a independent agency, have spending authority in Florida or esp Puerto Rico? Reconstructing it's [sic] grid as a majority decentralized wind/solar/tidal system could be a demonstration for regional reorientation for Texas independent grid or the N.E. states dependent on coal. (*Commenter: Gary Albrecht*)

*Response:* Thank you for your comment. This subject is outside the scope of this review.

371. The Tennessee Valley Waterways Authorities has plenty of resources and my ideas for the next 55 years so that this area does not become a food desert would be to have a global hydroponics desalination farms process to grow a [sic] abundance of fresh hydroponics farms foods along the Tennessee Valley Waterways Authorities because food needs water and the riverbanks of the Tennessee Valley Waterways Authorities is a great place to start but I am just a poor older adult lady that has many experiments in my head like filtering the water with the desalination process before it comes in contact with the hydroponics farms systems to have cleaned filtered water grow the food to have and abundance of foods to prevent this areas from becoming a food desert. (*Commenter: Angle Marie Davis*)

*Response:* Thank you for your comment. This subject is outside the scope of this review.

372. To make decisions which will result in more longwall mining of coal - or mining of coal by any method - ignores the impact that mining has already had on Illinois farmland and on the citizens who depend on it for a livelihood and for food. (*Commenter: Rev. Aline Gaston Russell, D.Min.*)

*Response:* Thank you for your comment. This subject is outside the scope of this review.

373. The 12 M tons of coal burned by TVA during both 2022 and 2023 may have come from the Sugar Camp Mine in Illinois. Foresight Energy is the owner of Sugar Camp Mine and Deer Run Mine that is a few miles away from my home. Believe me, farmers are invaded by the coal operator and the control over their property is gone. IDNR has been wonderful to coal operators, but its obligations to the state of Illinois and to coalfield residents are not met. Longwall mining has damaged farmland, water resources, economic development, and emits methane. Who wants to breathe coal dust, to endure flooded fields, and to drive over cracked-bumpy roads? (*Commenter: Mary Ellen DeClue*)

*Response:* Thank you for your comment. This subject is outside the scope of this review.

374. Pledge and ensure TVA will keep your Illinois coal rights in the ground. TVA claims to be ending its use of coal as part of its move to clean energy systems. The future of the approximately 64,689 acres TVA coal rights in the area of the Sugar Camp Mine in Franklin, Jefferson, and Hamilton Counties, Illinois, is a critical concern. Similar concerns extend to other areas of Illinois, such as the Pond Creek Mine, Williamson County, and other TVA coal rights in the state. It is difficult to comprehend how TVA can claim to be ending coal usage while enabling coal mining to continue across tens of thousands of acres for many decades ahead. (*Commenter: Joyce Blumenshine*)

*Response:* Thank you for your comment. This subject is outside the scope of this review.

375. If TVA is committed to moving to clean energy, we ask you to stop decades of more harmful climate change impacts from coal and declare that you will not facilitate the mining of any more coal from its Illinois mineral rights. We urge you to know that longwall mining of your TVA coal rights causes prime farmland subsidence in Illinois, making flat, efficient-to-farm fields uneven, and causing long-term drainage problems. I ask TVA to carefully consider the costs of climate change caused by mining and burning your 680 million tons of Illinois coal rights. This will only add to the rapid progress of climate change. Clearly, the impacts of Hurricane Helene on TVA residents and communities show climate change is worse and can turn life up-side-down for tens of thousands of TVA residents. The human suffering and losses, and billions of dollars in damages to your people should tell TVA that it is more important for you to keep your Illinois coal rights and keep that coal in the ground. (*Commenter: Illinois Coal Form Letter Commenters*)

*Response:* Thank you for your comment. This subject is outside the scope of this review.

376. I am writing to urge you to solidify this commitment by holding onto your remaining mineral rights. TVA has enough coal in reserves -- to the point that they are scheduled to close coal plants by 2035 -- and handing these rights over to coal companies will only make your clean energy goals impossible to achieve. If you sell these rights, coal mine operations will only cause more damage to water, air, farms, and homes in nearby communities. The coal will then be sold to other countries, creating greenhouse gas emissions through transportation and burning. (*Commenter: Coal Form Letter Commenters*)

*Response:* Thank you for your comment. This subject is outside the scope of this review.

377. I would like to start by saying you are impacting many homes along with decreasing home values through this effort. My farm neighbors this large block of land where I live. Over 100 areas of run-off comes from this land travels through my property. My livestock drinks water from the run off caught in ponds from this property that would impact my livestock and property once dirt work starts. There are also proven facts of solar panel equipment leaching out harmful chemicals into the soil which would drain onto my property. Also, Indian artifacts have been found along the ditch that runs through the property of Tim May.

If this project proceeds forward I will be contacting my lawyer to proceed with legal action!  
(*Commenter: Shane Whitfield*)

*Response:* Thank you for your comment. This subject is outside the scope of this review.

378. However, I was not impressed with the coal ash "lagoon", as it were, which did not seem to be secure. It has had leaks since then, and we can do better, especially with coal firing in drastic, overdue decline. [at Kingston plant]. (*Commenter: Dale Tomlinson*)

*Response:* Thank you for your comment. This subject is outside the scope of this review.

379. Vote vote vote (*Commenter: Abiodun Badejo*)

*Response:* Thank you for your comment. This subject is outside the scope of this review.

380. Everyone needs the ability to vote whether by mail or at the ballot box. (*Commenter: Claudia Rushlow*)

*Response:* Thank you for your comment. This subject is outside the scope of this review.

381. Democrats and independent voters must work together. We are the future of our Democracy!  
(*Commenter: Patricia Roles*)

*Response:* Thank you for your comment. This subject is outside the scope of this review.

### **H.3 Index of Commenters**

Following is a list of the commenters, their affiliations, and the identification number(s) of the comment statements to which they contributed. In a few cases, handwritten names were difficult to read and the names listed below are TVA's best interpretations. This index is divided into two sections. The first section lists those who submitted individual comments. The second section lists the signers of each of the form-style comments. Form-style comments are identified by the name of the form (as listed above in Section H.1).

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| Adams, Shirley, TN      | Arcangeli, Kathy, TN | Baine, Brenda, TN    |
| Adams, Wayne, TN        | Arnold, Ardarian, KY | Baker, Mallory, AL   |
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| Alsup, William, TN      | Atkinson, Reese, TN  | Barnes, Deborah, TN  |
| Ameen, Arshad, TN       | Atlakson, Carli, TN  | Batchelor, M, TN     |
| Andied, Rita, TN        | Atwater, Dianne, TN  | Bean, Joan, AL       |
| Andrews, Joy, TN        | Baggett, Ruth, KY    | Beard, Joanne, TN    |

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| Beck, Deborah, KY      | Cannon, Kenneth, TN            | Dowell, James G, TN       |
| Beder, Andrej, TN      | Cannon, Pam, TN                | Drake, Frederick, AL      |
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| Black, Jason, TN       | Caso, Mark, MS                 | Duplissis, Eve, TN        |
| Black, Rhonda, GA      | Castleberry, Mary L, AL        | Dycus, William, TN        |
| Blake, Billy, KY       | Chambers, Charles, AL          | Dymond, Dighan, AL        |
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| Mullins, Kate, TN       | Richey, Tuesday, AL     | Spradlin, Karen, AL                 |
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| Newell, Emily, TN       | Rodriguez, Carlos, TN   | Swindell, Kacey, TN                 |
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| Newson, Raymond, TN     | Rooks-Clark, Angela, TN | Taggart, Jeff, TN                   |
| Niceley, Carrie, TN     | Roop, Stephen, TN       | Taylor, Nidia, TN                   |
| O'Dell, Debbie, TN      | Roper, Brends, TN       | Taylor, W James, TN                 |
| Oetjen, Christine, TN   | Rosken, Esther, TN      | Teague, Amy, TN                     |
| Ogle, Philip, TN        | Rossiter, Lucas, AL     | Thiemann, Jeff, KY                  |
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| Oliver, Sabrina, AL     | Russell, Shirley, TN    | Thomas, Jewell, TN                  |
| Ooten, Viveca, TN       | Sabel, Leah, TN         | Thomas, Micah, AL                   |
| Outten, Erica, AL       | Sanders, Patrice, TN    | Thomas, Phillip, TN                 |
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| Papin, Loretta, TN      | Scott, Don, TN          | Thompson, Bethany, TN               |
| Paris, Douglas, TN      | Scott, Gary, TN         | Thompson, Carol, AL                 |
| Parkans, Stephanie, TN  | Scott, Sean, AL         | Thompson, Terri, TN                 |
| Parks, Misty, TN        | Scruggs, Kristina, TN   | Thompson, Thomas, KY                |
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 Bobilin, Noel, Mountain View, HI  
 Bouville, Jef, Los Angeles, CA  
 Braun-Greiner, Kolya, Takoma Park, MD  
 Brehme, Ellie, Ann Arbor, MI  
 Bull, Ashley, Dallas, TX  
 Burgess, John, Pittstown, NJ  
 Burnett, Brian, Berkeley, MI  
 Cameron, Casey, San Jose, CA  
 Cameron, Alexis, Delmar, NY  
 Carlson, Doug, Chattanooga, TN  
 Carney, Cheryl, San Antonio, TX  
 Casanova, James, North Las Vegas, NV  
 Claunch, Emma, Columbia, MO  
 Cocchiario, Gerald, Lansdale, PA  
 Conture, Shelley, Syracuse, NY  
 Cottle, Elaine, Hopewell Junction, NY  
 Cowen, Macenna, , Unknown  
 Cray, Nick, Mequon, WI  
 Dack, Michael, Sacramento, CA  
 Davis, Shawn, Phoenix, AZ  
 DiSalvo, Chuck, Rochester, NY  
 Dittman, David, Elkridge, MD  
 Dunham, Elenna, New York, NY

Edstrom, Heather, Oak Park, MI  
 Fanelli, William, St Louis, MO  
 Farone, Aurora, Willowick, OH  
 Feder, Patrick, Belvedere, CA  
 Fernández Rodríguez, Amelia, Denver, CO  
 Fleischman, Christopher, Houston, TX  
 Fletcher, Barbara, Farmington Hills, MI  
 Floyd, Melissa, University Park, MD  
 Fredericks, Misha, Poughkeepsie, NY  
 Gentzler, Sara, Brooklyn, NY  
 Gray, Kaitlyn, Raleigh, NC  
 Hakiel, Annette, Brooklyn, NY  
 Hammann, Mary, New York, NY  
 Hart, Doug, Lake Orion, MI  
 Hartzell, Sandra, Orrtanna, PA  
 Hook, Jenny, Hingham, MA  
 Howe, Dana, West Bloomfield, MI  
 Howell, Jess, Southfield, MI  
 Huddleston, Frank, San Antonio, TX  
 Hyde, Pat, Sanibel, FL  
 Hyne, Joyce, Portland, OR  
 Ingerson, Tonya, Bellingham, WA  
 Irwin, Rebecca, Carmel, CA  
 Jacobs, Robert, Troy, NY  
 Johnson, Jeffrey, Phoenix, AZ  
 Kaskowitz, David, San Francisco, CA  
 Keller, Christina, San Antonio, TX  
 Ketchaver, James, Lakewood, OH  
 King, David, Bronx, NY  
 Krakauer, Wendy, Seattle, WA  
 Kuehn, Margie, Annapolis, MD  
 Kurth, Krista, Potomac, MD  
 LaBelle, Donna, Bloomfield Hills, MI  
 Laird, Amy, New Waverly, TX  
 Landry, Hayley, Houston, TX

Lathrop, Rick, Portland, OR  
 Lockwood, Sarah, Minneapolis, MN  
 Logan, Joanne, Hermitage, TN  
 Lowry, MaryEllen, Greensboro, NC  
 Martin, Kai, Pacifica, CA  
 Mason, David, Fayetteville, NY  
 Meyerson, Julie, Sunnyvale, CA  
 Mog, Gloria, Arlington, VA  
 Moody, Harry, San Mateo, CA  
 Moran, Thomas, Minnetonka, MN  
 Munn, Barb, Meadow Vista, CA  
 Neves, Deb, Lansdale, PA  
 Nordrum, Susann, Box Elder, SD  
 Olmsted Silverstein, Dara, Hillsborough, CA  
 Oscarlece, Lisa, Valley Cottage, NY  
 Paulson, Barbara, Troy, MI  
 Peregrine, Erik, Providence, RI  
 Peterson, Sandra, Palm Desert, CA  
 Porter, Shirley, Grass Valley, CA  
 Rice, Dave, Saint Charles, IL  
 Roberts, Robby, Annapolis, MD  
 Rockley, Joshua, West Allis, WI  
 Rodrigues, Maryann, North Attleboro, MA  
 Rogers, Coleman, Lowell, MA  
 Romesburg, Denise, Phoenix, AZ  
 Ronson, Ian, Jacksonville, FL  
 Root, Bob, Reston, VA  
 Roquet, Lauren, Mahtomedi, MN  
 Rubinton, David, Long Beach, NY  
 Schmidt, Ken, Lombard, IL  
 Schroeder, Karen, Neptune City, NJ  
 Seelke, Cindy, Cleburne, TX  
 Skardarasy, Doreen, Belleville, MI  
 Snyder, Debbie & Bob, Livonia, MI

|                                           |                                              |                                            |
|-------------------------------------------|----------------------------------------------|--------------------------------------------|
| Sorrell, Reverend Lyle, Fairmont, WV      | DiMaria, Peter, Berkeley, CA                 | Musgrove, Donna, Lake Tapps, WA            |
| Stewart, Frances, Bethesda, MD            | Duda, Timothy, San Antonio, TX               | Myasishchev, Denis, Chandler, AZ           |
| Sticha, Lily, Saint Paul, MN              | Dunham, Elenna, New York, NY                 | Nierenberg, Al, Boxford, MA                |
| Stonge, Emily, Verona, WI                 | Dygert-Gearheart, Anita, Spokane, WA         | Parker, Teadra, White Center, WA           |
| Sullivan-Peters, Taylor, Indianapolis, IN | Elliot, Kristen, St Paul, MN                 | Pegg, John, Minneapolis, MN                |
| Sutter, Tom, New Lenox, IL                | Ferrante, Michael, East Norwich, NY          | Pendorf, Laura, South Pasadena, CA         |
| Sutter, Tom, New Lenox, IL                | Ford, Sam, San Jose, CA                      | Penner, Susan, Emeryville, CA              |
| Targos, Andrea, Folsom, CA                | Fuqua, Claire, Hastings, NE                  | Percy, Valerie, Kingston, NY               |
| Tarr, Sue, Edmond, OK                     | Giampe, Lelia, Monroe, CT                    | Pinch, Tracy, Royal Oak, MI                |
| Thomas, Rebecca, Santa Rosa, CA           | Greene, Avi, Indio, CA                       | Pontecorvo, Jenna, Flemington, NJ          |
| Triana, Mary, San Antonio, TX             | Gupta, Anshul, Vallhalla, NY                 | Powers, Alexis, Delmar, NY                 |
| Tullos, Margie, Decatur, GA               | Hamlin, Heather, Royal Oak, MI               | Prina, David, Salinas, CA                  |
| Tyson, Julianne, Wilton, NH               | Hannon, Alexandra, Bainbridge Island, WA     | Q-Shafer, Stephen, Saugerties, NY          |
| Van Kirk, Carol, Red Bank, NJ             | Hardy, Elisabeth, Beaverton, OR              | Randall, Scott, Copenhagen, NY             |
| Vital, Artèm, Cambridge, MA               | Hargrove, Molara, Louisville, KY             | Rapoport, Liz, , Unknown                   |
| Walker, Jasen, Malvern, PA                | Harrison, Liz, San Diego, CA                 | Rhyne, George, Wilkesboro, NC              |
| Wanees, Kyro, Fresh Meadows, NY           | Hayward, Linda, Sacramento, CA               | Richards, Eryn, Davison, MI                |
| Wharton, Leslie, Bethesda, MD             | Hindes, Miri, Los Angeles, CA                | Rotondo, Vincent, Jackson Heights, NY      |
| Wilson, Lisa, Royal Oak, MI               | Hinkel, Austin, Cold Spring, KY              | Russell, Cat, Jamestown, CO                |
| Withrow, Mindy, Perrysburg, OH            | Jaggi, Preeti, Decatur, GA                   | Sabol, Jae, Hermosa Beach, CA              |
| Woodland, Marcia, Fort Collins, CO        | Janowitz-Price, Beverly, Phoenix, AZ         | Schirm, Alyssa, Kearny, NJ                 |
| Yenchick, Suze, Bellingham, WA            | Jansen, Tiffany, Johns Creek, GA             | Schmitt, Alex, Cincinatti, OH              |
| Zingher, Judith, Elmsford, NY             | Johnson, Eric, , CO                          | Schwartz, Amy, Prairie Du Sac, WI          |
| Zurcher, Christoph, Beaverton, OR         | Johnson, Megan, St Paul, MN                  | SinghRawat, Shishpal, Folsom, CA           |
| Ashti, Christa, Belmont, CA               | Junco, Shauna, Orlando, FL                   | Stark, Sherie, West Hollywood, CA          |
| Atkinson, Vickie, Chappel Hill, NC        | Keeth, Trey, Franklin, TN                    | Stephens, Lori, Waynesville, NC            |
| Augustine, Victoria, Astoria, NY          | Komie, Adrian, Austin, TX                    | Sutherland,MD, Katherine, Winter Haven, FL |
| B, R, Palm Bay, FL                        | Kuenker, Amy, Millersville, MD               | Tharp, Julianne, Vestavia Hills, AL        |
| Bader, Jessica, New York, NY              | Lehman, Nanette, Berkley, MI                 | Thomas, Ari, Santa Rosa, CA                |
| Benim, Marilyn, Hasbrouck Heights, NJ     | Levan, Christina, Lancaster, PA              | Thompson, Gretchen, Williamstown, MA       |
| Bennett, Nancy, Oak Park, MI              | Lloyd, Gary, New Orleans, LA                 | Tombaugh, Katherine, New Haven, CT         |
| Bible, Eugene, Honolulu, HI               | Macfie, Rebekah, Corning, NY                 | Twarek, Drew, Berkley, MI                  |
| Bobola, Greycin, , Unknown                | Majestic, Kate, , Unknown                    | Unell, Alan, Vancouver, WA                 |
| Brandom,MD, Barbara, Rockwood, PA         | Majewski, Gene, Addison, IL                  | Vanderlee, Heidi, Brooklyn, NY             |
| Brooker, James, Onalaska, WI              | Man, Will, Stockholm, NJ                     | Voget, Richard, Seattle, WA                |
| Buchan, Bob, Chula Vista, CA              | Mandella, Gail, Berkeley, CA                 | Walter, Nancy, Schererville, IN            |
| Bunin, Greta, Elkins Park, PA             | Marquardt, Jeana, Commerce Township, MI      | Washburn, Constance, Lagunitas, CA         |
| Burns, Daniel, Spring, TX                 | Martinez, Nevaeh, Jarrell, TX                | Whitt, Charles, Dardenne Prairie, MO       |
| Butt, Glenn, Picayune, MS                 | McDonnell-Forney, Catherine, Minneapolis, MN | Wittig, Michael, San Jose, CA              |
| Calame, Beatrice, Redmond, WA             | Mercado, Joyce, Alameda, CA                  | Woodruff, Margaret, Charlotte, VT          |
| Campbell, Liz, Seattle, WA                | Meseguer, Alejandro, Little Egg Harbor, NJ   | Wright, Marilyn, Sacramento, CA            |
| ChenAllen, Doreen, Pasadena, CA           | Moore, Carolyn, Wake Forest, NC              | York, Traci, Erath, LA                     |
| Constant, Hugh, La Jolla, CA              | Moreau, Lynn, San Leandro, CA                | Z, Anthony,                                |
| D'Arcy, John, Holmdel, NJ                 | Munie, Kenneth, Princeton, NJ                | Jones, Rebekah, Akron, OH                  |
| Davis, Alexis, Fort Myers, FL             |                                              |                                            |
| deLaTorre, Alejandro, Webster, TX         |                                              |                                            |
| DeManuel, Paula, Torrance, CA             |                                              |                                            |

**H.3.2.3 Coal Form Letter, 128, 185, 376**

|                                       |                                      |                               |
|---------------------------------------|--------------------------------------|-------------------------------|
| A, Madeleine                          | Copple, Frank                        | Johnson, Emanuel, Chicago, IL |
| Abramson, Billie                      | Costelle, Autumn                     | Johnson, Eric                 |
| Ahn, Dennis                           | Cox, Remi                            | Johnson, Megan                |
| Albury, Kathryn                       | Cozens, Brians                       | Johnson, Treve                |
| Ali, Maggie                           | Cragg, Dianne                        | Johnston, Catherine           |
| Allegoren, Mary                       | Cray, Nick                           | Jones, Brian                  |
| Allison, Jetana                       | Cuneo, Sherrell                      | Jones, Mikaela                |
| Anderson, Florence                    | Dack, Michael, Sacramento, CA        | Junco, Shauna                 |
| Anderson, Nancy                       | Dahill, Judith                       | Kahn, Rob                     |
| Antonik, Marilyn                      | Dahl, Jessica                        | Kana, Catherine               |
| Augustine, Victoria                   | D'Arcy, John                         | Kathy and Dave                |
| B, R                                  | Davidson, Linda                      | Keeth, Trey                   |
| Barndt, Deborah                       | De Manuel, Paula                     | Keleher, Richard              |
| Bartolomeo, Kathleen                  | DeBolt, Angela, Oswego, IL           | King, David                   |
| Basierbe, Deborah                     | DeMarta, Sonia                       | Kofler, Marilyn               |
| Baughn, Autumn                        | Dittman, Dave                        | Kofler, Marilyn               |
| Benim, Marilyn                        | Dorries, Bruce                       | Kohlmeyer, Sandy              |
| Bennett, Nancy                        | Dow, Ryan                            | Kovacs, Dakota                |
| berman, Jody                          | Durocher, Laurie                     | Krakauer, Wendy               |
| Bernstein, Susan                      | Dygert-Gearheart, anita              | Kubiac, Jan                   |
| Bettig, Allen                         | Edstrom, Heather                     | Kuehn, Case                   |
| Beuttenmueller, Nathan                | Ellish, Melissa                      | Kuehn, Margie                 |
| Blake, Ann                            | Fanelli, Lynn                        | Kuehn, Ashtom, Maryville, IL  |
| Bliss, Nishanga                       | Farone, Aurora                       | LaRochelle, Sophie            |
| Booth, Jimmy                          | Fec, Jeanne                          | LeBaron, Mary Rose            |
| Bouville, Jef                         | Feder, Patrick                       | LePage, Abby                  |
| Bradford, James                       | Fernandez, Luci                      | Lloyd, Deborah K.             |
| Brandom, Barbara                      | Fletcher, Barbara                    | Lloyd, Gary                   |
| Brasseale, Elizabeth                  | Ford, Sam                            | Lord, Danielle                |
| Braun-Greiner, Kolya, Takoma Park, MD | Fosshage, Mark                       | Lott, Catie                   |
| Brehme, Ellie                         | Freiermuth, Donna                    | Lowery, Scott                 |
| Brooker, Barbara                      | Gajewski, Kathryn                    | Lyon, Kathleen                |
| Brown, Mitchell                       | Garrett, Dennis                      | Macfie, Rebekah               |
| Buchan, Bob                           | Gehl, Carol                          | Majewski, Gene                |
| Bull, Ashley                          | Gerhauser, Donna                     | Mammarella, Mary              |
| Burnett, Brian, Berkley, MI           | Glenn, Suki                          | Man, William                  |
| Burns, Daniel                         | Goetz, Issabella                     | Manza, Dana                   |
| Calame, Beatrice                      | Gonzalez, Alexistori                 | Marquardt, Jeana              |
| Campbell, Kay                         | Goulart, Joshua                      | Martin, Kai                   |
| Campbell, Liz                         | GrantWingate, Aurora                 | Maupin, Cami                  |
| Carlson, Doug                         | Greene, Avi                          | Maxwell-Glenn, Caitlin        |
| Carny, Cheryl                         | Guillen, Heather                     | McAdam, Kyle                  |
| Casanova, James                       | Hakiel, Annette                      | McCormick, Martha             |
| Chakrabarty, Neil                     | Harris, Judy                         | McDonald, Catherine           |
| Chamberlin, Amy                       | Hart, Doug                           | McDowell, Leslie              |
| Chang, Dar-Lon                        | Hayden, Monica                       | Mercado, Joyce                |
| Chatsey, Stephanie                    | Hinkel, Austin                       | Meredith, Linda               |
| Chaves, Chris                         | Hirsch, Laurenace                    | Miller, Elaine                |
| chu, Paula                            | Howe, Dana                           | Moma, Luke                    |
| chu, Paula                            | Howell, Jess                         | Moody, Harry, San Mateo, CA   |
| Cocchiaro, Gerald                     | Hyne, Joyce                          | Moore, Carolyn                |
| Collier, Duane                        | Hyre, Noreen                         | Moran, Tom                    |
| Constant, Hugh                        | Ignatoff, Rachael                    | Morgan, Kat                   |
| Couture, Shelley                      | Ingerson, Tonya                      | Morgan, Mary                  |
| Cooper, James                         | Irwin, Rebecca                       | Morton, Cheryl                |
| Cooper, Ruth                          | Jacobs, Bob                          | Munie, Kenneth                |
|                                       | Janowitz-Price, Beverly, Phoenix, AZ | Murray, Julia                 |

|                     |                                   |                              |
|---------------------|-----------------------------------|------------------------------|
| Musgrove, Donna     | Roquet, Lauren                    | Thomas, Chris                |
| Myasishchev, Denis  | Roquet, Lauren                    | Tomyris, Scout               |
| Nakamura, Ellen     | Rorke-Davis, Shawn                | Trudeau, Ned                 |
| Nankivell, Sue      | Rosenweig, Lester                 | Truong, Justin               |
| Narr, Valerie       | Roskos, Nicole                    | Twarek, Drew                 |
| Nicholas, Ann       | Rotondo, Vincent                  | Unell, Alan                  |
| Nierenberg, Al      | Sableman, Lynn                    | Van Kirk, Carol              |
| Pagan, Kathleen W.  | Sabol, Jae                        | Villegas, Teresa             |
| Paine, Lesley Blair | Salinger, Elaine, San Mateo, CA   | Voget, Richard               |
| Palmer, Jeanne      | Schirm, Alyssa                    | Walker, Gary, Youngstown, OH |
| Parker, Teadra      | Schley, Marta, Bethesda, MD       | Walker, Jasen                |
| parson, Kim         | Schultz, Sara                     | Walter, Cooper A.            |
| Pearce, Liz         | Schweitzer, Jillian               | Walter, Nancy                |
| Pegg, John          | Seelke, Cindy                     | Washle, Kiersten             |
| Pellman, Julie      | Shafer, Stephen Q.                | Ways, Heather                |
| Pendorf, Laura      | Sherman, Mike                     | Wendell, Diana               |
| Penner, Susan       | Short, David                      | Wentz, Dylan                 |
| Pepe, Joseph        | Siegel, Ellen                     | Wharton, Leslie              |
| Pinch, Tracey       | Singh Rawat, Shishpal             | White, Jane, Berkeley, CA    |
| Porter, Joshua      | Snodgrass, Paul                   | Williams, Briana             |
| Porter, Keith       | Solazzo, Alyssa                   | Wilson, Lisa                 |
| Powell, Lauren      | Solazzo, Alyssa                   | Wittig, Mike                 |
| Prina, David        | St Onge, Emily                    | Woolf, Amanda                |
| Ramirez, Yenesey    | Stark, Sherie                     | Wozniak, John                |
| Randall, Hope       | Stauffer-Dunham, Elenna           | Wright, Marilyn              |
| Rapoport, Liz       | Stevens, Brynne                   | Yanez, Laura                 |
| Reh, Toni           | Stewart, Frances                  | Ybarra, Cindy                |
| Rennie, Alice       | Stratton, Sherry, Warrenville, IL | Yencich, Jay                 |
| Rhyne, George       | Suagee-Beauduy, Mary              | York, Traci                  |
| Rice, Mary          | Sutherland, Katherine             | Z, Anthony                   |
| Richards, Eryn      | Sutter, Tom                       | Zingher, Judith              |
| Robinson, Paula     | Sutton, Brian K.                  | Zurcher, Christoph           |
| Rockley, Joshua     | Swetman, Bonnie                   |                              |
| Rodrigues, Maryann  | Targos, Andrea                    |                              |
| Rollow, Mardi       | Tharp, Julianne                   |                              |

#### **H.3.2.4 Illinois Coal Form Letter, 150, 340, 375**

|                              |                          |                        |
|------------------------------|--------------------------|------------------------|
| Abella, Olga, IL             | Barker, Mary, IL         | Brown, Jean, IL        |
| Abraham, Clark, IL           | Barrett, Donna, IL       | Brown, Laurie, IL      |
| Adkisson, Derek, IL          | Bauer, Nancy, IL         | Brown, Nancy, IL       |
| Aguilar, Margaret, IL        | Beck, Robert, IL         | Brunner, Meredith, IL  |
| Aguirre, James, IL           | Beck, Tammy, IL          | Buckler, Daniel, IL    |
| Amling, Michael, IL          | Benson, Eric, IL         | Buehler, Sara, IL      |
| Amling, Peter, IL            | Bergstrom, Gail, IL      | Bullard, Clark, IL     |
| Amundsen-Kuester, Connor, IL | Biondo, Ron, IL          | Bullard, Clark, IL     |
| Applegate, Jim, IL           | Blackwell, Curtis, IL    | Bunkers, Laurie, IL    |
| Atkinson, Nancy, IL          | Blanchard, Ann, IL       | Burke, Dana, IL        |
| Atwood, John, IL             | Blumenshine, Joyce, IL   | Butler, Melanie, IL    |
| Aud, Kenneth, IL             | Boland, Maura, IL        | Callaci, Gloria, IL    |
| Ayres, Peter, IL             | Boling, Thomas, IL       | Camp, Kristin, IL      |
| B, B, IL                     | Borkowski, Tom, IL       | Carey, Peter, IL       |
| Babler, Pam, IL              | Bortoluzzo, Virginia, IL | Castelluccio, K, IL    |
| Baits, Paul, IL              | Bortoluzzo, Virginia, IL | Chorn, Donly, IL       |
| Baker, Greg, IL              | Bowsher, Pam, IL         | Christensen, Deb, IL   |
| Balaban, Susan, IL           | Bozzetti, Paula, IL      | Clarkin, Catherine, IL |
| Bannerman, Brittany, IL      | Bradley, Sue, IL         | Clendenen, Cindy, IL   |
| Banning, Robert, IL          | Bravo, Karen, IL         | Clinch, Paul, IL       |
| Barbezat, Mary, IL           | Brewster, Deborah, IL    | Cline, Austin, IL      |
| Bargiel, Paula, IL           | Brooker, Mark, IL        | Coleman, Carol, IL     |



|                           |                           |                         |
|---------------------------|---------------------------|-------------------------|
| Coles, Megan, IL          | George, Meredith, IL      | Knol, Patricia, IL      |
| Cook, Stefanie, IL        | Georgia, Nikki, IL        | Kochman, Ron, IL        |
| Cornelius, Stacy, IL      | Glass, Jacqueline, IL     | Kohli, Manvika, IL      |
| Cornwell, Ed, IL          | Glennemeier, Karen, IL    | Komisarz, Marion, IL    |
| Cowger, Nancy, IL         | Gottlieb, MaryAnn, IL     | Koss, Mary, IL          |
| Crouse, George, IL        | Graham, Geoffrey, IL      | Kraemer, Mark, IL       |
| Daglas, Andie, IL         | Grant, William, IL        | Krause, Christine, IL   |
| Dale, Foster, IL          | Gray, Karen, IL           | Kreger, Laurie, IL      |
| DannerLentz, Eve, IL      | Greco, Rose, IL           | Kreymer, Jeanne, IL     |
| Dappen, Mary, IL          | Greenberg, Jill, IL       | Krucoff, Rachel, IL     |
| Davis, Laura, IL          | Greer, Geoffrey, IL       | Krusa, Christopher, IL  |
| DeBolt, Angela, IL        | Griffith, Julie, IL       | Krusa, Christopher, IL  |
| Dempsey, Peter, IL        | Grigorian, Renee, IL      | Kuehnelt, Ashton, IL    |
| Deoss, Carol, IL          | Groch, Clare, IL          | Kuffner, MaryJo, IL     |
| DePriest, Bridget, IL     | Gysler, Kathleen, IL      | LaBarge, Alison, IL     |
| Derks, Laura, IL          | Hall, Steven, IL          | LaBuda, L, IL           |
| Dibenedetto, Nicholas, IL | Halloran, Monica, IL      | LaGessee, Rebecca, IL   |
| Dickerson, Paul, IL       | Halloway, Cynthia, IL     | Langer, Eric, IL        |
| Dilger, Val, IL           | Hanahan, Brad, IL         | Lantow, Susan, IL       |
| Dively, John, IL          | Hancock, Jonathan, IL     | Lauder, David, IL       |
| Doherty, Brigitte, IL     | Handelsman, Robert, IL    | LeBihan, Marie, IL      |
| Dohrmann, Paul, IL        | Hansen, Brenda, IL        | Lee, Robert, IL         |
| Domke, Ellen, IL          | Hansen, Kai, IL           | Leviton, Grant, IL      |
| Dosch, Mary, IL           | Hawk, Gary, IL            | Lindsay, Carla, IL      |
| Dostalek, Patricia, IL    | Heidenfelder, Randy, IL   | Lindsay, Susan, IL      |
| Drake, Tracy, IL          | Henderson, Henry, IL      | Llewellyn, David, IL    |
| Drake, Tracy, IL          | Henderson, Jim, IL        | Lobonc, Susan, IL       |
| Dressen, Karyl, IL        | Hensley, Jen, IL          | Logerquist, Kristin, IL |
| Dulcan, Kristin, IL       | Hinkle, Harry, IL         | Lombardi, Dan, IL       |
| Duy, Bob, IL              | Hippensteel, Donna, IL    | Lundholm, Mark, IL      |
| Eckberg, Brenda, IL       | Hoban, Eileen, IL         | Luner, Julie, IL        |
| Edwards, Eric, IL         | Hoffman, Andrew, IL       | Luther, June, IL        |
| Englebresten, Alice, IL   | Holowczak, Barbara, IL    | Manobianco, Daniel, IL  |
| Englund, LindaS, IL       | Holt, Randi, IL           | Marcus, Syd&Diane, IL   |
| Englund-Kenealy, Kate, IL | Hossli, Jerome, IL        | Marquis, Wendy, IL      |
| Enstrom, Paula, IL        | Hudak, Lindsey, IL        | Marro, John, IL         |
| Evans, Larry, IL          | Huffman, Melodie, IL      | Marsh, Jeanette, IL     |
| Feda, Nicholas, IL        | Huggins, Joyce, IL        | Martinez, Patricia, IL  |
| Finkel, David, IL         | Husseini, Sharif, IL      | Marzano, Gina, IL       |
| Finn, Robert, IL          | Jacobson, Roberta, IL     | Mast, Joyce, IL         |
| Firestone, Anne, IL       | Jesse, Chuck, IL          | Mathews, Deni, IL       |
| Fischer, Tessa, IL        | Johnson, Emanuel, IL      | Mauloff, Dolores, IL    |
| Flanagan, Marianne, IL    | Johnson, Sue, IL          | May, Lana, IL           |
| Ford, Mary, IL            | Jones, Alexander, IL      | Maziarz, Rosemary, IL   |
| Forsythe, Nathaniel, IL   | Julien, Beverly, IL       | McCabe, Ann, IL         |
| Frankel, Janice, IL       | Juliusson, Marguerite, IL | McCullough, Debra, IL   |
| Fredericks, Rachel, IL    | K, Ed, IL                 | McDonald, Catherine, IL |
| Freese, Lisanne, IL       | Kearney, Laura, IL        | McDonnell, Janet, IL    |
| Friz, Lee, IL             | Keating, Joanne, IL       | McGee, Dennis, IL       |
| Frost, Tom, IL            | Kegley, Jillian, IL       | McGee, Dennis, IL       |
| Fruin, Emmett, IL         | Keistler, Robert, IL      | McGowan, Janis, IL      |
| Fry, Barbara, IL          | Kessler, Roberta, IL      | McKasson, Barbara, IL   |
| Fujihara, Tracy, IL       | Kett, Nancy, IL           | McKee, Kevin, IL        |
| Fuller, Victoria, IL      | Killeen, Robert, IL       | McShane, Julie, IL      |
| Gahris, Jeff, IL          | King, Catherine, IL       | Meeker, Robert, IL      |
| Gallagher, Karen, IL      | Kitchen, Linda, IL        | Merrill, Lawrence, IL   |
| GawneJr, Bill, IL         | Kite, Anna, IL            | Merritt, Frank, IL      |
| Gebhardt, Sarah, IL       | Kittlaus, Janet, IL       | Milkowski, George, IL   |
| Gendron, Bob, IL          | Klubek, Brian, IL         | Miller, Krista, IL      |

|                             |                                 |                          |
|-----------------------------|---------------------------------|--------------------------|
| Miller, Mary, IL            | Reingruber, Gregory, IL         | Swarzman, Gerald, IL     |
| Minyo, Tiffany, IL          | Rejebian, Sona, IL              | Szot, Thomas, IL         |
| Mitchell, Brian, IL         | Rendulich, Ellen, IL            | T, S, IL                 |
| Montalto, Tina, IL          | Ricketts, Christie, IL          | Tafel, Carol, IL         |
| Morgan, Beverly, IL         | Ricobene, Tom, IL               | Tait, Barbara, IL        |
| MorrisDownie, Elizabeth, IL | Roberts, Nathan, IL             | Templeton, Mark, IL      |
| Morrison, Larry, IL         | Robertson, Anne, IL             | Tharp, Reynold, IL       |
| Mortimer, Rudolf, IL        | Robertson, Julie, IL            | Thompson, Wanda, IL      |
| Mosby, Lisa, IL             | Robertson, Linda, IL            | Thoresen, Ruthann, IL    |
| Murphy,MD, Eileen, IL       | Roman, Michael, IL              | Tieman, Amedee, IL       |
| Nagendran, Divya, IL        | Rossman, Jeremy, IL             | Toigo, Joe, IL           |
| Negele, Linda, IL           | Rubin, David, IL                | Trimble, Carolyn, IL     |
| Noel, Letitia, IL           | Rudo, Behn, IL                  | Turney, Andrew, IL       |
| Nommensen, Mary, IL         | Rutschman, Richard, IL          | Twery, Jill, IL          |
| Noworyta, Tim, IL           | Sallee, Barbara, IL             | Udel, L, IL              |
| Nuccio, Pat, IL             | Sanes, Janice, IL               | Unverfehrt, Karen, IL    |
| Nuenthel, Don, IL           | Sarelas, Thomas, IL             | Valsecchi, Sergio, IL    |
| Nusekabel, Kent, IL         | Saurs, Terri, IL                | Vandewalker, Jean, IL    |
| O'Connell, Chris, IL        | Schacht, Lenore, IL             | Vernon, Wendy, IL        |
| O'Donoghue, James, IL       | Schaefer, David, IL             | Verwiell, Maureen, IL    |
| Oestry, Linda, IL           | Scheiber, Linda, IL             | Vogel, Denise, IL        |
| Ogorzaly, David, IL         | Schietzelt, RandallandNancy, IL | W, I, IL                 |
| O'Kiersey, MaryE., IL       | Schillaci, MaryJo, IL           | Wagner, Jessica, IL      |
| Okroi, Robert, IL           | Schleman, Joshua, IL            | Walker, Brad, IL         |
| Olson, David, IL            | Schlender, Greg, IL             | Walsh, Sarah, IL         |
| Ondek, Michael, IL          | Schmeck, Melanie, IL            | Walter, Laurie, IL       |
| Orlik, David, IL            | Schmidt, Connie, IL             | Walton-Winnie, Jayne, IL |
| Osowski, Maryjo, IL         | Schmidt, Ulrich, IL             | WardJr., Tedd, IL        |
| Ozik, Sam, IL               | Schmitt, Darlene, IL            | Webb, Randall, IL        |
| Packheiser, Jen, IL         | Schnur, Kathy, IL               | Webster, Ken, IL         |
| Parks, Jim, IL              | Schueth, Steve, IL              | Weinert, Mark, IL        |
| Pawlisz, Linda, IL          | Schultz, Kristin, IL            | Weiss, Jeffrey, IL       |
| Pearson, Suzanne, IL        | Schutzius, Catharine, IL        | Whelan, Maria, IL        |
| Pellegrino, Samantha, IL    | Scovill, Richard, IL            | Whelan, Maria, IL        |
| Pervenecki, Shelly, IL      | Seidenfeld, Jerome, IL          | Willenborg, Susan, IL    |
| Peterson, Karen, IL         | Self, Rob, IL                   | Williams, Dawn, IL       |
| Petrakis, Carolyn, IL       | Shapiro, Ellene, IL             | Williamson, Lauren, IL   |
| Pfeifer, Wallace, IL        | Sizemore, Linda, IL             | Winn, Linda, IL          |
| Philipp, Sara, IL           | Smith, Curt, IL                 | Winter, Joan, IL         |
| Picchetti, Gloria, IL       | Smith, Fran, IL                 | Wiseman, Ann, IL         |
| Pierri, Frank, IL           | Smith, Lora, IL                 | Witkowski, Allyson, IL   |
| Piersialla, Leonard, IL     | Smith, Newland, IL              | Wolcott, Ellen, IL       |
| Piniotes, Betty, IL         | Snawadzki, Mark, IL             | Wolcott, Keith, IL       |
| Podewell, Roger, IL         | Sondheim, Steven, IL            | Wolfe, Amy, IL           |
| Pohlman, Maxine, IL         | Sparks, Connor, IL              | Woodford, Hannah, IL     |
| Polite, Michael, IL         | Stacey, Karen, IL               | Woodman, Bradley, IL     |
| Pope, Jacquelyn, IL         | Stanley, Robert, IL             | Woods, Chris, IL         |
| Poteraske, John, IL         | Starr, Sharon, IL               | Wooten, Caroline, IL     |
| Proffitt, Susan, IL         | Stelzer, Sarah, IL              | Workman, David, IL       |
| Pruitt, Patricia, IL        | Stevens, Vicky, IL              | Wright, Kimball, IL      |
| Pszanka, James, IL          | Stoll, Marcia, IL               | Wyant, Dianne, IL        |
| R, Le, IL                   | Stouder, Ariel, IL              | Yanda, Jack, IL          |
| Raatz, Annette, IL          | Strimbu, MJ, IL                 | Youse, Robin, IL         |
| Randle, Stephanie, IL       | Strong, Laura, IL               | Zare, Debra, IL          |
| Rausa, Krysten, IL          | Stuckey, Richard, IL            | Ziegler, Russ, IL        |
| Real, Amanda, IL            | Stuhlmacher, James, IL          | Ziegler, Russ, IL        |
| Reid, William, IL           | SueNoe, Sr.Linda, IL            | Zurakov, Michael, IL     |
| Reifman, Jamie, IL          | Sullivan, Eric, IL              |                          |
| Reimer, Karen, IL           | Sutton, Katherine, IL           |                          |

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Allen, Michele, Millington, TN  
Allred, Katie, Millington, TN  
Asemota, Barbara & Emmanuel,  
Millington, TN  
Baskin, Skip, Millington, TN  
Bell, Johnnie, Millington, TN  
Biscoe, Chris, Millington, TN  
Brady, Susan, Millington, TN  
Church, David, Millington, TN  
Clance, Leslie, Millington, TN  
Dacus, Tim, Millington, TN  
Espinoza, Gina, Millington, TN  
Espinoza, Georgina, Millington, TN  
Estupinan, Georgina, Millington, TN

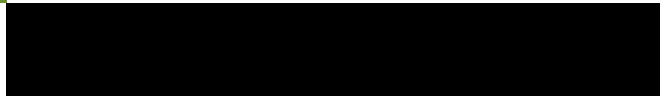
Everingham, N.Mark, Millington, TN  
Fly, Danny, Millington, TN  
Godwin, Tracie, Millington, TN  
Grabowski, Craig, Millington, TN  
Green, Susan, Millington, TN  
Hayden, Karon, Millington, TN  
Jeffcoat, James, Millington, TN  
Johnson, Michael & Jo-Annette,  
Millington, TN  
Kawaii, Neko, Millington, TN  
Landau, Denise, Millington, TN  
Maclin, Leroy, Millington, TN  
Moorlach, Kent, Millington, TN  
Moorlach, Faith, Millington, TN

Moorlach, Stephanie, Millington, TN  
Morton, Dean, Millington, TN  
Myers, Jody, Millington, TN  
Myers, Jody, Millington, TN  
Neff, John & Peg, Millington, TN  
Owen, Carrol, Millington, TN  
Patterson, Donna, Millington, TN  
Sarinoglu, Linda, Millington, TN  
Schmidt, Susan, Millington, TN  
Schnell, Randy, Millington, TN  
Schnell, Gabriel, Millington, TN  
Taylor, AJ & Katherine, Millington,  
TN  
Walker, Rona, Millington, TN



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## **Appendix J – Public and Agency Comments on the Preliminary Final IRP and Environmental Impact Statement**

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## **Appendix J - Public and Agency Comments on the Preliminary Final IRP and Environmental Impact Statement**

On June 22, 2026, TVA released the preliminary final Integrated Resource Plan and Environmental Impact Statement for public review. During the 30-day review period, TVA received about 245 comment submittals from members of the public, governmental agencies and officials, and non-governmental organizations. Among those submitting input to TVA was the U.S. Environmental Protection Agency (EPA Region 4), two U.S. Senators, one U.S. Congressman, several state and local elected officials, two state historic preservation agencies, ten environmental non-governmental organizations, and several industry and customer organizations. The Sierra Club submitted a form letter cosigned by 3,669 members and supporters; about 1,144 of these individuals submitted additional, unique statements.

TVA appreciates the interest from the public and the important input provided. All public and agency comments submitted on the preliminary final IRP/EIS are posted at [www.tva.com/irp](http://www.tva.com/irp).

Many of the comment topics and concerns raised during the review are similar to those received on the draft IRP and EIS in late 2024. The previously submitted public and agency comments are addressed in Appendix H of Volume 2. In developing its preliminary final IRP and EIS, TVA made numerous revisions to the IRP and EIS based on public and agency input on the draft IRP and EIS.

In reviewing comments on the preliminary final IRP and EIS, TVA found that the public and agency comments on the documents reflect a wide spectrum of perspectives on TVA's future energy direction. A majority of commenters expressed a preference for certain types of generation resources. About half of commenters encouraged greater reliance on renewable energy, nuclear generation, battery storage, energy efficiency, and conservation incentives, with some specifically supporting distributed residential solar. Many of these commenters voiced strong opposition to continued fossil fuel use or expressed concerns about the environmental impacts such as air, water, land and/or climate, and long-term affordability associated with coal, natural gas, and expanded data-center loads. About a quarter of commenters expressed concerns with and opposition to data-center development altogether; some of these commenters argued that data centers should generate their own power. Additional feedback highlighted worries about grid capacity, rising rates, and how these pressures intersect with large-scale load growth. Some commenters criticized aspects of the IRP process itself while others expressed support for the IRP process. A few commenters advocated particular infrastructure projects, such as a proposed gas pipeline in Jackson County, Alabama. Some individuals expressed skepticism toward renewables or nuclear energy, citing concerns about reliability, cost, land use, or safety. A few commenters identified specific concerns with the adequacy of the environmental analysis. Finally, several commenters referenced and submitted numerous attachments in various formats (e.g., reports, articles, presentations, studies) to support their comments. TVA also received one comment letter that was submitted by three elected officials after the review period ended.



TVA carefully reviewed the distinct comments to determine whether changes to the plan or environmental analysis were necessary, consistent with TVA NEPA procedures at 18 CFR 1318.500. Comments which resulted in changes to the IRP and/or EIS are discussed below.

Comments from the EPA Region 4:

EPA Region 4 Comment: *“On page 5-30 of Volume 2 of the Integrated Resource Plan 2026, the first paragraph of Section 5.5.1, Air Quality, states “After 2040, emissions of SO<sub>2</sub> [sulfur dioxide] and mercury cease with the expected end of life for coal facilities.” Natural gas combustion turbines, as well as their support equipment, emit SO<sub>2</sub>. EPA’s AP-42, Compilation of Air Pollutant Emissions Factors, Chapter 1.4 (page 1.4-7) includes a -0.6 pounds/10<sup>6</sup> standard cubic feet emission factor for SO<sub>2</sub> emissions from the combustion of natural gas which can be used for general estimations of SO<sub>2</sub> emissions from natural gas combustion turbines. TVA’s Allen Combined Cycle Plant’s current title V permit includes support equipment, such as an auxiliary boiler and duct burners on their Heat Recovery Steam Generators, which also emit SO<sub>2</sub>. EPA recommends updating Section 5.5.1 as well as table 5-14 and figure 5-2 to reflect the SO<sub>2</sub> emissions from natural gas combustion.”*

Response: In response to these recommendations, TVA made several revisions to related sections of the EIS (Volume 2) to acknowledge that there are some SO<sub>2</sub> emissions associated with natural gas generation. TVA modified section 5.2.1.3 (Natural Gas – Existing Facilities) to state that “sulfur-containing odorants are added to natural gas for detecting leaks, leading to small amounts of SO<sub>2</sub> emissions,” citing to the EPA AP-42 guidelines. In section 5.5.1’s discussion of impacts on air quality, TVA added a statement reflecting that after 2040, once coal facilities reach their expected end of life, small amounts of SO<sub>2</sub> emissions would be expected and that the emissions are associated with sulfur-containing odorants added to natural gas for detecting leaks. TVA also added footnotes to Table 5-1, Table 5-14, and Figure 5-2 to acknowledge that trace amounts of SO<sub>2</sub> emissions (US EPA default emission rate of 0.0006 lb/mmBtu) associated with sulfur-containing odorants added to pipeline-delivered natural gas are not included in the tables or figure because of their relatively minute amounts. TVA notes that, as a cooperating agency, the EPA Region 4 reviewed the preliminary document prior to its public release in June 2026; these revisions were included in the preliminary final EIS (Volume 2) shared with the public.

Multiple individuals commented that they felt the IRP’s battery storage overnight cost assumptions were too high. While not exhaustive, the three comments below provide an example of the feedback received:

Joe Schiller: *“...TVA’s cost estimates in this IRP seem badly out of date. This is a critical flaw that calls into question the validity of the entire IRP. For example, TVA cites a cost for four-hour lithium ion battery storage of \$2158/kW, whereas a Google search yields \$400-600/kW...”*

Joanne Logan: “...Industry estimates show that the modeled prices for gas plants are too low, and the modeled price for battery storage is much too high...”

Gil Hough (TenneSEIA): “...High cost assumptions for new lithium-ion storage batteries...”

Response: In response to these comments, TVA undertook a review of the published overnight capital costs for battery storage expansion options and their associated narrative, provided in Chapter 2, Section 2.6.5 and Appendix E, Section E.9 of Volume 1. TVA identified a spreadsheet reporting error in the translation of the actual modeled storage costs into overnight capital costs for reporting purposes. This error did not impact TVA’s IRP modeling of battery storage options.

Battery storage options in the IRP are modeled as power purchase agreements using an all-in annual demand charge (\$/kW-yr). The modeled demand charge did tie correctly to bottom-quartile offers of a recent request for proposal (RFP), however when back-calculating these RFP responses into the component parts for reporting purposes (i.e., annual fixed O&M, annual capital cost recovery, etc.) the annual fixed O&M cost was not removed from the annual capital cost recovery, resulting in a reported overnight capital cost (\$/kW) assumption higher than intended. Table 2-4 and Section E.9 has been updated to reflect corrected overnight capital costs for both 4-hour lithium-ion and 8-hour advanced chemistry battery options and the narrative paragraph following Table E-11 has been updated to better explain TVA’s process for creating and reporting battery storage cost assumptions.

Other comments submitted during public review of the preliminary final IRP and EIS did not result in changes to the final IRP or EIS. After review and careful consideration, TVA determined that other comments did not necessitate modifications to the alternatives considered or evaluation of additional alternative, nor did other comments compel revisions to its environmental impact analyses. Except for the responses above, none of the information provided necessitated factual corrections as well. Therefore, no further action is needed (18 CFR 1318.500(e)).