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NEW CALEDONIA GAS PLANT PROJECT
ENVIRONMENTAL IMPACT STATEMENT
SCOPING REPORT

Prepared by:
TENNESSEE VALLEY AUTHORITY
Knoxville, Tennessee

May 2024

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Table of Contents

List of Figures

List of Appendices

Abbreviations and Acronyms

CC	Combined Cycle
CT	Combustion Turbine
EA	Environmental Assessment
EIS	Environmental Impact Statement
EO	Executive Order
IRP	Integrated Resource Plan
MW	megawatts
NCG	New Caledonia Gas Plant
NEPA	National Environmental Policy Act
TVA	Tennessee Valley Authority

1.0 Introduction

The Tennessee Valley Authority (TVA) intends to prepare an Environmental Impact Statement (EIS) pursuant to the National Environmental Policy Act (NEPA) to assess the potential environmental and social impacts associated with the construction and operation of a combustion turbine (CT) facility, consisting of six dual-fuel frame CTs capable of generating approximately 500 megawatts (MW), at the TVA New Caledonia Simple Cycle Facility site (New Caledonia Gas Plant [NCG] project or Proposed Action). TVA's project goal is to support continued load growth within the Tennessee Valley in a way that is consistent with the recommendations in the TVA 2019 Integrated Resource Plan (IRP) (TVA 2019)[1] and to facilitate the integration of renewables onto the electric grid, thereby advancing TVA's decarbonization goals while complying with the requirement under the TVA Act that power be sold at rates as low as feasible.

This NCG Project Scoping Report (herein Scoping Report) describes the internal and public scoping for relevant issues relating to the NCG project and outreach conducted by TVA to notify the public. The Scoping Report also documents the input submitted to TVA by the public, organizations, and intergovernmental entities during the public scoping period.

1.1 Background

In June 2019, TVA published the 2019 IRP (TVA 2019), which evaluated six scenarios (plausible futures) and five strategies (potential TVA responses to those futures) and identified a range of potential energy resource additions and retirements. The 2019 IRP acknowledged that reliance on only one strategy would not ensure reliability and resilience and, therefore, considered a variety of generation resources. The 2019 IRP identified the potential addition of up to 500 MW of demand response and 2,200 MW of energy efficiency (demand-side options); 4,200 MW of wind; 5,300 MW of storage; 8,600 MW of CTs; 9,800 MW of combined cycle (CC); and 14,000 MW of solar by 2038. The 2019 IRP recommendation optimizes TVA's ability to create a more flexible power-generation system that can successfully integrate increasing amounts of renewable energy sources while ensuring reliability. Additionally, the 2019 IRP recommended a series of near-term actions, including evaluating engineering end-of-life dates for aging fossil units, to determine whether retirements greater than 2,200 MW would be appropriate to inform long-term planning. The strategic direction established by the 2019 IRP and results from recommended near-term actions formed the basis for TVA's asset strategy, which continues to support affordable, reliable, and cleaner energy for customers.

As a result of resource changes outlined in the asset strategy, TVA has a plan for 70% carbon reductions by 2030, a path to approximately 80% carbon reductions by 2035, and aspires to net-zero carbon emissions by 2050 (based on a 2005 baseline).

[1] TVA is in the process of developing the 2024 IRP. TVA's past practice has been to evaluate its IRPs every 4 to 5 years. Accordingly, on May 19, 2023, TVA published a Notice of Intent in the Federal Register announcing its plans to prepare an EIS associated with the implementation of the updated IRP, initiating the 45-day scoping period, which concluded on July 3, 2023. The 2019 IRP remains valid and guides future generation planning consistent with least-cost planning principles.

The combination of resource technologies in the overall asset strategy includes:

- Maintaining the existing low-cost, carbon-free nuclear and hydro fleets;
- Retiring aging coal units as they reach the end of their useful lives, expected by 2035;
- Adding up to 10,000 MW of solar by 2035 to meet customer demands and system needs, complemented with storage;
- Using natural-gas-fueled generation to enable needed coal retirements and solar expansion as other technologies develop;
- Leveraging demand-side options, in partnership with local power companies; and
- Partnering to develop new carbon-free technologies for greater reduction in carbon emissions.

Since the pandemic, TVA has seen an increase in electric demand. The population in the TVA service region has grown 1.5%, and that pace is expected to continue in 2024. TVA expects continued growth in annual electric demand through the middle of this decade. Forecasted electric demand is expected to grow more than one percent per year on average between 2023 and 2026.

With increased residential migration and commercial development in the Tennessee Valley, TVA must add capacity to the system to maintain adequate operating reserves. Operating reserves are defined as the capability above firm system demand required to provide for regulation, load forecasting error, equipment, -forced and scheduled outages, and local area protection. Peaking units, such as CTs, are valuable in meeting electricity demand for shorter periods of high demand on summer and winter peak days. Their flexibility also plays a key role in successfully integrating renewable resources, which have variable and unpredictable generation patterns.

TVA's energy portfolio is expected to change over time given the rise of renewable energy sources. TVA is working to expand its nearly 3,200 MW of solar capacity commitments to 10,000 MW of solar by 2035. TVA is continuing to expand its solar and carbon-free commitments through procurement methods such as requests for proposals and opportunities at existing TVA sites. In July 2022 TVA issued a request for proposals for up to 5,000 MW for additional carbon free energy.

The 2019 IRP indicated that the near-term actions required TVA to enhance system flexibility to integrate increasing amounts of renewable resources. Solar resources are typically only available on average about 20 to 25% of the year, and their availability can vary significantly during daylight hours as cloud cover and precipitation events occur. As such, solar power must be paired with dispatchable power or battery storage to meet year-round capacity needs. Battery storage pairing is constrained in that batteries are energy limited (e.g., typically providing a 4-hour duration) and are net consumers of electricity. Pairing solar resources with the appropriate level battery storage can compensate for this deficiency but adds cost and introduces transmission stability and reliability issues that then must be addressed with transmission system improvements (TVA 2019).

The need for inclusion of natural-gas-fired CTs and CCs in the target power supply mix is driven by the demand for reliable electricity, the increased amount of solar penetration, system dispatchable capacity requirements, commodity prices, costs relative to alternative resource

options, and transmission system reliability. Natural-gas-fired CT or CC units can be operated year-round to meet the fluctuating demand on the power system, including overnight, during cold pre-dawn winter mornings, and during warm summer evenings as solar generation fades. The inclusion of dispatchable power generation from natural-gas-fired CTs and CCs effectively enables systemwide integration of solar while providing critical transmission-related benefits to ensure reliability and power quality (TVA 2019).

The NCG site is a decommissioned former CT. By constructing and operating an approximately 500-MW CT facility at the same location as the previous generating facility, TVA would be able to utilize existing natural gas and transmission infrastructure, allowing the facility to operate without needing new pipeline construction.

1.2 Purpose and Need

The purpose of the Proposed Action is to support continued load growth within the Tennessee Valley in a way that is consistent with the recommendations in the 2019 IRP to meet demand for electricity and to facilitate the integration of renewables onto the electric grid, thereby advancing TVA's decarbonization goals. The 2019 IRP included the addition of up to 5,200 MW of CTs by 2028 and up to 8,600 MW by 2038 to accommodate load growth. CTs are needed to provide dispatchable generation capacity to ensure that TVA can reliably meet required year-round generation, maximum capacity system demands, planning reserve margin targets, and comply with the requirement under the TVA Act that power be sold at rates as low as feasible.

The Proposed Action aligns with the 2019 IRP, which remains current and valid to guide future generation planning consistent with least system cost principles. The addition of CT units to the fleet was recommended to enhance system flexibility to integrate renewables and distributed resources, with substantial solar additions expected over the next two decades. As the amount of solar generation in the TVA generation portfolio continues to increase, flexibility of the remainder of the fleet becomes even more important.

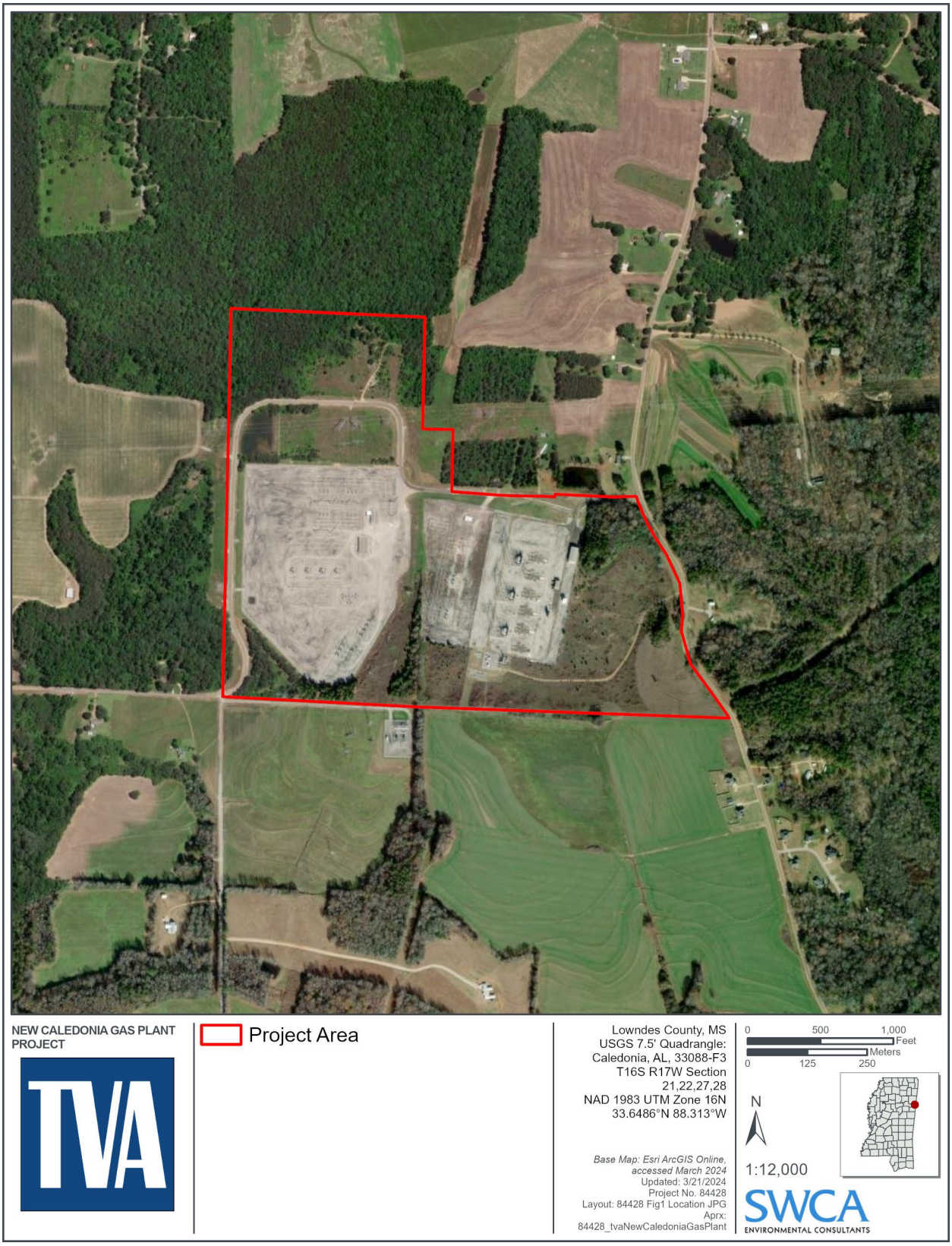

Figure 1. Proposed NCG Project Location.

1.3 Related Documents and Environmental Reviews

The following environmental reviews were prepared for actions related to the NCG project:

- *TVA 2019 IRP and Programmatic EIS* (TVA 2019). The 2019 IRP and Programmatic EIS provides direction for how TVA will meet the future electricity demand of the Tennessee Valley region while fulfilling its mission of providing the Tennessee Valley with low-cost reliable power, environmental stewardship, and economic development. The 2019 IRP evaluated six scenarios (plausible futures) and five strategies (potential TVA responses to those futures) and identified a range of potential resource additions and retirements throughout the TVA power service area.
- *TVA 2024a. Demolition of Structures and Utilities at New Caledonia, Mississippi Categorical Exclusion.* Reroute, demolition and removal of structures, utilities and surfacing at the former New Caledonia site to reduce safety concerns and eliminate the need for upkeep at an underutilized site.
- *TVA 2024b. Demolition of Two Transformers at New Caledonia Categorical Exclusion.* Verification of polychlorinated biphenyl status, drainage of water in the containment around the tanks, and demolition of two transformers at the former New Caledonia site.

2.0 Alternatives

2.1 Alternatives Carried Forward for Analysis

TVA anticipates that the NCG EIS will address two alternatives: the Proposed Action and a No Action Alternative. Whether these or other alternatives are reasonable, warranting further consideration under NEPA, would be determined while preparing the EIS. Connected actions will also be considered in this assessment.

2.1.1 Alternative A – No Action Alternative

The No Action Alternative provides a baseline for comparing against the Action Alternative. Under the No Action Alternative, TVA would not construct a simple cycle frame CT facility at the NCG site. TVA would not make related upgrades to the transmission system to interconnect the generation and actions related to upgrades of the existing natural gas pipeline interconnection would not be completed. This alternative does not meet the purpose and need of TVA's Proposed Action; however, it is included in this evaluation as it represents current conditions against which the Proposed Action will be compared.

2.1.2 Alternative B – Action Alternative (Proposed Action)

Location and Description

The NCG project is proposed to be located on an existing approximately 63 acre parcel of TVA property and an adjacent 82-acre substation parcel, located in Lowndes County, Mississippi, approximately 10 miles northeast of Columbus (see Figure 1). The property is a decommissioned former CT site. Much of the property is fenced and graveled with the remaining portions undeveloped and largely composed of early successional forest, particularly in areas with steep slopes, while the flatter portions of the property are largely fallow field. The Action Alternative would evaluate the development of the NCG site for construction and operation of six gas-fired frame CTs (500 MW). The CTs would use existing natural gas and transmission infrastructure.

3.0 Environmental Review Process

The NEPA review process helps federal agencies make decisions based on an understanding of a proposed action's potential impacts. NEPA also requires that federal agencies provide opportunities for public involvement in the agency decision-making process. Finally, federal agencies conduct scoping under NEPA to engage important stakeholders in the early identification of concerns, potential impacts, relevant effects of past actions, and possible alternative actions.

TVA will consider input obtained from the public, stakeholders, resource and permitting agencies, and other interested parties during the public scoping period when developing the Draft EIS. Publication of the Draft EIS will include a public review and comment period, during which TVA will conduct a public meeting. TVA will consider all substantive comments and edits submitted on the Draft EIS, make appropriate revisions in response, and publish a Final EIS. TVA's final decision on which alternative will be implemented will be documented in a Record of Decision, to be published in the Federal Register.

In addition to agency and public input, the EIS will also address specific requirements associated with a number of federal laws such as the National Historic Preservation Act, Endangered Species Act, Clean Water Act, and Clean Air Act, and relevant executive actions, including Executive Order (EO) 11988 (Floodplain Management), EO 11990 (Protection of Wetlands), EO 12898 (Environmental Justice), EO 13112 as amended by 13751 (Invasive Species), EO 13990 (Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis), EO 14008 (Tackling the Climate Crisis at Home and Abroad), and other relevant EOs.

At the time of publication of this report, TVA estimates that the Draft EIS will be published in the summer of 2024 and the Final EIS will be published by winter of 2024. TVA will issue a decision document, a Record of Decision, by Spring 2025.

3.1 Scoping Period Public Outreach

The public scoping process was initiated with the publication of a Notice of Intent to prepare an EA or EIS in the Federal Register on November 28, 2023 (Appendix A). Additionally, TVA posted a public notice about the scoping period and information regarding the EA or EIS on the TVA website (www.tva.com/nepa). The public scoping period occurred between November 28, 2023, and January 19, 2024. To facilitate awareness of this opportunity, in addition to posting the Notice of Intent in the Federal Register and TVA website, TVA contacted local, state, and federal government agencies, local power companies, and direct serve customers and sent a media advisory to news outlets across the TVA service area(Columbus Commercial Dispatch and the Monrow Journal), TVA also posted Facebook Events ads within 10 miles of the following zip codes: 35461, 35576, 35586, 35592, 38848, 39701, 39702, 39705, 39740, 39746, 39766, 39773.

TVA encouraged the public to comment on the scope of the EA or EIS, the alternatives under consideration, and environmental issues that should be addressed. TVA invited the public as well as Federal, state, and local agencies and federally recognized Indian tribes to submit formal comments via email (nepa@tva.gov), the TVA webpage (www.tva.com/nepa), or by mail. TVA's webpage also provided a link for virtual submission of comments.

As part of public scoping, TVA hosted an in-person public open house on January 8, 2024, to gather input from the public and stakeholders. The public was invited to attend this meeting and submit formal comments. At the public open house, TVA provided an interactive web-browser simulating various phases of the project, and informative posters outlining the NCG site history, a description of the Proposed Action, project schedule, and NEPA regulatory framework. A total of 43 individuals, both members of the general public and representatives of a variety of organizations, signed in for the meeting.

3.2 Summary of Scoping Feedback

TVA received a wide variety of comments and opinions regarding the construction and operation of a CT plant at the NCG site. Based on TVA's internal scoping and input gathered from the public scoping process, TVA determined that an EIS would be the appropriate level of review for the Proposed Action. TVA will consider this input in developing its Draft EIS.

TVA received 30 submissions from members of the public, federal agencies, and various organizations totaling 1,027 unique comments. The submissions consisted of:

- Sixteen submissions from the General Public.
- One submission from a federal agency, the U.S. Environmental Protection Agency.
- Thirteen submissions from the following organizations: Appalachian Voices, Center for Biological Diversity, GS Research LLC, Gulf Coast for a Sustainable Future, Hop, Legacy Village Inc, Mississippi Rising Coalition (2 submissions), Robbins Properties, Sierra Club, Solar Energy Industries Association, Southern Alliance for Clean Energy, Southern Environmental Law Center.

All comments submitted are included in Appendix B.

The 30 submissions were reviewed to identify specific issues of concern by each commenter and were grouped in general categories for identification and review. In total, 1,027 unique comments were identified. In order of number of comments received, the general categories raised by commenters included the following:

1. *Preference for renewable energy options:* Concerns regarding using non-renewable energy instead of expanding on existing renewable energy options or building new renewable energy facilities (201 comments)

2. *Cost effectiveness:* Concerns regarding project cost as well as other forms of energy being more affordable (171 comments)

3. *EIS requested*: Requests for further analysis of environmental impact of building a gas plant and fossil fuel use (146 comments)

4. *Job creation/economic development:* Concerns that gas plants will not provide the jobs that residential solar and energy efficiency programs could (125 comments)

5. *Renewable options more reliable*: Concerns pertaining to renewable energy providing supply needs in inclement weather when non-renewable sources have failed (125 comments)

6. *Lacking information*: Requests for more information on one or more parts of the process and/or documentation (45 comments)

7. *Policy/regulation*: Concerns that the 2019 IRP does not conform to current policies and regulations (43 comments)

8. *IRP information*: Questions and concerns over the use of information from the 2019 IRP (42 comments)

9. *Climate change*: Concerns regarding the use of fossil fuels and impacts on global warming (40 comments)

10. *Environmental justice*: Concerns regarding potential impacts to the human environment, particularly vulnerable communities adjacent to the gas plant (39 comments)

11. *Air quality*: Concerns over adequate representation of greenhouse gas emissions and lack of measures to prevent impact to air quality (13 comments)

12. *Pollution (general)*: Concerns over pollution to the environment specifically related to impact to environmental justice communities (13 comments)

13. *Electric resources needed*: Comments acknowledging the need for more utility support in the area (7 comments)

14. *Mitigation*: Concerns with whether cost measurements associated with the project include appropriate mitigation (6 comments)

15. *Reliability of energy source*: Commentors discussed rolling blackouts associated with cold climates and stated support for renewable energy that provided back-up to gas plants (6 comments)

16. *Alternatives analysis*: While alternatives are discussed in many comments, these specifically highlighted concerns with a lack of alternatives for a thorough alternatives analysis (5 comments)

3.3 Issues to be Addressed

Based on TVA's internal scoping and input gathered from the public scoping process, the anticipated major issues to be addressed in this EIS include:

- *Air Quality and Climate Change/Greenhouse Gases:* Air quality considerations including attainment status and regional air quality information will be presented. Impacts to air quality from activities associated with each of the alternatives will be evaluated. The impact of greenhouse gas emissions from each of the alternatives on climate change will be addressed.
- *Geology and Soils*: Regional geology and soils at the NCG site will be identified and any limitations related to construction and operation will be evaluated. Impacts to prime farmland soils will be quantified. The seismic history of the region will be identified and evaluated.

- *Land Use/Prime Farmlands*: Land uses within the NCG site and within the vicinity (5-mile radius) will be identified. Permanent and temporary direct and indirect impacts to land use associated with each of the alternatives will be evaluated.
- *Groundwater Quality and Quantity:* Existing groundwater conditions in the vicinity of the site will be described and analyzed to the extent to which each alternative would affect groundwater quality.
- *Surface Water Quality and Quantity:* The quality of surface water resources will be described and the extent to which each alternative would affect water quality directly or indirectly will be analyzed.
- *Floodplains and Wetlands*: Wetlands, waterbodies, and floodplains within the NCG site will be identified and impacts will be quantified. The effects of each of the alternatives on jurisdictional wetlands, waterbodies, and floodplains will be evaluated.
- *Biological Resources* (vegetation, wildlife, and aquatic life): Vegetation community types within the NCG site will be described. Significant natural features, including rare species habitat, important wildlife habitat, and locally uncommon natural community types, will be identified. The effects of each alternative on terrestrial and aquatic ecosystems will be evaluated.
- *Threatened and Endangered Species*: Federally or state-listed as threatened or endangered plants and animals known to exist in the vicinity of the NCG site will be identified. The effects of each alternative on endangered, threatened, and rare species in need of management will be evaluated.
- *Recreational and Managed Areas*: Natural areas, parks, and other managed areas within the vicinity of the alternatives will be identified and potential impacts associated with the proposed alternatives will be addressed.
- *Cultural and Historic Resources:* Archaeological and historic resources within the Area of Potential Effect of the NCG site will be characterized. Any known sites listed on or eligible for the National Register of Historic Places will be discussed. The potential effects of each alternative on historic and archaeological resources will be evaluated. The cultural resources analysis and recommendations will be reviewed through formal consultation with the Mississippi State Historic Preservation Office and interested Tribes, the results of which will also be provided.
- *Visual Resources:* The aesthetic setting of the NCG site will be described and an analysis of changes to scenic attractiveness and scenic integrity associated with each of the alternatives will be completed.
- *Noise:* Noise emissions and impacts associated with the construction phase equipment use and plant operations will be assessed to determine the potential noise effects of each alternative on sensitive receptors.
- *Transportation*: The existing roadway network in the vicinity of the NCG site, including physical road characteristics (number of lanes, shoulders, and posted speed limit) and existing traffic characteristics will be identified. The effect of construction and operational traffic to the NCG site will be evaluated, including the potential for improvements to site access from local highways.
- *Solid and Hazardous Waste:* Current practices regarding hazardous materials/waste management near the NCG site will be identified. Any impacts from waste generation

during construction and operation will be identified. Operational measures (waste management practices) will be incorporated into the assessment of impacts.

- *Socioeconomics and Environmental Justice:* Demographic and community characteristics within the vicinity (10-mile radius) of the NCG site will be evaluated. Potential low-income and minority populations will be identified to evaluate the potential for disproportionate adverse impacts in accordance with EO 12898 and EO 13990. Economic effects associated with the construction and operational workforce for each alternative will also be evaluated. The existing local services, including emergency, water, and wastewater, will be evaluated to determine adequate resources and effects associated with each alternative.
- *Public Health and Safety, Services, and Utilities:* The public emergency services and utilities in the vicinity of the project will be described. Any safety concerns in the vicinity resulting from project activities will be identified.

The potential direct and indirect impacts to each resource will be assessed in the EIS. Avoidance, minimization, and mitigation measures will be identified as appropriate. In addition, the EIS will include an analysis of the cumulative impacts associated with each alternative. A cumulative impact analysis considers the potential impact to the environment that may result from the incremental impact of the project when added to other past, present, and reasonably foreseeable future actions (40 Code of Federal Regulations 1508.7). These past, present, and reasonably foreseeable future actions will include, but are not limited to, the other potential development actions that are connected to the development of a simple cycle facility at the NCG Site. The methodology for performing such analysis is set forth in the Council on Environmental Quality's *Considering Cumulative Effects under NEPA*.

4.0 References

Tennessee Valley Authority (TVA). 2019. 2019 Integrated Resource Plan. Retrieved from https://www.tva.com/environment/environmental-stewardship/integrated-resource-plan/2019-integrated-resource-plan (accessed January 2024).

_____. 2024a. Categorical Exclusion Record for Demolition of Structures and Utilities at New Caledonia, MS. March 2024.

_____. 2024b. Categorical Exclusion Record for Demolition of Two Transformers at New Caledonia. March 2024.

APPENDIX A

Federal Register Notice

blocked pursuant to a determination by the Secretary of State pursuant to E.O. 13224.

Consistent with the determination in section 10 of E.O. 13224 that prior notice to persons determined to be subject to the Order who might have a constitutional presence in the United States would render ineffectual the blocking and other measures authorized in the Order because of the ability to transfer funds instantaneously, I determine that no prior notice needs to be provided to any person subject to this determination who might have a constitutional presence in the United States, because to do so would render ineffectual the measures authorized in the Order.

This notice shall be published in the **Federal Register**.

Dated: November 16, 2023.

Antony J. Blinken,

Secretary of State.

[FR Doc. 2023–26103 Filed 11–27–23; 8:45 am]

BILLING CODE 4710–AD–P

TENNESSEE VALLEY AUTHORITY

New Caledonia Generation Site Project

AGENCY: Tennessee Valley Authority.

ACTION: Notice of intent.

SUMMARY: The Tennessee Valley Authority (TVA) intends to prepare an environmental assessment (EA) or an environmental impact statement (EIS) under the National Environmental Policy Act (NEPA) to address the potential environmental impacts associated with the proposed construction and operation of a Combustion Turbine (CT) Plant on a parcel of TVA-owned brownfield property in Lowndes County, Mississippi. The proposed New Caledonia Generation Site (NCG) would provide approximately 500 Megawatts (MW) of new generation capacity. The NCG CTs would be composed of six (6) natural gas-fired frame CTs. NCG would provide flexible and dispatchable transmission grid support and facilitate the integration of renewable generation onto the TVA bulk transmission system, consistent with the 2019 Integrated Resource Plan (IRP). Public comment is invited concerning the scope of the environmental review, alternatives being considered, and environmental issues that should be addressed. TVA is also requesting data, information, and analysis relevant to the proposed action from the public; affected Federal, State, Tribal, and local governments, agencies, and offices; the scientific community; industry; or any other interested party.

DATES: The public scoping period begins with the publication of this Notice of Intent in the **Federal Register**. To ensure consideration, comments must be postmarked, submitted online, or emailed no later than January 19, 2024. To facilitate the scoping process, TVA will hold an in-person public open house from 5 p.m. to 7 p.m. on January 8, 2024, at the Caledonia Community Center; see *https://www.tva.com/nepa* for more information on the meeting.

ADDRESSES: Written comments should be sent to Erica McLamb, NEPA Compliance Specialist, 1101 Market Street, BR 2C–C, Chattanooga, Tennessee 37402. Comments may also be submitted online at: *https://www.tva.com/nepa* or by email at *nepa@tva.gov.* The public meeting will be held at the Caledonia Community Center, located at 205 South St., Caledonia, Mississippi 39740.

FOR FURTHER INFORMATION CONTACT: Erica McLamb by email to *nepa@tva.gov,* by phone at (423) 751–8022, or by mail at the address above.

SUPPLEMENTARY INFORMATION: This notice is provided in accordance with the Council on Environmental Quality's regulations (40 CFR parts 1500 to 1508) and TVA's procedures for implementing NEPA. TVA is an agency and instrumentality of the United States, established by an act of Congress in 1933, to foster the social and economic welfare of the people of the Tennessee Valley region and to promote the proper use and conservation of the region's natural resources. One component of this mission is the generation, transmission, and sale of reliable and affordable electric energy.

Background

TVA provides electricity for local power companies serving 10 million people in Tennessee and parts of six surrounding States, as well as directly to large industrial customers and Federal installations. TVA is fully self-financed without Federal appropriations and funds virtually all operations through electricity sales and power system bond financing. The dependable electrical capacity on the TVA power system is approximately 38,000 MW. TVA transmits electricity from generating facilities over 16,000 miles of transmission lines.

In June 2019, TVA published an IRP, which was developed with input from stakeholder groups and the public. The 2019 IRP evaluated six scenarios (plausible futures) and five strategies (potential TVA responses to those plausible futures) and identified a range of potential resource additions and retirements throughout the TVA power service area, which encompasses approximately 80,000 square miles. The 2019 IRP identified the potential addition of up to 500 MW of demand response and 2,200 MW of energy efficiency (demand-side options); 4,200 MW of wind; 5,300 MW of storage; 8,600 MW of CT; 9,800 MW of combined cycle (CC); and 14,000 MW of solar by 2038. The 2019 IRP recommendation optimizes TVA's ability to create a more flexible power-generation system that can successfully integrate increasing amounts of renewable energy sources while ensuring reliability. Additionally, the 2019 IRP recommended a series of near-term actions, including evaluating engineering end-of-life dates for aging fossil units, to determine whether retirements greater than 2,200 MW would be appropriate to inform long-term planning. The strategic direction established by the 2019 IRP and results from recommended near-term actions formed the basis for TVA's asset strategy, which continues to support affordable, reliable, and cleaner energy for customers. As a result of resource changes outlined in the asset strategy, TVA has a plan for 70% carbon reductions by 2030, a path to an approximately 80% carbon reductions by 2035 and aspires to net-zero carbon emissions by 2050 (based on a 2005 baseline).

Since the pandemic, TVA has seen a strong increase in electric demand. Population in the TVA service region has grown 1.5%. TVA expects continued strong growth in annual electric demand through the middle of this decade. Forecasted electric demand is expected to grow more than one percent per year on average between 2023–2026. Current system modeling shows that with increased In-Valley residential migration and commercial development, TVA must add generation capacity to the system to maintain adequate operating reserves.

The NCG Site is an approximately 63-acre federally owned brownfield property managed by TVA in Lowndes, Mississippi, located approximately 10 miles northeast of Columbus. The NCG site was the location of a former CT facility, originally constructed in 1998 and operated for several years by a private company. The company decommissioned the facility in 2007, removing the existing six frame CTs from the site. The adjacent TVA Lowndes County 161 kV and 500-kV Substation is approximately 82 acres and has remained in-service. The study area for the proposed action is 145 acres and includes the entire combustion

turbine property as well as the adjacent substation property.

TVA is considering constructing and operating a combustion turbine facility (with generation capacity of approximately 500 MW) at the same brownfield location as the previously operated generating facility, which would allow TVA to utilize existing natural gas and transmission infrastructure.

Project Purpose and Need

The purpose of the proposed action is to help provide generation to support continued load growth in the TVA power service area and TVA's decarbonization goals. TVA needs flexible, dispatchable power that can successfully integrate increasing amounts of renewable energy sources while ensuring reliability. The need for the Proposed Action is to ensure that TVA can meet required year-round generation and maximum capacity system demands and planning reserve margin targets.

Preliminary Proposed Action and Alternatives

TVA anticipates that the scope of the EA or EIS will evaluate a No Action Alternative and an Action Alternative. The No Action Alternative provides a baseline for comparing against the Action Alternative. Under the No Action Alternative, TVA would not redevelop the TVA-owned brownfield property in Lowndes County for energy generation. The Action Alternative would evaluate the development of the NCG site for construction and operation of a CT. Whether these or other alternatives are reasonable warranting further consideration under NEPA would be determined in the course of preparing the EA or EIS.

Anticipated Environmental Impacts

The EA or EIS will include a detailed evaluation of the environmental, social, and economic impacts associated with implementation of the proposed action. Resource areas to be addressed in the EA or EIS include but are not limited to air quality; aquatics; botany; climate change; cultural resources; emergency planning; floodplains; geology and groundwater; land use; noise and vibration; health and safety; soil erosion and surface water; socioeconomics and environmental justice; threatened and endangered species; transportation; visual resources; waste; wetlands; and wildlife. Measures to avoid, minimize, and mitigate adverse effects will be identified and evaluated in the EA or EIS.

Anticipated Permits and Other Authorizations

TVA anticipates seeking required permits or authorizations, as appropriate. TVA's proposed action to construct a CT may also require issuance of an air permit under the Clean Air Act, an Individual or Nationwide Permit under section 404 of the Clean Water Act; section 401 Water Quality Certification; a Mississippi Large Construction Stormwater Permit; conformance with Executive Orders on Environmental Justice (12898), Wetlands (11990), Floodplain Management (11988), Migratory Birds (13186), and Invasive Species (13112); and compliance with Section 106 of the National Historic Preservation Act, section 7 of the Endangered Species Act, and other applicable local, Federal, and State regulations.

Public Participation and Scoping Process

Scoping, which is integral to the process for implementing NEPA, provides an early and open process to ensure that issues are identified early and properly studied; issues of little significance do not consume substantial time and effort; the draft EA or EIS is thorough and balanced; and delays caused by an inadequate EA or EIS are avoided. TVA seeks comment and participation from all interested parties for identification of potential alternatives, information, and analyses relevant to the proposed action in this EA or EIS. Public comments received during the scoping period will assist TVA in determining the appropriate level of NEPA review.

Information about this project is available at *https://www.tva.com/nepa,* which includes a link to an online public comment page. Comments must be received or postmarked no later than January 19, 2024. Federal, State, local agencies, and Native American Tribes are also invited to provide comments. Please note that any comments received, including names and addresses, will become part of the project administrative record and will be available for public inspection. To facilitate the scoping process, TVA will hold an in-person public open house from 5 p.m. to 7 p.m. on January 8, 2024, at the New Caledonia Community Center located at 205 South St., Caledonia, MS 39740; see the project website for more information on the meeting.

EA or EIS Preparation and Schedule

TVA will consider comments received during the scoping period and develop a scoping report which will be published online. The scoping report will summarize public and agency comments that were received and identify the projected schedule for completing the environmental review process. TVA will post a draft EA or EIS for public review and comment on the project website. TVA anticipates holding a public open house after releasing the draft EA or EIS. TVA expects to release the draft EA or EIS in Spring or Summer 2024 and a final EA or EIS in late 2024. If an EIS is prepared, TVA would publish a Record of Decision at least 30 days after the release of the final EIS.

Authority: 40 CFR 1501.9.

Susan Jacks,

General Manager, Environmental Resource Compliance.

[FR Doc. 2023–26178 Filed 11–27–23; 8:45 am]

BILLING CODE 8120–08–P

DEPARTMENT OF THE TREASURY

Internal Revenue Service

Proposed Collection; Requesting Comments on Qualification and Transfer of Credit Under Sections 30D and 25E From the Taxpayer to an Eligible Entity

AGENCY: Internal Revenue Service (IRS), Treasury.

ACTION: Notice and request for comments.

SUMMARY: The Internal Revenue Service, as part of its continuing effort to reduce paperwork and respondent burden, invites the general public and other federal agencies to take this opportunity to comment on proposed and/or continuing information collections, as required by the Paperwork Reduction Act of 1995. The IRS is soliciting comments concerning Revenue Procedure 2023–33 and subsequent procedures for making a transfer election under Internal Revenue Code (IRC) sections 30D and 25E, and qualifying vehicles under IRC section 30D.

DATES: Written comments should be received on or before January 29, 2024 to be assured of consideration.

ADDRESSES: Direct all written comments to Andres Garcia, Internal Revenue Service, Room 6526, 1111 Constitution Avenue NW, Washington, DC 20224, or by email to *pra.comments@irs.gov.* Include OMB Control No. 1545–2311 in the subject line of the message.

FOR FURTHER INFORMATION CONTACT: Requests for additional information or

APPENDIX B

Public and Agency Comments Submitted During the Scoping Period

(November 28, 2023, through January 19, 2024)

McLamb, Erica S

From: Wufoo [redacted]
Sent: Friday, January 19, 2024 2:36 PM
To: nepa
Subject: New Caledonia Gas Plant [#23]

Name	Gabriela Sarri-Tobar
City	[redacted]
State	District of Columbia
Organization	Center for Biological Diversity
Email	[redacted]
Phone Number	[redacted]
Please provide your comments by uploading a file or by entering them below. *	Comments uploaded
Upload File #1	2024.1.19_center_for_biological_diversity_scoping_comments_to_tva_on_new_caledonia_gas_plant.pdf 311.56 KB • PDF

January 19, 2024

Via Submission to TVANepaComments.com

Ms. Erica McLamb
NEPA Project Manager
Tennessee Valley Authority
400 West Summit Hill Drive
Knoxville TN 37902
nepa@tva.com
esmclamb@tva.gov

Re: Scoping Comments for Proposed New Caledonia Gas Plant

Dear Ms. McLamb,

On behalf of the Center for Biological Diversity ("Center"), we submit these scoping comments on the Tennessee Valley Authority's ("TVA") Notice of Intent to prepare either an Environmental Assessment ("EA") or Environmental Impact Statement ("EIS") for the construction of six fossil gas dual-fuel frame Combustion Turbines ("CT") at the New Caledonia site ("New Caledonia Plant"). We appreciate the opportunity to provide these comments on issues including the necessity for TVA to: (1) complete a comprehensive EIS — and not an EA — on the proposed action; (2) abandon plans to build new fossil gas capacity; and (3) instead add a critical action alternative to the EIS for distributed energy resources ("DER"), battery storage, demand response and energy efficiency improvements.

As a threshold matter, the climate emergency and growing energy inequity in the Tennessee Valley demand an expedited phaseout of fossil fuels. However, the only action alternative TVA is considering would instead cement the region's dependence on fossil fuels, which burdens communities, particularly Black and low-wealth communities in Lowndes, Mississippi, with increased air and water pollution, health hazards, and volatile prices that would aggravate existing energy burdens. Given the proposed project's serious health and environmental, socio-economic, and environmental justice impacts, it is critical that TVA conduct a robust analysis of all the project's foreseeable impacts in an EIS.

Furthermore, while TVA establishes that this new generation is essential to improve system reliability and support continued system load growth, TVA has failed to propose any other reasonable action alternatives that would not involve the construction of new polluting resources. TVA claims in its Notice of Intent ("NOI") that this new gas capacity would facilitate the

integration of new renewable generation in the future. However, TVA fails to even consider how it can integrate new renewable generation now at the New Caledonia site and avoid building new polluting, centralized fossil fuel generation. The New Caledonia Plant EIS must therefore fully and fairly consider alternatives that would rely on DERs, battery storage, demand response and energy efficiency technology, in order to comply with the requirements of the National Environmental Policy Act ("NEPA"), 42 U.S.C. § 4321, *et seq*. Importantly, such an alternative would help put TVA on track with President Biden's 2035 clean energy mandate and addressing the most pressing issue today: the urgent need for a rapid transition away from all fossil fuels toward a renewable energy economy to avoid the worst impacts of the climate emergency and address the disproportionate harm experienced by environmental justice communities from the fossil fuel economy.

We look forward to reviewing TVA's Draft EIS addressing these issues.

DISCUSSION

I. TVA Must Prepare a Comprehensive EIS, Rather Than Simply Relying on an Environmental Assessment.

It is well recognized that an EIS is necessary whenever a project may have significant environmental impacts — including as a result of (a) the controversial or precedential nature of the project; (b) its uncertain impacts; (c) the risks it poses to the environment or other resources; or (d) the risks it poses to public health or safety. 40 C.F.R. § 1508.27. Each of these factors are implicated here, and thus an EIS is necessary.

First, the construction of new, unnecessary, and costly fossil fuel infrastructure is highly controversial, especially considering climate science and federal and global climate mandates that demand an immediate and expedited phase out of fossil fuels in order to cut emissions and tackle the climate emergency. TVA has the largest planned gas buildout of any utility by 2030 and according to its most recent IRP, the utility will still be producing over 38 million tons of carbon emissions in 2038.[1] Building another gas plant flies in the face of the Biden Administration's pledge to transition off fossil fuels and risks burdening the 10 million people in the Tennessee Valley – and especially communities around the New Caledonia site – with decades more of pollution, fossil-fueled extreme weather events, higher utility bills and stranded assets, and

[1] TVA 2019 Environmental Impact Statement, Final EIS at 5-27. *See also* Sierra Club, *The Dirty Truth About Utility Climate Pledges*, (October 2023), https://coal.sierraclub.org/sites/nat-coal/files/dirty_truth_report_2023.pdf?utm_source=sierraclub&utm_medium=web&utm_id=dirty-truth&utm_content=page.

unreliable power.[2] Given the gravity of the project and its significant impacts that extend beyond just those to environmental quality, it is necessary that TVA conduct a comprehensive EIS.

Second, TVA is currently conducting its long-range energy planning process through which it has identified uncertainties about future energy needs in the region. TVA continuously refers to projections for high load growth in the region as a justification for building new gas capacity. Yet, TVA has not publicly released its modeling assumptions to back up this assertion. These uncertainties surrounding load growth and demand in the region should be explored to establish need for proposed action, and especially for new fossil fuel generation. It is TVA's responsibility to thoroughly evaluate *all* impacts in an EIS in order to make an informed decision, especially when the proposed action carriers substantial environmental and public health risk.

Third, it is well established that fossil fuels have a significant impact on the environment, including threatening air and water quality, wildlife including threatened and endangered species, and cultural resources like recreational waterways.[3] As outlined in the comments below, the New Caledonia Plant is likely to impact the environment significantly and negatively. TVA must therefore prepare an EIS to evaluate the cumulative effects of the gas plant.

Finally, the proposed project poses substantial public health and safety risks. Unlike renewable energy alternatives like solar, wind, and battery storage, gas is a highly polluting energy source. Carbon emissions aside, gas plants produce hazardous methane emissions as well as over 60 hazardous air pollutants that severely impact public health.[4] TVA must fully evaluate how the New Caledonia Plant will impact the health and safety of communities near the plant, as well as the indirect impacts of new fossil fuel generation on the region.

II. TVA Should Abandon Plans to Expand Gas in the Region Because it Violates the TVA Act and Fails to Achieve Rapid Greenhouse Gas Reductions That Are Critical to Addressing the Climate Emergency and Environmental Injustice.

It is well established that the actions taken this decade are crucial to avoid the most devastating impacts of the climate emergency. Indeed, as detailed by the Intergovernmental Panel on Climate Change ("IPCC"), without prompt action across all sectors, the world is likely to

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[2] The agreement refers to the First Global Stocktake Decision of the 28th Conference of the Parties to the UNFCCC, passed on Dec. 13, 2023, *available at*: https://unfccc.int/sites/default/files/resource/cma2023_L17_adv.pdf.

[3] Environmental Protection Agency, "Power Plants and Neighboring Communities," https://www.epa.gov/power-sector/power-plants-and-neighboring-communities.

[4] Greenpeace, *Fossil Fuel Racism: How Phasing Out Oil, Gas, and Coal Can Protect Communities* (2021), https://www.greenpeace.org/usa/wp-content/uploads/2021/04/Fossil-Fuel-Racism.pdf.

surpass 1.5°C of warming — its most ambitions climate target — in less than a decade.[5] And recently, a new report warned that at our current emission rate we will surpass our carbon budget (in line with a 50% chance of limiting warming to 1.5°C) within six years.[6]

Persistent fossil fuel dependence will make it nearly impossible to preserve a livable planet. Last year was the hottest year on record – a trend that will surely persist as we continue to expand and rely on fossil fuels.[7] As United Nations Secretary General Antonio Guterres has made clear, "Fossil fuels are a dead end – for our planet, for humanity, and […] for economies. A prompt, well-managed transition to renewables is the only pathway to energy security, universal access and the green jobs our world needs."[8]

Acknowledging the urgency of tackling the climate emergency, the United States recently agreed at the COP28 United Nations climate negotiations to "transition away from fossil fuels in energy systems" and triple renewable energy by 2030.[9] As the country's largest federal power provider, TVA should be aligning all its energy planning with this commitment.

Instead, TVA is moving in the opposite direction by *expanding* fossil fuels in the Tennessee Valley. TVA has the *largest* planned gas buildout among all other utilities by 2030 — 5.9 GW of new gas.[10] And, although TVA is currently updating its Integrated Resource Plan ("IRP"), under the most recent IRP the agency will not achieve full decarbonization until *sometime after 2080*.[11]

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[5] Intergovernmental Panel on Climate Change, *Synthesis Report of the IPCC Sixth Assessment Report (AR6)* (2023), https://www.ipcc.ch/report/ar6/syr/downloads/report/IPCC_AR6_SYR_LongerReport.pdf.

[6] Lamboll, R.D., Nicholls, Z.R.J., Smith, C.J. *et al.* Assessing the size and uncertainty of remaining carbon budgets. *Nat. Clim. Chang.* (October 30, 2023). https://doi.org/10.1038/s41558-023-01848-5.

[7] Zhong, Raymond and Collings, Keith, "See How 2023 Shattered Records to Become the Hottest Year", *New York Times*, (January 9, 2023), https://www.nytimes.com/2024/01/09/climate/2023-warmest-year-record.html.

[8] *See* Secretary-General's video message to the Press Conference Launch of IPCC Report, (February 28, 2022), https://www.un.org/sg/en/content/sg/statement/2022-02-28/secretary-generals-video-message-the-press-conference-launch-of-ipcc-report-scroll-down-for-languages.

[9] The agreement refers to the First Global Stocktake Decision of the 28th Conference of the Parties to the UNFCCC, passed on Dec. 13, 2023, *available at*: https://unfccc.int/sites/default/files/resource/cma2023_L17_adv.pdf.

[10] Sierra Club, *The Dirty Truth About Utility Climate Pledges*, (October 2023), https://coal.sierraclub.org/sites/nat-coal/files/dirty_truth_report_2023.pdf?utm_source=sierraclub&utm_medium=web&utm_id=dirty-truth&utm_content=page.

[11] Southern Alliance for Clean Energy, *Tracking Decarbonization in the Southeast*, Generation and CO2 Emissions Report (June 2022), https://cleanenergy.org/wp-content/uploads/Tracking-Decarbonization-in-the-Southeast-Fourth-Annual-Report.pdf.

Moreover, with increased reliance on gas, TVA currently forecasts that it will *generate more than 34 million tons of CO_2 each year in 2038*.[12] In fact, TVA's annual emissions — averaging over 38 million tons — put the utility within the top 15 polluting utilities amongst the 100 largest power providers in the country.[13]

The TVA Act mandates that, in managing its electric generation system, TVA protect "the economic, environmental, social, or physical well-being" of the customers it serves. 16 U.S.C. § 831a(g)(1)(K)(ii). Congress has also mandated that, in planning for new resources, TVA must "evaluate[ ] the *full range* of existing and incremental resources (including new power supplies, energy conservation and efficiency, and renewable energy resources)" that can be relied on to serve "electric customers of the Tennessee Valley Authority at the lowest system cost." *Id.* § 831m-1(b)(1)(emphasis added); *see also id.* § 831a(b)(5) (setting out TVA's mission to be "a national leader in technological innovation, low-cost power, and environmental stewardship").

Given the climate emergency, and the present and threatened impacts of the climate emergency on TVA customers, the agency's plan to build new fossil gas capacity — instead of renewable energy — is in flat violation of the TVA Act. As the nation's largest power provider, with massive greenhouse gas emissions, TVA must abandon its plans to pursue new fossil gas generation at the New Caledonia Plant and instead invest in non-fossil fuel resources, specifically distributed renewable energy, battery storage and energy efficiency.

1. TVA's EIS Must Address the Devastating Impacts of Continued Fossil Fuel Dependence on The People It Is Charged to Serve.

TVA's proposal to build new gas generation — and refusal to even consider renewable energy alternatives — at the New Caledonia Plant exacerbates pollution and climate impacts and will only further harm communities of color and low wealth who continue to bear the brunt of the agency's reliance on fossil fuels. TVA's planned energy investment, as exemplified by the full swath of proposed gas projects including Cumberland, Cheatham County, Kingston, Allen Plant and now at the New Caledonia Plant, contradicts the agency's mission to improve the quality of life of its customers. Rather, as TVA invests in new gas and slow-walks the transition away from existing fossil fuel resources to renewables, the agency is fueling the climate emergency and energy injustice which threaten people's quality of life. Furthermore, the gravity of the precise

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12 TVA 2019 Environmental Impact Statement, Final EIS at 5-27.

13 Christopher Van Atten, Amlan Saha, Luke Hellgren, and Ted Langlois, *Benchmarking Air Emissions Of the 100 Largest Electric Power Producers in the United States*, CERES, (September 2022), https://www.ceres.org/sites/default/files/reports/2022-09/BenchmarkingAirEmissions2022%20%281%29.pdf.

impacts of building a gas plant at the New Caledonia site remains uncertain and can only be fully analyzed through an EIS.

First, just within the past year, communities in the Tennessee Valley have faced record-breaking tornadoes, floods, heat waves, winter storms, and even hazardous air quality from wildfires. Notably, Winter Storm Elliot put TVA's energy grid in peril and caused widespread coal and gas plant failures that resulted in the first rolling blackouts in TVA's history. Even more, TVA's system is increasingly vulnerable to these climate disasters — more fossil fuels plants will only exacerbate that vulnerability. A U.S. Government Accountability Office (GAO) report found that TVA's system faces several climate-related risks that could cost customers billions of dollars in outages, capacity disruptions, and infrastructure damage.[14] The impact of these outages and associated costs are substantial and will fall most heavily on environmental justice communities.

Second, fossil gas disproportionately harms low-income communities and people of color.[15] In addition to driving the climate emergency via especially potent methane emissions, gas generation produces over 60 hazardous air pollutants — including volatile organic compounds, carcinogens, and endocrine disrupting chemicals.[16] And gas generation exposes communities within closer proximity to gas facilities to elevated ozone levels which, among other harms, can exacerbate asthma and other diseases.[17]

It is well-recognized that the fossil fuel economy particularly harms Black, Indigenous, and other communities of color.[18] Black Americans are exposed to 56% more polluted air than white Americans, on average, and more than one million Black Americans live within a half-mile of gas facilities, resulting in higher risks of cancer and other health problems.[19]

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[14] *Tennessee Valley Authority: Additional Steps Are Needed to Better Manage Climate-Related Risks*, U.S. Government Accountability Office (Jan. 30, 2023), https://www.gao.gov/products/gao-23-105375.

[15] Greenpeace, *Fossil Fuel Racism: How Phasing Out Oil, Gas, and Coal Can Protect Communities* (2021), https://www.greenpeace.org/usa/wp-content/uploads/2021/04/Fossil-Fuel-Racism.pdf.

[16] *Id*. at 17.

[17] *Id.* at 17-18.

[18] *See* NAACP *et al.* (2017), *Fumes Across the Fenceline*, http ://www.catf.us/wp-content/uploads/2017/11/CATF_Pub_FumesAcrossTheFenceLine.pdf; *see also* Mikati et al. (2018). *Disparities in Distribution of Particulate Matter Emission Sources by Race and Poverty Status*, American Public Health Association, https://ajph.aphapublications.org/doi/abs/10.2105/AJPH.2017.304297; *see also* Sarah Kaplan, "Climate Justice is a Racial Justice Problem," Washington Post, June 29, 2020.

[19] Thompson, Andrea. "People of Color Breath More Than Their Share of Polluted Air." *Scientific American*, (Jun. 1, 2019), https://www.scientificamerican.com/article/minorities-breathe-more-than-their-share-of-polluted-air/;

Finally, residents of Lowndes, Mississippi — where TVA proposes to build the New Caledonia plant — experience an 8% energy burden (the national average is 3%).[20] Deepening the region's dependence on volatile gas would aggravate already high energy costs, especially for Black and low-wealth households who pay significantly more for energy than their White and higher-wealth counterparts, respectively.[21] Just last month, TVA raised rates across the region for the first time in four years, in part to help finance new gas plants.

TVA must address the disproportionate harm experienced by environmental justice communities from the fossil fuel economy by exploring non-fossil fuel alternatives in the EIS, and fully examining the social, economic, and health impacts of all potential pathways for energy generation in Mississippi. It is imperative that TVA prioritize renewable energy alternatives, like distributed renewable energy, demand response, and especially energy efficiency would go a long way in helping families bring down their monthly energy costs over time. A recent American Council for an Energy-Efficient Economy (ACEEE) Report demonstrates that investing in energy efficiency could reduce electricity produced by fossil fuels by up to 86% by mid-century. [22] Additionally, ACEEE projects savings of $10 to $19 billion annually by 2050 through avoided transmission and generation capacity costs. Despite TVA's emphasis on economic development and cost-effective energy investments, the agency's investments in energy efficiency (0.01% in 2021) fall well below the U.S. average (0.68%).

see also NAACP, *et. al* (2017); Bullard, Robert D., Paul Mohai, Robin Shaha, and Beverly Wright, *Toxic Wastes and Race at Twenty: 1987-2007*, March 2007, http://www.ejnet.org/ej/twart.pdf.

[20] National Renewable Energy Laboratories, *Energy and Environmental Justice - Household Energy and Transportation Burden*, (accessed on January 12, 2024), https://maps.nrel.gov/slope/data-viewer?filters=%5B%5D&layer=eej.household-energy-burden&geoId=G2800870&year=2020&res=county.

[21] "Low-Income, Black, Hispanic, and Native American Households Face High Energy Burdens." *ACEEE,* https://www.aceee.org/energy-burden.

[22] Specian, Mike and Bell-Pasht, Aimee, "Energy Efficiency in a High Renewable Energy Future," *American Council for an Energy-Efficiency Economy*, (June 21, 2023), https://www.aceee.org/research-report/u2303.

III. TVA Must Examine Fossil Fuel-Free Alternatives to Meet New Energy Demand to Comply with NEPA, Align with Federal Clean Energy Targets, and Improve the Quality of Life of People in the Tennessee Valley.

1. TVA must consider renewable energy alternatives aligned with a "path to zero emissions" that would also reduce energy demand and costs and improve system resilience.

The purpose of NEPA is to identify reasonable alternatives to an agency's proposed action, and then expose and discuss the multitude of public health, environmental, socio-economic, wildlife, and other impacts of those alternatives. However, regardless of the ultimate decisions made by the agency, NEPA does not permit an agency to refuse to even *consider* reasonable alternatives.[23] Accordingly, here TVA may not rely on contract terms or simple economic considerations to refuse to consider alternative scenarios for its power mix in the coming decades, including DER and storage alternatives.

This is particularly true given that TVA acknowledges that its statutory mandate under the TVA Act requires that it be a "leader in technology innovation, low-cost power and environmental stewardship."[24] TVA therefore is legally mandated to consider investments in cost-competitive renewable energy technologies that will help reduce electricity prices and make those technologies even more cost-competitive in the coming years.

Ample research demonstrates that DERs, storage, and energy efficiency could provide significant financial benefits. One analysis modeled the cost-effectiveness and impact of DERs and other clean energy resources on the electricity system. Under the examined scenarios, significant investment in DER would result in cumulative system-wide savings of $301 billion by 2050 compared to a business-as-usual energy system.[25]

More specifically to TVA, Synapse Energy Economics' *TVA Clean Energy Future Study* critically evaluates renewable energy alternatives and energy efficiency at TVA, demonstrating that the agency can reliably meet energy needs in the Valley without coal and new gas and by

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[23] *See, e.g., Nat'l Wildlife Fed'n v. Nat'l Marine Fisheries Serv.*, 235 F. Supp. 2d 1143, 1154 (W.D. Wash. 2002) ("An agency may not reject a reasonable alternative because it is not within the jurisdiction of the lead agency").

[24] *See* Final 2019 TVA IRP at 5-1

[25] Clack et al., *Technical Report: Why Local Solar For All Costs Less- A New Roadmap for the Lowest Cost Grid*, Vibrant Clean Energy (2020), https://www.vibrantcleanenergy.com/wp-content/uploads/2020/12/WhyDERs_TR_Final.pdf.

transitioning to 100% clean, renewable energy by 2035.[26] The report shows that such a transition **would save customers in the region over $255 billion over the next two decades, reduce energy burdens, create thousands of new jobs annually, and improve public health with reduced air pollution**. Furthermore, the report points out, if TVA were to maximize distributed energy in the region, these costs savings could be greater with avoided costs for utility-scale solar and transmission.

These financial benefits should be augmented by the many clean energy incentives in the Inflation Reduction Act (IRA), which TVA is eligible for, including refundable clean energy tax credits which include solar and battery storage, building energy efficiency and electrification rebate programs, and the Energy Infrastructure Reinvestment Program. The IRA has the potential to make already cheap renewable energy even cheaper, and with that help bring down energy costs for TVA customers as they affordably transition to a safer, cleaner energy future. Indeed, as detailed in the Synapse Report, with the IRA there is new and even greater impetus for TVA to comprehensively evaluate these cheaper distributed and renewable energy technologies as replacements for fossil fuels, including gas and coal.

In addition to cost savings, DERs bring several additional benefits including grid management, demand response, and transmission benefits.[27] TVA has expressed concern that alternatives prioritizing renewables like solar are incapable of addressing peak demand. But as the Vibrant Clean Energy report demonstrates, DER can *minimize peak demand by about 17 percent* and effectively shift demand to meet variable supply rather than forcing supply to meet demand.[28]

The *TVA Clean Energy Future Study* similarly demonstrates that maximizing distributed energy and flexible load in the TVA region could help reduce demand in peak hours.[29] This is especially important in light of increased grid stresses from extreme weather, such as during

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[26] The full Study is attached to these scoping comments and available at the following URL, and is incorporated here by reference: https://www.biologicaldiversity.org/programs/energy-justice/pdfs/TVAs-Clean-Energy-Future.pdf. The accompanying Policy Brief is available here: https://www.biologicaldiversity.org/programs/energy-justice/pdfs/TVA-Clean-Energy-Roadmap_Policy-Brief.pdf. We expect that any decision by TVA not to follow this Study's recommendations in connection with this project will address the entire Study, and detail the technical bases for any TVA disagreement with the Study's findings and recommendations.

[27] Armstrong et. al., Techno–Ecological Synergies of Solar Energy for Global Sustainability, 2 Nature Sustainability 560 (July 2019); Crystal, et. al., Rooftop Solar Justice (2023), https://www.biologicaldiversity.org/programs/energy-justice/pdfs/Rooftop-Solar-Justice-Report-March-2023.pdf.

[28] Vibrant Clean Energy Technical Report (2020) at 48 (emphasis added).

[29] *See* TVA Clean Energy Future Study at https://www.biologicaldiversity.org/programs/energy-justice/pdfs/TVAs-Clean-Energy-Future.pdf.

Winter Storm Elliot where demand soared yet conventional energy sources failed to deliver reliable power. In effect, DERs and especially flexible load could provide system-wide benefits by displacing the need for expensive, volatile centralized energy sources, like gas plants.

Distributed solar generation can provide further benefits to communities and ecosystems including reduced water use, reduced land use, and even improved wildlife habitat, which are critically important to TVA's customers.[30]

TVA has often accentuated the associated land use impacts of utility-scale solar as a reason to not move forward with such energy alternatives, as it has in recent NEPA analyses for generation builds at Cumberland, Kingston, and Cheatham County. However, this concern is irrelevant to the kinds of DER, energy efficiency, and related initiatives we propose for the New Caledonia Plant EIS, which could *minimize* land use impacts as well as *reduce* demand for large-scale energy projects like gas that carry significant environmental, community, and public health hazards.[31]

In light of the ample financial, reliability, and social benefits of DERs and renewable energy, it is anathema to NEPA and the TVA Act that TVA refuses to examine this alternative in the EIS. TVA must consider a *full range of renewable energy alternatives*, including an alternative that largely or completely relies on DER, storage, and energy efficiency, and then must compare the environmental impacts of such alternatives with the other options — including not only the cost of potential expansion of gas, but also the social cost of carbon associated with keeping these units running for many years to come.

Furthermore, instead of investing in risky alternatives based on an assumption of increasing energy demand, TVA should lead the way in investing in climate-friendly, resilient, and just energy solutions, like distributed solar generation and energy efficiency, that would both reduce energy consumption and TVA's greenhouse gas emissions.

In short, to meet its purpose of providing safe, clean, and affordable electricity to all its customers, TVA must add a critical action alternative accounting for declining demand for centralized TVA generation, including offsetting TVA generation and meeting new energy demand with DERs, storage, and energy efficiency improvements.

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30 Techno-Ecological Synergies of Solar Energy for Global Sustainability (2019) at 563.

31 *See* Environmental Protection Agency, "Distributed Generation of Electricity and its Environmental Impacts", https://www.epa.gov/energy/distributed-generation-electricity-and-its-environmental-impacts.

2. TVA must meaningfully assess the impacts of greenhouse gas emissions by comparing impacts between the existing alternative and one or more alternatives that chart a path to zero emissions.

In other environmental reviews, TVA has refused to meaningfully consider its contributions to greenhouse gas emissions on the grounds that they are small relative to global emissions.[32] This approach violates NEPA.

It is well-established that NEPA requires a robust consideration of the impacts of a project's greenhouse gas emissions in terms of its relationship 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."[33]

TVA must therefore not only add the necessary alternative discussed above that will advance its rapid transition to zero emissions, but it must also fully consider — and inform the public about — the likely environmental outcomes under the different alternatives, including relative greenhouse gas emissions. Under the currently considered alternative, which proposes building six new CT gas units, TVA will continue to be one of the largest contributors to the greenhouse gas emissions that are fueling the climate emergency, and thus will continue to be responsible for the devastating impacts that are certain to come in the country and around the world as we continue to increase the concentrations of greenhouse gas emissions in the atmosphere.

Alternatively, under a renewable energy alternative that maximizes DER, storage, and energy efficiency, and which would reduce demand for centralized and fossil fuel TVA power, TVA would not only carry out its requisite part in phasing out fossil fuels and lowering greenhouse gas emissions, but also in addressing environmental justice concerns associated with a reliance on false solutions like fossil gas.

* * *

The impacts of the climate emergency and worsening energy injustice for the communities that TVA serves are concrete, palpable, and are projected to worsen — and will certainly do so should TVA fail to consider and pursue non-fossil fuel alternatives. The proposed gas expansion at the New Caledonia Plant is out of step with climate science, community demands, the TVA Act, the Biden Administration's climate and clean energy targets, and now even the U.S.'s global climate commitments. TVA has an opportunity to improve the quality of life of people in the

[32] *See, e.g.,* TVA 2019 Environmental Impact Statement, Final EIS at 5-28.

[33] *N. Plains Res. Council, Inc. v. Surface Transp. Bd.*, 668 F.3d 1067, 1079 (9th Cir. 2011) (citation omitted).

region, and that starts with completing an EIS that examines DERs, storage, and energy efficiency improvements instead of expanding fossil gas operations.

We look forward to commenting on a Draft EIS for the New Caledonia Plant that fully addresses these concerns. In the meantime, please contact us should there be any further information we can provide.

Sincerely,

CENTER FOR BIOLOGICAL DIVERSITY

/s/ Gaby Sarri-Tobar
Gaby Sarri-Tobar
[redacted]

Attachments to Community Groups' Comments on TVA's Notice Regarding New Caledonia Gas Plant Proposal

Attachments 1-12

Attachment 1

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4
SAM NUNN ATLANTA FEDERAL CENTER
61 FORSYTH STREET, SW
ATLANTA, GEORGIA 30303-8960

July 7, 2023

J. Taylor Johnson
NEPA Compliance Specialist
Tennessee Valley Authority
1101 Market Street BR2C-C
Chattanooga, Tennessee 37402

Re: EPA Comments on the Notice of Intent to Prepare an Environmental Impact Statement for the Cheatham County Generation Site, Cheatham County, Tennessee

Dear Ms. Johnson:

The U.S. Environmental Protection Agency (EPA) reviewed the referenced document in accordance with Section 309 of the Clean Air Act (CAA) and Section 102(2)(C) of the National Environmental Policy Act (NEPA). The CAA Section 309 role is unique to the EPA. Among other things, CAA Section 309 requires the EPA to review and comment publicly on any proposed federal action subject to NEPA's environmental impact statement requirement.

According to the Notice of Intent (NOI), the Tennessee Valley Authority (TVA) intends to prepare an Environmental Impact Statement (EIS) to assess the potential impacts associated with the proposed construction and operation of a simple cycle Combustion Turbine (CT) plant and 400-megawatt (MW) Battery Energy Storage System (BESS) in Cheatham County, TN. The Cheatham County Generation Site (CHG) would generate up to 900 MW and replace generation capacity for a portion of the Cumberland Fossil Plant (CUF) second unit retirement planned by the end of 2028. The CHG CTs would be composed of multiple natural gas-fired frame CTs and natural gas-fired and oil-fired (i.e., dual-fuel) Aeroderivative CTs. TVA would also construct a 12-mile natural gas pipeline to fuel the proposed CTs.

TVA states that the purpose of the proposed action is to help provide generation to support continued load growth in the Tennessee Valley and TVA's decarbonization goals. According to the NOI, TVA needs flexible, dispatchable power that can successfully integrate increasing amounts of renewable energy sources while ensuring reliability. TVA notes that the proposed action will facilitate the integration of solar power onto the electric grid and thereby advance TVA's decarbonization goals. According to the NOI, the need for the proposed action is to ensure that TVA can meet required year-round generation and maximum capacity system demands and planning reserve margin targets. The scoping document also indicates that the addition of the proposed 400 MW-hour BESS could help TVA maintain grid stability and reliability as renewable generating assets with greater minute-by-minute variability are integrated into TVA's transmission system.

According to TVA, the EIS will address effects including environmental, social, and economic impacts associated with implementation of the proposed action. Based on our review of the scoping document, the EPA has the following comments:

Range of Alternatives and Consideration of IRA Incentives: The NOI notes that the EIS will evaluate a No Action Alternative and one Action Alternative to develop CHG property for construction and operation of a CT interconnected with a BESS. On January 20, 2023, TVA published a Record of Decision (ROD) in the Federal Register for its retirement of Coal-fired generation units at Cumberland stating that "planning for the replacement generation for the second retired CUF unit will be deferred to allow consideration of a broader range of replacement generation alternatives depending on system needs and the state of technology at the time replacement is needed." The EPA is particularly concerned about TVA's piecemeal approach to continued investment in fossil fuel projects given that this NOI was published just four months after the CUF ROD, suggesting that only one action alternative will be considered to replace the second coal-fire CUF unit, which does not align with the commitment in the CUF ROD. TVA should explain the departure from the statement in the CUF ROD to defer planning, particularly as TVA has commenced the development of its next IRP update per TVA's NOI in the Federal Register on May 19, 2023.

There have been significant statutory, regulatory, and technology changes since the development of the non-binding 2019 IRP. In accordance with CEQ's NEPA regulations, TVA must consider a reasonable range of alternatives. Particularly in light of the Inflation Reduction Act, forecasts of higher natural gas prices, and dramatic cost reductions to renewable energy, the EPA recommends that more than one Action Alternative be identified and considered. The EIS should identify system flexibilities and constraints. Where practicable, renewable alternatives may warrant consideration and discussion given they could result in significantly lower greenhouse gas emissions and lock in smaller amounts of fossil fuel consumption. Reasonable alternatives include a combination of peak shaving, increased generation from other production units to include renewable energy sources, energy efficiency, and demand-management to meet capacity requirements and lower the need for this sizeable increase in peak generating capacity.[1]

The IRA and future policies may significantly impact aspects of the energy market, such as energy prices and demand and supply, as well as the underlying cost of technologies. The EPA notes that the Department of Energy has estimated the impacts of the IRA on clean energy and GHG emissions.[2] The EPA recommends that TVA consider the proposed regulations and guidance released by the IRS on June 14, 2023, about the Direct Pay tax credits under the IRA.[3] TVA is an applicable entity, and the new direct pay provision will let TVA receive a payment equal to the full value of tax credits for building qualifying clean energy projects. TVA should consider updated resources such as the U.S. Treasury Department's Final Rule on Section 45Q Credit Regulations, that provide clarity on how to use the credit for qualified carbon sequestration. We strongly encourage TVA to consider and incorporate new and emerging technologies that are more economically advantageous as a result of IRA to include carbon sequestration, hydrogen, etc. Similarly, the price of natural gas is projected by the Energy

[1] For example, a recent article suggests that solar and wind generation may be used to reduce peak variability in summer and winter months (See https://www.sciencedirect.com/science/article/pii/S0306261921011119).
[2] See, e.g., https://www.energy.gov/sites/default/files/2022-08/8.18%20InflationReductionAct_Factsheet_Final.pdf; https://www.energy.gov/policy/methodological-appendix.
[3] White House Guidance can be found at: https://www.whitehouse.gov/cleanenergy/directpay/. See also the proposed regulations from the IRA: https://public-inspection.federalregister.gov/2023-12798.pdf https://www.irs.gov/pub/irs-drop/n-23-44.pdf

Information Administration (EIA) to be higher than estimated in the 2019 IRP. The analysis should also evaluate the potential cost implications of reasonably foreseeable future air quality and greenhouse gas regulations on natural gas units, noting any uncertainties, as appropriate. Furthermore, U.S. natural gas exports have both substantially increased and changed in distribution, shifting to Europe to reflect changing underlying demand conditions.

For the development of the EIS, the EPA recommends TVA consider the comment letters that the EPA previously provided to TVA on the Cumberland and Kingston Retirement projects. These letters provide more detailed comments and delineate substantive concerns with the EIS analyses conducted for those projects. In addition, while TVA is citing the implementation of the 2019 IRP, extensive renewable buildout is not occurring under the current IRP though the need for back-up generation is held up here as the catalyst for this peaking unit capacity. The 900 MW expansion here is in addition to 5,000 MW of natural gas generation planned by TVA elsewhere, which is well above the central forecasts of the 2019 IRP. Although the region has recently experienced high demand growth, it is not clear if this will continue. TVA's work on the 2024 IRP should incorporate anticipated growth in renewables as noted in our comments during scoping, dated July 3, 2023. The EPA recommends the EIS identify the timeline in which renewable buildout will occur and the direct connections between that buildout and planned natural gas generation that TVA identifies as enabling of future renewable energy sources. These gas generation plants have been proposed without comparable renewable energy generation investment.

Social Cost of Greenhouse Gases: The EPA recommends that TVA use the best available Social Costs of Greenhouse Gases (SC-GHG) estimates in the EIS. The Council on Environmental Quality (CEQ's) interim guidance on consideration of GHG emissions and climate change in NEPA analyses notes that agencies "should apply the best available estimates of the SC-GHG" to the GHG emissions from a proposed action and its alternatives.[4] The current best available SC-GHG estimates contain a range of discount rates to capture potential uncertainty. To reflect TVA's previous concerns with uncertainty (as reflected in the Kingston and Cumberland EISs), and to help the public understand the impacts, the climate damages should be presented for each GHG at discount rates of 2.5%, 3.0%, and 5.0%.CEQ's interim guidance on GHG emissions and climate change notes that "[w]here helpful to provide context, such as for proposed actions with relatively large GHG emissions or reductions or that will expand or perpetuate reliance on GHG-emitting energy sources, agencies should explain how the proposed action and alternatives would help meet or detract from achieving relevant climate action goals and commitments, including Federal goals, international agreements, state or regional goals, Tribal goals, agency-specific goals, or others as appropriate." The EPA recommends the EIS include a discussion of whether and to what extent the estimated GHG emissions from the alternatives are consistent with TVA taking action to help achieve science-based national GHG reduction targets.

Net Zero/GHG Emissions Reduction Policy and Goals: Given the urgency of the climate crisis, the EPA recommends the alternatives analysis reflect alternatives consistent with meeting the science-based national mid-century and other net-zero emissions goals laid out by the Administration, TVA's own commitments, and the U.S. 2030 national reduction target in the Paris Agreement. Additionally, the analysis should reflect Executive Order 14057, which establishes a policy for the federal government to lead by example to achieve a carbon-pollution free electricity sector by 2035 and net-zero emissions economy-wide by no later than 2050.

[4] See the "Technical Support Document: Social Cost of Carbon, Methane, and Nitrous Oxide Interim Estimates under Executive Order 13990" released by the Interagency Working Group on Social Cost of Greenhouse Gases (IWG SC-GHG) in February 2021, which presents interim estimates of the social cost of carbon, methane, and nitrous oxide and represent the best available science and should be used to monetize the SC-GHG.

The EIS should also discuss alignment with agency GHG reduction goals and policies, including TVA's 2021 Strategic Intent and Guiding Principles document. Additionally, per 40 CFR 1506.2(d), and consistent with CEQ's guidance, the EIS should disclose and discuss any inconsistency of the proposed action with State, Tribal, or local plans or laws, including local GHG emissions reduction goals.[5]

Mitigation: The EIS should consider plant designs with increased Carbon Capture and Storage (CCS) and hydrogen fuel blending technology incorporation as a means of mitigating emissions. The EPA recommends that plant designs incorporate and use mitigation technologies that can be implemented at initial plant start-up, while accommodating for developments in CCS and hydrogen fuel as these technologies mature.

If TVA intends to install carbon mitigation measures after plant start-up, these costs should be included in costs analysis. Many utilities are displacing some portion of their natural gas generation with these technologies in a comparable timeframe. For example, the Intermountain Power new natural gas generating units, which will begin operation in 2025, will be designed to utilize 30 percent hydrogen fuel at start-up, transitioning to 100 percent hydrogen fuel by 2045 as technology improves (see https://www.ipautah.com/ipp-renewed/). While smaller in scale, other utilities are displacing a portion of their natural gas use with hydrogen (seehttps://dailyenergyinsider.com/news/34040-florida-power-light-taps-cummins-for-its-green-hydrogen-facility/). Additionally, Competitive Power Ventures is constructing a CC natural gas generation facility using carbon capture technology (see https://cpv.com/2022/12/12/cpv-selects-doddridge-county-for-location-of-3-billion-carbon-capture-project-in-west-virginia/).

The lifecycle of Sulfur Hexafluoride (SF6), starting from manufacturing, produces significant SF6 emissions. The EPA has partnered with utilities to reduce and phase out the use of this pollutant, as have other countries. In addition, SF6 free switchgears are reported to have lower operation and maintenance costs and higher reliability. The EPA recommends that TVA consider the evolving technology and commercial availability of SF6-free switchgears and, where equipment availability and project requirements allow, use SF6-free switchgear in new construction and replacement installations.

Environmental Justice: The EPA recommends that TVA analyze the potential for alternatives to exacerbate or mitigate impacts on already overburdened and vulnerable communities from climate change,[4] exposure to criteria air pollutants, and other harms related to electricity production and fossil fuel production and transportation. The EPA also recommends that TVA meaningfully engage and collaborate with underserved and overburdened communities to identify and address the adverse conditions they experience and ensure they do not face additional disproportionate burdens under the proposed action. This would be consistent with Executive Order 14096, *Revitalizing Our Nation's Commitment to Environmental Justice for All*, which affirms the national policy to advance environmental justice for all and defines environmental justice as "the just treatment and meaningful involvement of all people, regardless of income, race, color, national origin, Tribal affiliation, or disability, in agency decision-making and other Federal activities that affect human health and the environmental so that people are fully protected from disproportionate and adverse human health and environmental effects (including risks) and hazards including those related to climate change, noise, the cumulative impacts of environmental and other burdens, and the legacy of racism or other structural or

[5] See, e.g., https://www.knoxvilletn.gov/government/city_departments_offices/sustainability/climate_change#:~:text=Our%20new%20goal%20to%20reduce,which%20are%20outside%20City%20control

systemic barriers." (Section 2(b)(i)). Notably, section 3(a) provides analytic direction that should be incorporated within the scope of the environmental analysis.

In addition to the new executive order, the EIS should ensure consistency with the Executive Order 12898 of February 11, 1994, *Federal Actions To Address Environmental Justice in Minority Populations and Low-Income Populations* by identifying and mitigating disproportionate impacts on communities with EJ concerns. In accordance with the Executive Order, the EPA recommends that the environmental document identify and address any disproportionate impacts on minority and low-income populations. The Environmental Justice Interagency Working Group *Promising Practices for EJ Methodologies in NEPA Reviews* (*Promising Practices)*, dated March 2016, provides guiding principles agencies can consider in identifying disproportionately high and adverse impacts on minority and low-income populations.

Climate Adaptation and Resilience: The EPA recommends that the EIS consider alternatives which are consistent with TVA's Adaptation Plan. TVA should evaluate how climate change impacts (such as increases in temperature, flooding, and drought events) may affect operations of alternatives considered. The EPA recommends that this analysis use climate projections specific to the study area rather than using national or global climate projections. This analysis should also consider that increased heavy precipitation and flooding could potentially expand the existing 100-year floodplain, which may affect appropriate siting and elevation of infrastructure. Climate change may heighten the risk of landslides due to both higher wildfire risk and flooding, the compounding effects of which may result in destabilized soil and resulting debris flows. This heightened risk of landslides should also be considered in the climate impacts analysis. The EPA also recommends that in addition to the climate analysis on operations, TVA considers how alternatives may exacerbate climate change impacts to surrounding areas and consider opportunities to mitigate those impacts. For example, increased drought could reduce local water availability, heightening any impacts the alternatives have on water resources as well. For all the above, the EPA recommends that TVA consider adaptation measures to reduce impacts.

The EPA appreciates the opportunity to review the NOI and looks forward to continued participation with the Cheetham County Generation Site. To discuss our technical recommendations further, please contact Douglas White of my staff at [redacted] or ([redacted].

Sincerely,

Kajumba, Ntale

Digitally signed by Kajumba, Ntale
Date: 2023.07.07 15:13:07 -04'00'

Ntale Kajumba
NEPA Section Manager

Attachment 2

Assessing TVA's IRP Planning Practices

Prepared on behalf of the Southern Environmental Law Center (SELC)

Authors:

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Elizabeth A. Stanton, PhD

Applied Economics Clinic

June 2023

Applied Economics Clinic
Economic and Policy Analysis of Energy, Environment and Equity

Executive Summary

As the United States' largest public power producer, Tennessee Valley Authority (TVA) must plan and invest to meet aggressive decarbonization targets. TVA conducts regular Integrated Resource Plans (IRPs) to: 1) assess what its resource needs are; 2) evaluate what resources could meet those needs; 3) model different resource combinations under varying conditions; and 4) publish "planning ranges" estimating how much capacity it may add or retire for each resource. In principle, the IRPs should present reasonable ranges (and a schedule) against which TVA's actual capacity additions and retirements can be compared. TVA's 2011, 2015, and latest 2019 IRPs, however, neither clearly explained its planning processes nor gave an accurate picture of future resource decisions.

A useful IRP process has three key features: 1) It bases its modeling and analysis of potential resources on a survey or "all-resource RFP" of available energy resources and their characteristics; 2) the IRP designates a preferred portfolio—a combination of resource additions and retirements that together will meet future demand for power; and 3) the IRP's results and planning methods are adequate (an accurate enough) to inform subsequent site-specific instances of planning. This Applied Economic Clinic (AEC) report assesses TVA's 2011, 2015, and 2019 IRP results by comparing them with TVA's actual additions and retirements from 2011 to 2021 and finds TVA's process and results lacking. This report also compares TVA's 2019 IRP to site-specific planning for the replacement of TVA's Cumberland Fossil Plant. The report presents the following takeaways:

- **TVA must set aggressive climate goals** in line with the Paris Agreement's requirement to limit temperature increases and with the Biden Administration's executive orders requiring a carbon-free electric system by 2035.
- **TVA must be more transparent** regarding its assumptions and modeling inputs.
- **TVA must select a portfolio with a more targeted preferred resource plan** than its prior IRPs**.**
- **TVA should plan to utilize the grants, loans, and tax credits of the Inflation Reduction Act** to achieve aggressive climate targets.
- **TVA must clarify how it demarcates "ownership" of solar and wind resources** between its distribution utilities, power purchase agreements from other parties, and capacity that TVA outright owns, and provide reliable annual or monthly data on solar, wind, and storage capacity.
- **TVA should conduct an all-resource RFP for resources,** at market prices, that could be made available by the time new capacity is required, and compare and include price forecasts from reputable sources.
- **TVA must ensure that its site-specific planning documents reflect the most recent IRPs' plans and use methods that do not contradict overall-system- and site-specific planning exercises.**

Applied Economics Clinic
Economic and Policy Analysis of Energy, Environment and Equity

Table of Contents

About the Applied Economics Clinic

Based in Arlington, Massachusetts, the Applied Economics Clinic (AEC, www.aeclinic.org) is a mission-based non-profit consulting group that offers expert services in the areas of energy, environment, consumer protection, and equity from seasoned professionals while providing on-the-job training to the next generation of technical experts.

AEC's non-profit status allows us to provide lower-cost services than most consultancies, and when we receive foundation grants, AEC also offers services on a pro bono basis. AEC's clients are primarily public interest organizations—non-profits, government agencies, and green business associations—who work on issues related to AEC's areas of expertise. Our work products include expert testimony, analysis, modeling, policy briefs, and reports, on topics including energy and emissions forecasting, economic assessment of proposed infrastructure plans, and research on cutting-edge, flexible energy system resources.

AEC works proactively to support and promote diversity in our areas of work by providing applied, on-the-job learning experiences to graduate students—and occasionally highly qualified undergraduates—in related fields such as economics, environmental engineering, and political science. Over the past four years, AEC has hosted research assistants from Boston University, Brandeis University, Clark University, Tufts University, University of Denver, University of Massachusetts-Amherst, University of Massachusetts-Boston, University of Southern Maine, and University of Tennessee. AEC is committed to a just workplace that is diverse, pays a living wage, and is responsive to the needs of its full-time and part-time staff.

Founded in 2017 by Director and Senior Economist Elizabeth A. Stanton, PhD, AEC's talented researchers and analysts provide a unique service-minded consulting experience. Dr. Stanton has had more than two decades of professional experience as a political and environmental economist leading numerous studies on environmental regulation, alternatives to fossil fuel infrastructure, and local and upstream emissions analysis. AEC professional staff includes experts in electric, multi-sector and economic systems modeling, climate and emissions analysis, green technologies, and translating technical information for a general audience. AEC's staff are committed to addressing climate change and environmental injustice in all its forms through diligent, transparent, and comprehensible research and analysis.

I. Introduction

An integrated resource plan (IRP) is a study to determine how a power provider can best meet forecasted customer electric demand over a set period of time.[1] IRPs consider supply- and demand-side resources (central power stations, renewables, distributed energy resources, storage, and demand-side management) and develop scenarios to meet specific goals: minimizing risks, keeping costs low, or reducing environmental impacts.[2] The decisions made by the Tennessee Valley Authority (TVA) regarding its energy generation capacity are vital to the region's ability to meet climate targets and for the United States' ability to decarbonize its electric systems.

The U.S. Energy Policy Act of 1992 requires TVA to engage in a least-cost planning and selection process in which it treats supply- and demand-side resources on an equal footing basis while accounting for system operation features of those resources (such as diversity and reliability) and the ability to verify and measure energy savings from efficiency and conservation.[3] These planning processes, however, are only as good as the methods and assumptions utilized by TVA. TVA's IRPs illustrate successes and blind spots and, when examined over time, can show whether TVA is investing with science-based climate targets in mind.

TVA has a responsibility to ensure that its planning processes account for and reflect its own climate commitments over the next couple of decades. TVA's upcoming 2024 IRP is its first since committing to an 80 percent emissions reduction by 2035 from 2005 levels and to achieving net-zero emissions by 2050.[4] The 2024 IRP will also be the first since the United States established several science-based climate goals, including the commitment to limit global warming to "well below" 2 degrees Celsius pursuant to the Paris Agreement[5] and to achieve a "carbon pollution-free electricity sector no later than 2035" pursuant to multiple federal executive orders.[6] In its previous IRPs, TVA did not plan sufficiently for future

[1] TVA. "Integrated Resource Plan." Available at: https://www.tva.com/environment/environmental-stewardship/integrated-resource-plan.
[2] Power system Engineering. "Integrated Resource Planning." Available at: https://www.powersystem.org/services/economics-rates-and-business-planning/resource-planning-and-demand-side-management/integrated-resource-planning/#:~:text=An%20Integrated%20Resource%20Plan%20(IRP,meeting%20a%20utility's%20electricity%20needs..
[3] U.S. GPO. *§831m–1. Tennessee Valley Authority least-cost planning program*. Available at: https://www.govinfo.gov/content/pkg/USCODE-2019-title16/pdf/USCODE-2019-title16-chap12A-sec831m-1.pdf.
[4] TVA. 2021. *TVA Strategic Intent and Guiding Principles.* Available at: https://tva-azr-eastus-cdn-ep-tvawcm-prd.azureedge.net/cdn-tvawcma/docs/default-source/about-tva/board-of-directors/may-6-2021/strategic-plan-documentc67079e2-d479-4f3d-a13b-1fa6fd714cde.pdf?sfvrsn=bc7bb2e8_7. p. 20-22.
[5] United Nations. 2015. *Paris Agreement.* Available at: https://unfccc.int/sites/default/files/english_paris_agreement.pdf. p. 5.
[6] 1) White House. 2022. *Executive Order on the Implementation of the Energy and Infrastructure Provisions of the Inflation Reduction Act of 2022.* Available at: https://www.whitehouse.gov/briefing-room/presidential-actions/2022/09/12/executive-order-on-the-implementation-of-the-energy-and-infrastructure-provisions-of-the-inflation-reduction-act-of-2022/. 2) White House. 2021. *Executive Order on Tackling the Climate Crisis at Home and Abroad.* Available at: https://www.whitehouse.gov/briefing-room/presidential-actions/2021/01/27/executive-order-on-tackling-the-climate-crisis-at-home-and-abroad/; 3) White House. 2021. *Executive Order on Catalyzing Clean energy Industries and Jobs Through Federal Sustainability.* Available at: https://www.whitehouse.gov/briefing-room/presidential-actions/2021/12/08/executive-order-on-catalyzing-clean-energy-industries-and-jobs-through-

decarbonization. While TVA's coal capacity has fallen by 54 percent over the last several years, the addition of zero emission generation capacity has not kept pace with the addition of gas generation.

The report begins in **Section II** with a description of the Tennessee Valley Authority, its capacity and generation mix since 2011, and the role of TVA's IRPs. **Section III** examines the planning process that TVA utilizes in its IRPs to assess future resource needs and recommend planning ranges for select resources. **Section IV** compares TVA's planning ranges in its past three IRPs in 2011, 2015, and 2019 to the actual capacity additions and retirements undertaken by TVA. **Section V** presents a case study on the 2019 IRP, comparing TVA's individual resource (or site-specific) assessment methods with the integrated methodology used in TVA's IRPs and making recommendations on the use of specific methods. Finally, **Section VI** concludes with recommendations for TVA's upcoming 2024 IRP process.

II. The Tennessee Valley Authority

Established by an act of Congress in 1933, the Tennessee Valley Authority (TVA) is the largest public power provider in the United States partnering with municipal utilities and regional cooperatives) across seven states[7,8] to supply power to numerous delivery districts in Tennessee, Kentucky, Mississippi, Alabama, Georgia, North Carolina, and Virginia (see Figure 1).[9]

Out of the 153 power companies that purchase power from TVA to sell across the Tennessee Valley region, all but six are served through rolling power purchase agreements with 20-year notice of termination provisions, accounting for over 90 percent of TVA's revenue.[10,11] TVA also directly serves 58 industrial customers that together constitute 8 percent of its revenue.[12] The remaining 1 percent of TVA's revenue comes from power purchased by twelve utilities located in the Southeastern United States.[13] Through these arrangements, TVA's 29 hydroelectric sites (109 units), 14 solar sites, nine gas-fired combustion sites plants (86 units), eight gas-fired combined cycle sites (14 units), five coal-fired sites (25 units), three nuclear sites (7 units), one coal-fired co-generation unit, [14] and one pumped storage site (4 units) serve approximately 10 million people.[15]

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federal-sustainability/;

[7] TVA. *2019 Integrated Resource Plan Volume I – Final Resource Plan*. Available at: https://www.tva.com/environment/environmental-stewardship/integrated-resource-plan. p. 1.

[8] TVA. 2019. *Integrated Resource Plan: A Notice by the Tennessee Valley Authority.* Federal Register: 84 FR 4987. Available at: https://www.federalregister.gov/documents/2019/09/17/2019-20104/integrated-resource-plan.

[9] TVA. "TVA's Local Power Company Providers." Available at: https://www.tva.com/energy/public-power-partnerships/local-power-companies.

[10] TVA. "Public Power for the Valley." Available at: https://www.tva.com/energy/public-power-partnerships.

[11] TVA. 2022. "TVA Reports Fiscal Year 2022 Financial Results." Available at: https://www.tva.com/newsroom/press-releases/tva-reports-fiscal-year-2022-financial-results.

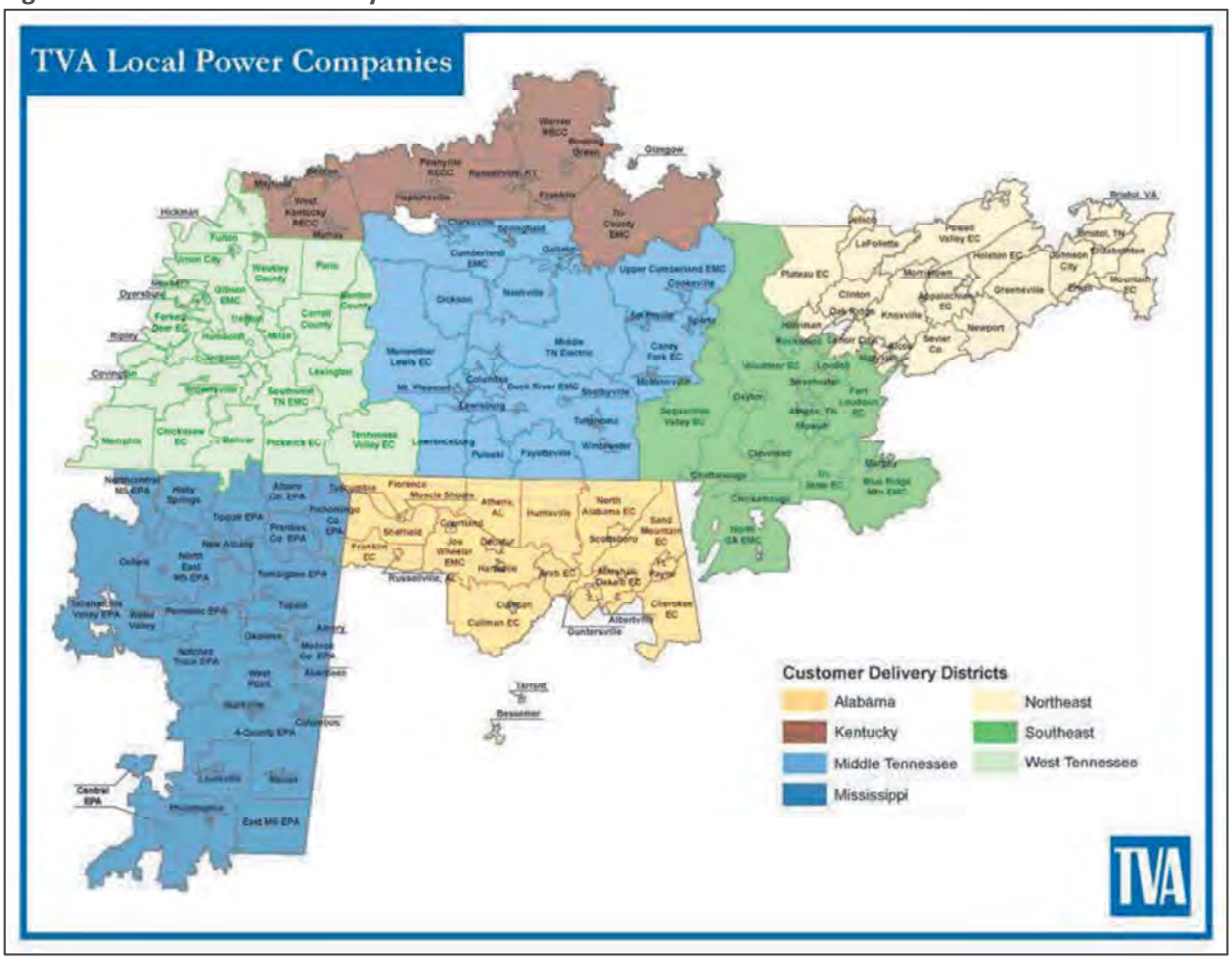
[12] TVA. "Public Power for the Valley." Available at: https://www.tva.com/energy/public-power-partnerships.

[13] Ibid.

[14] TVA. "Full Steam Ahead." Available at: https://www.tva.com/energy/full-steam-ahead.

[15] TVA. "Built for the People." Available at: https://tva-azr-eastus-cdn-ep-tvawcm-prd.azureedge.net/cdn-tvawcma/docs/default-source/annual-report/fy21-tva-fact-sheet04b7ef82-7693-4b86-9326-8dcb612bc534.pdf?sfvrsn=19efd01f_3.

Figure 1. TVA customer delivery districts

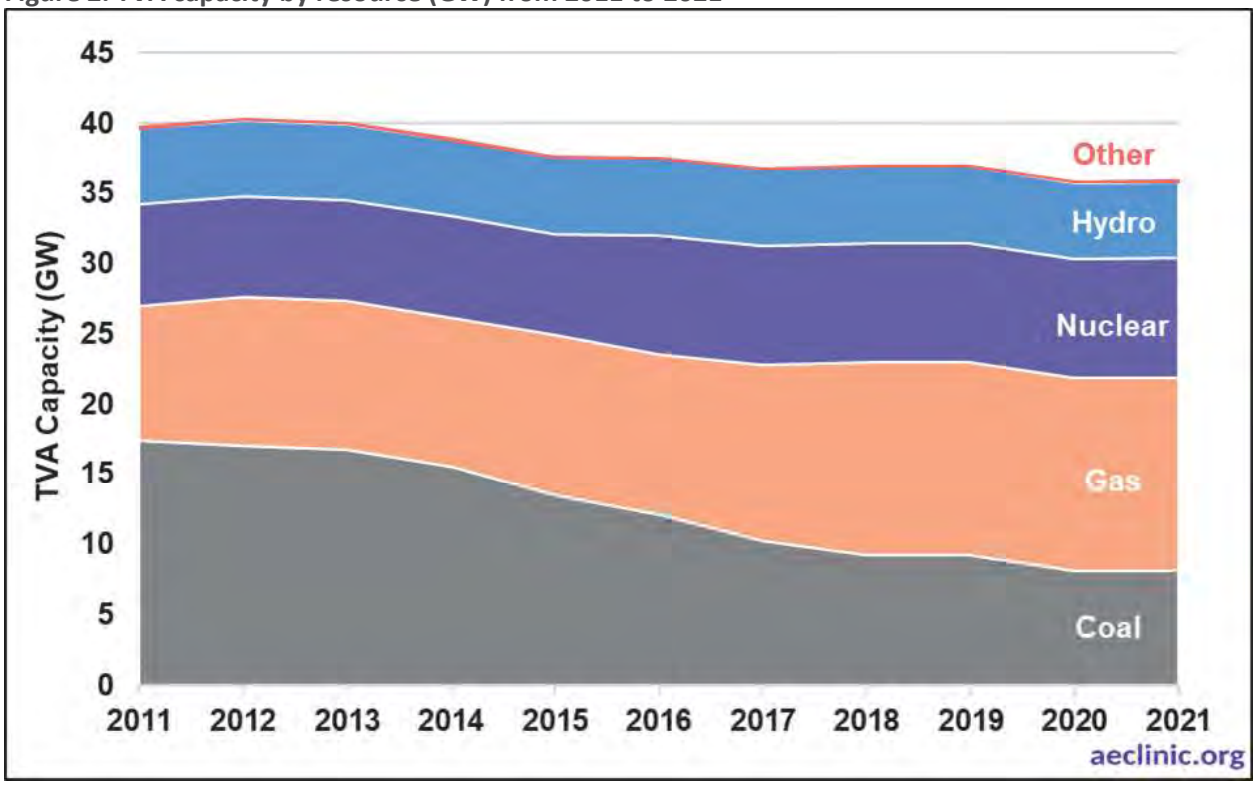


Source: Reproduced from TVA. "TVA's Local Power Company Partners." Available at: https://www.tva.com/energy/public-power-partnerships/local-power-companies.

In 2021, TVA owned 35.9 GW of electric capacity not including renewables, which has declined over time from 39.6 GW due entirely to coal retirements (see Figure 2). Gas is the single largest generating source, accounting for 38 percent (13.8 GW). Nuclear and coal respectively each account for 24 percent (8.5 GW) and 23 percent (8.0 GW), while hydroelectric capacity makes up the remaining 15 percent (5.4 GW). From 2011 to 2021, coal's share of capacity declined by nearly half, the remainder being replaced by nuclear (through the Watts Bar Nuclear Generating Station, which added 1,150 MW of electric generating capacity[16]) and gas, which increased by 44 percent between 2011 and 2021.

[16] EIA. 2016. "First new U.S. nuclear reactor in almost two decades set to begin operating." Available at: https://www.eia.gov/todayinenergy/detail.php?id=26652.

Figure 2. TVA capacity by resource (GW) from 2011 to 2021



Note: "Other" refers to oil (which drops from 27 to 23 MW between 2011 and 2021) and wind capacity (which is 2 MW from 2011 to 2021). This graph only includes data from U.S. EIA, which is incomplete with regard to TVA's solar and wind capacity.
Source: U.S. EIA. September 22, 2022. Form EIA-860 detailed data with previous form data (EIA-860A/860B). Available at: https://www.eia.gov/electricity/data/eia860/.

U.S. Energy Information Administration data on TVA's wind and solar resources is incomplete. However, TVA alludes to the available and contracted renewable capacity in other sources. In its *Renewable Highlights* document for Fiscal Year 2022, TVA claimed to have 8,264 MW of operating and contracted renewables capacity as of Fiscal Year 2022.[17] There are minimal data on how much operating solar and wind capacity TVA claims as its own. According to data compiled by the Southern Environmental Law Center (SELC) from TVA's 10-K forms[18], most of TVA's "operating capacity" is likely under power purchase contracts—rising from at least 84.3 MW of solar in 2018 to 510 MW of solar in 2022 (see Table 1). TVA has 1,240 to 1,242 MW of wind from power purchase contracts from 2018 to 2022 and also claims to have 1,828 MW of contracted power that is not yet operating in 2022, up from 53 MW in 2018.[19] As of 2022, TVA further "expects" 2,338 MW of contracted power that will be online between 2023 and 2025.[20] Note that it is also unclear whether or not the data in Table 1 are comprehensive; EIA reports TVA to have had 2

[17] TVA. *Renewable Highlights: Fiscal Year 2022.* Available at: https://tva-azr-eastus-cdn-ep-tvawcm-prd.azureedge.net/cdn-tvawcma/docs/default-source/energy/valley-renewable-energy/tva-renewables-highlights-report---fiscal-year-2022.pdf?sfvrsn=41675a30_1. p. 2.
[18] SELC calculations using: TVA. "SEC Filings." Available at: https://tva.q4ir.com/financial-information/sec-filings/default.aspx.
[19] Ibid.
[20] Ibid.

MW of wind capacity from 2011 to 2021, but does not specify whether that capacity is owned or purchased. The data in Table 1 do not specify any owned wind capacity.

Table 1. TVA's operating solar and wind capacity (MW)

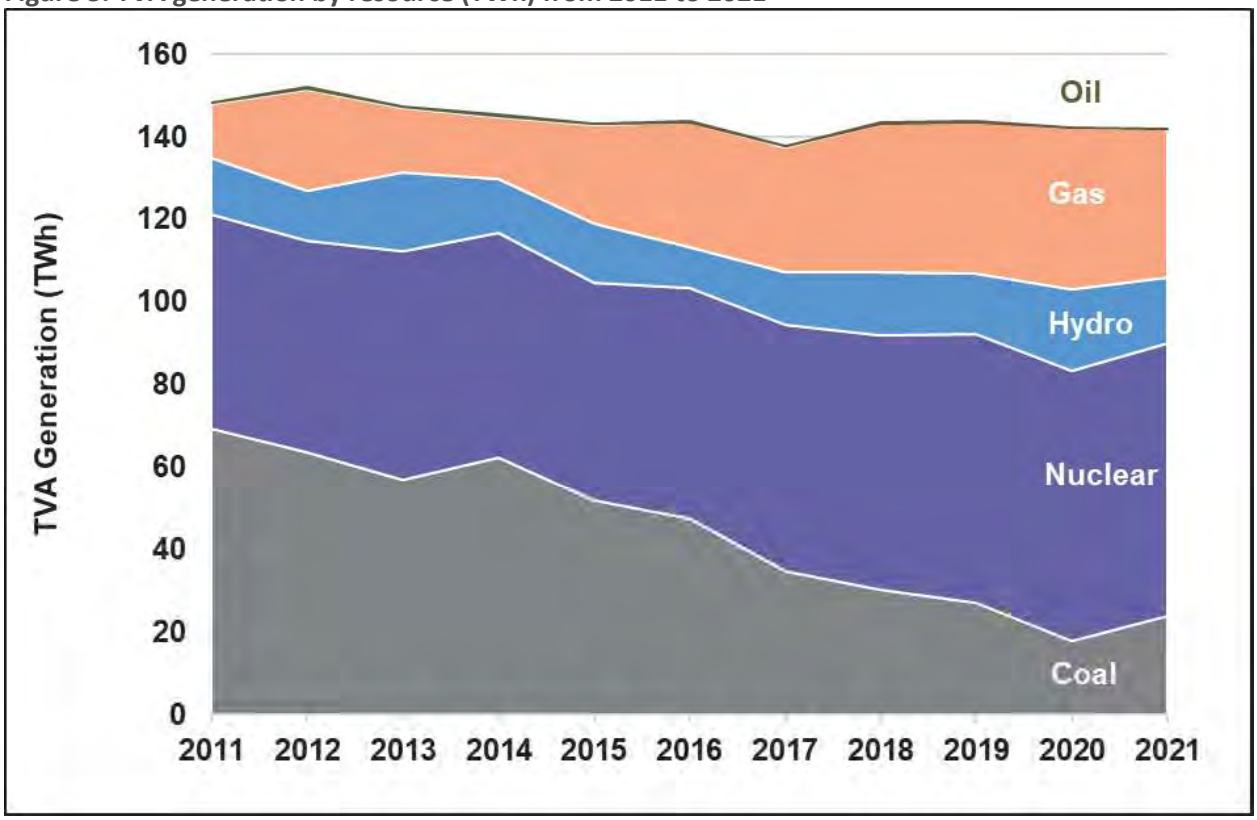
		2018	2019	2020	2021	2022
Solar	TVA-Owned	1.0	1.0	1.0	1.0	1.0
	Power Purchase Contracts	84.3	132.5	133.0	360.0	510.0
	Total	**85.3**	**133.5**	**134.0**	**361.0**	**511.0**
Wind	TVA-Owned	0.0	0.0	0.0	0.0	0.0
	Power Purchase Contracts	1,242.0	1,242.0	1,242.0	1,242.0	1,240.0
	Total	**1,242.0**	**1,242.0**	**1,242.0**	**1,242.0**	**1,240.0**

Source: SELC calculations using: TVA. "SEC Filings." Available at: https://tva.q4ir.com/financial-information/sec-filings/default.aspx.

In 2021, the largest share of TVA's generation came from nuclear at 47 percent (66.4 TWh, see Figure 3). Gas- and coal-fired resources accounted for 42 percent (or 59.6 TWh), while the remaining 11 percent (or 15.8 TWh) was generated at hydroelectric facilities (11 percent).[21] The share of nuclear generation has increased since 2011 (when it provided just 35 percent or 51.8 TWh). Hydro has also remained static in terms of its generation—providing 15.8 TWh in 2021 and 13.7 TWh in 2011 (11 and 9 percent respectively). Gas and coal have seen the most dramatic change. Coal fell from 69.4 TWh to 23.8 TWh (46.9 percent to 16.8 percent) while gas increased from 13 TWh in 2011 to 35.8 TWh in 2021 (8.8 percent to 25.3 percent). As discussed in Section III, these changes reflect TVA's unplanned coal retirements over the last decade and large-scale expansion of gas capacity.

[21] AEC calculations using: US EIA. September 22, 2022. Form EIA-860 detailed data with previous form data (EIA-860A/860B). Available at: https://www.eia.gov/electricity/data/eia860/

Figure 3. TVA generation by resource (TWh) from 2011 to 2021



Note: This graph only includes data from U.S. EIA, which is incomplete with regard to solar and wind capacity.
Source: U.S. EIA. September 22, 2022. Form EIA-923 detailed data with previous form data (EIA-906/920). Available at: https://www.eia.gov/electricity/data/eia923/.

TVA's climate goals

In March 2021, TVA announced its "aspiration to achieve net zero carbon emissions by 2050" in its *Strategic Intent and Guiding Principles* document.[22] In achieving this goal, TVA views "natural gas as a bridge" between coal retirements and solar expansion, and argues that gas facilitates coal retirements, solar energy expansion, and maintains system reliability and resiliency.[23] TVA also states that it is "developing a path" to approximately 80 percent carbon reduction of 2005 levels by 2035 by extending the life of the current nuclear and hydro fleets, adding 10,000 MW of solar by 2035,[24] and collaborating with local power companies to plan and leverage demand-side solutions.[25] Finally, TVA also planned to execute

[22] TVA. 2021. *TVA Strategic Intent and Guiding Principles.* Available at: https://tva-azr-eastus-cdn-ep-tvawcm-prd.azureedge.net/cdn-tvawcma/docs/default-source/about-tva/board-of-directors/may-6-2021/strategic-plan-documentc67079e2-d479-4f3d-a13b-1fa6fd714cde.pdf?sfvrsn=bc7bb2e8_7. p. 22.
[23] Ibid, 23.
[24] The solar additions that TVA highlighted as aspirations or goals in its 2021 *Strategic Intent and Guiding Principles* were published after its 2019 IRP.
[25] TVA. 2021. *TVA Strategic Intent and Guiding Principles.* Available at: https://tva-azr-eastus-cdn-ep-tvawcm-prd.azureedge.net/cdn-tvawcma/docs/default-source/about-tva/board-of-directors/may-6-2021/strategic-plan-documentc67079e2-d479-4f3d-a13b-1fa6fd714cde.pdf?sfvrsn=bc7bb2e8_7. p. 22.

a 70 percent carbon reduction from 2005 levels by 2030.[26]

Since 2021, numerous federal executive orders have reiterated that federal agencies (like TVA) must prioritize, facilitate, and/or otherwise achieve a carbon pollution-free electric sector by 2035 and net-zero emissions economy-wide by no later than 2050.[27] TVA must ensure that subsequent IRPs plan future resources, additions, and retirements in line with these goals. As a federal agency, TVA is also responsible for contributing to the United States' efforts to keep global average temperature increases "well below" 2 degrees Celsius above pre-industrial levels per the 2015 Paris Agreement.[28]

TVA's IRP process

Title 16 U.S. Code § 831m-1 of the Energy Policy Act of 1992[29] requires TVA to "employ and implement a planning and selection process for new energy resources which 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" to TVA customers at the "lowest system cost."[30] The federally mandated planning process must account for:[31]

- Features of system operation: diversity, reliability, dispatchability, and other risk factors;
- Energy savings through conservation and efficiency; and
- Treatment of demand and supply resources "on a consistent and integrated basis."

In addition, the Tennessee Valley Authority Act of 1933 requires TVA's power system to be self-financing, operate as a nonprofit, and sell power at rates as low as feasible.[32]

TVA conducts its required planning process through IRPs,[33] long-term plans for the next 20 years of TVA

[26] Ibid, p. 21.
[27] 1) White House. 2022. *Executive Order on the Implementation of the Energy and Infrastructure Provisions of the Inflation Reduction Act of 2022.* Available at: https://www.whitehouse.gov/briefing-room/presidential-actions/2022/09/12/executive-order-on-the-implementation-of-the-energy-and-infrastructure-provisions-of-the-inflation-reduction-act-of-2022/. 2) White House. 2021. *Executive Order on Tackling the Climate Crisis at Home and Abroad.* Available at: https://www.whitehouse.gov/briefing-room/presidential-actions/2021/01/27/executive-order-on-tackling-the-climate-crisis-at-home-and-abroad/; 3) White House. 2021. *Executive Order on Catalyzing Clean energy Industries and Jobs Through Federal Sustainability.* Available at: https://www.whitehouse.gov/briefing-room/presidential-actions/2021/12/08/executive-order-on-catalyzing-clean-energy-industries-and-jobs-through-federal-sustainability/;
[28] United Nations. 2015. *Paris Agreement.* Available at: https://unfccc.int/sites/default/files/english_paris_agreement.pdf. p. 5.
[29] United States Code Annotated. *Title 16 § 831-m: Tennessee Valley Authority least-cost planning program*. WestLaw.
[30] Ibid, p. 1.
[31] Ibid, p. 1.
[32] 1) TVA. 2019. *Integrated Resource Plan: A Notice by the Tennessee Valley Authority.* Federal Register: 84 FR 4987. Available at: https://www.federalregister.gov/documents/2019/09/17/2019-20104/integrated-resource-plan; 2) United States Code Annotated. *Title 16 § 831-m: Tennessee Valley Authority least-cost planning program*. WestLaw. p. 4.
[33] TVA. 2019. *Integrated Resource Plan: A Notice by the Tennessee Valley Authority.* Federal Register: 84 FR 4987.

capacity, the goal of which is to identify a resource plan that functions well under different future conditions and accounts for metrics such as costs, risks, or environmental factors.[34] In this report, we review IRPs prepared by TVA in 2019,[35] 2015,[36] and 2011.[37] TVA's next IRP is expected to be completed by the end of 2024.[38] TVA's IRPs are accompanied with Environmental Impact Statements (EIS), as required under the U.S. National Environmental Policy Act of 1970.[39] Rather than providing a recommended or preferred resource plan, TVA IRPs to date have developed prospective ranges for capacity additions and retirements over 20-year planning periods (see Table 2)[40] based on a collection of scorecard-based metrics that include cost, financial risk, operational flexibility, macroeconomic effects, or environmental impacts or stewardship.[41] The IRPs publish a low- and high-end for capacity additions and retirements (together constituting a planning range). In the 2015 and 2019 IRPs TVA publishes planning ranges ten years and twenty years out from when the IRP calculations were undertaken. The "actual" column displays the addition to TVA capacity through 2021 for the given resource from TVA capacity in the IRP year. Blank spaces in the "Actual" column denote lack of sufficient data to calculate changes in capacity between the respective IRP year and 2021—the latest year available for EIA data. The "actual" column does not incorporate changes in capacity that have not yet occurred (i.e. anticipated additions or retirements). For a discussion of how TVA continues to prioritize gas in its site-specific decision-making see Section V.

Available at: https://www.federalregister.gov/documents/2019/09/17/2019-20104/integrated-resource-plan.

[34] TVA. *2019 Integrated Resource Plan Volume I – Final Resource Plan*. Available at: https://www.tva.com/environment/environmental-stewardship/integrated-resource-plan. p. ES-1.

[35] Ibid, p. 1.

[36] TVA. *Integrated Resource Plan: 2015 Final Report*. Available at: https://tva-azr-eastus-cdn-ep-tvawcm-prd.azureedge.net/cdn-tvawcma/docs/default-source/default-document-library/site-content/environment/environmental-stewardship/irp/documents/2015_irp.pdf?sfvrsn=4892374_0.

[37] TVA. 2011. *Integrated Resource Plan: TVA's Environmental & Energy Future.* Available at: https://www.nrc.gov/docs/ML1217/ML12171A189.pdf.

[38] TVA. 2023. "TVA Engaging Public for Input on Next Integrated Resource Plan." Available at: https://www.tva.com/newsroom/press-releases/tva-engaging-public-for-input-on-next-integrated-resource-plan.

[39] TVA. *2019 Integrated Resource Plan: Executive Summary*. Available at: https://www.tva.com/environment/environmental-stewardship/integrated-resource-plan. p. 2.

[40] TVA. 2019. *Integrated Resource Plan: A Notice by the Tennessee Valley Authority.* Federal Register: 84 FR 4987. Available at: https://www.federalregister.gov/documents/2019/09/17/2019-20104/integrated-resource-plan.

[41] TVA. 2019. *Integrated Resource Plan: A Notice by the Tennessee Valley Authority.* Federal Register: 84 FR 4987. Available at: https://www.federalregister.gov/documents/2019/09/17/2019-20104/integrated-resource-plan. p. 6-14.

Table 2. Summary of TVA planning ranges and capacity changes

IRP Year	Capcity Additions and Retirements	Planning Ranges (MW)		Timeframe	Actual
		Low	High		
2011	EEDR	3,600	5,100	2020	
	Renewable	1,500	2,500	2020	
	Coal-fired capacity idled	2,400	4,700	2017	
	Storage	850	850	2020-2024	0
	Nuclear	1,150	5,900	2013-2029	1,343
	Coal	0	900	2025-2029	-9,327
	Gas	900	9,300	2012-2029	4,178
2015	Demand Response	450	575	2023	
	Energy Efficiency	900	1,300		
	Wind	0	0		
	Solar	150	800		
	Hydro	50	50		0
	Nuclear	800	800		1,343
	Coal	0	0		-5,398
	Gas	700	2,300		2,331
	Demand Response	450	575	2033	
	Energy Efficiency	2,000	2,800		
	Wind	500	1,750		
	Solar	3,150	3,800		
	Hydro	50	50		0
	Nuclear	800	800		1,343
	Coal	0	-3,400		-5,398
	Gas	3,900	5,500		2,331
2019	Demand Response	0	0	2028	
	Energy Efficiency	0	1,800		
	Wind	0	1,800		0
	Solar	1,500	8,000		228
	Hydro	0	0		0
	Storage	0	2,400		
	Nuclear	0	0		74
	Coal	-2,100	-2,100		-1,150
	Gas - Combustion Turbine	-2,000	5,200		0
	Gas - Combined Cycle	-800	5,700		0
	Demand Response	0	500	2038	
	Energy Efficiency	0	2,200		
	Wind	0	4,200		0
	Solar	1,500	14,000		228
	Hydro	0	175		0
	Storage	0	5,300		
	Nuclear	0	0		74
	Coal	-2,100	-2,100		-1,150
	Gas - Combustion Turbine	-2,000	8,600		0
	Gas - Combine Cycle	-800	9,800		0

Note: The long-term planning ranges (2038 for the 2019 IRP and 2033 for the 2015 IRP) are inclusive of the short-term planning ranges (2028 for the 2019 IRP and 2023 for the 2015 IRP).
Source: 1) TVA. 2011. Integrated Resource Plan: TVA's Environmental & Energy Future. Available at: https://www.nrc.gov/docs/ML1217/ML12171A189.pdf.; 2) TVA. Integrated Resource Plan: 2015 Final Report. Available at: https://tva-azr-eastus-cdn-ep-tvawcm-prd.azureedge.net/cdn-tvawcma/docs/default-source/default-document-library/site-content/environment/environmental-stewardship/irp/documents/2015_irp.pdf?sfvrsn=4892374_0.; 3) TVA. 2019. Integrated Resource Plan: A Notice by the Tennessee Valley Authority. Federal Register: 84 FR 4987. Available at:

https://www.federalregister.gov/documents/2019/09/17/2019-20104/integrated-resource-plan.; 4) U.S. EIA. September 22, 2022. Form EIA-860 detailed data with previous form data (EIA-860A/860B). Available at: https://www.eia.gov/electricity/data/eia860/; 5) U.S. EIA. September 22, 2022. Form EIA-923 detailed data with previous form data (EIA-906/920). Available at: https://www.eia.gov/electricity/data/eia923/.

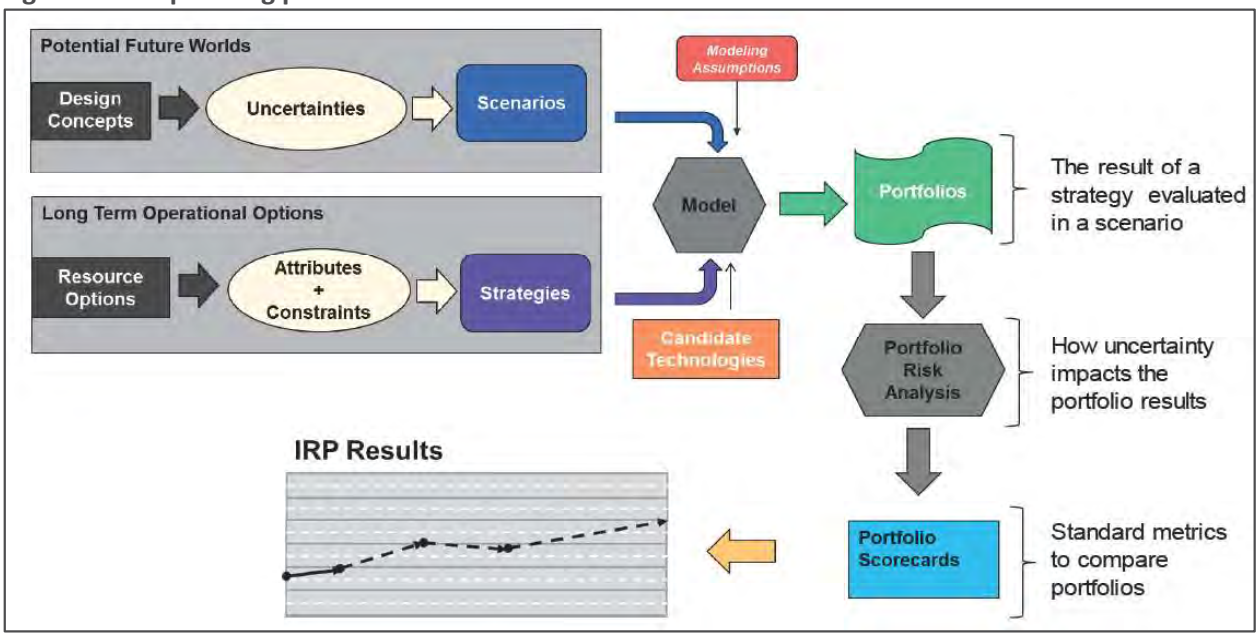
III. TVA's Planning Methods

In general, the goal of an IRP process is to facilitate the determination of a utility's future resource additions and retirements based on criteria such as the needs of the electric system, future demand, and environmental and climate goals. Once designed and approved, an IRP can function as a reference point in evaluating future resource decisions. TVA identifies the resources to include in its investment strategies, assesses multiple possible investment strategies, and then creates ranges of capacity additions or retirements for each strategy under different conditions. Throughout its planning process, TVA does not make publicly available the assumptions, parameters, and other modeling details used to arrive at the results. This black box approach makes it difficult to disentangle how TVA arrived at specific results, including its final recommended planning ranges. All three of TVA's previous IRPs (2011, 2015, and 2019) describe the use of a similar planning processes (see Figure 4).

1. TVA forecasts customer peak electric demand, including an additional reserve amount for contingencies.
2. TVA determines its existing and expected future power supply, or peak capacity.
3. TVA calculates a "capacity gap" between available supply and expected demand.
4. TVA creates possible scenarios representing futures that are not in its control and strategies based on business decisions that are in its control.
5. TVA models the least-cost combination of resources that would meet demand.
6. TVA analyzes its proposed portfolios to determine their financial, operational, and environmental impacts.
7. TVA subjects its portfolios to sensitivity analysis to test their robustness to supply and demand disruptions, market conditions, weather, technological improvements, and economic cycles;[42]
8. TVA compares portfolios based on a series of scorecard metrics.
9. TVA summarizes the results of the analysis in Steps 5 - 7 and presents ranges of recommended resource adoption and retirement for short- and long-term capacity expansion. TVA does not make a determination at the end of its IRPs as to how it will act on the published planning ranges.

[42] Ibid, p. 6-10.

Figure 4. TVA planning process



Source: Reproduced from TVA. 2019 Integrated Resource Plan Volume I – Final Resource Plan. Available at: https://www.tva.com/environment/environmental-stewardship/integrated-resource-plan. p. 6-1.

This section reviews these steps in more detail in the TVA context and provides examples from each IRP.

Estimating a capacity gap: Steps 1 – 3

The 2011, 2015 and 2019 TVA IRPs estimate electric demand, supply, and a capacity gap using three steps:

1. **Peak demand:** Future demand for the IRP models is determined using projections of long-term growth in electric sales and peak demand based on quantitative models that link sales to factors driving growth, including economic activity, electric rates, and customer retention.[43]
2. **Power supply:** TVA then identifies what generating capacity is available to it today and in the near future—the available power supply—by examining TVA-owned resources, budgeted and approved projects, updates to existing assets, and its existing power purchase agreements.[44]
3. **Capacity gap:** TVA calculates its "capacity gap:"[45] the difference between TVA's peak demand (including its reserve requirement) and its power supply.[46]

[43] TVA. *Integrated Resource Plan: 2015 Final Report*. Available at: https://tva-azr-eastus-cdn-ep-tvawcm-prd.azureedge.net/cdn-tvawcma/docs/default-source/default-document-library/site-content/environment/environmental-stewardship/irp/documents/2015_irp.pdf?sfvrsn=4892374_0. p. 26.
[44] Ibid, p. 30.
[45] Also known as the "energy gap." Ibid, p. 33.
[46] Ibid, p. 33.

Creating portfolios: Steps 4 – 5

TVA constructs a series of alternative possible future scenarios with different economic, regulatory, technological, and social conditions that are not under TVA's control.[47] TVA then develops multiple possible business strategies.[48] A portfolio represents the resulting capacity addition plan from the application of a TVA business strategy to a scenario.[49]

TVA's 2019 IRP presents five scenarios:

- a current outlook scenario with modest growth and increasing efficiencies with little or no load growth;
- a scenario with an economic downturn;
- large-scale load growth scenario in the Tennessee Valley;
- a scenario with rapid policy-induced reduction in greenhouse gas emissions,
- increasing consumer demand for distributed energy resources (DERs); and
- a scenario in which new large-scale nuclear capacity is curtailed in favor of other options.[50]

TVA's 2019 IRP developed business strategies included:

- a base case retaining TVA's existing assumptions on cost trajectories;
- a move towards promoting DERs;
- an emphasis on investment in smaller units of capacity to promote operational flexibility;
- promoting electrification and demand management to control load shape; and
- promoting renewables at all scales.[51]

Each scenario-strategy combination (thirty in total) in TVA's 2019 IRP was used to develop a portfolio of resource additions and retirements which are then subjected to modeling (see Table 3). Each scenario-strategy combination represents a portfolio of potential capacity changes for TVA to make in response to the development of the capacity gap, conditions in the economy, policy, and electricity markets. TVA's next step is to determine the exact amount of capacity changes represented by those portfolios.

[47] TVA. *2019 Integrated Resource Plan Volume I – Final Resource Plan*. Available at: https://www.tva.com/environment/environmental-stewardship/integrated-resource-plan. p. 2-1.
[48] TVA. *Integrated Resource Plan: 2015 Final Report*. Available at: https://tva-azr-eastus-cdn-ep-tvawcm-prd.azureedge.net/cdn-tvawcma/docs/default-source/default-document-library/site-content/environment/environmental-stewardship/irp/documents/2015_irp.pdf?sfvrsn=4892374_0. p. 12.
[49] Ibid, p. 12.
[50] TVA. *2019 Integrated Resource Plan Volume I – Final Resource Plan*. Available at: https://www.tva.com/environment/environmental-stewardship/integrated-resource-plan. p. 2-1.
[51] Ibid, p. 2-2.

Table 3. TVA's 2019 scenario-strategy combinations (portfolios)

Scenarios	Strategies				
	A: Base Case	B: Promote DER	C: Promote Resiliency	D: Promote Efficient Load Shape	E: Promote Renewables
1: Current Outlook	1A	1B	1C	1D	1E
2: Economic Downturn	2A	2B	2C	2D	2E
3: Valley Load Growth	3A	3B	3C	3D	3E
4: Decarbonization	4A	4B	4C	4D	4E
5: Rapid DER Adoption	5A	5B	5C	5D	5E
6: No Nuclear Extensions	6A	6B	6C	6D	6E

Source: Reproduced from TVA. 2019 Integrated Resource Plan Volume I – Final Resource Plan. Available at: https://www.tva.com/environment/environmental-stewardship/integrated-resource-plan. p. 7-1.

Assessing the portfolios: Steps 6 – 8

TVA models each resource portfolio for cost effectiveness, technical potential, fuel requirements, and operating limits.

The portfolios' precise capacity expansions are determined using a resource expansion optimization model called System Optimizer[52] from ABB that minimizes the cumulative present value of total revenue requirements (PVRR) subject to a series of constraints selected by TVA including limitations on the balance of supply and demand, the energy balance, the reserve margin, generation and transmission operation, fuel purchases and utilization, new resource capital and operating costs, existing resource and operating costs, fuel prices, and the pace of distributed generation and storage adoption.[53] Optimal (or least-cost) modeling results are strongly dependent on the modeler's selection of parameter values and other settings; different selections would lead to a different "optimal" result. TVA specifies modifications to the constraints for optimization for each scenario-strategy pairing. System Optimizer uses a dispatch methodology for the 20 years of the IRP (the study period) and a "representative hours" approach in which the generation and load (the amount of electricity demanded over a period of time) values for given periods in a week are scaled to span entire weeks, and days in a month. The capacity path with the lowest PVRR—based on TVA's parameter selections—becomes the optimized capacity plan or portfolio.

Each capacity portfolio is then subject to a financial analysis using the MIDAS[54] hourly production cost model that determines a PVRR with additional variables such as cash flows associated with financing over the full 20-year study period.[55] The model also calculates a system average costs to gauge the rate impacts

[52] ABB. "Adaptable, integrated optimization." Available at: https://new.abb.com/power-generation/solutions/power-plant-optimization.

[53] TVA. *2019 Integrated Resource Plan Volume I – Final Resource Plan*. Available at: https://www.tva.com/environment/environmental-stewardship/integrated-resource-plan,p. 6-9.

[54] ABB. "Adaptable, integrated optimization." Available at: https://new.abb.com/power-generation/solutions/power-plant-optimization.

[55] TVA. *Integrated Resource Plan: 2015 Final Report*. Available at: https://tva-azr-eastus-cdn-ep-tvawcm-prd.azureedge.net/cdn-tvawcma/docs/default-source/default-document-library/site-content/environment/environmental-stewardship/irp/documents/2015_irp.pdf?sfvrsn=4892374_0. p. 63.

of a given portfolio.[56] TVA discounted future costs and revenue at 8 percent in the 2019 IRP,[57] the 2015 IRP,[58] and the 2011 IRP.[59]

The capacity portfolios are then subject to analysis to assess the sensitivity of modeling results to changes in key variables. In the 2019 IRP, for example, the variables used to assess uncertainty included: the prices of natural gas and coal, financial parameters like interest rates or operation and maintenance costs, and net sales forecast uncertainty for peak and energy (including demand, energy efficiency, electrification, behind-the-meter-solar, and combined heat and power).[60]

Each portfolio's performance is compared using a standardized series of metrics gathered in a scorecard. The 2019 scorecard's metrics included PVRR, CO_2 emissions, waste consumption of water, and per capita income for the Tennessee Valley among others (see Table 4).

[56] Ibid.

[57] Ibid, p. 6-9.

[58] TVA. *Integrated Resource Plan: 2015 Final Report*. Available at: https://tva-azr-eastus-cdn-ep-tvawcm-prd.azureedge.net/cdn-tvawcma/docs/default-source/default-document-library/site-content/environment/environmental-stewardship/irp/documents/2015_irp.pdf?sfvrsn=4892374_0. p. 63.

[59] TVA. 2011. *Integrated Resource Plan: TVA's Environmental & Energy Future.* Available at: https://www.nrc.gov/docs/ML1217/ML12171A189.pdf. p. 100.

[60] TVA. *2019 Integrated Resource Plan Volume I – Final Resource Plan*. Available at: https://www.tva.com/environment/environmental-stewardship/integrated-resource-plan,p. 6-12.

Table 4. TVA 2019 IRP Scorecard

Category	Metric	Formula
Cost	PVRR ($Bn)	Present Value of Revenue Requirements over Planning Period
	Total Resource Cost ($Bn)	PVRR + Participant cost net of savings (bill savings, tax credits)
	System Average Cost ($/MWh)	$\frac{\text{NPV Rev Reqs (2019–2038)}}{\text{NPV Sales (2019–2038)}}$
Risk	Risk/Benefit Ratio	$\frac{95\text{th}_{(PVRR)} - \text{Expected}_{(PVRR)}}{\text{Expected}_{(PVRR)} - 5\text{th}_{(PVRR)}}$
	Risk Exposure ($Bn)	$95\text{th Percentile}_{(PVRR)}$
Environmental Stewardship	CO2 (MMTons)	Average Annual Tons of CO2 Emitted During Planning Period
	CO2 Intensity (lbs/MWh)	$\frac{\text{Pounds CO2 (2019–2038)}}{\text{MWh Generated \& Purchased (2019–2038)}}$
	Water Consumption (MMGallons)	Average Annual Gallons of Water Consumed During Planning Period
	Waste (MMTons)	Average Annual Tons of Coal Ash and Scrubber Residue During Planning Period
	Land Use (Acres)	Acreage Needed for Expansion Units in Each Portfolio (2038)
Operational Flexibility	Flexible Resource Coverage Ratio	$\frac{\text{Flexible Capacity Available for Max 3–Hour Ramp in each Strategy (2038)}}{\text{Capacity Required for Max 3–Hour Ramp in each Scenario (2038)}}$
	Flexibility Turn Down Factor	$\frac{\text{"Must Run" + "Non–Dispatchable" (2038)}}{\text{Sales (2038)}}$
Valley Economics	Percent Difference in Real Per Capita Income	Percent Difference in Real Per Capita Personal Income Compared to the Base Case (for each scenario)
	Percent Difference in Employment	Percent Difference in Non-Farm Employment Compared to the Base Case

Source: Reproduced from TVA. 2019 Integrated Resource Plan Volume I – Final Resource Plan. Available at: https://www.tva.com/environment/environmental-stewardship/integrated-resource-plan,p. 6-15.

TVA's recommended capacity ranges: Step 9

Finally, TVA selects among the resource portfolios modeling to recommend capacity additions and retirements for each resource type. In contrast to the widely used practice of utility IRPs determining a single "preferred portfolio," TVA does not select a single portfolio or overall strategy in the recommendations of any of its IRPs. Instead, TVA publishes power supply ranges without making a specific recommendation based on prospective schedules of additions and retirements of each resource type. In its 2019 IRP, TVA's "target power supply ranges" represent the resulting minimum and maximum addition or retirement possibilities in the "current outlook scenario."[61] In its 2015 IRP, TVA's recommended power supply ranges draw from analysis on strategies that do not emphasize meeting needs with a specific resource type (i.e. TVA did not use strategies in a way that would "place specific targets on particular resource types"—for example, energy efficiency and renewables).[62] In both cases, TVA delineates the

[61] TVA. *2019 Integrated Resource Plan Volume I – Final Resource Plan*. Available at: https://www.tva.com/environment/environmental-stewardship/integrated-resource-plan. p. 9-2.
[62] TVA. *Integrated Resource Plan: 2015 Final Report*. Available at: https://tva-azr-eastus-cdn-ep-tvawcm-prd.azureedge.net/cdn-tvawcma/docs/default-source/default-document-library/site-content/environment/environmental-stewardship/irp/documents/2015_irp.pdf?sfvrsn=4892374_0. p. 115.

circumstances in which analysis on its various portfolios ultimately contributes to the planning ranges it displays. Other electric utilities commonly use IRPs to recommend a single portfolio. A few examples, among many, of this practice are:

- The Northern Indiana Public Service Company's 2018 IRP selected a preferred plan among its various portfolios and provides a year-by-year snapshot of its chosen energy portfolio (Portfolio F)—the purchases leading up to which include solar, wind, battery storage, market purchases, and demand-side management—through 2038;[63]
- PacificCorp, in their 2023 IRP, publishes exact schedules for the retirement of coal and gas plans for their prospective resource mix from 2023 to 2052;[64]

TVA's failure to make firm recommendations on capacity addition and retirement limits the degree to which its IRPs can be treated as reliable indicators of TVA's future plans or metrics against which to compare TVA's past investments. For example, the 2019 IRP does not select portfolios constructed from the "Current Outlook" scenario, undermining evaluations of whether TVA is actually achieving a least-cost portfolio or aiming to achieve decarbonization goals. This lack of firm recommendations also limits the IRP's ability to function as a planning tool, as the capacity ranges proposed by TVA have been large—leaving open a broad set of plausible capacity additions or retirements. It may also result in ad hoc decision-making as TVA has no other benchmark for capacity additions beyond large ranges that can accommodate numerous conflicting possibilities, strategic investments (or lack thereof), and costs. There is little investigation of the feasibility of different capacity additions, nor of "all resource RFPs" that might solicit resources to meet TVA's target ranges. TVA also omits detailed timelines for the planned addition or retirement of resources, noting only that the ranges of additions and retirements should be met within five or ten years of the publication of the IRP.

IV. Comparing TVA's planning process to its evolving resource mix

TVA's additions and retirements planning ranges provide an overview of TVA's priorities over the last decade, in particular the extent to which TVA has shifted from coal- to gas-based generation. This section compares TVA's actual additions and retirements between 2011 and 2021 to the plans outlined in its 2011, 2015, and 2019 IRPs. The IRPs failed to:

- anticipate the size of coal retirements;
- limit the planned or actual growth of gas capacity; and
- plan adequately for a decarbonized gas system following 2019.

TVA's actual capacity additions and retirements can be calculated by subtracting its latest available

[63] NIPSCO. 2018. *Northern Indiana Public Service Company LLC Integrated Resource Plan.* Available at: https://www.nipsco.com/docs/librariesprovider11/rates-and-tariffs/irp/2018-nipsco-irp.pdf?sfvrsn=15. p. 172
[64] PacifiCorp. 2023. *2023 Integrated Resource Plan: Volume I.* Available at: https://www.pacificorp.com/content/dam/pcorp/documents/en/pacificorp/energy/integrated-resource-plan/2023-irp/2023_IRP_Volume_I.pdf. p. 146-147.

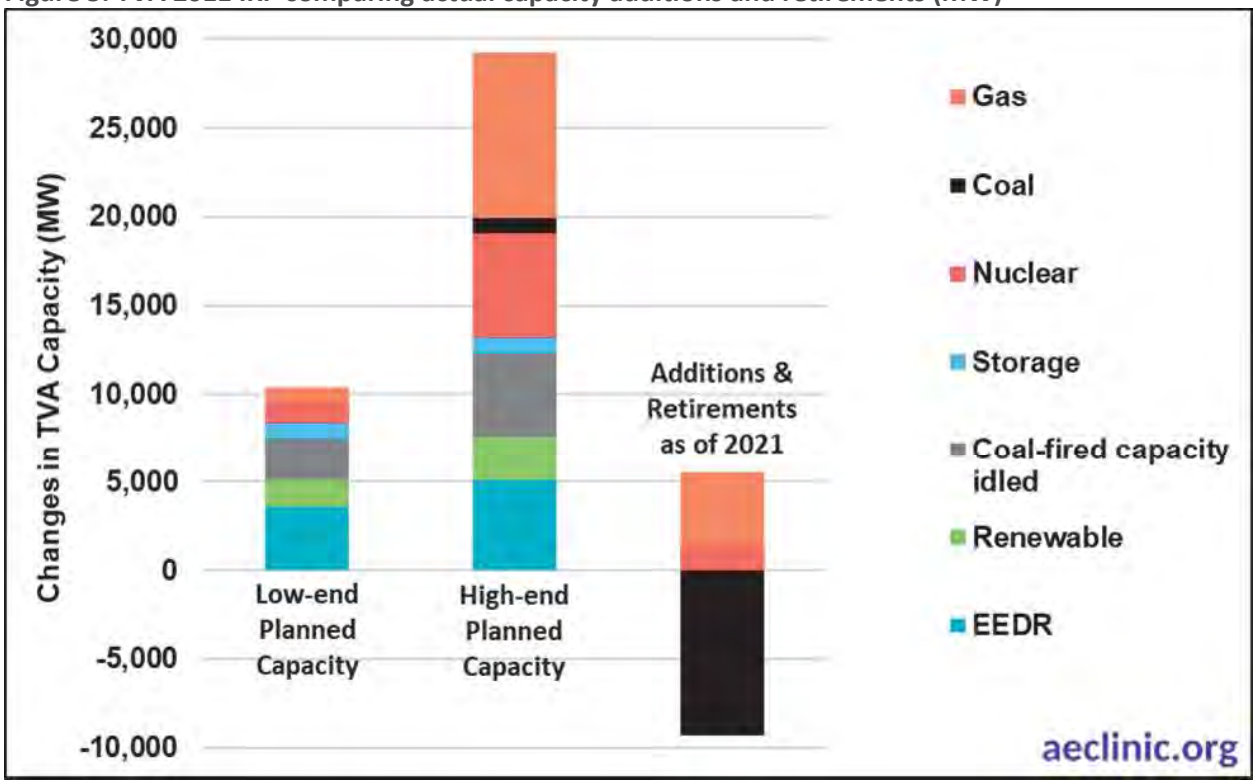
capacity data (2021) from the TVA capacity additions or retirements planned in the year the IRP was published (2011, 2015, or 2019). For example, TVA's gas capacity increased from 9,607 MW to 13,786 MW—resulting in an actual capacity additions of 4,178 MW. Comparing the actual capacity additions and retirements to their planned values can illustrate the extent of TVA's commitment to previous plans and the quality of assumptions or other aspects of the planning process. However more specific statements about their commitments to a particular strategy are precluded by TVA's lack of portfolio selection and opaque methods.

TVA publishes both short- (ten-year) and long-term (20-year) planning ranges in each of its IRPs (see Figure 5 through Figure 7). These planning ranges denote the amount of resource capacity TVA expects to add, idle, or retire by a given target year.

TVA's 2011 IRP failed to plan for coal retirements

Unlike later IRPs, the 2011 IRP planned for no coal retirements whatsoever; 2,400 MW to 4,700 MW of TVA's total 17,407 MW of coal capacity was planned to be idled through 2033 (see Figure 5). By 2021, TVA had already retired 9,327 MW of coal since 2011. TVA's additions (through 2021) of gas and nuclear are still within the 2011 IRP planned range: TVA has already added 4,178 MW of gas, 44 percent of the 2011 IRP's high-end goal for gas additions by 2029; and 1,343 MW of nuclear, 167 percent of the high-end goal for the period 2012-2029. The IRP did not anticipate the coal retirements that would occur in the coming decade and did not plan its other capacity additions accordingly. In fact, its high-end planning allows for a 900 MW addition of coal capacity. A full accounting of the reasons for TVA's failure to anticipate coal retirements would require further analysis, but the failure itself is indicative of a planning process with inaccurate load projections and/or mistaken core inputs or assumptions regarding coal's feasibility, cost, or environmental effects.

Figure 5. TVA 2011 IRP comparing actual capacity additions and retirements (MW)

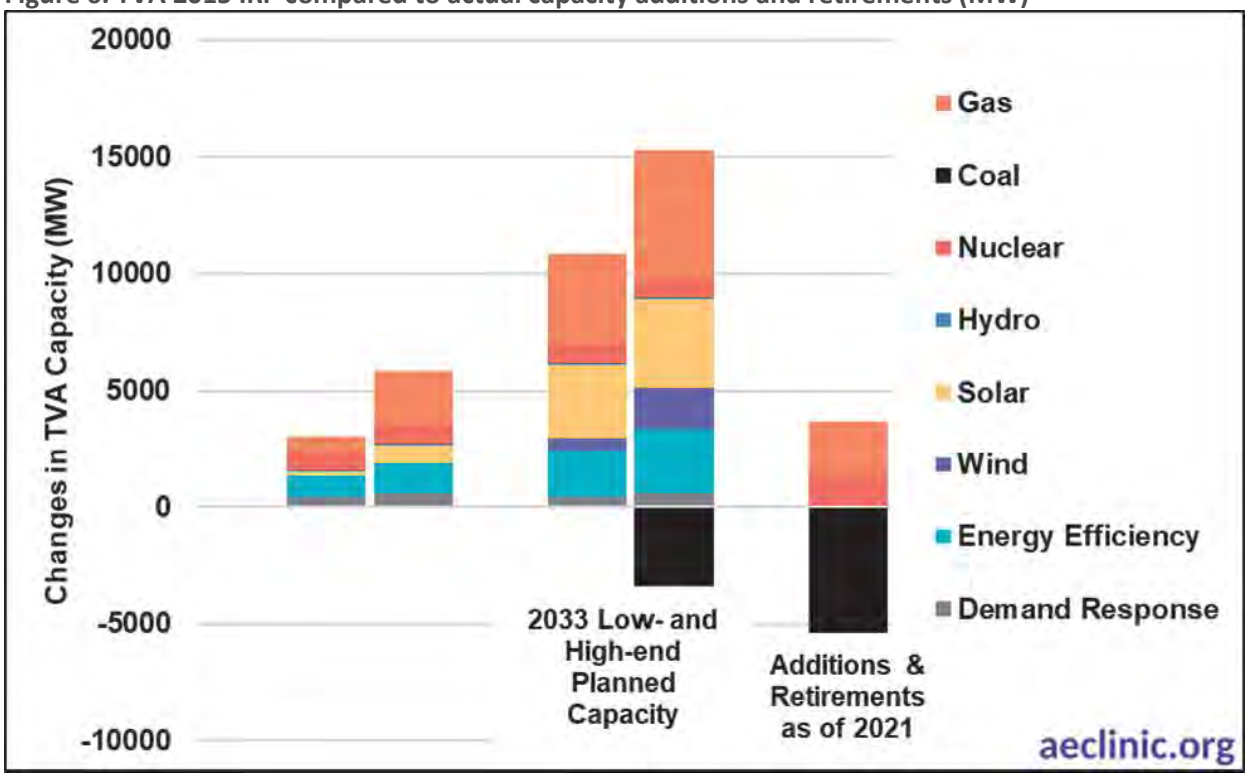


Note: Renewable capacity additions are not included in this graph due to a lack of available data on operating renewable capacity prior to 2018. High-end and low-end planned capacity are the maximum and minimums respectively for the resource planning ranges TVA proposes in its 2011 IRP. Finally, there are no specific timeframes for low-end and high-end planned capacity displayed in this figure because TVA assigns different timeframes to each resource (see Table 2).
Source: 1) TVA. 2011. Integrated Resource Plan: TVA's Environmental & Energy Future. Available at: https://www.nrc.gov/docs/ML1217/ML12171A189.pdf; 2) US EIA. September 22, 2022. Form EIA-923 detailed data with previous form data (EIA-906/920). Available at: https://www.eia.gov/electricity/data/eia923/.

TVA's 2015 IRP: expanding gas and nuclear

TVA' 2015 IRP planned for larger and more explicit commitments to specific renewables, such as wind and solar, and a firmer commitment to coal retirements (rather than idling coal capacity) (see Figure 6). TVA's coal retirements (2,331 MW since 2015) continued to greatly outpace its high-end predictions for both 2023 and 2033 in the 2015 IRP. Gas capacity additions by 2021 outpace the high end planned capacity additions through 2023 (2,331 MW of added gas capacity compared to no planned additions for 2023). The nuclear capacity added since 2015 exceeds the high end of planned capacity through 2023 and 2033 (both 800 MW). Once again, TVA underestimated the scale of subsequent coal retirements. Finally, while TVA does show expanded ranges for solar and wind capacity (previously combining them as "renewable" capacity in the 2011 IRP), the Authority provides insufficient data to assess the degree to which TVA's capacity fell within these planning ranges (see Table 1 for the data that are available via TVA's filings with the Securities and Exchange Commission (SEC)).

Figure 6. TVA 2015 IRP compared to actual capacity additions and retirements (MW)



Note: Gas in this figure is inclusive of both combustion turbine and combined cycle units. Data on renewable capacity additions are not included in this graph due to a lack of available data on operating renewable capacity prior to 2018. Planned capacity for 2033 is cumulative (i.e. includes the bars for 2023).
Source: 1) TVA. Integrated Resource Plan: 2015 Final Report. Available at: https://tva-azr-eastus-cdn-ep-tvawcm-prd.azureedge.net/cdn-tvawcma/docs/default-source/default-document-library/site-content/environment/environmental-stewardship/irp/documents/2015_irp.pdf?sfvrsn=4892374_0.; 2) US EIA. September 22, 2022. Form EIA-923 detailed data with previous form data (EIA-906/920). Available at: https://www.eia.gov/electricity/data/eia923/.

TVA's 2019 IRP: A defunct IRP

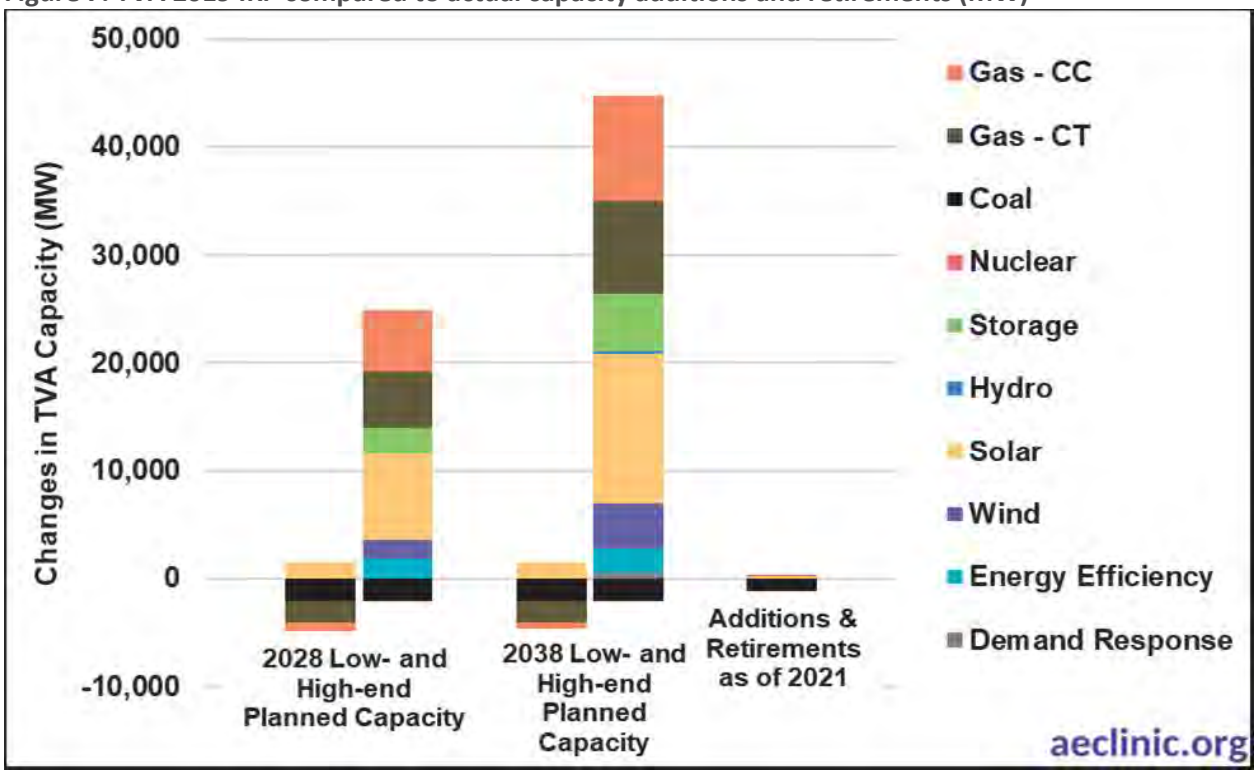
TVA's 2019 IRP plans for an acceleration of gas and solar capacity additions relative to the 2015 and 2011 IRPs (see Figure 7). As only two years passed between 2019 and the latest year of available capacity data from EIA, there is little to compare between actual and planned capacity changes. TVA has already retired 1,150 MW of coal—it planned to retire 2,100 MW at most by 2038—only promising to "evaluate" additional retirements of up to 2,200.[65] TVA also greatly expanded the scale of its gas planning ranges. The high-end planned capacity for 2028 and 2038 respectively is -2,000 to 8,600 for combustion turbines and -800 to 9,800 MW for combined cycle plants, together more than triple the high-end planned capacity for gas set in the 2015 IRP (2,300 MW for 2023 and 5,500 MW for 2033). TVA added 275.7 MW of solar capacity between 2018 and 2021, and another 150 MW by 2022—all of which was acquired through power

[65] TVA. *2019 Integrated Resource Plan Volume I – Final Resource Plan*. Available at: https://www.tva.com/environment/environmental-stewardship/integrated-resource-plan. p. ES-4.

purchase contracts.[66] TVA has not added new owned- or purchased-wind capacity.[67] There is no schedule or chart tracking prospective gas additions, making it infeasible to assess the viability of gas additions at this scale (TVA has announced a number of specific gas additions since the IRP that can be used for comparison such as Kingston[68] and Cheatham[69].)

Finally, the 2021 announcement of TVA's net zero goal by 2050 renders the 2019 IRP defunct. Further, TVA cannot meet its obligations under the Paris Agreement or Federal executive orders based on this plan, due to the scale of planned gas additions.

Figure 7. TVA 2019 IRP compared to actual capacity additions and retirements (MW)



Note: Planned capacity for 2038 encompasses planned capacity for 2028.
Source: 1) TVA. 2019 Integrated Resource Plan Volume I – Final Resource Plan. Available at: https://www.tva.com/environment/environmental-stewardship/integrated-resource-plan..; 2) US EIA. September 22, 2022. Form EIA-923 detailed data with previous form data (EIA-906/920). Available at: https://www.eia.gov/electricity/data/eia923/.

Takeaways from the IRPs

Based on the assessment of TVA's planning process and the comparison of additions and retirements for

[66] SELC calculations using: TVA. "SEC Filings." Available at: https://tva.q4ir.com/financial-information/sec-filings/default.aspx.
[67] Ibid.
[68] TVA. 2023. "Kingston Fossil Plant Retirement." Available at: https://www.tva.com/environment/environmental-stewardship/environmental-reviews/nepa-detail/kingston-fossil-plant-retirement.
[69] TVA. 2023. "Cheatham County Generation Site." Available at: https://www.tva.com/environment/environmental-stewardship/environmental-reviews/nepa-detail/cheatham-county-generation-site.

each respective IRP:

1. TVA does not plan to halt the increase in gas capacity over the previous decade—its combined cycle and combustion turbine gas additions are larger than its solar and wind additions *combined* (up to 18,400 new gas proposed versus 1,500 MW to 14,000 MW of proposed wind and solar).
2. TVA's capacity planning ranges are of limited use in understanding its planning intentions. There are no prospective schedules for additions or retirements and the planning ranges are too large to draw useful conclusions regarding what would constitute success or failure of the planning exercise.
3. TVA does not publish or provide data on renewable capacity for the years 2011 to 2021 consistently across different data sources including U.S. EIA data, TVA's own publications, and data from the SEC.

V. TVA's 2019 IRP: A Case Study on the Cumberland Retirements

TVA's most recent IRP provides an opportunity for a more detailed assessment of planning methods and a comparison with related planning documents published in or after 2019: Cumberland Fossil Plant Environmental Impact Statement (EIS)—and its related system cost analysis—and a Concentric Energy Advisors review of recent studies critical of TVA planning.[70] A close examination of the Cumberland EIS and the Concentric Report indicates that:

1. The Cumberland EIS utilizes IRP results in a way that leads to incorrect conclusions;
2. TVA's individual resource (or site-specific) assessment methods (as exemplified by the Cumberland EIS) differ significantly in their assessments of viable capacity additions and retirements from the integrated methodology used in the Authority's IRP; and
3. Stakeholder processes make IRPs better, but the TVA process is not currently structured to facilitate effective stakeholder input.

TVA needs a new, up-to-date IRP, with a thorough stakeholder process to include the broadest set of ideas and solutions in an effort to keep ratepayer costs low while meeting TVA's and the nation's climate,

[70] 1) TVA. *2019 Integrated Resource Plan Volume I – Final Resource Plan*. Available at: https://tva-azr-eastus-cdn-ep-tvawcm-prd.azureedge.net/cdn-tvawcma/docs/default-source/default-document-library/site-content/environment/environmental-stewardship/irp/2019-documents/tva-2019-integrated-resource-plan-volume-i-final-resource-plan.pdf?sfvrsn=44251e0a_4; 2) TVA. 2022. *Cumberland Fossil Plant Retirement. Final Environmental Impact Statement.* Available at: https://tva-azr-eastus-cdn-ep-tvawcm-prd.azureedge.net/cdn-tvawcma/docs/default-source/environment/cumberland-fossil-plant-retirement-final-eis4eeac6f0-b6bf-4843-9881-75d19ccf8ede.pdf?sfvrsn=d61f6b6f_7; 3) Concentric Energy Advisers. 2022. "Assessment of the Draft Environmental Impact Study and Response to Certain Reports." In *Cumberland Fossil Plant Retirement Final Environmental Impact Statement.* Available at: https://tva-azr-eastus-cdn-ep-tvawcm-prd.azureedge.net/cdn-tvawcma/docs/default-source/environment/cumberland-fossil-plant-retirement-final-eis4eeac6f0-b6bf-4843-9881-75d19ccf8ede.pdf?sfvrsn=d61f6b6f_7

environmental and economic development standards.

The Cumberland 1 and 2 retirements are not modeled in TVA's 2019 IRP.

Since its last IRP in 2019, TVA has put forth other plans that substantively disagree with the IRP's recommended planning ranges. TVA 2019 IRP calls for retirement of the Paradise 3 coal unit (1,150 MW nameplate capacity) in 2020 and Bull Run coal unit (950 MW) in 2023, and plans to "evaluate retirements of up to 2,200 MW of additional coal capacity if cost-effective."[71] TVA's Cumberland Fossil Plant Retirement plan, however, proposes additional coal unit retirements beyond the 2019 IRP plans: retiring an additional 1,300 MW by 2026 and another 1,300 MW by 2028. The Cumberland EIS also recommends a complete retirement of all TVA coal units: 9 units (1,700 MW) at Kingston in 2027, 4 units (1,255 MW) at Gallatin in 2031, and 9 units (1,575 MW) at Shawnee in 2033 (see Figure 8). The latter two retirements represent significant departures from the IRP that impact on major resource decisions not contemplated in the IRP. The additional 2,200 MW of retirements that TVA stated it would evaluate is still less than what is proposed in the Cumberland Fossil Retirement Plan, and also less than the full retirement of all TVA coal units. Cumberland EIS planning circumvents the requirements of the IRP, including stakeholder engagement—indicating that the IRP could have been more aggressive in planning for coal retirements.

Figure 8. TVA coal fleet end-of-life evaluation (retirement dates)

Source: Cumberland EIS Appendix B p.3

TVA incorrectly claims that the Cumberland Unit 1 retirement and replacement (or "Proposed Action Alternatives") is consistent with its IRP:

> *TVA's Proposed Action Alternatives align with the 2019 IRP near-term actions to evaluate engineering end-of-life dates for aging generation units to inform long-term planning and to enhance system flexibility to integrate renewables and distributed resources…The Preferred Alternative replaces coal-fired generation, consistent with the target supply mix adopted in the 2019 IRP and the Coal End-of-Life Evaluation for the aging coal fleet, and meets the purpose and need of the proposed action to have the replacement generation operating by 2026.*[72]

[71] TVA. *2019 Integrated Resource Plan Volume I – Final Resource Plan*. Available at: https://tva-azr-eastus-cdn-ep-tvawcm-prd.azureedge.net/cdn-tvawcma/docs/default-source/default-document-library/site-content/environment/environmental-stewardship/irp/2019-documents/tva-2019-integrated-resource-plan-volume-i-final-resource-plan.pdf?sfvrsn=44251e0a_4. p.ES-4.

[72] TVA. 2022. *Cumberland Fossil Plant Retirement. Final Environmental Impact Statement.* Available at: https://tva-azr-eastus-cdn-ep-tvawcm-prd.azureedge.net/cdn-tvawcma/docs/default-source/environment/cumberland-fossil-

> *The decision associated with this EIS is a specific, discrete component of TVA's blended Asset Strategy and consistent with the recommended target power supply mix in the 2019 IRP.*[73]

In fact, none of the 30 scenario-strategy combinations in the IRP anticipate additional coal retirements (beyond Paradise 3 and Bull Run) earlier than 2032 (although the model was permitted to select earlier retirements if found to be cost effective[74]). In contrast, TVA's Cumberland EIS makes a clear and compelling case for accelerating TVA coal plant retirements, citing the age and deterioration of TVA's fleet:

> *Following the completion of the Tennessee Valley Authority (TVA) 2019 Integrated Resource Plan (IRP), TVA began conducting end-of-life evaluations of its operating coalfired generating plants not already scheduled for retirement to inform long-term planning. This evaluation confirmed that the aging TVA coal fleet is among the oldest in the nation and is experiencing deterioration of material condition and performance challenges. The performance challenges are projected to increase because of the coal fleet's advancing age and the difficulty of adapting the fleet's generation within the changing generation profile. The continued long-term operation of some of TVA coal plants, including the Cumberland Fossil Plant (CUF), is contributing to environmental, economic, and reliability risks.*[75]

TVA's 2019 IRP does not anticipate a need to retire aging coal plants and therefore cannot provide a useful reference in making critical resource decisions.

The system planning presented in the 2019 IRP does not anticipate this need. This is a critical planning issue for TVA. An IRP that fails to consider a need to retire old and deteriorating coal plants—some of which are over 60 or more years old—cannot act as a useful reference in TVA's critical resource decisions. New IRP planning is essential given TVA's transformative resource retirement plan presented in the 2022 Cumberland EIS.

It is because of this divergence from TVA's most recent IRP that TVA and Concentric refer to new solar, storage and energy efficiency resources proposed as replacements for Cumberland as "additional" to the amounts already planned in the IRP (and not as part of the IRP's range of planned resource):

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plant-retirement-final-eis4eeac6f0-b6bf-4843-9881-75d19ccf8ede.pdf?sfvrsn=d61f6b6f_7. p.iii,v

[73] TVA. 2022. "Appendix B: TVA Alternatives Evaluation." In Cumberland Fossil Plant Retirement: *Final Environmental Impact Statement*. p.22

[74] TVA. *2019 Integrated Resource Plan Volume I – Final Resource Plan*. Available at: https://tva-azr-eastus-cdn-ep-tvawcm-prd.azureedge.net/cdn-tvawcma/docs/default-source/default-document-library/site-content/environment/environmental-stewardship/irp/2019-documents/tva-2019-integrated-resource-plan-volume-i-final-resource-plan.pdf?sfvrsn=44251e0a_4. p.5-7.

[75] TVA. 2022. *Cumberland Fossil Plant Retirement. Final Environmental Impact Statement.* Available at: https://tva-azr-eastus-cdn-ep-tvawcm-prd.azureedge.net/cdn-tvawcma/docs/default-source/environment/cumberland-fossil-plant-retirement-final-eis4eeac6f0-b6bf-4843-9881-75d19ccf8ede.pdf?sfvrsn=d61f6b6f_7. p.iii

> *Solar additions tied to a replacement of the first CUF unit would need to be in addition to the 10,000 MW already included in TVA's base plans… Analysis indicated a need for 3,000 MW of additional solar to replace the annual energy of the first CUF unit, on top of the 10,000 MW of solar already included in the base plan.*[76]
>
> *The 2019 IRP range includes battery storage up to 2,400 MW by 2028 and up to 5,300 MW by 2038 (depending on technology costs, performance, and load growth). The Grid Strategies report characterizes batteries as a resource akin to a baseload generating resource capable of providing baseload energy and capacity across a majority of hours, while the Synapse report adds 32,000 MW of battery storage plus nearly 30,000 MW of solar in the Solar/Storage Replacement scenario.*[77]
>
> *Moreover, the amount of savings available at those cost levels in TVA's 2019 IRP was constrained to reflect adoption limitations with the underlying delivery strategies and incentive levels. This point was entirely ignored by the Grid Strategies report, which referenced the same source as the Synapse report to support the assertion that more energy efficiency savings were readily available.*[78]

TVA understates the potential for solar and storage resources in its 2019 IRP—to the extent that subsequent reports highlight the need for solar and storage additions well beyond the IRP's highest proposals for the same periods. If Cumberland retirement and replacement was within the (broad) parameters of the IRP, then the new resources proposed in the Cumberland Alternatives would be among the gas, solar and storage additions proposed within the IRP. In addition to -2,800 to 10,900 MW of new gas (combined cycle and combustion turbine) generation by 2028, the TVA 2019 IRP calls for:[79]

- 1,500 to 8,000 MW of new solar by 2028,
- From 0 to 2,400 MW of new storage by 2028, and
- Energy efficiency savings from 0 to 1,800 MW by 2028.

TVA and Concentric describe alternatives proposed to replace Cumberland as "in addition" to those planned amounts. TVA argues that Cumberland 1 can be replaced with 3,000 MW of new solar and 1,700 MW of new batteries[80]; the same amounts would be needed to replace the second unit. (TVA has not

[76] TVA. 2022. "Appendix B: TVA Alternatives Evaluation." In Cumberland Fossil Plant Retirement: *Final Environmental Impact Statement*. p.13, 14.
[77] TVA. 2022. "Appendix Q – Concentric Report – Response to Synapse and Goggin Reports." In *Final Environmental Impact Statement*. p.12.
[78] Cumberland EIS Appendix Q p.11
[79] TVA. *2019 Integrated Resource Plan Volume I – Final Resource Plan*. Available at: https://tva-azr-eastus-cdn-ep-tvawcm-prd.azureedge.net/cdn-tvawcma/docs/default-source/default-document-library/site-content/environment/environmental-stewardship/irp/2019-documents/tva-2019-integrated-resource-plan-volume-i-final-resource-plan.pdf?sfvrsn=44251e0a_4. p. 9-3 – 9-4.
[80] TVA. 2022. *Cumberland Fossil Plant Retirement. Final Environmental Impact Statement.* Available at: https://tva-azr-eastus-cdn-ep-tvawcm-prd.azureedge.net/cdn-tvawcma/docs/default-source/environment/cumberland-fossil-plant-retirement-final-eis4eeac6f0-b6bf-4843-9881-75d19ccf8ede.pdf?sfvrsn=d61f6b6f_7. p.53

presented modeling of the replacement of the second unit by any alternative.[81])

Together Cumberland 1 and 2 are 32 percent of TVA's coal capacity and 7 percent of its total capacity: Cumberland's 2026-2028 retirement is not a small change for TVA.[82] This major divergence from TVA's already three-year old 2019 IRP, should have been presented as a new IRP or (equivalently) with full reporting of modeling assumptions, methods, and results, updated to current-year knowledge and expectations, and made fully available for stakeholders and their third-party experts to review. Instead, new IRP-type modeling results that include the unplanned 2023 and 2026 Cumberland retirements were presented in an Appendix to the EIS as a 23-page PowerPoint slide deck, without a full reporting of modeling assumptions, methods, and results.[83]

TVA's modeling assumptions include numerous questionable choices and out-of-date values.

TVA incorrectly assumes that wind generation cannot be part of a viable replacement for Cumberland. The TVA 2019 IRP calls for sunsetting of existing wind contracts and no additional wind investments in the 20-year planning period, outside of an exploration of the sensitivity of modeling results to reductions in TVA's forecasted wind capital costs.[84] Alternatives A, B, and C do not include wind: "Not selected due to low wind speeds in Tennessee Valley and higher transmission costs for out-of-Valley wind, both of which increase relative costs. Wind can provide dependable capacity in both summer and winter, though intermittent."[85]

Concentric's assessment of the draft Cumberland EIS explains that TVA's wind capital cost assumption of $1,807 per kilowatt (kW) is higher than other recent estimates because it includes interconnection costs.[86] NREL's 2022 ATB resource costs, which also include interconnection costs[87], price new wind at $1,462 per

[81] TVA. 2022. *Cumberland Fossil Plant Retirement. Final Environmental Impact Statement.* Available at: https://tva-azr-eastus-cdn-ep-tvawcm-prd.azureedge.net/cdn-tvawcma/docs/default-source/environment/cumberland-fossil-plant-retirement-final-eis4eeac6f0-b6bf-4843-9881-75d19ccf8ede.pdf?sfvrsn=d61f6b6f_7. p.22; TVA. 2022. "Appendix B: TVA Alternatives Evaluation." In Cumberland Fossil Plant Retirement: *Final Environmental Impact Statement*. p.8

[82] TVA's nameplate coal capacity was 8,080 MW and total generation capacity was 35,866 MW as of 2021 Form EIA-860. Cumberland 1 and 2 are each 1,300 MW.

[83] TVA. 2022. "Appendix B: TVA Alternatives Evaluation." In Cumberland Fossil Plant Retirement: *Final Environmental Impact Statement*.

[84] TVA. *2019 Integrated Resource Plan Volume I – Final Resource Plan*. Available at: https://tva-azr-eastus-cdn-ep-tvawcm-prd.azureedge.net/cdn-tvawcma/docs/default-source/default-document-library/site-content/environment/environmental-stewardship/irp/2019-documents/tva-2019-integrated-resource-plan-volume-i-final-resource-plan.pdf?sfvrsn=44251e0a_4. p.ES-4 and ES-11

[85] TVA. 2022. "Appendix B: TVA Alternatives Evaluation." In Cumberland Fossil Plant Retirement: *Final Environmental Impact Statement*. p.15

[86] TVA. 2022. "Appendix Q – Concentric Report – Response to Synapse and Goggin Reports." In *Final Environmental Impact Statement*. p.8

[87] See https://atb.nrel.gov/electricity/2022/definitions#capex.

kW;[88] Concentric and the TVA 2019 IRP both cite NREL's 2019 ATB costs.[89] NREL's latest wind cost estimates—including interconnection costs—represents a 19 percent decrease from the costs used in TVA modeling. Based on these lower costs, updating assumptions in TVA's modeling has the potential to result in a recommendation for investment in new wind resources.

TVA wrongly assumes that energy efficiency cannot be part of a viable replacement for Cumberland. Alternatives A, B, and C do not include energy efficiency: "Dismissed as EE programs take time to scale and market, while also facing increasing costs for higher depth and penetration levels. EE is well-positioned to help TVA absorb load growth resulting from increased electrification of the economy in the future."[90] Concentric argues that additional energy efficiency savings—beyond the 1,800 MW by 2028 and 2,200 MW by 2038 planned for in TVA's 2019 IRP—are "overly optimistic"[91] Concentric disagrees with alternative modeling showing substantial energy savings at a low cost by 1) rejecting analysis that assumes that upfront efficiency costs can be financed over their lifetime (rather than paid in a lump sum up front), and 2) by criticizing higher cost efficiency investments allocated by other utilities to disadvantaged communities.

U.S. Energy Information Administration (EIA) data (self-reported by utilities) on energy efficiency savings reports 4.0 MW of incremental savings for TVA in 2019, 3.4 MW in 2020 and 1.7 MW in 2021.[92] TVA's slow progress towards meeting its 1,800 MW by 2028 and 2,200 MW by 2038 energy efficiency goals suggest a lot of potential still available for new and low-cost savings measures.

TVA implausibly assumes that demand response cannot be part of a viable replacement for Cumberland. TVA 2019 IRP's range of resource plans includes 0 to 500 MW of demand response (not counting expiring or retiring capacity) by 2028[93] and calls for a "short term action" market potential study for energy efficiency and demand response (which has not yet been completed three years after the publication of the IRP[94]). Cumberland Alternatives A, B, and C do not include demand response: "Dismissed as they are limited in the number of calls available and do not provide reliable firm, dispatchable power. DR can help TVA absorb load growth resulting from increased electrification of the economy and allow TVA to offset

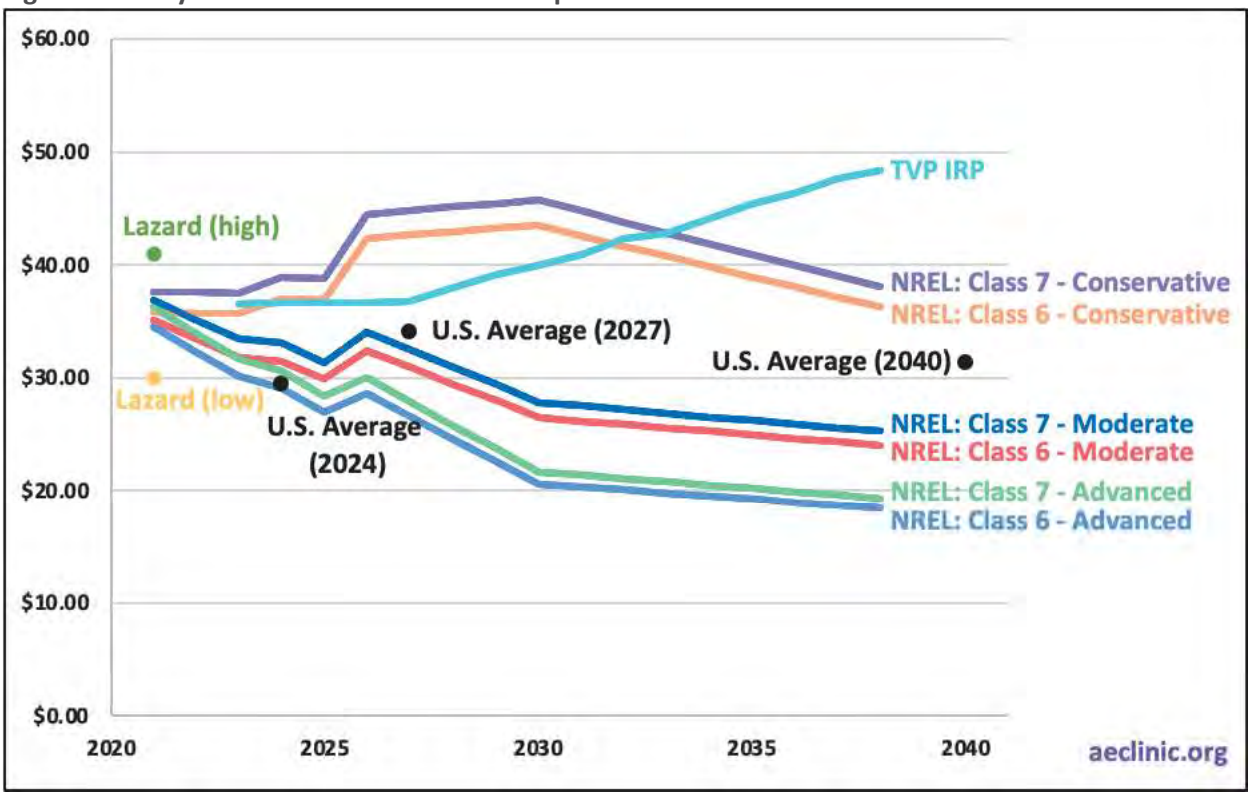
[88] NREL. "2022 Electricity ATB Technologies and Data Overview." Available at: https://atb.nrel.gov/electricity/2022/index.
[89] TVA. 2022. "Appendix Q – Concentric Report – Response to Synapse and Goggin Reports." In *Final Environmental Impact Statement*. p.8
[90] TVA. 2022. "Appendix B: TVA Alternatives Evaluation." In Cumberland Fossil Plant Retirement: *Final Environmental Impact Statement*. p.15
[91] TVA. 2022. "Appendix Q – Concentric Report – Response to Synapse and Goggin Reports." In *Final Environmental Impact Statement*. p. 8-11
[92] U.S. EIA. 2022. *Annual Electric Power Industry Report, Form EIA-861 detailed data files.* Available at: https://www.eia.gov/electricity/data/eia861/.
[93] TVA. *2019 Integrated Resource Plan Volume I – Final Resource Plan*. Available at: https://tva-azr-eastus-cdn-ep-tvawcm-prd.azureedge.net/cdn-tvawcma/docs/default-source/default-document-library/site-content/environment/environmental-stewardship/irp/2019-documents/tva-2019-integrated-resource-plan-volume-i-final-resource-plan.pdf?sfvrsn=44251e0a_4. p.ES-4
[94] TVA. 2022. "Appendix Q – Concentric Report – Response to Synapse and Goggin Reports." In *Final Environmental Impact Statement*. p.12

physical capacity needs."[95]

TVA improperly finds new gas generation to be more cost effective than renewables. TVA's modeling[96] concludes that system costs with the addition of a 1,450 MW gas combined cycle generator are $1.83 billion (20-year net present value (NPV)) lower than the addition of 3,000 MW solar and 1,700 MW storage—an added cost found by TVA to be 10 times greater than the cost of retirement without replacement. TVA's 20-year NPV system costs in the 2019 IRP range from $100 to 125 billion; but the financial analysis provided with the Cumberland EIS does not report several key data points essential to an effective third-party review: the added system cost of the gas combined cycle Alternative A, assumed gas prices and other commodity prices, and new resource costs.

TVA wrongly assumes that solar cannot be part of a viable replacement for Cumberland. The TVA 2019 IRP assumes solar levelized costs of energy to be $36.49 in 2023 rising to $48.40 in 2038, values that are substantially higher than other industry projections, particular in later years when TVA's solar cost assumptions exceed all common industry estimates (see Figure 9).

Figure 9. Utility-scale solar levelized cost comparison



Note. Class 6 and 7 resources refer to the NREL Annual Technology Baseline's solar resource classes, which vary based on the

[95] TVA. 2022. "Appendix B: TVA Alternatives Evaluation." In Cumberland Fossil Plant Retirement: *Final Environmental Impact Statement*. p.15

[96] TVA. 2022. *Cumberland Fossil Plant Retirement. Final Environmental Impact Statement.* Available at: https://tva-azr-eastus-cdn-ep-tvawcm-prd.azureedge.net/cdn-tvawcma/docs/default-source/environment/cumberland-fossil-plant-retirement-final-eis4eeac6f0-b6bf-4843-9881-75d19ccf8ede.pdf?sfvrsn=d61f6b6f_7. p. 80.

irradiance of the solar resource. Class 6 resources experience global horizontal irradiance of between 4.5 – 4.75 kWh/m²/day. Class 7 resources experience 4.25 – 4.5 kWh/m²/day.
Source: 1) TVA. 2019.TVA 2019 IRP. Figure 8-14 Wind and Solar Cost Comparison. p.8-14. Data extracted with WebPlotDigitizer; 2) LAZARD. 2021. Levelized Cost of Energy Analysis – Version 15.0. Available at: https://www.lazard.com/media/451881/lazards-levelized-cost-of-energy-version-150-vf.pdf. p. 2; 3) NREL. 2022. Annual Technology Baseline (ATB). Available at: https://atb.nrel.gov/electricity/2022/data; 4) NREL. "Utility-Scale PV." Available at: https://atb.nrel.gov/electricity/2022/utility-scale_pv; 5) U.S. EIA. 2022. "Levelized Costs of New Generation Resources in the Annual Energy Outlook 2022." Available at: https://www.eia.gov/outlooks/aeo/pdf/electricity_generation.pdf. p. 4.

U.S. EIA data report no growth in Tennessee utility-owned solar generation in 2019, 2020, or 2021 (solar capacity remained constant at 1.6 MW, with ownership by Nashville Electric Service). Total utility-scale solar located in Tennessee rose from 181 MW in 2018 up to 194 MW in 2021, none of which reported TVA ownership.[97] TVA has sharply increased its purchased solar power since 2018, indicating that it has much more room to add solar within its 2019 planning ranges. TVA added 425.7 MW of solar—entirely through power purchase contracts—between 2018 and 2022.[98] The TVA 2019 IRP proposes 1,500 to 8,000 MW of solar additions by 2028 and up to 14,000 MW by 2038.[99]

TVA without adequate evidence assumes that storage cannot be part of a viable replacement for Cumberland. TVA's assumed battery storage costs rely on its in-house estimation of uncertainty in future battery operation and on the assumption that existing battery cost projections are vulnerable to unexpected increases in fixed operations and maintenance. While it may be that this impactful choice can be substantiated, TVA has not provided sufficient evidence to demonstrate the reasonableness of the assumption.

It is also important to note that TVA's IRP and the Cumberland EIS plan take only 4-hour batteries into consideration, excluding the 8-hour and 10-hour batteries that are expected to form part of a needed suite of flexible, dispatchable peak resources within TVA's planning period. For instance, C Power procured two 8-hour lithium-ion battery systems in early 2022 to provide peak energy in California.[100]

The TVA 2019 IRP plans for 2,400 MW battery storage by 2028 and up to 5,300 MW by 2038.[101] Concentric compares additional storage in the Cumberland Alternative C to U.S. current-day installed battery resources:

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[97] U.S. EIA. 2022. *Annual Electric Power Industry Report, Form EIA-861 detailed data files.* Available at: https://www.eia.gov/electricity/data/eia861/.
[98] *SELC calculations using: TVA. "SEC Filings." Available at: https://tva.q4ir.com/financial-information/sec-filings/default.aspx*.
[99] TVA. *2019 Integrated Resource Plan Volume I – Final Resource Plan*. Available at: https://tva-azr-eastus-cdn-ep-tvawcm-prd.azureedge.net/cdn-tvawcma/docs/default-source/default-document-library/site-content/environment/environmental-stewardship/irp/2019-documents/tva-2019-integrated-resource-plan-volume-i-final-resource-plan.pdf?sfvrsn=44251e0a_4. p.ES-4
[100] Colthorpe, Andy. March 8, 2022. "Second eight-hour lithium-ion battery system picked in California long-duration storage procurement." *Energy Storage News.* Available at: https://www.energy-storage.news/second-eight-hour-lithium-ion-battery-system-picked-in-california-long-duration-storage-procurement/
[101] TVA. *2019 Integrated Resource Plan Volume I – Final Resource Plan*. Available at: https://tva-azr-eastus-cdn-ep-tvawcm-prd.azureedge.net/cdn-tvawcma/docs/default-source/default-document-library/site-content/environment/environmental-stewardship/irp/2019-documents/tva-2019-integrated-resource-plan-volume-i-final-resource-plan.pdf?sfvrsn=44251e0a_4. p.ES-4

> *In 2019, the U.S. Energy Information Administration indicated there was a total combined battery storage capacity of about 1,000 MW which grew to 1,500 in 2020 and then to over 4,500 in 2021. As part of Alternative C, adding 1,700 MW of storage by 2026 for the CUF retirement would result in TVA adding, owning, and operating more battery storage capacity over the next 4 years than the entire United States had in 2020. (Cumberland EIS Appendix Q p.15)*

This comparison of planned U.S. storage capacity in 2026 to existing capacity in 2021 muddies an important concern in electric resource planning and obscures the real potential to deploy cost effective peaking resources to TVA customers' benefit. Far from the 4,500 MW battery storage in operation in the United States in 2021, U.S. EIA's 2022 expectation for 2025 battery storage capacity is 30,000 MW;[102] a recent Bloomberg energy news report forecasts U.S. battery capacity of 50,000 MW in 2025 and 110,000 MW in 2030.[103] An additional 1,700 MW of storage as proposed in Alternative C would be an important part of that U.S. total, but it would in no way dwarf nationwide storage capacity as suggested by Concentric.

TVA's Cumberland replacement cost comparison appears to omit carbon prices. The TVA 2019 IRP assumes a $0 carbon price in its Current Outlook, Economic Downturn, Rapid DER Adoption and No Nuclear Extension future scenarios; an approximately $5 per ton in 2025 rising to $7 per ton in 2038 carbon price in the Valley Load Growth scenario; and an approximately $20 per ton in 2025 rising to $40 per ton in 2038 carbon price in the Decarbonization scenario.[104] (The IRP also explores a "double decarbonization" modeling sensitivity with carbon prices of $40 per ton in 2025 rising to $80 per ton in 2038.[105]) TVA does not reveal its policy assumptions used in developing the trajectories of these carbon prices nor does it explain why the prices vary the way they do in different scenarios. The addition of carbon prices in IRP modeling further improves the cost effectiveness of resource portfolios with greater shares of renewables, storage, energy efficiency and demand response and increases the investments in these zero-carbon resources recommended by optimization modeling. New Inflation Reduction Act funding, not modeled by TVA, would have a similar effect of making many zero-carbon resources more cost effective.

The Cumberland Retirement EIS's Final Alternatives Evaluation omits any mention of a carbon price and, indeed, any mention of the future scenario assumptions under which its Cumberland replacement cost analysis was conducted. The 1,450 MW gas combined cycle power plant proposed as Alternative A would generate 7 TWh per year, assuming the same 55 percent capacity factor used in the Cumberland EIS

[102] U.S. Energy Information Administration. December 8, 2022. "U.S. battery storage capacity will increase significantly by 2025". Available at: https://www.eia.gov/todayinenergy/detail.php?id=54939#:~:text=As%20of%20October%202022%2C%207.8,GW%20of%20battery%20storage%20capacity

[103] Henze, V. October 12, 2022. "Global Energy Storage Market to Grow 15-Fold by 2030". BloombergNEF. Available at: https://about.bnef.com/blog/global-energy-storage-market-to-grow-15-fold-by-2030/

[104] TVA. *2019 Integrated Resource Plan Volume I – Final Resource Plan*. Available at: https://tva-azr-eastus-cdn-ep-tvawcm-prd.azureedge.net/cdn-tvawcma/docs/default-source/default-document-library/site-content/environment/environmental-stewardship/irp/2019-documents/tva-2019-integrated-resource-plan-volume-i-final-resource-plan.pdf?sfvrsn=44251e0a_4. p.6-6

[105] Ibid, IRP p.8-17

assessment of social costs.[106] Over a 20-year planning period, a rough approximation of the additional costs associated with carbon prices in Alternative A would be $840 million in the Valley Load Growth scenario, $4.2 billion in the Decarbonization scenario, and $8.4 billion using the double decarbonization carbon price before levelization.

TVA-sponsored analysis suggests spurious limitations to TVA renewable resource investment. Concentric's October 2022 report prepared for TVA as an assessment of its draft Cumberland EIS erroneously suggests that the results of MISO's 2021 Renewable Integration Impact Assessment are a limiting factor in TVA's short- and medium-term renewables additions:

> *Due to environmental mandates requiring "clean" generating resources by a certain date, and the uncertainty around the impact of a high penetration of zero-emitting generating resources on the power system, system operators have conducted highly detailed studies to explore how wind and solar growth would affect reliability and resiliency. These studies…have shown that the complexity of renewable integration escalates with the growing penetration of renewable energy, requiring significant physical and operational changes to the bulk power system. Over some renewable penetration ranges, complexity is constant when spare capacity and flexibility exist. However, at specific penetration levels, complexity rises dramatically as the excess capacity and flexibility are exhausted. These represent system inflection points, where the underlying infrastructure, system operations, or both need to be significantly modified to reliably achieve the next tranche of renewable deployment. (Cumberland EIS Appendix Q p.18)*

MISO's analysis finds that challenges to system integration begin when wind and solar levels exceed 30 percent of total system capacity and that, importantly, these challenges occur in the absence of RTO-wide investments in transmission and other integration upgrades. Concentric fails to mention that no IRP scenario-strategy combination exceeds 8 percent wind and solar by 2028 or 17 percent by 2038 on the TVA system. Adding solar proposed as Cumberland Alternative C raises the renewable share to 17 percent in 2028 and 26 percent in 2038 on the TVA system. Integration challenges posed by MISO reaching 30 percent wind and solar are not expected to occur in the TVA region in the next 20 years.

TVA finds Alternative C solar plus storage construction to be too long and too complex as compared to the Alternative A gas combined cycle generator. TVA anticipates the need for "Construction and operation of many (likely 20+) solar and storage facilities"[107] and finds that the Alternative C "Solar & storage and transmission projects fail to meet 2026 timeline by 3+ years and higher costs for reliability and environmental compliance at [Cumberland]."[108] Concentric refers to Alternative C as "orchestrating a symphony of assumed capabilities and costs of energy efficiency, solar, wind, and batteries along with the accompanying transmission upgrades" and concludes that it is "simply not a viable or rigorous approach as

[106] TVA. 2022. *Cumberland Fossil Plant Retirement. Final Environmental Impact Statement.* Available at: https://tva-azr-eastus-cdn-ep-tvawcm-prd.azureedge.net/cdn-tvawcma/docs/default-source/environment/cumberland-fossil-plant-retirement-final-eis4eeac6f0-b6bf-4843-9881-75d19ccf8ede.pdf?sfvrsn=d61f6b6f_7. p.273
[107] TVA. 2022. "Appendix B: TVA Alternatives Evaluation." In Cumberland Fossil Plant Retirement: *Final Environmental Impact Statement*. p.12
[108] Ibid, p.18.

a near-term alternative that meets system reliability requirements."[109]

International Energy Agency data for electric construction projects for 2010 to 2018 show renewable power completed 1.5 to 2 years more quickly than fossil-fuel resources.[110] In addition, if more time were needed to build a desired alternative, TVA's EIS reports that Cumberland retirement is not required until 2028[111] and that TVA could itself construct utility-scale solar rather than relying on the quick deployment of a large number of smaller third-party solar farms.[112] The issuance of an all-source or solar-specific request for proposals (RFP) in advance of performing both the 2019 IRP and the Cumberland EIS would have allowed for more accurate, market-based assumptions regarding both solar availability and solar costs.

If the Cumberland brownfield were converted to solar panels—an option not presented by TVA—its 2,388 acres (less 326 acres of coal ash pits[113]) would accommodate 900 MW of solar—30 percent of the total amount proposed in Alternative C.[114] TVA also omits the consideration of solar panels added to its Johnsonville and Gleason sites, proposed to accommodate additional gas combustion turbines under Alternative B.

TVA could increase the accuracy and relevancy of its planning by issuing an all-source RFP and using the resulting bids to set resource prices in modeling.

TVA's IRP-type analysis of the 2026 Cumberland coal unit retirement, not anticipated in the 2019 IRP, has only been made available to stakeholders in the form of a brief summary of modeling results, without the benefit of stakeholder input or detailed information regarding modeling scenarios, commodity and resources costs, carbon prices, and other key modeling inputs. The 2022 Cumberland analysis appears to share an additional serious flaw with the TVA 2019 IRP: Neither cost assessment draws real-world, real-time resource prices from an all-source RFP specific to the TVA context. The practice of issuing an all-source RFP in advance of IRP and other similar planning exercises (see for example the NIPSCO 2019 and 2021 IRPs)[115] has important advantages for increasing the accuracy and relevancy of planning and the potential to aid in reducing system costs for ratepayers.

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[109] TVA. 2022. "Appendix Q – Concentric Report – Response to Synapse and Goggin Reports." In *Final Environmental Impact Statement*. p.2

[110] International Energy Agency. October 26, 2022. "Average power generation construction time (capacity weighted), 2010-2018." *IEA.* Available at: https://www.iea.org/data-and-statistics/charts/average-power-generation-construction-time-capacity-weighted-2010-2018.

[111] TVA. 2022. "Appendix B: TVA Alternatives Evaluation." In Cumberland Fossil Plant Retirement: *Final Environmental Impact Statement*. p.3

[112] Ibid, p.12

[113] TVA. 2022. *Cumberland Fossil Plant Retirement. Final Environmental Impact Statement.* Available at: https://tva-azr-eastus-cdn-ep-tvawcm-prd.azureedge.net/cdn-tvawcma/docs/default-source/environment/cumberland-fossil-plant-retirement-final-eis4eeac6f0-b6bf-4843-9881-75d19ccf8ede.pdf?sfvrsn=d61f6b6f_7. p.10

[114] Based on a rule of thumb approximation of 1 kW of solar per 100 square feet.

[115] 1) NIPSCO. 2021. *Northern Indiana Public Service Company LLC 2021 Integrated Resource Plan.* Available at: https://www.nipsco.com/docs/librariesprovider11/rates-and-tariffs/irp/2021-nipsco-integrated-resource-plan.pdf; 2) NIPSCO 2018. *Northern Indiana Public Service Company LLC Integrated Resource Plan.* Available at: https://www.nipsco.com/docs/librariesprovider11/rates-and-tariffs/irp/2018-nipsco-irp.pdf?sfvrsn=83256851_16.

An all-source RFP solicits resources that could be constructed or otherwise made available today under current market expectations of near-time future pricing with an open-bidding process for any interested parties. The results of all-source RFPs should be compared and incorporated together with price forecasts from reputable sources.

Resource prices developed in this way have the greatest likelihood of conforming to market expectations regarding both cost and actual availability. Power purchase agreement prices have risen recently due to short-term supply chain issues and the rise in interconnection costs, but TVA should not face the latter issue and should not let higher prices prevent it from soliciting responses. TVA's IRP and Cumberland retirement analyses also lack (or fail to report) any resource portfolios developed through unconstrained optimization. TVA's IRP modeling includes 30 constrained optimization runs of scenario-strategy pairings, and several related sensitivity runs, but fails to explore a portfolio developed through model optimization in the context of any and all resources being made available for model selection. Unconstrained optimization is an important tool available to utility planners in IRP and other similar resource planning exercises that permits the development of new resource combinations without an intervening filter of modeler selection.

VI. Recommendations

TVA is planning to produce a new IRP by late 2024. Two major changes have occurred since the 2019 IRP that are essential to reflect in any new planning process. First, TVA has committed to a climate goal of net zero greenhouse gas emissions by 2050, with an 80 percent carbon reduction by 2035 and a 70 percent carbon reduction by 2030. TVA is also subject to the Paris Agreement's commitment to help limit temperature increases from pre-industrial levels and to the Biden-Harris Administration's executive orders calling for carbon-free electricity by 2035. Second, Congress passed the Inflation Reduction Act, and it was signed into law by President Biden. The bill dramatically expanded numerous tax credits, grants, and other subsidization schemes for zero emission energy and storage resources. The following recommendations for TVA's planning process in that IRP and for subsequent site-specific planning exercises are based on these key developments together with the assessments of TVA's IRPs and site-specific planning methods:

- **TVA must incorporate its own net zero by 2050 commitment as well as the 2035 federal decarbonization goal as clear policy goals and basic modeling limitations in its IRP and craft plans in which all portfolios achieve these goals.** TVA's 2019 IRP is rendered defunct by the release of TVA's own emissions targets and federal climate goals. TVA should be transparent both about its scheduled capacity additions and retirements, and about which resources will supply the necessary emission reductions to meet its own climate goals, those of the Paris Agreement, and the instruction to federal agencies to pursue a goal of carbon-free electricity by 2035.
- **TVA must be more transparent regarding its assumptions and modeling inputs**, including its assumed carbon price and social costs of further investments in emitting resources—preferably making a detailed technical appendix available for public review.
- **TVA's IRPs need a clear selection of a portfolio with a more targeted preferred resource plan**.

The selected portfolio should provide schedules for prospective additions and retirements of coal and gas plants as well as the for the addition of zero emission sources of power. Absent these detailed expectations, planning ranges alone do not permit either TVA or other stakeholders to assess the impacts of the most likely resource additions or effectively evaluate the environmental or economic benefits of prior capacity additions.

- **TVA should state clearly how it intends to utilize the grants, loans, and tax credits of the of the Inflation Reduction Act**. One example provision is direct pay of IRA tax credits; this provision explicitly state that TVA can access credit money for eligible projects through direct payments from the U.S. Treasury. TVA needs to document how IRA programs affect its modeling, selected resource plans, and finances.
- **TVA must clarify how it demarcates "ownership" of solar and wind resources between its distribution utilities, power purchase agreements from other parties, and capacity that TVA outright owns.** Currently, TVA does not specify why its claimed solar and wind resources are not reported in EIA data, nor the extent to which its renewable resources are capacity owned and operated by its distribution utility partners or capacity it has access to through power purchase agreements. TVA should also be transparent about the renewable attributes committed to third parties through renewable energy credits.
- **TVA should provide reliable annual or monthly data on solar, wind, and storage capacity**. These time-series data should also distinguish between utility-scale resources that represent TVA's own capacity, contracted capacity, and/or capacity from TVA's distribution utility or municipal partners that TVA claims as its own. The data are essential to an effective evaluation of TVA's past and future plans by making a comparison between proposed and actual renewable additions.
- **TVA should conduct an all-resource RFP of resources that could be made available today under current market prices.** Resource cost assumptions made in the absence of an all-resource RFP provide inferior information that biases modeling results, and compare and include price forecasts from reputable sources.
- **TVA must ensure that its site-specific planning documents, such as environmental impact statements, reflect the most recent IRPs plans and use methods that do not result in contradictions between overall-system- and site-specific planning exercises.** Site-specific planning exercises should also provide detailed technical appendixes with information on modeling inputs and outputs. Site-specific planning exercises should state clearly how their proposed capacity additions (and assessments of the viability or infeasibility of alternative additions) integrate with or alter the findings of the most recent IRP.

Attachment 3

Integrated Resource Plan

The Tennessee Valley Authority is excited to be working on the next Integrated Resource Plan, which serves as a compass for how to best meet forecasted energy demand in the coming decades.

The comprehensive study includes TVA describing resource needs, policy goals, physical and operational constraints, risks, and proposed resource choices. Stakeholders are involved throughout the process, reviewing the planning information and shaping the analysis and outcomes.

The current IRP was completed in 2019, and the next IRP is slated to be completed in 2024. Check this page periodically for the most recent information.

Public Scoping

TVA issued a Notice of Intent on May 19, 2023, and held a 45-day public comment period. The Notice of Intent and Scoping Report are available below.

Related Documents

Notice of Intent (PDF)

Scoping Report (PDF)

Fact Sheet - IRP Public Involvement

Fact Sheet - IRP Process

2024 IRP Scenarios and Strategies

Public Webinars

2024 IRP Update - Scenarios and Strategies

Dec. 14, 2023
12 p.m. ET
Meeting Replay
Meeting Presentation

Public Educational Webinars

Sept. 21, 2023
6 p.m. ET
Meeting Replay
Meeting Presentation

Public Scoping Meetings

Scoping Meeting Presentation

May 23, 2023
6 p.m. - 7:30 p.m. ET
Meeting Replay

June 7, 2023
12 p.m. - 1:30 p.m. ET
Meeting Replay

2019 IRP

Integrated Resource Plan

2019 IRP Background

2019 IRP Supporting Documents

IRP Working Group Materials

Meeting 1: July 17-18, 2023

- Working Group Meeting 1 Summary
- Working Group Meeting 1 Material

Virtual Meeting 1: August 18, 2023

- Working Group Virtual Meeting 1 Summary

Meeting 2: August 28-29, 2023

- Working Group Meeting 2 Summary
- Working Group Meeting 2 Material

Virtual Meeting 2: September 14, 2023

- Working Group Virtual Meeting 2 Summary

Meeting 3: September 25-26, 2023

- Working Group Meeting 3 Summary
- Working Group Meeting 3 Material

Virtual Meeting 3: October 19, 2023

- Working Group Virtual Meeting 3 Summary

Meeting 4: October 23-24, 2023

- Working Group Meeting 4 Summary
- Working Group Meeting 4 Material

Meeting 5: November 13-14, 2023

- Working Group Meeting 5 Summary
- Working Group Meeting 5 Material

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Contact

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Project Manager
[redacted]

Kelly Baxter
NEPA Project Manager
[redacted]

TENNESSEE VALLEY AUTHORITY

TOOLS AND RESOURCES:

- DOING BUSINESS WITH TVA
- EMPLOYEES AND RETIREES
- INSPECTOR GENERAL
- SAFETY
- TVA KIDS
- TVA POLICE
- TVA STEM

POLICIES:

- ACCESSIBILITY INFORMATION
- EQUAL EMPLOYMENT OPPORTUNITY POLICY
- FREEDOM OF INFORMATION ACT
- LEGAL NOTICES
- NO FEAR ACT DATA
- PRIVACY POLICY
- REASONABLE ACCOMMODATION
- VULNERABILITY DISCLOSURE POLICY

CONTACT:

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(865) 632-2101
TVAINFO@TVA.COM

ISSUES / SUGGESTIONS:

- INFORMATION QUALITY
- WEBSITE FEEDBACK

Attachment 4

The Business Case for New Gas Is Shrinking

The Inflation Reduction Act makes clean energy cheaper than more than 90 percent of proposed gas plants.

December 8, 2022

By Lauren Shwisberg

As the dust settles following the passage of the Inflation Reduction Act (IRA), the

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Understanding How EV Battery

electricity industry is only beginning to understand its true impacts. One of those impacts is the continued erosion of the business case for new fossil gas power plants.

Over the past decade, fossil gas power plants became the default resource option for utility investment, making up a majority of capacity additions. While over the past few years the total capacity of plants built has **declined** and high **profile cancellations** have increased, the IRA's tax incentive provisions will accelerate deployment of cleaner, cheaper electricity — making gas an even less competitive choice.

New RMI analysis shows just how much the IRA changes the game.

The Analysis

We used our Clean Energy Portfolios Model — updated to include resource cost projections that reflect post-IRA levels of tax credits — to identify the lowest cost portfolio of wind, solar, battery energy storage, energy efficiency, and demand flexibility that can provide the same estimated services as a proposed fossil gas plant.

When we ran 76 GW of fossil gas plants proposed before 2035 through our Clean Energy Portfolios Model, we found that the vast majority of plants were more expensive than their respective clean

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Changing the Climate Forecast in 2024 — Five Ways Power Sectors Worldwide Can Drive Down Emissions

CATEGORIES

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Building Electrification

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Carbon Markets

China

Cities

Climate Data

Commercial Buildings

e-Lab: Electricity Innovation Lab

Electricity

Energy Efficiency

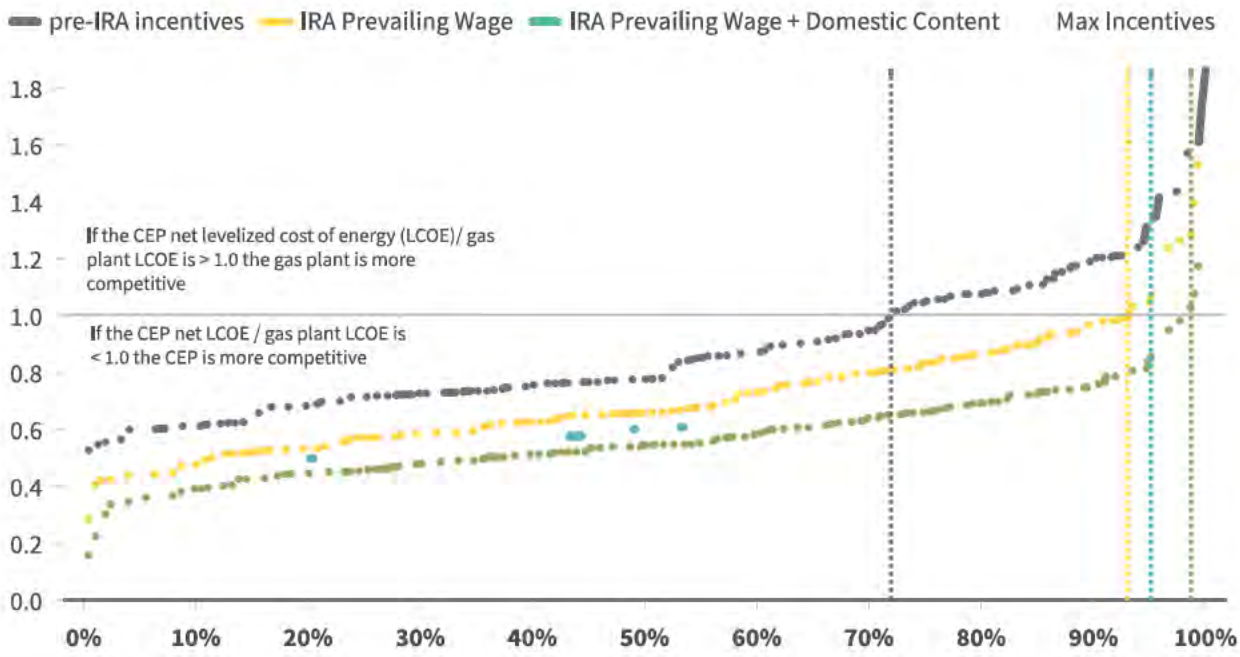
energy portfolios (CEPs), shown in Exhibit 1. In a scenario where clean energy resources use the 30 percent Investment Tax Credit or the Production Tax Credit at $26/MWh, clean energy outcompetes 93 percent of proposed fossil gas plants – more than 20 percent more than pre-IRA.

With additional bonuses for investment in energy communities, use of domestically sourced resources, or siting in low-income communities, in nearly every instance, clean energy beats gas on cost alone. That means that when taking full advantage of the tax credits in the IRA, clean, renewable sources will be cheaper than 99 percent of proposed gas plants – plants that are contributing to price volatility in American household energy bills.

> When taking full advantage of the tax credits in the Inflation Reduction Act, clean, renewable sources will be cheaper than 99 percent of proposed gas plants.

Finance
General
General Energy
Global South
Hydrogen
India
Industry
Islands
Oil and Gas Solutions
Residential Buildings
RMI
Strategic Insights
Supply Chain Emissions
Transportation
Trucking
US Policy

Impacts of IRA incentives on the percent cumulative capacity of competitive CEPs



IRA credit scenario assumptions and results

Credit scenario (2022$)	CEP results
Pre-IRA Incentives	72% of plants outcompeted
Prevailing wages - ITC at 30%, PTC at $26/MWh	93% of plants outcompeted
Prevailing wages + domestic content or energy community bonus - ITC at 40%, PTC at $28.5/MWh	95% of plants outcompeted
Maximum credit - ITC at 50%, PTC at $31.2/MWh	99% of plants outcompeted

The Power of Financial Incentives

One of the main reasons for this is that post-IRA solar and wind costs are expected to plummet. Analysts are projecting that renewables costs will continue to fall – with jaw-droppingly low

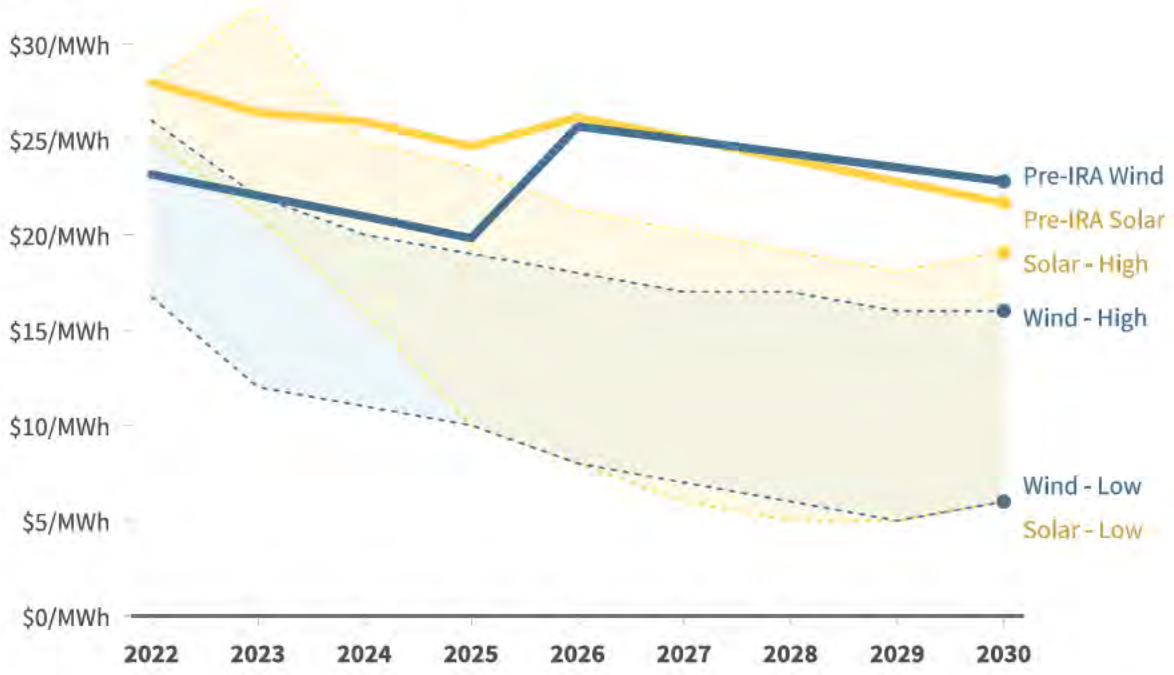
prices for wind and solar by the end of the decade.

Credit Suisse, for example, **made headlines** when it projected $5/MWh wind and solar by 2029. S&P Global and IHS Markit **projected** numbers nearly as low — with about $10/MWh solar in 2030 falling to $5/MWh by 2035. Consulting firm ICF's **projections**, though slightly less bullish, still predict that a levelized cost of energy for solar and wind in 2030 will be 20–35 percent and 38–49 percent lower, respectively, than pre-IRA.

In most of these forecasts, renewable costs fall below the go-forward cost of a combined cycle gas plant — generally expected to be at least $30–$40/MWh. This means it will be cheaper on a per megawatt hour basis to build new wind and solar than to continue to operate existing gas.

Exhibit 3 aggregates these projections (Credit Suisse, S&P Global and IHS Markit, and ICF's low projections for 2030) into charts that show an indicative range of levelized cost of energy for wind and solar post-IRA, compared with NREL's 2022 Annual Technology Baseline pre-IRA.

Analyst projections of solar and wind LCOE pre-IRA and post-IRA ($2021)



Source: RMI analysis of NREL 2022 Annual Technology Baseline data (Wind Class 4, Utility PV Class 5), S&P and IHS Markit data, Credit Suisse data, and ICF data — all normalized to $2021

While our analysis in the Clean Energy Portfolios Model only looked at battery energy storage and demand flexibility to provide firm, dispatchable energy, a host of new resource options may also be **cost-competitive** with fossil gas by the end of the decade. A range of "clean firm" technologies will increasingly compete directly with fossil gas, such as alternative energy storage technologies, geothermal, advanced nuclear, hydrogen-fired turbines, and carbon capture and storage.

Updated Resource Plans and Procurement Processes Can Unlock $5 Billion per Year in Savings

RMI's analysis and other independent analysts are showing that the IRA can fundamentally change the math on the next right utility investment — and deliver substantial savings to customers. These aren't far-off future projections either. Cheaper, cleaner energy is the result of strong policy we passed this year.

There are actions **regulators** and utilities can take today to realize the IRA's projected **$5 billion** per year in savings for their ratepayers. New resource plans can include updated resource costs that accurately represent the new tax credits, seek to represent the full range of resources that may be commercially available within the planning horizon, and demonstrate how they will use additional IRA funding sources such as **the Energy Infrastructure Reinvestment program**. While costs remain uncertain, regulators and utilities can use **all-source procurement** — a competitive process that solicits bids from all types of resources — for near-term needs to discover the market prices and relative competitiveness across resources.

As these changes begin to make their way into utility planning and procurement, we're starting to see results:

- DTE Energy in Michigan filed its Integrated Resource Plan in early November, with a scenario that factored in IRA tax incentives. Utility executives **reported** that they expected the IRA to lower the price tag of their 20-year plan for customers about $500 million.
- The Minnesota Public Utilities Commission approved Xcel's request this week to build 460 MW of solar at a retiring coal plant site — part of a CEP that will avoid a new gas plant. Xcel **reported** that the IRA was anticipated to save ratepayers 30 percent over its initial estimate of project costs.
- **Duke Energy** in Florida is providing customers with a $56 million refund as a result of solar tax credits.
- **Ameren** is proposing to lower customer rates by 4.5 percent.

To fully realize the benefits of the IRA, now is the time for utilities and regulators to reevaluate plans for investing in new fossil gas power plants and take advantage of the opportunity to deliver ratepayer savings with cleaner options.

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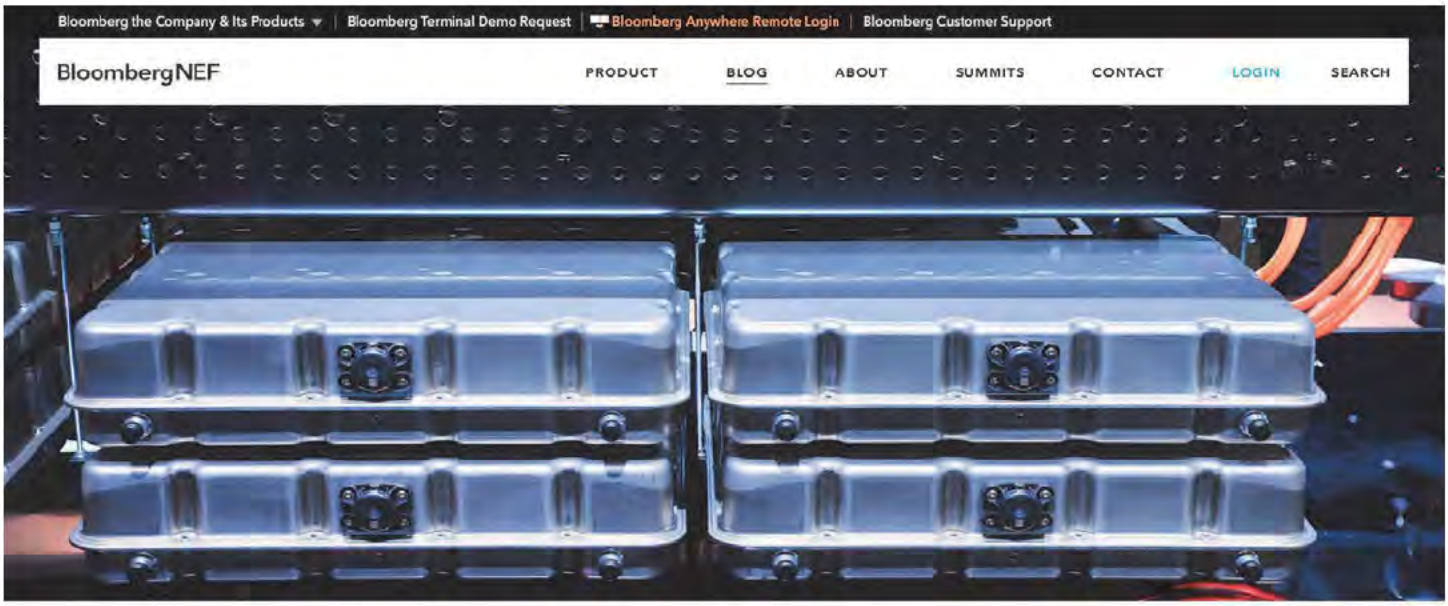
Attachment 5



Lithium-ion Battery Pack Prices Rise for First Time to an Average of $151/kWh

December 6, 2022

BloombergNEF's annual battery price survey finds prices increased by 7% from 2021 to 2022

New York, December 6, 2022 – Rising raw material and battery component prices and soaring inflation have led to the first ever increase in lithium-ion battery pack prices since BloombergNEF (BNEF) began tracking the market in 2010. After more than a decade of declines, volume-weighted average prices for lithium-ion battery packs across all sectors have increased to $151/kWh in 2022, a 7% rise from last year in real terms. The upward cost pressure on batteries outpaced the higher adoption of lower cost chemistries like lithium iron phosphate (LFP). BloombergNEF expects prices to stay at similar levels next year, further defying historical trends.

The above figures represent an average across multiple battery end-uses, including different types of electric vehicles, buses and stationary storage projects. For battery electric vehicle (BEV) packs in particular, prices were $138/kWh on a volume-weighted average basis in 2022. At the cell level, average BEV prices were just $115/kWh. This indicates that on average, cells account for 83% of the total pack

price. Over the last three years, the cell-to-pack cost ratio has diverged from the traditional 70:30 split. This is partially due to changes to pack design, such as the introduction of cell-to-pack approaches, which have helped reduce costs.

On a regional basis, battery pack prices were cheapest in China, at $127/kWh. Packs in the US and Europe were 24% and 33% higher, respectively. Higher prices reflect the relative immaturity of these markets, the higher production costs, the diverse range of applications and battery imports. For the higher end of the range, low volume and bespoke orders push prices up.

Prices could have risen further in 2022 had it not been for the higher adoption of the low-cost cathode chemistry known as LFP, and the continued reduction of expensive cobalt in nickel base cathodes. On average, LFP cells were 20% cheaper than lithium nickel manganese cobalt oxide (NMC) cells in 2022. However, even low-cost chemistries like LFP, which is particularly exposed to lithium carbonate prices, have felt the bite of rising costs throughout the supply chain. LFP battery pack prices rose 27% in 2022, compared to 2021.

Evelina Stoikou, an energy storage associate at BNEF and lead author of the report, said: "Raw material and component price increases have been the biggest contributors to the higher cell prices observed in 2022. Amidst these price increases for battery metals, large battery manufacturers and automakers have turned to more aggressive strategies to hedge against volatility, including direct investments in mining and refining projects."

Figure 1: Volume-weighted average lithium-ion battery pack and cell price split, 2013-2022

Source: BloombergNEF. All values in real 2022 dollars. Weighted average survey value includes 178 data points from passenger cars, buses, commercial vehicles and stationary storage.

While prices for key battery metals like lithium, nickel and cobalt have moderated slightly in recent months, BNEF expects average battery pack prices to remain elevated in 2023 at $152/kWh (in real 2022 dollars).

BNEF expects battery price to start dropping again in 2024, when lithium prices are expected to ease as more extraction and refining capacity comes online. Based on the updated observed learning rate, BNEF's 2022 Battery Price Survey predicts that average pack prices should fall below $100/kWh by 2026. This is two years later than previously expected and will negatively impact the ability for

automakers to produce and sell mass-market EVs in areas without subsidies or other forms of support. Higher battery prices could also hurt the economics of energy storage projects.

Yayoi Sekine, head of energy storage at BNEF, said: "Despite a setback on price declines, battery demand is still reaching new records each year. Demand will reach 603GWh in 2022, which is almost double that in 2021. Scaling up supply at that rate of growth is a real challenge for the industry, but investment in the sector is also rising rapidly and technology innovation is not slowing down."

Kwasi Ampofo, head of metals and mining at BloombergNEF, added: "Lithium prices remain high due to persistent supply chain constraints and the slow ramp up in new production capacity. Additional lithium supply could ease the pressure on prices in 2024, while geo politics and trade tension remain the biggest uncertainties for other key battery metal prices in the short-term. Resolving these tensions could help calm prices in 2023 and beyond."

Continued investment in R&D, manufacturing process improvements, and capacity expansion across the supply chain will help to improve battery technology and reduce costs over the next decade. BloombergNEF expects next-generation technologies, such as silicon and lithium metal anodes, solid-state electrolytes and new cathode material and cell manufacturing processes, to play an important role in enabling further price reductions.

Contact
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BloombergNEF
[redacted]

About BloombergNEF

BloombergNEF (BNEF) is a strategic research provider covering global commodity markets and the disruptive technologies driving the transition to a low-carbon economy. Our expert coverage assesses pathways for the power, transport, industry, buildings and agriculture sectors to adapt to the energy transition. We help commodity trading, corporate strategy, finance and policy professionals navigate change and generate opportunities.

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Bloomberg

Attachment 6

Top 10 Energy Storage Trends in 2023

January 11, 2023

At the beginning of each year, we pause to reflect on what has happened in our industry and gather our thoughts on what to expect in the coming 12 months. These 10 trends highlight what we think will be some of the most noteworthy developments in energy storage in 2023.

By the Numbers

$152/kWh	BNEF's volume-weighted lithium-ion battery pack price forecast for 2023
28GW/ 69GWh	BNEF's stationary energy storage installation forecast for 2023
$300/kWh	BNEF's forecast turnkey energy storage system costs for a four-hour duration system in 2023, on a usable basis

Near-term lithium-ion battery cell and pack price forecast

Source: BloombergNEF

- Lithium-ion battery pack prices remain elevated, averaging $152/kWh. In 2022, volume-weighted price of lithium-ion battery packs across all sectors averaged $151 per kilowatt-hour (kWh), a 7% rise from 2021 and the first time BNEF recorded an increase in price. Now, BNEF expects the volume-weighted average battery pack price to rise to $152/kWh in 2023. Lithium and nickel prices will also remain high in the coming year, given the uncertainty surrounding China's reopening post-Covid Zero policy and the continued disruption to metal supply chains caused by Russia's war in Ukraine.

- Volatility in supply, demand and prices continues, although lithium prices may start easing with new supply. In the second half of 2022, battery metals were buffeted by events around the world: Russia's war in Ukraine intensified, China's battle with Covid wouldn't go away, inflationary pressures built and fears of recession grew. Yet a rally in metals prices persisted throughout most of the year, and the long-term outlook is bullish (despite signs that a short slowdown in metals demand may be imminent). While we'll be watching all battery metals in 2023, we focus here on lithium, given its price throughout the second half of 2022.

- Announcements from a large battery maker and a two- or three-wheeler manufacturer give sodium-ion batteries a boost. Sodium-ion batteries, still in their infancy, are beginning to scale up. An alternative to lithium-ion batteries, sodium-ion battery technology offers could alleviate battery-market pressures – and potentially push down costs – as soon as 2026. For 2023, we speculate that at least one major battery manufacturer will come out with a significant sodium-ion battery product roadmap announcement. In addition, we think that two major energy storage system (ESS) products will be launched and that at least one large-scale two- or three-wheeled-vehicle company will announce a vehicle model powered by sodium-ion batteries.

- Solid-state batteries progress, with new announcements potentially adding more than 40GWh. Solid-state batteries have become the most promising technology for pushing cell-level energy density up to 500 watt-hours per kilogram and driving battery prices down in the second half of the decade. Several leading battery manufacturers, like LG Energy Solution, CATL and SK, as well as startups like Solid Power, Prologium and Quantumscape, have laid out clear roadmaps to commercialize solid-state batteries within this decade.

- US Inflation Reduction Act guidance is released, leading to more than $80 billion in new investments for the battery supply chain. The Inflation Reduction Act (IRA) was signed into law by US President Joe Biden on August 16, 2022, injecting at least $369 billion into the country's clean energy economy. With a good chunk of cash going to the power sector and electric vehicles, the law represents the largest effort yet to strengthen the battery supply chain in the US. Under the 'Advanced Manufacturing Production Credit' and 'Clean Vehicle Credit' sections, the law introduced a variety of credits to support the domestic supply chain, from raw materials to battery cells, modules,

electric vehicles (EVs) and energy storage.

- A weakened battery position forces the EU to rethink incentives. As the North American battery supply chain enjoys an IRA boost, European battery players will likely pressure the EU to offer new incentives, too. BNEF will be watching for the EU's response, which may include new subsidy schemes for domestic manufacturing and 'buy European' requirements for local content. Facing waning enthusiasm for local battery-making, Europe will be under pressure to loosen state aid rules (EU competition rules that restrict subsidy spending at a country level rather than through the EU), ease permitting and potentially allocate additional EU funds toward the battery supply chain.

- As policies regulating raw material origination take hold in the EU and US, the Chinese battery supply chain devises creative workarounds. Chinese companies will be closely watching the rollout of IRA guidance, with a special eye to the regulation of critical minerals and battery components – and the definition of 'foreign entities of concern.' Ford and CATL are rumored to be considering building a battery manufacturing plant in Michigan, US, in a complex arrangement that would allow the facility to reap tax benefits while respecting the terms of the law. (Ford would own the facility while CATL would operate it.) Such creative workarounds will become increasingly likely among Chinese companies, especially among those that are interested in expanding into the US.

- Energy storage system costs stay above $300/kWh for a turnkey four-hour duration system. In 2022, rising raw material and component prices led to the first increase in energy storage system costs since BNEF started its ESS cost survey in 2017. Costs are expected to remain high in 2023 before dropping in 2024.

- The energy storage system market doubles, despite higher costs. The global energy storage market will continue to grow despite higher energy storage costs, adding roughly 28GW/69GWh of energy storage by the end of 2023. In gigawatt-hour terms, the market will almost double relative to 2022 installations. (In October 2022, BNEF estimated 16GW/35GWh would be installed by the end of the year.)

- Pumped hydro makes a comeback, attracting more investment than other long-duration storage technologies. Despite long lead times, BNEF is taking a stance that investors and policymakers will be banking on pumped hydro energy storage in 2023. We speculate that this may lead to more committed investments towards pumped hydro than for other long-duration energy storage technologies this year.

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Attachment 7

APRIL 22, 2021

FACT SHEET: President Biden Sets 2030 Greenhouse Gas Pollution Reduction Target Aimed at Creating Good-Paying Union Jobs and Securing U.S. Leadership on Clean Energy Technologies

Building on Past U.S. Leadership, including Efforts by States, Cities, Tribes, and Territories, the New Target Aims at 50-52 Percent Reduction in U.S. Greenhouse Gas Pollution from 2005 Levels in 2030

Today, President Biden will announce a new target for the United States to achieve a 50-52 percent reduction from 2005 levels in economy-wide net greenhouse gas pollution in 2030 – building on progress to-date and by positioning American workers and industry to tackle the climate crisis.

The announcement – made during the Leaders Summit on Climate that President Biden is holding to challenge the world on increased ambition in combatting climate change – is part of the President's focus on building back better in a way that will create millions of good-paying, union jobs, ensure economic competitiveness, advance environmental justice, and improve the health and security of communities across America.

On Day One, President Biden fulfilled his promise to rejoin the Paris Agreement and set a course for the United States to tackle the climate crisis at home and abroad, reaching net zero emissions economy-wide by no later than 2050. As part of re-entering the Paris Agreement, he also launched a whole-of-government process, organized through his National Climate Task Force, to establish this new 2030 emissions target – known as the "nationally determined contribution" or "NDC," a formal submission to the United Nations Framework Convention on Climate Change (UNFCCC). Today's announcement is the product of this government-wide assessment of how to make the most of the opportunity combatting climate change presents.

PUSHING PROGRESS, CREATING JOBS, AND ACHIEVING JUSTICE

The United States is not waiting, the costs of delay are too great, and our nation is resolved to act now. Climate change poses an existential threat, but responding to this threat offers an opportunity to support good-paying, union jobs, strengthen America's working communities, protect public health, and advance environmental justice. Creating jobs and tackling climate change go hand in hand – empowering the U.S. to build more resilient infrastructure, expand access to clean air and drinking water, spur American technological innovations, and create good-paying, union jobs along the way.

To develop the goal, the Administration analyzed how every sector of the economy can spur innovation, unleash new opportunities, drive competitiveness, and cut pollution. The target builds on leadership from mayors, county executives, governors, tribal leaders, businesses, faith groups, cultural institutions, health care organizations, investors, and communities who have worked together tirelessly to ensure sustained progress in reducing pollution in the United States.

Building on and benefiting from that foundation, America's 2030 target picks up the pace of emissions reductions in the United States, compared to historical levels, while supporting President Biden's existing goals to create a carbon pollution-free power sector by 2035 and net zero emissions economy by no later than 2050. There are multiple paths to reach these goals, and the U.S. federal, state, local, and tribal governments have many tools available to work with civil society and the private sector to mobilize investment to meet these goals while supporting a strong economy.

SUPPORTING AMERICAN WORKERS

This target prioritizes American workers. Meeting the 2030 emissions target will create millions of good-paying, middle class, union jobs – line workers who will lay thousands of miles of transmission lines for a clean, modern, resilient grid; workers capping abandoned wells and reclaiming mines and stopping methane leaks; autoworkers building modern, efficient, electric vehicles and the charging infrastructure to support them; engineers and

construction workers expanding carbon capture and green hydrogen to forge cleaner steel and cement; and farmers using cutting-edge tools to make American soil the next frontier of carbon innovation.

The health of our communities, well-being of our workers, and competitiveness of our economy requires this quick and bold action to reduce greenhouse gas emissions. We must:

- **Invest in infrastructure and innovation.** America must lead the critical industries that produce and deploy the clean technologies that we can harness today – and the ones that we will improve and invent tomorrow.
- **Fuel an economic recovery that creates jobs.** We have the opportunity to fuel an equitable recovery, expand supply chains and bolster manufacturing, create millions of good-paying, union jobs, and build a more sustainable, resilient future.
- **Breathe clean air and drink clean water and advance environmental justice.** We can improve the health and well-being of our families and communities – especially those places too often left out and left behind.
- **Make it in America.** We can bolster our domestic supply chains and position the U.S. to ship American-made, clean energy products — like EV batteries – around the world.

MEETING THE MOMENT

The target is consistent with the President's goal of achieving net-zero greenhouse gas emissions by no later than 2050 and of limiting global warming to 1.5 degrees Celsius, as the science demands. To develop the target, the Administration:

- **Used a whole-of-government approach:** The NDC was developed by the National Climate Task Force using a whole-of-government approach, relying on a detailed bottom-up analysis that reviewed technology availability, current costs, and future cost reductions, as well as the role of enabling infrastructure. Standards, incentives, programs, and support for innovation were all weighed in the analysis. The National Climate Task Force is developing this into a national climate strategy to be issued later this year.

- **Consulted important and diverse stakeholders:** From unions that collectively bargain for millions of Americans who have built our country and work to keep it running to groups representing tens of millions of advocates and young Americans, the Administration listened to Americans across the country. This also included groups representing thousands of scientists; hundreds of governmental leaders like governors, mayors, and tribal leaders; hundreds of businesses; hundreds of schools and institutions of higher education; as well as with many specialized researchers focused on questions of pollution reduction.

- **Explored multiple pathways across the economy:** The target is grounded in analysis that explored multiple pathways for each economic sector of the economy that produces CO_2 and non-CO_2 greenhouse gases: electricity, transportation, buildings, industry, and lands.

Each policy considered for reducing emissions is also an opportunity to support good jobs and improve equity:

- The United States has set a goal to reach **100 percent carbon pollution-free electricity by 2035**, which can be achieved through multiple cost-effective pathways each resulting in meaningful emissions reductions in this decade. That means good-paying jobs deploying carbon pollution-free electricity generating resources, transmission, and energy storage and leveraging the carbon pollution-free energy potential of power plants retrofitted with carbon capture and existing nuclear, while ensuring those facilities meet robust and rigorous standards for worker, public, environmental safety and environmental justice.

- The United States can create good-paying jobs and **cut emissions and energy costs for families by supporting efficiency upgrades and electrification in buildings** through support for job-creating retrofit programs and sustainable affordable housing, wider use of heat pumps and induction stoves, and adoption of modern energy codes for new buildings. The United States will also invest in new technologies to reduce emissions associated with construction, including for high-performance electrified buildings.

- The United States can **reduce carbon pollution from the transportation sector** by reducing tailpipe emissions and boosting the

efficiency of cars and trucks; providing funding for charging infrastructure; and spurring research, development, demonstration, and deployment efforts that drive forward very low carbon new-generation renewable fuels for applications like aviation, and other cutting-edge transportation technologies across modes. Investment in a wider array of transportation infrastructure, including transit, rail, and biking improvements, will make more choices available to travelers.

- The United States can **reduce emissions from forests and agriculture and enhance carbon sinks** through a range of programs and measures including nature-based solutions for ecosystems ranging from our forests and agricultural soils to our rivers and coasts. Ocean-based solutions can also contribute towards reducing U.S. emissions.

- The United States can **address carbon pollution from industrial processes** by supporting carbon capture as well as new sources of hydrogen—produced from renewable energy, nuclear energy, or waste—to power industrial facilities. The government can use its procurement power to support early markets for these very low- and zero-carbon industrial goods.

- The United States will also reduce non-CO2 greenhouse gases, including methane, hydrofluorocarbons and other potent short-lived climate pollutants. Reducing these pollutants delivers fast climate benefits.

- In addition, the United States will **invest in innovation** to improve and broaden the set of solutions as a critical complement to deploying the affordable, reliable, and resilient clean technologies and infrastructure available today.

America must act— and not just the federal government, but cities and states, small and big business, working communities. Together, we can seize the opportunity to drive prosperity, create jobs, and build the clean energy economy of tomorrow.

###

Attachment 8

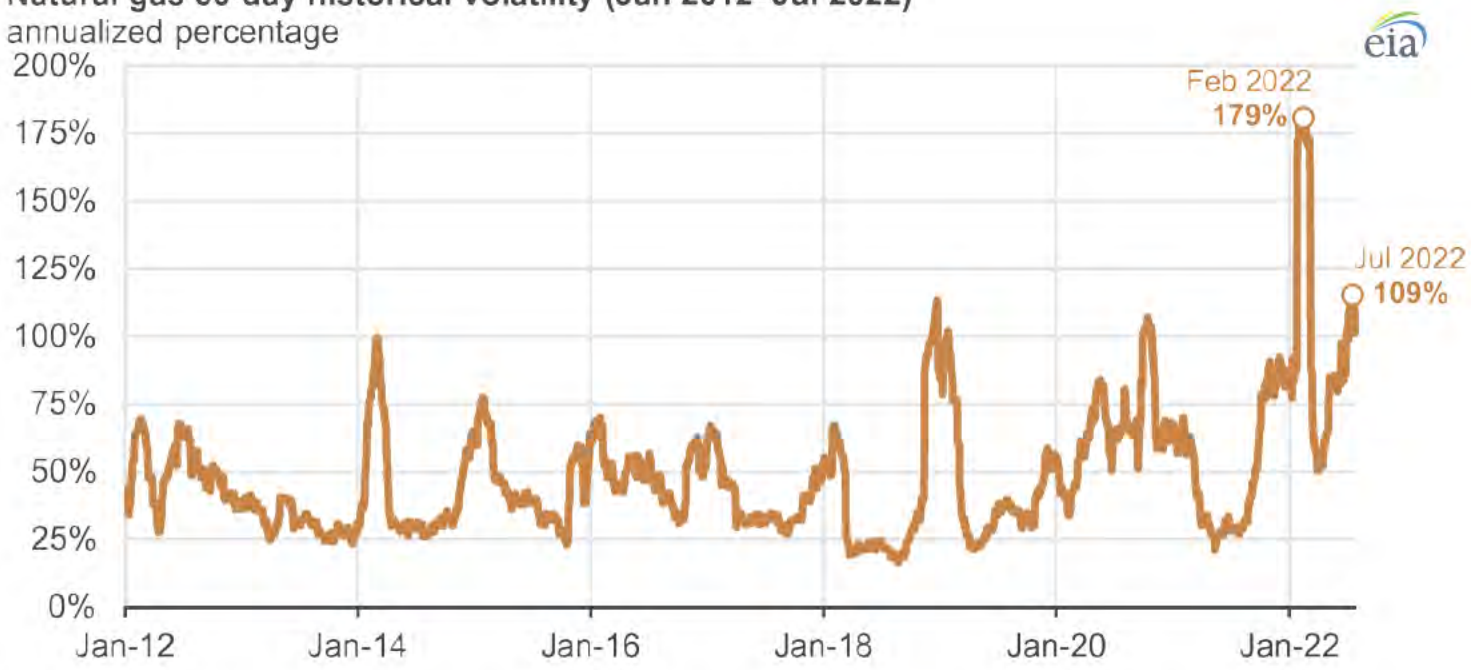
U.S. Energy Information Administration

Today in Energy

August 24, 2022

U.S. natural gas price saw record volatility in the first quarter of 2022

Natural gas 30-day historical volatility (Jan 2012–Jul 2022)
annualized percentage



Data source: Bloomberg L.P.

Note: Annualized percentage, a widely used trading measure of price volatility, is the standard deviation for the previous 30 days of daily changes in the Henry Hub front-month futures price multiplied by the square root of 252 (number of trading days in a year) multiplied by 100. Percentages are averages for that period.

U.S. natural gas price volatility (a measure of daily price changes) reached its highest level in 20 years, hitting record highs in the first quarter (January–March) of 2022. The 30-day historical volatility of U.S. natural gas prices, which is based on the U.S. benchmark Henry Hub front-month futures price, averaged 179% in February compared with 57% during the first quarter of 2021.

Historical volatility is a measure of daily closing price changes for a commodity at a specific time in the past. During July, historical volatility was lower on a percentage basis, in part, because natural gas prices were relatively higher than during the first quarter of this year.

The Henry Hub front-month futures price averaged $7.19 per million British thermal units (MMBtu) during July compared with an average of $4.46/MMBtu during February. Natural gas price volatility averaged 124% during the first quarter of 2022 and 75% during the second quarter.

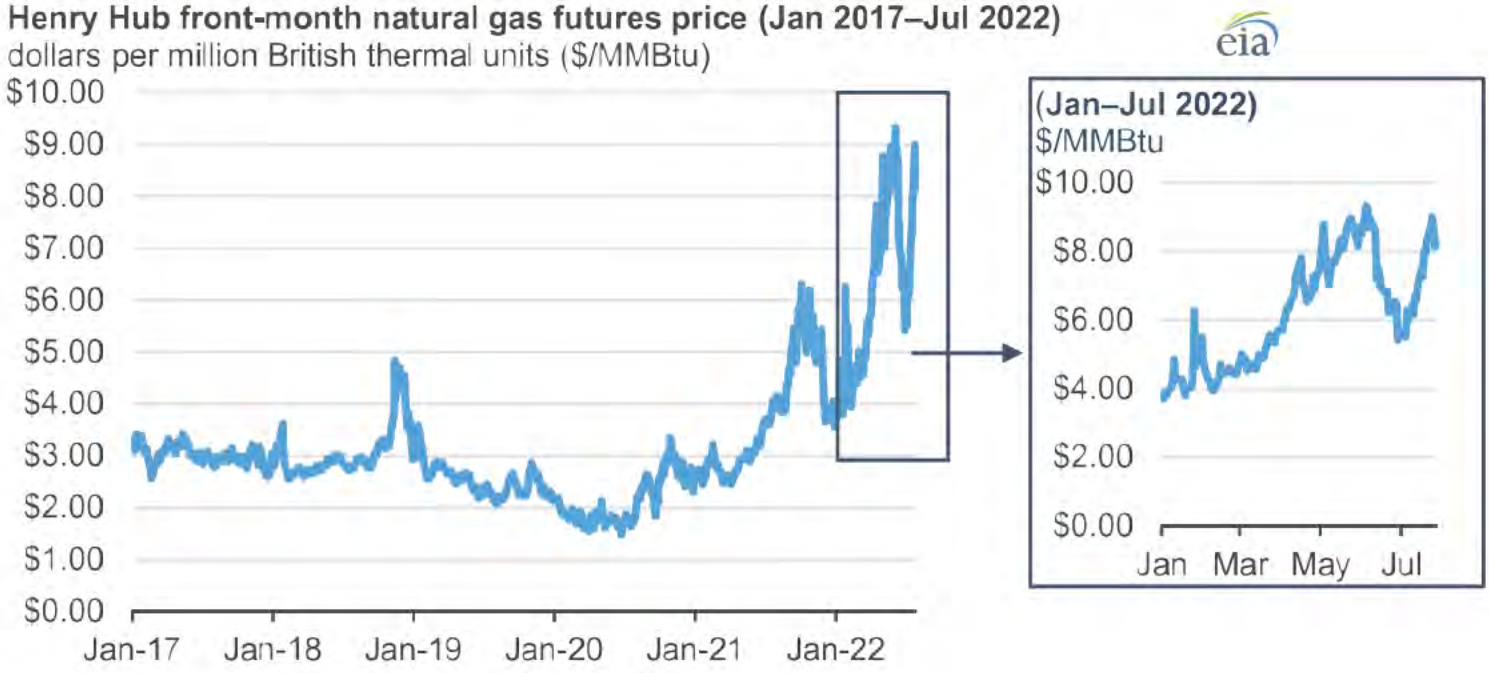
Increased uncertainty about market conditions that affect natural gas supply and demand can result in high price volatility. Events that have contributed to changing market conditions include:

- Production freeze-offs
- Storms
- Unplanned pipeline maintenance and outages
- Significant departures from normal weather
- Changes in inventory levels
- Availability of substitute fuels
- Changes in imports or exports
- Other sudden changes in demand

U.S. natural gas prices are typically more volatile during the first quarter of a year because of the fluctuating demand for natural gas for space heating as weather changes. Factors that contributed to heightened volatility in the first three months of this year include:

- Weather-driven fluctuations in natural gas demand
- Declining natural gas production in January and February
- Declines in Lower 48 states' working natural gas levels
- Record U.S. LNG exports to Europe to help offset reduced natural gas supplies from Russia

Henry Hub front-month natural gas futures price (Jan 2017–Jul 2022)
dollars per million British thermal units ($/MMBtu)



Data source: CME Group, Bloomberg, L.P.

Historical Henry Hub front-month natural gas price volatility fell to an average of 56% in April but rose in subsequent months, averaging 109% in July. Warmer-than-normal temperatures and increased domestic supply contributed to this increase in volatility.

The temporary shutdown of the Freeport LNG terminal in June decreased demand for feed gas by 2 billion cubic feet per day, generating a surplus of natural gas on the domestic market. The Henry Hub futures price fell by 39% from June 10 to June 30. In July, however, the warmer-than-normal temperatures across the Lower 48 states resulted in increased natural gas demand in the electric power sector, absorbing much of the Freeport LNG-related surplus. As a result, the natural gas futures price increased 52% in July compared with June.

Principal contributor: Katy Fleury

Attachment 9

UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
Washington, D.C. 20549
FORM 10-K

(MARK ONE)
☒ 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
OR
☐ TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934
For the transition period from _____ to _____

Commission file number 000-52313
TENNESSEE VALLEY AUTHORITY
(Exact name of registrant as specified in its charter)

A corporate agency of the United States created by an act of Congress *(State or other jurisdiction of incorporation or organization)*	62-0474417 *(IRS Employer Identification No.)*
400 W. Summit Hill Drive Knoxville, Tennessee *(Address of principal executive offices)*	37902 *(Zip Code)*

(865) 632-2101
(Registrant's telephone number, including area code)

Securities registered pursuant to Section 12(b) of the Act:

Title of each class	Trading Symbol(s)	Name of each exchange on which registered
N/A	N/A	N/A

Securities registered pursuant to Section 12(g) of the Act: None

Indicate by check mark if the registrant is a well-known seasoned issuer, as defined in Rule 405 of the Securities Act.
Yes ☐ No ☒

Indicate by check mark if the registrant is not required to file reports pursuant to Section 13, Section 15(d), or Section 37 of the Act.
Yes ☐ No ☒

Indicate by check mark whether the registrant (1) has filed all reports required to be filed by Section 13, 15(d), or 37 of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days.
Yes ☒ No ☐

Indicate by check mark whether the registrant has submitted electronically every Interactive Data File required to be submitted pursuant to Rule 405 of Regulation S-T (§ 232.405 of this chapter) during the preceding 12 months (or for such shorter period that the registrant was required to submit such files).
Yes ☒ No ☐

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, a smaller reporting company, or an emerging growth company. See the definitions of "large accelerated filer," "accelerated filer," "smaller reporting company," and "emerging growth company" in Rule 12b-2 of the Exchange Act.

Large accelerated filer ☐ Emerging growth company ☐ Smaller reporting company ☐
Non-accelerated filer ☒ Accelerated filer ☐

If an emerging growth company, indicate by check mark if the registrant has elected not to use the extended transition period for complying with any new or revised financial accounting standards provided pursuant to Section 13(a) of the Exchange Act. ☐

Indicate by check mark whether the registrant has filed a report on and attestation to its management's assessment of the effectiveness of its internal control over financial reporting under Section 404(b) of the Sarbanes-Oxley Act (15 U.S.C. 7262(b)) by the registered public accounting firm that prepared or issued its audit report. ☒

If securities are registered pursuant to Section 12(b) of the Act, indicate by check mark whether the financial statements of the registrant included in the filing reflect the correction of an error to previously issued financial statements. ☐

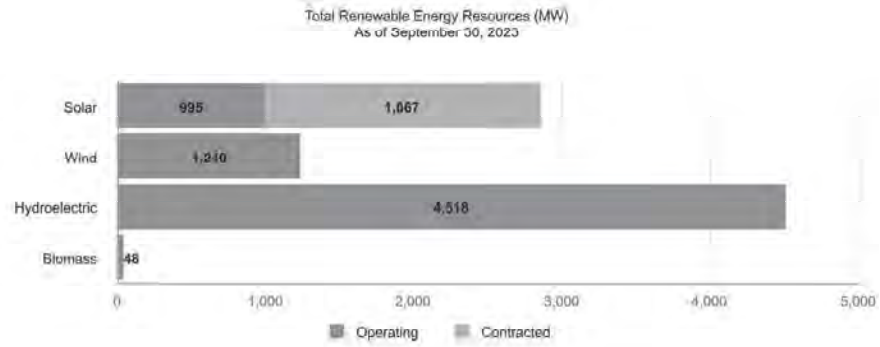
Indicate by check mark whether any of those error corrections are restatements that required a recovery analysis of incentive-based compensation received by any of the registrant's executive officers during the relevant recovery period pursuant to §240.10D-1(b). ☐

Indicate by check mark whether the registrant is a shell company (as defined in Rule 12b-2 of the Exchange Act).
Yes ☐ No ☒

Estimated aggregate market value of the common equity held by non-affiliates of TVA at March 31, 2023: N/A

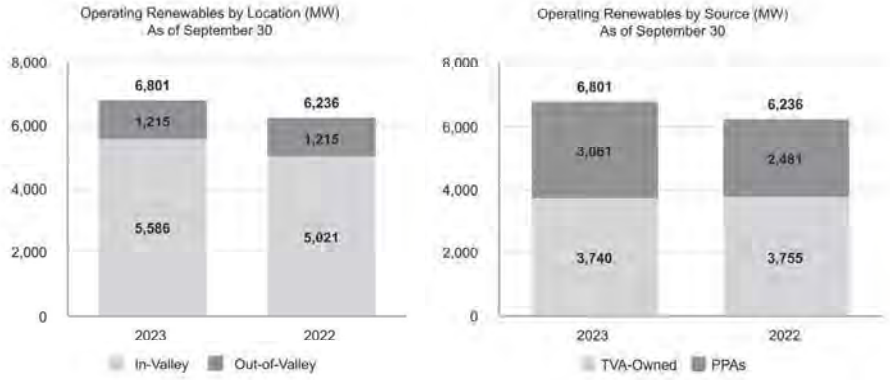
Number of shares of common stock outstanding at November 13, 2023: N/A

Total Renewable Energy Resources. As of September 30, 2023, TVA's total renewable energy resources amounted to 8,668 MW. Of this amount, 6,801 MW are operating while 1,867 MW are contracted but not yet online. In addition, TVA has 299 MW from self-directed solar projects currently under development.



Notes
(1) Contracted resources are executed PPAs expected to come online at a future date.
(2) Hydroelectric power consists of 3,739 MW from TVA-owned conventional hydroelectric facilities and 779 MW from renewable PPAs.
(3) TVA sells the RECs resulting from some of its purchased power to certain customers. See Part II, Item 7, Management's Discussion and Analysis of Financial Condition and Results of Operations — *Key Initiatives and Challenges* — *Optimum Energy Portfolio* — *Renewable Power Purchase Agreements.*

TVA's operating renewables by location and by source are detailed below:



Notes
(1) In-Valley refers to the renewable energy that is sourced within TVA's service territory. Out-of-Valley refers to the renewable energy that is sourced outside of TVA's service territory and solely consists of wind power.
(2) See *Power Purchase and Other Agreements* below. PPAs also include capability from various historical renewable energy programs primarily with individuals and small businesses.
(3) TVA sells the RECs resulting from some of its purchased power to certain customers. See Part II, Item 7, Management's Discussion and Analysis of Financial Condition and Results of Operations — *Key Initiatives and Challenges* — *Optimum Energy Portfolio* — *Renewable Power Purchase Agreements.*

Distributed Energy Resources

Consumer desire for energy choice, among other things, is driving the expectation for flexible options in the electric industry. TVA and LPCs are working together to leverage the strengths of the Tennessee Valley public power model to provide distributed energy solutions that are economical, sustainable, and flexible. TVA will focus on the safety and reliability impacts of these resources as they are interconnected to the grid and will aim to ensure that the pricing of electricity remains as low as feasible. Additional regulatory considerations and analysis may be required as the distributed energy resources ("DER") market, technologies, and programs evolve.

resulting in a $36 million decrease in fuel expenses. Additionally, fuel expense decreased $3 million due to lower demand for energy. Partially offsetting these decreases was an increase in fuel cost recovery of $21 million from the recognition of unplanned fuel costs that were deferred in the summer of 2022.

Purchased power expense decreased $288 million for the year ended September 30, 2023, as compared to the prior year. This decrease was primarily due to lower demand for energy due to overall milder weather and higher availability of nuclear generation resulting in a decrease of $335 million. Partially offsetting this decrease was an increase in fuel cost recovery of $45 million from the recognition of unplanned purchased power costs that were deferred in the summer of 2022, as well as an increase of $2 million from higher purchased power market prices.

Operating and maintenance expense increased $386 million for the year ended September 30, 2023, as compared to the prior year. This increase was primarily due to $110 million of increased payroll and benefit costs primarily due to labor escalation for cost of living increases and additional headcount to support operational needs, $73 million of increased expenditures related to TVA's New Nuclear Program, $43 million of increased outage expense primarily driven by increased scope for natural gas outages, Winter Storm Elliot, and power operations performance improvement activities, and $40 million of increased contract labor costs primarily related to power operations performance improvement activities and natural gas project work. In addition, there was an increase of other post-employment benefit expense of $37 million primarily due to the changes in discount rates.

Depreciation and amortization expense increased $159 million for the year ended September 30, 2023, as compared to the prior year, primarily driven by an increase of $85 million in depreciation expense associated with the retirements of Cumberland and Bull Run and an increase of $51 million in amortization expense of decommissioning costs recovered in rates. The remainder of the increase is primarily due to depreciation of additions to net completed plant. See Note 1 — *Summary of Significant Accounting Policies* — *Property, Plant, and Equipment, and Depreciation* — *Depreciation*.

Tax equivalents expense decreased $8 million for the year ended September 30, 2023, as compared to the prior year. This change is primarily driven by an decrease in the tax equivalents collected in the fuel cost recovery.

Generating Sources. The following tables show TVA's generation and purchased power by generating source as a percentage of all electrical power generated and purchased (based on kWh) for the periods indicated:

Total Power Supply by Generating Source
For the years ended September 30
(millions of kWh)

	2023		2022	
Nuclear	67,102	42 %	64,475	39 %
Natural gas and/or oil-fired[1]	34,467	22 %	36,259	22 %
Coal-fired	20,896	13 %	20,999	13 %
Hydroelectric	13,063	8 %	13,934	8 %
Total TVA-operated generation facilities[2][3]	135,528	85 %	135,667	82 %
Purchased power (natural gas and/or oil-fired)[4]	13,703	9 %	18,352	11 %
Purchased power (other renewables)[5]	6,247	4 %	6,141	4 %
Purchased power (coal-fired)	2,722	1 %	2,753	2 %
Purchased power (hydroelectric)	1,591	1 %	2,543	1 %
Total purchased power[3]	24,263	15 %	29,789	18 %
Total power supply	159,791	100 %	165,456	100 %

Notes
(1) The generation for 2023 includes 99 million kWh of pre-commercial generation at Colbert Combustion Turbine Units 9-11.
(2) Generation from TVA-owned renewable resources (non-hydroelectric) is less than one percent for all periods shown and therefore is not represented in the table above.
(3) Raccoon Mountain Pumped-Storage Plant net generation is allocated against each TVA-operated generation facility and purchased power type for both the year ended September 30, 2023, and the year ended September 30, 2022. See Part I, Item 1, Business — *Power Supply and Load Management Resources* — *Hydroelectric Pumped-Storage* for a discussion of Raccoon Mountain Pumped-Storage Plant.
(4) Purchased power (natural gas and/or oil-fired) includes generation from Caledonia CC, which is currently a leased facility operated by TVA. Generation from Caledonia CC was 4,030 million kWh and 4,797 million kWh for the years ended September 30, 2023 and 2022, respectively.
(5) Purchased power (other renewables) includes purchased power from the following renewable sources: solar, wind, biomass, and renewable cogeneration. TVA sells the Renewable Energy Certificates ("RECs") resulting from some of this purchased power to certain customers.

In addition to power supply sources included here, TVA offers energy efficiency programs that effectively reduced 2023 energy needs by about 2,100 net cumulative gigawatt hours or 1.3%.

Attachment 10

NES plots future for solar, beyond TVA

CAROLINE EGGERS APRIL 4, 2023

Nuno Marques / Unsplash

Since last August, three companies have announced new or expanded manufacturing operations for solar energy in Tennessee.

The Nashville Electric Service supplies electricity to Middle Tennessee.

Virtually all of that electricity is generated by the Tennessee Valley Authority. This is by design, encoded in the federal utility's evergreen contract with NES.

Under this contract, debuted back in 2019, NES can get 5% of its electricity needs from outside of TVA.

The power company now has a plan for this allowance.

"We're committed to getting all of that from renewable sources," NES CEO Teresa Broyles-Aplin told a crowd at the State of the Environment conference at Vanderbilt University last week.

For most of that 5%, which has been calculated at 175 megawatts, NES is developing a utility-scale solar project with Silicon Ranch, a solar company based in Nashville.

The project is expected to reduce costs to ratepayers.

"It's at a rate that's cheaper than what we pay TVA currently," Broyles-Aplin said.

NES will fill the remainder of the 5% through rooftop, ground mount and canopy solar being deployed by the city.

After the power company finishes these projects, Broyles-Aplin said she plans to go back to TVA to ask for a greater renewable allotment.

"I would like 15%," she said.

Jim Rossi, a Vanderbilt law professor, compared this limit on renewables to the rolling blackouts during the Arctic storm in December.

"TVA asked you to curtail customer usage by 10% in December, and yet they're not willing to allow you to produce 10% of the energy for your own customers," Rossi said to applause at the conference. "(TVA is) basically precluding us from having the resilience and reliability that every other distribution utility in the US is allowed to invest in."

Broyles-Aplin said NES is also about to undertake a promotional campaign to educate customers on how they can use the Inflation Reduction Act for rooftop solar projects.

The power company does not offer net metering, which is a system that allows customers to sell excess electricity that a home or building doesn't use back to the grid. NES has a monthly fee on residential customers with rooftop solar.

FILED UNDER: Environment, WPLN News

TAGGED WITH: Nashville Electric Service, Renewable Energy, Solar Power, Tennessee Valley Authority

RELATED POSTS:

TVA bet on gas for Arctic storms. It backfired.

TVA, NES ask Tennesseans to conserve electricity during blistering heat wave, a Band-Aid for a bigger problem

Tennessee has massive wind energy potential. Why is nobody talking about it?

Want solar panels? In Tennessee, only corporations and the wealthy can really afford them.

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Caroline Eggers, Environmental Reporter

Caroline Eggers covers environmental issues with a focus on equity for WPLN News through Report for America, a national service program that supports journalists in local newsrooms across the country. Before joining the station, she spent several years covering water quality issues, biodiversity, climate change and Mammoth Cave National Park for newsrooms in the South. Her reporting on homelessness and a runoff-related "fish kill" for the Bowling Green Daily News earned her 2020 Kentucky Press Association awards in the general news and extended coverage categories, respectively. Beyond deadlines, she is frequently dancing, playing piano and photographing wildlife and her poodle, Princess. She graduated from Emory University with majors in journalism and creative writing.

Attachment 11

period, and successive reports shall be due annually on the same date thereafter. Without limitation, Peloton acknowledges and agrees that failure to make such timely and accurate reports as required by this Agreement and Order may constitute a violation of Section 19(a)(3) of the CPSA and may subject the Firm to enforcement under section 22 of the CPSA.

36. Notwithstanding and in addition to the above, Peloton shall promptly provide written documentation of any changes or modifications to its compliance program or internal controls and procedures, including the effective dates of the changes or modifications thereto. Peloton shall cooperate fully and truthfully with staff and shall make available all non-privileged information and materials and personnel deemed necessary by staff to evaluate Peloton's compliance with the terms of the Agreement.

37. The parties acknowledge and agree that the Commission may publicize the terms of the Agreement and the Order.

38. Peloton represents that the Agreement:

(i) is entered into freely and voluntarily, without any degree of duress or compulsion whatsoever;

(ii) has been duly authorized; and

(iii) constitutes the valid and binding obligation of Peloton, enforceable against Peloton in accordance with its terms. The individuals signing the Agreement on behalf of Peloton represent and warrant that they are duly authorized by Peloton to execute the Agreement.

39. The signatories represent that they are authorized to execute this Agreement.

40. The Agreement is governed by the laws of the United States.

41. The Agreement and the Order shall apply to, and be binding upon, Peloton and each of its parents, successors, transferees, and assigns; and a violation of the Agreement or Order may subject Peloton, and each of its parents, successors, transferees, and assigns, to appropriate legal action.

42. The Agreement, any attachments, and the Order constitute the complete agreement between the parties on the subject matter contained therein.

43. The Agreement may be used in interpreting the Order. Understandings, agreements, representations, or interpretations apart from those contained in the Agreement and the Order may not be used to vary or contradict their terms. For purposes of construction, the Agreement shall be deemed to have been drafted by both of the parties and shall not, therefore, be construed against any party, for that reason, in any subsequent dispute.

44. The Agreement may not be waived, amended, modified, or otherwise altered, except as in accordance with the provisions of 16 CFR 1118.20(h). The Agreement may be executed in counterparts.

45. If any provision of the Agreement or the Order is held to be illegal, invalid, or unenforceable under present or future laws effective during the terms of the Agreement and the Order, such provision shall be fully severable. The balance of the Agreement and the Order shall remain in full force and effect, unless the Commission and Peloton agree in writing that severing the provision materially affects the purpose of the Agreement and the Order.

(Signatures on next page)

PELOTON INTERACTIVE, INC.
Dated: 12/8/22
By: /s/Barry McCarthy
Barry McCarthy, Peloton Interactive, Inc., CEO & President

Dated: 12/9/2022
By: /s/Erin M. Bosman
Erin M. Bosman, Morrison Foerster LLP, Counsel to Peloton Interactive, Inc.

U.S. CONSUMER PRODUCT SAFETY COMMISSION
Mary B. Murphy, Director
Leah Ippolito, Supervisory Attorney
Michael J. Rogal, Trial Attorney

Dated: 12/14/22
By: /s/Michael J. Rogal
Michael J. Rogal, Trial Attorney, Division of Enforcement and Litigation, Office of Compliance and Field Operations

United States of America Consumer Product Safety Commission

In the Matter of: PELOTON INTERACTIVE, INC.

CPSC Docket No.: 23–C0001

Order

Upon consideration of the Settlement Agreement entered into between Peloton Interactive, Inc. (''Peloton''), and the U.S. Consumer Product Safety Commission (''Commission'' or ''CPSC''), and the Commission having jurisdiction over the subject matter and over Peloton, and it appearing that the Settlement Agreement and the Order are in the public interest, the Settlement Agreement is incorporated by reference and it is:

Provisionally accepted and provisional Order issued on the 28th day of December, 2022.

By Order of the Commission.

/s/Alberta Mills
Alberta E. Mills,
Secretary, U.S. Consumer Product Safety Commission.

[FR Doc. 2023–00146 Filed 1–6–23; 8:45 am]
BILLING CODE 6355–01–P

COUNCIL ON ENVIRONMENTAL QUALITY

[CEQ–2022–0005]

RIN 0331–AA06

National Environmental Policy Act Guidance on Consideration of Greenhouse Gas Emissions and Climate Change

AGENCY: Council on Environmental Quality.

ACTION: Notice of interim guidance; request for comments.

SUMMARY: The Council on Environmental Quality (CEQ) is issuing this interim guidance to assist agencies in analyzing greenhouse gas (GHG) and climate change effects of their proposed actions under the National Environmental Policy Act (NEPA). CEQ is issuing this guidance as interim guidance so that agencies may make use of it immediately while CEQ seeks public comment on the guidance. CEQ intends to either revise the guidance in response to public comments or finalize the interim guidance.

DATES: This interim guidance is effective immediately. CEQ invites interested persons to submit comments on or before March 10, 2023.

ADDRESSES: You may submit comments, identified by docket number CEQ–2022–0005, by any of the following methods:

- *Federal eRulemaking Portal: https://www.regulations.gov.* Follow the instructions for submitting comments.
- *Fax:* 202–456–6546.
- *Mail:* Council on Environmental Quality, 730 Jackson Place NW, Washington, DC 20503.

All submissions received must include the agency name, ''Council on Environmental Quality,'' and the docket number, CEQ–2022–0005. All comments received will be posted without change to *https://www.regulations.gov,* including any personal information provided. Do not submit electronically any information you consider to be private, Confidential Business Information (CBI), or other information, the disclosure of which is restricted by statute.

FOR FURTHER INFORMATION CONTACT: Jomar Maldonado, Director for NEPA,

SUPPLEMENTARY INFORMATION:

I. Introduction

The Council on Environmental Quality (CEQ) issues this guidance to assist Federal agencies in their consideration of the effects of greenhouse gas (GHG) emissions [1] and climate change when evaluating proposed major Federal actions in accordance with the National Environmental Policy Act (NEPA) [2] and the CEQ Regulations Implementing the Procedural Provisions of NEPA (CEQ Regulations).[3] This guidance will facilitate compliance with existing NEPA requirements, improving the efficiency and consistency of reviews of proposed Federal actions for agencies, decision makers, project proponents, and the public.[4] This guidance provides Federal agencies a common approach for assessing their proposed actions, while recognizing each agency's unique circumstances and authorities.

The United States faces a profound climate crisis and there is little time left to avoid a dangerous—potentially catastrophic—climate trajectory. Climate change is a fundamental environmental issue, and its effects on the human environment fall squarely within NEPA's purview.[5] Major Federal actions may result in substantial GHG emissions or emissions reductions, so Federal leadership that is informed by sound analysis is crucial to addressing the climate crisis. Federal proposals may also be affected by climate change, so they should be designed in consideration of resilience and adaptation to a changing climate.[6] Climate change is a particularly complex challenge given its global nature and the inherent interrelationships among its sources and effects. Further, climate change raises environmental justice concerns because it will disproportionately and adversely affect human health and the environment in some communities, including communities of color, low-income communities, and Tribal Nations and Indigenous communities. Given the urgency of the climate crisis and NEPA's important role in providing critical information to decision makers and the public, NEPA reviews should quantify proposed actions' GHG emissions, place GHG emissions in appropriate context and disclose relevant GHG emissions and relevant climate impacts, and identify alternatives and mitigation measures to avoid or reduce GHG emissions. CEQ encourages agencies to mitigate GHG emissions associated with their proposed actions to the greatest extent possible, consistent with national, science-based GHG reduction policies established to avoid the worst impacts of climate change.[7]

As discussed in this guidance, when conducting climate change analyses in NEPA reviews, agencies should consider: (1) the potential effects of a proposed action on climate change, including by assessing both GHG emissions and reductions from the proposed action; and (2) the effects of climate change on a proposed action and its environmental impacts. Analyzing reasonably foreseeable climate effects in NEPA reviews [8] helps ensure that decisions are based on the best available science and account for the urgency of the climate crisis. Climate change analysis also enables agencies to evaluate reasonable alternatives and mitigation measures that could avoid or reduce potential climate change-related effects and help address mounting climate resilience and adaptation challenges.

Accurate and clear climate change analysis:

- Helps decision makers, stakeholders, and the public to identify and assess reasonable courses of action that will reduce GHG emissions and climate change effects;
- Enables agencies to make informed decisions to help meet applicable Federal, State, Tribal, regional, and local climate action goals; [9]
- Promotes climate change resilience and adaptation and prioritizes the national need to ensure climate-resilient infrastructure and operations, including by considering the reasonably foreseeable effects of climate change on infrastructure investments and the resources needed to protect such investments over their lifetime; [10]
- Protects national security by helping to identify and reduce climate change-related threats including potential resource conflicts, stresses to military operations and installations, and the potential for abrupt stressors; [11]
- Enables agencies to better understand and address the effects of climate change on vulnerable communities, thereby responding to environmental justice concerns and promoting resilience and adaptation;

[1] For purposes of this guidance, CEQ defines GHGs consistent with CEQ's *Federal Greenhouse Gas Accounting and Reporting Guidance* (Jan. 17, 2016), *https://www.sustainability.gov/pdfs/federal_ghg%20accounting_reporting-guidance.pdf* (carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, nitrogen trifluoride, and sulfur hexafluoride). Also, for purposes of this guidance, ''emissions'' includes release of stored GHGs as a result of land management activities affecting terrestrial GHG pools such as carbon stocks in forests and soils, as well as actions that affect the future changes in carbon stocks. To facilitate comparisons between emissions of the different GHGs, a common unit of measurement for GHGs is metric tons of CO_2 equivalent (mt CO_2-e).

[2] 42 U.S.C. 4321 *et seq.*

[3] 40 CFR parts 1500–1508.

[4] This guidance is not a rule or regulation, and the recommendations it contains may not apply to a particular situation based upon the individual facts and circumstances. This guidance does not change or substitute for any law, regulation, or other legally binding requirement, and is not legally enforceable. The use of non-mandatory language such as ''guidance,'' ''recommend,'' ''may,'' ''should,'' and ''can,'' describes CEQ policies and recommendations. The use of mandatory terminology such as ''must'' and ''required'' describes controlling requirements under the terms of NEPA and the CEQ regulations, but this document does not affect legally binding requirements.

[5] NEPA recognizes ''the profound impact of man's activity on the interrelations of all components of the natural environment . . . .'' 42 U.S.C. 4331(a). Among other things, it was enacted to promote efforts that will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of humans. 42 U.S.C. 4321. *See also* 42 U.S.C. 4332(2)(F) (requiring all Federal agencies to ''recognize the worldwide and long-range character of environmental problems'').

[6] *See* 42 U.S.C. 4332(2)(A) (directing agencies to ensure the use of ''the environmental design arts'' in planning and decision making).

[7] *See* White House Fact Sheet, *President Biden Sets 2030 Greenhouse Gas Pollution Reduction Target* (Apr. 22, 2021), *https://www.whitehouse.gov/briefing-room/statements-releases/2021/04/22/fact-sheet-president-biden-sets-2030-greenhouse-gas-pollution-reduction-target-aimed-at-creating-good-paying-union-jobs-and-securing-u-s-leadership-on-clean-energy-technologies/; see also* Executive Order (E.O.) 14008, *Tackling the Climate Crisis at Home and Abroad,* 86 FR 7619 (Jan. 25, 2021), *https://www.federalregister.gov/d/2021-02177;* E.O. 14057, *Catalyzing Clean Energy Industries and Jobs Through Federal Sustainability,* 86 FR 70935 (Dec. 13, 2021), *https://www.federalregister.gov/d/2021-27114.*

[8] The term ''NEPA review'' as used in this guidance includes the analysis, process, and documentation required under NEPA. While this document focuses on reviews conducted pursuant to NEPA, agencies should analyze GHG emissions and climate-resilient design issues early in the planning and development of proposed actions and projects under their substantive authorities.

[9] For example, the United States has set an economy-wide target of reducing its net GHG emissions by 50 to 52 percent below 2005 levels in 2030. *See* United Nations Framework Convention on Climate Change (UNFCC), U.S. Nationally Determined Contribution (Apr. 20, 2021), *https://unfccc.int/NDCREG.*

[10] Resilience is a priority for Federal agency actions. *See, e.g.,* E.O. 14057, *supra* note 7; *see also* E.O. 14008, *supra* note 7.

[11] *See, e.g.,* Nat'l Intel. Council, *Implications for U.S. National Security of Anticipated Climate Change* (Sept. 21, 2016), NIC WP 2016–01, *https://www.dni.gov/files/documents/Newsroom/Reports%20and%20Pubs/Implications_for_US_National_Security_of_Anticipated_Climate_Change.pdf; see also* Dep't of Def., Directive 4715.21, *Climate Change Adaptation and Resilience* (Jan. 14, 2016), *https://dod.defense.gov/Portals/1/Documents/pubs/471521p.pdf.*

• Supports the international leadership of the United States on climate issues; [12] and

• Enables agencies to better assess courses of action that will provide pollution reduction co-benefits and long-term cost savings and reduce litigation risk to Federal actions—including projects carried out pursuant to the Bipartisan Infrastructure Law [13] and the Inflation Reduction Act.[14]

This interim [15] GHG guidance, effective upon publication, builds upon and updates CEQ's 2016 *Final Guidance for Federal Departments and Agencies on Consideration of Greenhouse Gas Emissions and the Effects of Climate Change in National Environmental Policy Act Reviews (''2016 GHG Guidance''),* highlighting best practices for analysis grounded in science and agency experience.[16] CEQ is issuing this guidance to provide for greater clarity and more consistency in how agencies address climate change in NEPA reviews. This guidance applies longstanding NEPA principles to the analysis of climate change effects, which are a well-recognized category of effects on the human environment requiring consideration under NEPA. In fact, Federal agencies have been analyzing climate change impacts and GHG emissions in NEPA documents for many years. CEQ intends the guidance to assist agencies in publicly disclosing and considering the reasonably foreseeable effects of their proposed actions. CEQ encourages agencies to integrate the climate and other environmental considerations described in this guidance early in their planning processes. CEQ will review any agency proposals for revised NEPA procedures, including any revision of existing categorical exclusions, in light of this guidance.[17]

II. Summary of Key Content

This guidance explains how agencies should apply NEPA principles and existing best practices to their climate change analyses by:

• Recommending that agencies leverage early planning processes to integrate GHG emissions and climate change considerations into the identification of proposed actions, reasonable alternatives (as well as the no-action alternative), and potential mitigation and resilience measures;

• Recommending that agencies quantify a proposed action's projected GHG emissions or reductions for the expected lifetime of the action, considering available data and GHG quantification tools that are suitable for the proposed action;

• Recommending that agencies use projected GHG emissions associated with proposed actions and their reasonable alternatives to help assess potential climate change effects;

• Recommending that agencies provide additional context for GHG emissions, including through the use of the best available social cost of GHG (SC–GHG) estimates, to translate climate impacts into the more accessible metric of dollars, allow decision makers and the public to make comparisons, help evaluate the significance of an action's climate change effects, and better understand the tradeoffs associated with an action and its alternatives;

• Discussing methods to appropriately analyze reasonably foreseeable direct, indirect, and cumulative GHG emissions;

• Guiding agencies in considering reasonable alternatives and mitigation measures, as well as addressing short- and long-term climate change effects;

• Advising agencies to use the best available information and science when assessing the potential future state of the affected environment in NEPA analyses and providing up to date examples of existing sources of scientific information;

• Recommending agencies use the information developed during the NEPA review to consider reasonable alternatives that would make the actions and affected communities more resilient to the effects of a changing climate;

• Outlining unique considerations for agencies analyzing biogenic carbon dioxide sources and carbon stocks [18] associated with land and resource management actions under NEPA;

• Advising agencies that the ''rule of reason'' inherent in NEPA and the CEQ Regulations should guide agencies in determining, based on their expertise and experience, how to consider an environmental effect and prepare an analysis based on the available information; and

• Reminding agencies to incorporate environmental justice considerations into their analyses of climate-related effects, consistent with Executive Orders 12898 and 14008.

III. Background

Consistent with NEPA, climate change analysis is a critical component of environmental reviews and integral to Federal agencies managing and addressing climate change.[19] Recognizing the increasing urgency of the climate crisis and advances in climate science and GHG analysis techniques, CEQ has clarified and updated its 2016 GHG guidance on particular components including basic updates to reflect developments in climate science, methods to provide context for the impacts associated with GHG emissions, analysis of indirect effects, programmatic approaches, and environmental justice considerations. This guidance is applicable to all Federal actions subject to NEPA, with a focus on those for which an environmental assessment or environmental impact statement is prepared.[20] This guidance does not—and cannot—expand the range of Federal agency actions that are subject to NEPA.[21]

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[12] *See* 42 U.S.C. 4332(2)(F) (requiring all Federal agencies to ''recognize the worldwide and long-range character of environmental problems'').

[13] Infrastructure Investment and Jobs Act, Public Law 117–58, 135 Stat. 429.

[14] Public Law 117–169, 136 Stat. 1818.

[15] CEQ is issuing this guidance as interim guidance so that agencies may make use of it immediately while CEQ seeks public comment on the guidance. CEQ may revise the guidance in response to public comments or finalize the interim guidance at a later date.

[16] CEQ, Final Guidance for Federal Departments and Agencies on Consideration of Greenhouse Gas Emissions and the Effects of Climate Change in National Environmental Policy Act Reviews, 81 FR 51866 (Aug. 8, 2016), *https://ceq.doe.gov/docs/ceq-regulations-and-guidance/nepa_final_ghg_guidance.pdf.* On April 5, 2017, CEQ withdrew the final 2016 guidance, as directed by E.O. 13783. 82 FR 16576 (Apr. 5, 2017). On June 26, 2019, CEQ issued draft GHG guidance. 84 FR 30097 (June 26, 2019). CEQ rescinded this draft guidance on February 19, 2021, pursuant to E.O. 13990. 86 FR 10252 (Feb. 19, 2021). In addition, on April 20, 2022, CEQ issued a Final Rule for its ''Phase 1'' NEPA rulemaking. 87 FR 23453. CEQ will be proceeding with updates to the NEPA regulations as set forth in the 2022 Regulatory Agenda.

[17] *See* 40 CFR 1507.3. Agencies should review their policies and implementing procedures and revise them as necessary to ensure compliance with NEPA. Agency NEPA implementing procedures can be, but are not required to be, in the form of regulation. Section 1507.3 encourages agencies to publish explanatory guidance, and agencies also should consider whether any updates to explanatory guidance are necessary in light of this guidance.

[18] *See infra* section IV(I).

[19] This updated guidance is also consistent with E.O.s 13990, 14008, and 14057, which set forth commitments to address climate change; direct that Federal infrastructure investment reduce climate pollution; and that Federal permitting decisions consider the effects of GHG emissions and climate change. *See* E.O. 13990, 86 FR 7037 (Jan. 25, 2021); E.O. 14008, *supra* note 7; E.O. 14057, *supra* note 7.

[20] Notwithstanding this focus, where appropriate, agencies also should apply this guidance to consider climate impacts and GHG emissions in establishing new categorical exclusions (CEs) and extraordinary circumstances in their agency NEPA procedures. *See* 40 CFR 1507.3(e)(2)(ii); CEQ, Final Guidance for Federal Departments and Agencies on Establishing, Applying, and Revising Categorical Exclusions Under the National Environmental Policy Act, 75 FR 75628 (Dec. 6, 2010).

[21] *See* 40 CFR 1508.1(q).

A. NEPA

NEPA is designed to promote consideration of potential effects on the human environment [22] that would result from proposed Federal agency actions, and to provide the public and decision makers with useful information regarding reasonable alternatives [23] and mitigation measures to improve the environmental outcomes of Federal agency actions. NEPA encourages early planning, ensures that the environmental effects of proposed actions are considered before decisions are made, and informs the public of significant environmental effects of proposed Federal agency actions, promoting transparency and accountability.[24]

Agencies implement NEPA through one of three levels of analysis: a categorical exclusion (CE); an environmental assessment (EA); or an environmental impact statement (EIS). Agencies have discretion in how they tailor their individual NEPA reviews in consideration of this guidance, consistent with the CEQ Regulations and their respective implementing procedures and policies.[25] NEPA reviews should identify measures to avoid, minimize, or mitigate adverse effects of Federal agency actions.[26] Better analysis and informed decisions are the ultimate goal of the NEPA process.[27] Inherent in NEPA and the CEQ Regulations is a ''rule of reason'' that allows agencies to determine, based on their expertise and experience, how to consider an environmental effect and prepare an analysis based on the available information. The usefulness of that information to the decision-making process and the public, and the extent of the anticipated environmental consequences, are important factors to consider when applying that ''rule of reason.''

B. Climate Change

Climate change is a defining national and global environmental challenge of this time, threatening broad and potentially catastrophic impacts to the human environment. It is well established that rising global atmospheric GHG concentrations are substantially affecting the Earth's climate, and that the dramatic observed increases in GHG concentrations since 1750 are unequivocally caused by human activities including fossil fuel combustion.[28] CEQ's first Annual Report in 1970 discussed the various ways that human-driven actions were understood to potentially alter global temperatures and weather patterns.[29] At that time, the mean level of atmospheric carbon dioxide (CO_2) had been measured as increasing to 325 parts per million (ppm) from a pre-Industrial average of 280 ppm.[30] Since 1970, the global average concentration of atmospheric CO_2 has increased to 414.21 ppm as of 2021, setting a new record high.[31] Methane is a potent GHG; over a 100-year period, the emissions of a ton of methane contribute 28 to 36 times as much to global warming as a ton of carbon dioxide. Over a 20-year timeframe, methane is about 84 times as potent as carbon dioxide.[32] Concentrations of methane (CH_4), have more than doubled from pre-Industrial levels.[33] Methane concentrations continue to grow rapidly.[34] Concentrations of other GHGs have similarly continued to grow, including nitrous oxide (N_2O) and hydrofluorocarbons (HFC).[35] Since the publication of CEQ's first Annual Report, human activities have caused the carbon dioxide content of the atmosphere of our planet to increase to

[22] 42 U.S.C. 4331(a) (''[R]ecognizing the profound impact of [human] activity on the interrelations of all components of the natural environment . . . .'').

[23] 40 CFR 1501.9(e)(2) (''Alternatives, which include the no action alternative; other reasonable courses of action; and mitigation measures (not in the proposed action).'').

[24] *See* 42 U.S.C. 4332 and 40 CFR 1501.2.

[25] *See* 40 CFR 1502.23 (methodology and scientific accuracy).

[26] 40 CFR 1505.2(a)(3).

[27] 40 CFR 1500.1(a) (''NEPA's purpose is . . . to provide for informed decision making and foster excellent action.'').

[28] *See, e.g.,* Intergovernmental Panel on Climate Change (IPCC), *Climate Change 2021: The Physical Science Basis* (''The Physical Science Basis''), *Summary for Policymakers,* SPM–5 (Aug. 7, 2021), *https://www.ipcc.ch/report/ar6/wg1/chapter/summary-for-policymakers/* (''Observed increases in well-mixed greenhouse gas (GHG) concentrations since around 1750 are unequivocally caused by human activities''); *see also id., Technical Summary,* TS–45, *https://www.ipcc.ch/report/ar6/wg1/chapter/technical-summary/;* United States Global Change Research Program (''USGCRP''), *Fourth National Climate Assessment* (''Fourth National Climate Assessment''), *Volume II: Impacts, Risks, and Adaptation in the United States,* 76 (2018), *https://nca2018.globalchange.gov/* (''Many lines of evidence demonstrate that human activities, especially emissions of greenhouse gases from fossil fuel combustion, deforestation, and land-use change, are primarily responsible for the climate changes observed in the industrial era, especially over the last six decades''); IPCC, *Climate Change 2014 Synthesis Report,* 46 (2014), *https://www.ipcc.ch/site/assets/uploads/2018/05/SYR_AR5_FINAL_full_wcover.pdf* (''Emissions of CO_2 from fossil fuel combustion and industrial processes contributed about 78% of the total GHG emissions increase from 1970 to 2010, with a similar percentage contribution for the increase during the period 2000 to 2010 (high confidence).''). These conclusions are built upon a robust scientific record that has been created with substantial contributions from the USGCRP, which informs the United States' response to global climate change through coordinated Federal programs of research, education, communication, and decision support. *See* section 103, Public Law 101–606, 104 Stat. 3096. For additional information on the USGCRP, visit *http://www.globalchange.gov.* The USGCRP, formerly the Climate Change Science Program, coordinates and integrates the activities of 13 Federal agencies that conduct research on changes in the global environment and their implications for society. The USGCRP began as a Presidential initiative in 1989 and was codified in the Global Change Research Act of 1990 (Pub. L. 101–606). USGCRP-participating agencies are the Departments of Agriculture, Commerce, Defense, Energy, the Interior, Health and Human Services, State, and Transportation; the U.S. Agency for International Development, the Environmental Protection Agency, NASA, the National Science Foundation, and the Smithsonian Institution.

[29] *See* CEQ, *Environmental Quality: The First Annual Report,* 93 (Aug. 1970), *https://ceq.doe.gov/ceq-reports/annual_environmental_quality_reports.html.*

[30] *See* USGCRP, *Climate Change Impacts in the United States: The Third National Climate Assessment, Appendix 3: Climate Science Supplement,* 739 (J.M. Melillo et al. eds., 2014) (''Third National Climate Assessment''), U.S. Env't Protection Agency (EPA), EPA 430–R–15–004, *Inventory of U.S. Greenhouse Gas Emissions and Sinks, 1990–2013* (Apr. 2015), *https://www.epa.gov/sites/default/files/2015-12/documents/us-ghg-inventory-2015-main-text.pdf; see also* D.L. Hartmann et al., *Observations: Atmosphere and Surface, in Climate Change 2013: The Physical Science Basis.* Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (T.F. Stocker et al. eds., Cambridge Univ. Press 2013), *https://archive.ipcc.ch/pdf/assessment-report/ar5/wg1/WG1AR5_Chapter02_FINAL.pdf.*

[31] Nat'l Oceanic and Atmospheric Admin. (NOAA), *Climate Change: Atmospheric Carbon Dioxide* (June 23, 2022), *https://www.climate.gov/news-features/understanding-climate/climate-change-atmospheric-carbon-dioxide.*

[32] Although there are different ways to weight methane compared to carbon dioxide, the U.S. nationally determined contribution (NDC) under the Paris Agreement uses the 100-year GWP from the IPCC's Fifth Assessment Report. *See* IPCC, *Climate Change 2014 Synthesis Report, supra* note 28, at 5. To avoid potential ambiguity, CEQ encourages agencies to use the 100-year GWP when disclosing the GHG emissions impact from an action in their NEPA documents.

[33] *See* EPA, Proposed Rule on Standards of Performance for New, Reconstructed, and Modified Sources and Emissions Guidelines for Existing Sources: Oil and Natural Gas Sector Climate Review, 86 FR 63110, 63114 (Nov. 15, 2021), *https://www.federalregister.gov/d/2021-24202; see also* Climate and Clean Air Coalition and United Nations Environment Programme (UNEP), *Global Methane Assessment,* 18 (2021), *https://www.ccacoalition.org/en/resources/global-methane-assessment-full-report;* USGCRP, Fourth National Climate Assessment, *supra* note 28, Volume I, 82. Methane emissions are responsible for about 20 percent of climate forcing globally. *See* California Air Resources Board, *Short-Lived Climate Pollutant Reduction Strategy,* 7 (Mar. 2017), *https://ww2.arb.ca.gov/sites/default/files/2020-07/final_SLCP_strategy.pdf.*

[34] *See, e.g.,* NOAA, *Increase in atmospheric methane set another record during 2021* (Apr. 7, 2022), *https://www.noaa.gov/news-release/increase-in-atmospheric-methane-set-another-record-during-2021.*

[35] *See* USGCRP, Fourth National Climate Assessment, *supra* note 28, Volume I, 81 (Figure 2.5).

its highest level in at least 800,000 years.[36]

Rising GHG levels are causing corresponding increases in average global temperatures and in the frequency and severity of natural disasters including storms, flooding, and wildfires.[37] Even if the United States and the world meet ambitious decarbonization targets, those trends will continue for many years, adversely affecting critical components of the human environment, including water availability, ocean acidity, sea-level rise, ecosystem functions, biodiversity, energy production, energy transmission and distribution, agriculture and food security, air quality, and human health.[38]

Based primarily on the scientific assessments of the U.S. Global Change Research Program (USGCRP), the National Research Council, and the Intergovernmental Panel on Climate Change (IPCC), in 2009 the Environmental Protection Agency (EPA) issued a finding that declared that the changes in our climate caused by elevated concentrations of GHGs in the atmosphere are reasonably anticipated to endanger the public health and welfare of current and future generations.[39] Since then, EPA has acknowledged more recent scientific assessments that highlight the urgency of addressing the rising concentration of GHGs in the atmosphere [40] and has found that certain communities, including communities of color, low-income communities, Tribal Nations and Indigenous communities, are especially vulnerable to climate-related effects.[41] Climate change also is likely to increase a community's vulnerability to other environmental impacts, further exacerbating environmental justice concerns. The effects of climate change observed to date and projected to occur in the future include more frequent and intense heat waves, longer fire seasons and more severe wildfires, degraded air quality, increased drought, greater sea-level rise, an increase in the intensity and frequency of extreme weather events, harm to water resources, harm to agriculture, ocean acidification, and harm to wildlife and ecosystems.[42] The IPCC Assessment Report reinforces these findings by providing scientific evidence of the impacts of climate change driven by human-induced GHG emissions, on our ecosystems, infrastructure, human health, and socioeconomic makeup.[43] Moreover, the effects of climate change are likely to fall disproportionately on vulnerable communities, including communities of color, low-income communities and Tribal Nations and Indigenous communities with environmental justice concerns.[44]

IV. Quantifying, Disclosing, and Contextualizing Climate Impacts, and Addressing the Potential Climate Change Effects of Proposed Federal Actions

Consistent with section 102(2)(C) of NEPA, Federal agencies must disclose and consider the reasonably foreseeable effects of their proposed actions including the extent to which a proposed action and its reasonable alternatives (including the no action alternative) would result in reasonably foreseeable GHG emissions that contribute to climate change. Federal agencies also should consider the ways in which a changing climate may impact the proposed action and its reasonable alternatives, and change the action's environmental effects over the lifetime of those effects.

This guidance is intended to assist agencies in disclosing and considering the effects of GHG emissions and climate change. This guidance does not establish any particular quantity of GHG emissions as ''significantly'' affecting the quality of the human environment. However, quantifying a proposed action's reasonably foreseeable GHG emissions whenever possible, and placing those emissions in appropriate context are important components of analyzing a proposed action's reasonably foreseeable climate change effects.

This section of the guidance identifies and explains the following steps agencies should take when analyzing a proposed action's climate change effects under NEPA:

(1) Quantify the reasonably foreseeable GHG emissions (including direct and indirect emissions) of a proposed action, the no action alternative, and any reasonable alternatives as discussed in Section IV(A) below.

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[36] *See* Nat'l Aeronautics and Space Admin. (NASA) Earth Observatory, *The Carbon Cycle* (June 16, 2011), *http://earthobservatory.nasa.gov/Features/CarbonCycle;* Univ. of Cal. Riverside, NASA, and Riverside Unified School District, *Down to Earth Climate Change, http://globalclimate.ucr.edu/resources.html;* USGCRP, Fourth National Climate Assessment, *supra* note 28, Volume II, 1454.

[37] *See* IPCC, *Climate Change 2022: Impacts, Adaptation, and Vulnerability* (''Climate Change 2022''), *Summary for Policymakers,* 8 (H.-O. Pörtner et al. eds., 2022), *https://www.ipcc.ch/report/sixth-assessment-report-working-group-ii/;* USGCRP, Fourth National Climate Assessment, *supra* note 28, Climate Science Special Report, Chapter 7, 207, *https://science2017.globalchange.gov/downloads/CSSR_Ch7_Precipitation.pdf;* NOAA, *Climate Change Increased Chances of Record Rains in Louisiana by at Least 40 Percent* (Sept. 7, 2016, *https://www.noaa.gov/media-release/climate-change-increased-chances-of-record-rains-in-louisiana-by-at-least-40-percent.*

[38] *See* USGCRP, Fourth National Climate Assessment, *supra* note 28; IPCC, *Special Report on the Ocean and Cryosphere in a Changing Climate,* (H.-O. Portner et al., eds., 2019), *https://www.ipcc.ch/srocc/;* IPCC, *Special Report on Climate Change and Land,* (P.R. Shukla et al., eds., 2019), *https://www.ipcc.ch/srccl/; see also* USGCRP, *http://www.globalchange.gov;* 40 CFR 1508.1(g)(4) (''effects include ecological (such as the effects on natural resources and on the components, structures, and functioning of affected ecosystems), aesthetic, historic, cultural, economic, social, or health'' effects); USGCRP, *The Impacts of Climate Change on Human Health in the United States: A Scientific Assessment* (2016), *https://health2016.globalchange.gov/.*

[39] *See generally* EPA, Endangerment and Cause or Contribute Findings for Greenhouse Gases Under Section 202(a) of the Clean Air Act; Final Rule, 74 FR 66496 (Dec. 15, 2009) (noting, for example, ''[t]he evidence concerning how human-induced climate change may alter extreme weather events also clearly supports a finding of endangerment, given the serious adverse impacts that can result from such events and the increase in risk, even if small, of the occurrence and intensity of events such as hurricanes and floods. Additionally, public health is expected to be adversely affected by an increase in the severity of coastal storm events due to rising sea levels,'' *id.* at 66497–98).

[40] See EPA, Final Rule for Phasedown of Hydrofluorocarbons: Establishing the Allowance Allocation and Trading Program Under the American Innovation and Manufacturing Act, 86 FR 55124 (Oct. 5, 2021), *https://www.federalregister.gov/d/2021-21030.*

[41] *See* EPA, *Final Rule for Carbon Pollution Emission Guidelines for Existing Stationary Sources Electric Utility Generating Units,* 80 FR 64661, 64647 (Oct. 23, 2015), *https://www.federalregister.gov/d/2015-22842* (''[c]ertain groups, including children, the elderly, and the poor, are most vulnerable to climate-related effects.'' Recent studies also find that certain communities, including low-income communities and some communities of color . . . are disproportionately affected by certain climate change related impacts—including heat waves, degraded air quality, and extreme weather events—which are associated with increased deaths, illnesses, and economic challenges. Studies also find that climate change poses particular threats to the health, well-being, and ways of life of indigenous peoples in the U.S.); *see also* EPA, EPA 430–R–21–003, *Climate Change and Social Vulnerability in the United States: A Focus on Six Impacts* (''Six Impacts'') (Sept. 2021), *https://www.epa.gov/system/files/documents/2021-09/climate-vulnerability_september-2021_508.pdf.*

[42] *See* 80 FR 64647, *supra* note 41; *see also* USGCRP, Fourth National Climate Assessment, *supra* note 28, Volume II, Chapters 2–12 (Sectors) and Chapters 18–27 (Regions); Thomas R. Knutson et. al., *Global Projections of Intense Tropical Cyclone Activity for the Late Twenty-First Century from Dynamical Downscaling of CMIP5/RCP4.5 Scenarios,* 7221 (Sep. 15, 2015), *https://journals.ametsoc.org/view/journals/clim/28/18/jcli-d-15-0129.1.xml;* Ashley E. Payne et. al., *Responses and Impacts of Atmospheric Rivers to Climate Change,* 143, 154 (Mar. 9, 2020), *https://www.nature.com/articles/s43017-020-0030-5;* IPCC, *Climate Change 2022, supra* note 37; IPCC, *Special Report on Climate Change and Land, supra* note 38, at 270–72; U.S. Nat'l Park Service (NPS), *Wildlife and Climate Change* (last updated Dec. 8, 2021), *https://www.nps.gov/articles/000/wildlife-climateimpact.htm.*

[43] See IPCC, *Climate Change 2022,* supra note 37, *Summary for Policymakers.*

[44] See, *e.g.,* EPA, Six Impacts, supra note 41.

(2) Disclose and provide context for the GHG emissions and climate impacts associated with a proposed action and alternatives, including by, as relevant, monetizing climate damages using estimates of the SC–GHG, placing emissions in the context of relevant climate action goals and commitments, and providing common equivalents, as described below in Section IV(B).

(3) Analyze reasonable alternatives, including those that would reduce GHG emissions relative to baseline conditions, and identify available mitigation measures to avoid, minimize, or compensate for climate effects.

A. Quantifying a Proposed Action's GHG Emissions

To ensure that Federal agencies consider the incremental contribution of their actions to climate change, agencies should quantify the reasonably foreseeable direct and indirect GHG emissions of their proposed actions and reasonable alternatives (as well as the no-action alternative) and provide additional context to describe the effects associated with those projected emissions in NEPA analysis.[45]

Climate change results from an increase in atmospheric GHG concentrations from the incremental addition of GHG emissions from a vast multitude of individual sources.[46] The totality of climate change impacts is not attributable to any single action, but is exacerbated by a series of actions including actions taken pursuant to decisions of the Federal Government. Therefore, it is crucial for the Federal Government to analyze and consider the potential climate change effects of its proposed actions.[47]

NEPA requires more than a statement that emissions from a proposed Federal action or its alternatives represent only a small fraction of global or domestic emissions. Such a statement merely notes the nature of the climate change challenge, and is not a useful basis for deciding whether or to what extent to consider climate change effects under NEPA. Moreover, such comparisons and fractions also are not an appropriate method for characterizing the extent of a proposed action's and its alternatives' contributions to climate change because this approach does not reveal anything beyond the nature of the climate change challenge itself—the fact that diverse individual sources of emissions each make a relatively small addition to global atmospheric GHG concentrations that collectively have a large effect.

Therefore, when considering GHG emissions and their significance, agencies should use appropriate tools and methodologies to quantify GHG emissions, compare GHG emission quantities across alternative scenarios (including the no action alternative), and place emissions in relevant context, including how they relate to climate action commitments and goals. This approach allows an agency to present the environmental and public health effects of a proposed action in clear terms and with sufficient information to make a reasoned choice between no action and other alternatives and appropriate mitigation measures. This approach will also ensure the professional and scientific integrity of the NEPA review.[48]

As part of the NEPA documents they prepare, agencies should quantify the reasonably foreseeable gross GHG emissions increases and gross GHG emission reductions[49] for the proposed action, no action alternative, and any reasonable alternatives over their projected lifetime, using reasonably available information and data.[50] Agencies generally should quantify gross emissions increases or reductions (including both direct and indirect emissions) individually by GHG, as well as aggregated in terms of total CO_2 equivalence[51] by factoring in each pollutant's global warming potential (GWP), using the best available science and data.[52] Agencies also should quantify proposed actions' total net GHG emissions or reductions[53] (both by pollutant and by total CO_2-equivalent emissions) relative to baseline conditions.[54] To facilitate readability, agencies should include an overview of this information in the summary sections of EISs and, when relevant, in the summary section of EAs. Agencies also may use visual tools, such as charts and figures, to help readers more easily comprehend emissions data and compare emissions across alternatives.

Where feasible, agencies should also present annual GHG emission increases or reductions. This is particularly important where a proposed action presents both reasonably foreseeable GHG emission increases and GHG emission reductions. The agency generally should present annual GHG emissions increases or reductions, as well as net GHG emissions over the projected lifetime of the action, consistent with existing best practices.[55] Agencies should be guided by a rule of reason and the concept of proportionality in undertaking this analysis, particularly for proposed actions with net beneficial climate effects, as described below.

Quantification and assessment tools are widely available and are already in broad use in the Federal Government and private sector, by state and local governments, and globally. CEQ maintains a GHG Accounting Tools website listing many such tools.[56] These tools are designed to assist agencies, institutions, organizations, and companies that have different levels of

[45] *See* 40 CFR 1502.16.

[46] Some sources emit GHGs in quantities that are orders of magnitude greater than others. *See* EPA, *Greenhouse Gas Reporting Program, 2021 Reported Data,* Figure 1: Direct GHG Emissions Reported by Sector (2021), *https://www.epa.gov/ghgreporting/ghgrp-reported-data* (showing amounts of GHG emissions by sector).

[47] In addition to NEPA's requirement to describe the environmental impacts of the proposed action and any adverse environmental effects that cannot be avoided should the proposal be implemented, 42 U.S.C. 4332(2)(C)), NEPA also articulates a policy to use all practicable means and measures ''to foster and promote the general welfare, to create and maintain conditions under which [humans] and nature can exist in productive harmony, and fulfill the social, economic, and other requirements of present and future generations of Americans,'' including by ''attain[ing] the widest range of beneficial uses of the environment without degradation, risk to health or safety, or other undesirable and unintended consequences.'' 42 U.S.C. 4331(a)–(b).

[48] *See* 40 CFR 1502.23 (requiring agencies to ensure the professional and scientific integrity of the discussions and analyses in environmental impact statements).

[49] Note that agencies should be guided by a rule of reason and the concept of proportionality in undertaking this analysis, particularly for proposed actions with net beneficial climate effects, as described in Section IV(A).

[50] *See, e.g., Sierra Club* v. *Fed. Energy Regul. Comm'n,* 867 F.3d 1357, 1374 (D.C. Cir. 2017); *San Juan Citizens Alliance* v. *Bureau of Land Mgmt.,* 326 F. Supp. 3d 1227, 1241–44 (D.N.M. 2018); *see generally Scientists' Inst. for Pub. Info., Inc.* v. *Atomic Energy Comm'n,* 481 F.2d 1079, 1092 (D.C. Cir 1973) (''Reasonable forecasting and speculation is thus implicit in NEPA, and we must reject any attempt by agencies to shirk their responsibilities under NEPA by labeling any and all discussion of future environmental effects as 'crystal ball inquiry.' '').

[51] This is typically expressed in metric tons of CO_2 equivalent, or mt CO_2-e.

[52] As discussed above, methane is a potent GHG. *See supra* note 32.

[53] Net emissions can be calculated by totaling gross emissions (all reasonably foreseeable direct and indirect GHG emissions from the proposed action) and subtracting any gross emissions reductions from the proposed action, such as renewable energy generation that will displace more carbon intensive energy sources or the addition of carbon sinks. The resulting net value may be either a net increase in total GHG emissions or a net decrease in emissions. In rare circumstances, agencies should consider whether a significant delay between increased emissions and decreased emissions could undermine the value of a net emissions calculation as a metric of climate impact.

[54] *See infra* section IV(D).

[55] For example, certain types of actions may involve construction emissions in their first year or two, followed by operational emissions increases in a few years prior to achieving net emissions reductions in later years.

[56] *See* CEQ, *GHG Tools and Resources, https://ceq.doe.gov/guidance/ghg-tools-and-resources.html.*

technical sophistication, data availability, and GHG source profiles. Agencies should use tools that reflect the best available science and data. These tools can provide GHG emissions estimates, including emissions from fossil fuel combustion and carbon sequestration [57] for many of the sources and sinks potentially affected by proposed resource management actions.[58] When considering which tools to employ, it is important to consider the proposed action's temporal scale and the availability of input data.[59] Furthermore, agencies should seek to obtain the information needed to quantify GHG emissions, including by requesting or requiring information held by project applicants or by conducting modeling when relevant.

In the rare instance when an agency determines that tools, methodologies, or data inputs are not reasonably available to quantify GHG emissions associated with a specific action, the agency should explain why such an analysis cannot be done, and should seek to present a reasonable estimated range of quantitative emissions for the proposed action and alternatives. Where tools are available for some aspects of the analysis but not others, agencies should use all reasonably available tools and describe any relevant limitations. Agencies are encouraged to identify and communicate any data or tool gaps that they encounter to CEQ.

If an agency determines that it cannot provide even a reasonable range of potential GHG emissions, the agency should provide a qualitative analysis and its rationale for determining that a quantitative analysis is not possible. A qualitative analysis may include sector-specific descriptions of the GHG emissions from the category of Federal agency action that is the subject of the NEPA analysis, but should seek to provide additional context for potential resulting emissions.

Agencies should be guided by the rule of reason, as well as their expertise and experience, in conducting analysis commensurate with the quantity of projected GHG emissions and using GHG quantification tools suitable for the proposed action.[60] The rule of reason and the concept of proportionality caution against providing an in-depth analysis of emissions regardless of the insignificance of the quantity of GHG emissions that the proposed action would cause. For example, some proposed actions may involve net GHG emission reductions or no net GHG increase, such as certain infrastructure or renewable energy projects. For such actions, agencies should generally quantify projected GHG emission reductions, but may apply the rule of reason when determining the appropriate depth of analysis such that precision regarding emission reduction benefits does not come at the expense of efficient and accessible analysis. Absent exceptional circumstances, the relative minor and short-term GHG emissions associated with construction of certain renewable energy projects, such as utility-scale solar and offshore wind, should not warrant a detailed analysis of lifetime GHG emissions. As a second example, actions with only small GHG emissions may be able to rely on less detailed emissions estimates.

B. Disclosing and Providing Context for a Proposed Action's GHG Emissions and Climate Effects

In addition to quantifying emissions as described in Section IV(A), agencies should disclose and provide context for GHG emissions and climate effects to help decision makers and the public understand proposed actions' potential GHG emissions and climate change effects. To disclose effects and provide additional context for proposed actions' emissions once GHG emissions have been estimated, agencies should use the following best practices, as relevant:

(1) In most circumstances, once agencies have quantified GHG emissions, they should apply the best available estimates of the SC–GHG [61] to the incremental metric tons of each individual type of GHG emissions [62] expected from a proposed action and its alternatives.[63] SC–GHG estimates allow monetization (presented in U.S. dollars) of the climate change effects from the marginal or incremental emission of GHG emissions, including carbon dioxide, methane, and nitrous oxide.[64] These 3 GHGs represent more than 97 percent of U.S. GHG emissions.[65] The SC–GHG provides an appropriate and valuable metric that gives decision makers and the public useful information and context about a proposed action's climate effects even if no other costs or benefits are monetized, because metric tons of GHGs can be difficult to understand and assess the significance of in the abstract.[66] The SC–GHG translates metric tons of emissions into the familiar unit of dollars, allows for comparisons to other monetized values, and estimates the damages associated with GHG emissions over time and associated with different GHG pollutants.[67] The SC–GHG also can

[57] Carbon sequestration is the long-term carbon storage in plants, soils, geologic formations, and oceans.

[58] For example, the U.S. Department of Agriculture's (USDA's) Forest Inventory and Analysis tool can be used to assess the carbon sequestration of existing forestry activities along with the reduction in carbon sequestration (emissions) of project-level activities. *See* USDA, *Forest Inventory Data & Tools (FIA), https://www.fs.usda.gov/research/products/dataandtools/forestinventorydata.*

[59] *See* 40 CFR 1502.21.

[60] *See* 40 CFR 1502.2(b) (environmental impact statements shall discuss impacts in proportion to their significance); 40 CFR 1502.15 (data and analyses in a statement shall be commensurate with the importance of the impact).

[61] The SC–GHG estimates provide an aggregated monetary measure (in U.S. dollars) of the future stream of damages associated with an incremental metric ton of emissions and associated physical damages (*e.g.,* temperature increase, sea-level rise, infrastructure damage, human health effects) in a particular year. The ''Technical Support Document: Social Cost of Carbon, Methane, and Nitrous Oxide Interim Estimates under Executive Order 13990'' released by the Interagency Working Group on Social Cost of Greenhouse Gases (IWG SC–GHG) in February 2021 presents interim estimates of the social cost of carbon, methane, and nitrous oxide, which are the same as those developed by the IWG in 2013 and 2016 (updated to 2020 dollars). *See* IWG SC–GHG, U.S. Gov't, *Technical Support Document: Social Cost of Carbon, Methane, and Nitrous Oxide Interim Estimates under Executive Order 13990* (Feb. 2021), *https://www.whitehouse.gov/wp-content/uploads/2021/02/TechnicalSupportDocument_SocialCostofCarbonMethaneNitrousOxide.pdf.* The Technical Support Document notes that estimates of the SC–GHG have been used in NEPA analysis.

[62] Note that applying the specific social cost of each individual GHG to the quantifications of that GHG is more accurate than transforming the gases into CO_2-equivalents and then multiplying the CO_2-equivalents by the social cost of CO_2. *See* IWG SC–GHG, U.S. Gov't, *Addendum to Technical Support Document on Social Cost of Carbon for Regulatory Impact Analysis under Executive Order 12866: Application of the Methodology to Estimate the Social Cost of Methane and the Social Cost of Nitrous Oxide,* 2 (Aug. 2016), *https://www.epa.gov/sites/default/files/2016-12/documents/addendum_to_sc-ghg_tsd_august_2016.pdf.*

[63] *See* IWG SC–GHG, *Technical Support Document, supra* note 61. Agencies should typically apply the best available estimates of the SC–GHG to the incremental metric tons of GHG emissions expected from a proposed action and its alternatives. In uncommon circumstances, an agency may choose not to do so if doing so would be confusing, there are no available estimates for the GHG at issue, or, consistent with the concept of proportionality, an agency does not produce a quantitative estimate of GHG emissions because the emissions at issue are *de minimis.*

[64] Estimates of SC–HFCs have been developed and are available for use in NEPA analysis. *See, e.g.,* EPA, Regulatory Impact Analysis for Phasing Down Production and Consumption of Hydrofluorocarbons (HFCs) (June 2022), *https://www.epa.gov/system/files/documents/2022-07/RIA%20for%20Phasing%20Down%20Production%20and%20Consumption%20of%20Hydrofluorocarbons%20%28HFCs%29.pdf.*

[65] EPA, EPA 430–R–22–003, *Inventory of U.S. Greenhouse Gas Emissions and Sinks, 1990–2020* (Apr. 2022), *https://www.epa.gov/system/files/documents/2022-04/us-ghg-inventory-2022-main-text.pdf.*

[66] As described in section VI(F), NEPA does not require a cost-benefit analysis in which all monetized benefits and costs are directly compared.

[67] For example, if alternatives or mitigation strategies would result in varying emissions or

assist agencies and the public in assessing the significance of climate impacts. This is a simple and straightforward calculation that should not require additional time or resources.

Certain circumstances may make monetization using the SC–GHG particularly useful, such as if a NEPA review monetizes other costs and benefits for the proposed action (see Section VI(F)); if the alternatives differ in GHG emissions over time or in the type of GHGs emitted; or if the significance of climate change effects is difficult to assess or not apparent to the public without monetization. SC–GHG estimates can help describe the net social costs of increasing GHG emissions as well as the net social benefits of reducing such emissions. Given NEPA's mandates to consider worldwide and long-range environmental problems,[68] it is most appropriate for agencies to focus on SC–GHG estimates that capture global climate damages and, consistent with the best available science, reflect a timespan covering the vast majority of effects and discount future effects at rates that consider future generations. It is often also worth affirming that SC–GHG estimates, including those available at the publication of this guidance, may be conservative underestimates because various damage categories (like ocean acidification) are not currently included.

(2) Where helpful to provide context, such as for proposed actions with relatively large GHG emissions or reductions or that will expand or perpetuate reliance on GHG-emitting energy sources, agencies should explain how the proposed action and alternatives would help meet or detract from achieving relevant climate action goals and commitments, including Federal goals, international agreements, state or regional goals, Tribal goals, agency-specific goals, or others as appropriate.[69] However, as explained above, NEPA requires more than a statement that emissions from a proposed Federal action or its alternatives represent only a small fraction of global or domestic emissions. Such comparisons and fractions are not an appropriate method for characterizing the extent of a proposed action's and its alternatives' contributions to climate change. Agencies also should discuss whether and to what extent the proposal's reasonably foreseeable GHG emissions are consistent with GHG reduction goals, such as those reflected in the U.S. nationally determined contribution under the Paris Agreement. Federal planning documents that illustrate multi-decade pathways to achieve policy may also provide useful information, such as the *Long-Term Strategy of the United States: Pathways to Net-Zero Greenhouse Gas Emissions by 2050.*[70] Similarly, agencies' own climate goals may provide relevant context. Evaluating a proposed action's and its alternatives' consistency with such goals and commitments can help illuminate the policy context, the importance of considering alternatives and mitigation, and tradeoffs of the decision and help agencies evaluate the significance of a proposed action's GHG emissions and climate change effects. This type of comparison provides a different kind of disclosure and context than that provided by application of SC–GHG estimates as described above, demonstrating the potential utility of multiple contextualization methods.

(3) Where relevant, agencies should summarize and cite to available scientific literature to help explain the real-world effects—including those that will be experienced locally in relation to the proposed action—associated with an increase in GHG emissions that contribute to climate change, such as sea-level rise, temperature changes, ocean acidity, and more frequent and severe wildfires and drought, and human health effects (including to underserved populations).[71] Agencies should use the best available information, including scenarios and climate modeling information that are most relevant to a proposed action.[72]

(4) Agencies also can provide accessible comparisons or equivalents to help the public and decision makers understand GHG emissions in more familiar terms. Techniques may include placing a proposed action's GHG emissions in more familiar metrics such as household emissions per year, annual average emissions from a certain number of cars on the road, or gallons of gasoline burned.[73] Such comparisons may be a useful supplement and can, for example, be presented along with monetized damage estimates using SC–GHG values. Agencies should use disclosure and contextualization methods that best fit their proposed actions and alternatives.

C. Reasonable Alternatives

Considering reasonable alternatives, including alternatives that avoid or mitigate GHG emissions, is fundamental to the NEPA process and accords with Sections 102(2)(C) and 102(2)(E) of NEPA, which independently require the consideration of alternatives in environmental documents.[74] NEPA calls upon agencies to use the NEPA process to identify and assess the reasonable alternatives to proposed actions that will avoid or minimize adverse effects on the human environment.[75]

Consideration of alternatives provides an agency decision maker the information needed to examine other possible approaches to a particular proposed action (including the no action alternative) that could alter environmental effects or the balance of factors considered in making the decision. Agencies make better informed decisions by comparing relevant GHG emissions, GHG emission reductions, and carbon sequestration potential across reasonable alternatives, assessing trade-offs with other environmental values, and evaluating

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reductions of carbon dioxide, methane, and nitrous oxide over time, presenting emissions estimates in metric tons of each gas, or in metric tons of CO_2e, alone cannot fully illustrate the differences in the temporal pathways of these pollutants' impacts on society. The SC–GHG estimates can capture these differences when estimating the damages from the emission of each specific pollutant in a common unit of measurement, *i.e.,* the U.S. Dollar.

[68] *See, e.g.,* NEPA's direction that agencies shall consider the ''worldwide and long-range character of environmental problems.'' 42 U.S.C. 4332(2)(F).

[69] For example, the U.S. Department of the Interior's Bureau of Land Management (BLM) has discussed how agency actions in California, especially joint projects with the State, may or may not facilitate California reaching its GHG emission reduction goals, including goals under the State's Assembly Bill 32 (Global Warming Solutions Act) and related legislation. *See, e.g.,* BLM, Desert Renewable Energy Conservation Plan Proposed Land Use Plan Amendment and Final Environmental Impact Statement, Vol. I, section I.3.3.2, 12 (Oct. 2015), *https://eplanning.blm.gov/public_projects/lup/66459/20012403/250016887/I.3_Planning_Process.pdf; see also* 40 CFR 1506.2(d) (directing agencies to discuss any inconsistency of a proposed action with an approved State, Tribal, or local plan or law); BLM, Environmental Assessment for Oberon Renewable Energy Project, 33–34 (Aug. 2021), *https://eplanning.blm.gov/public_projects/2001226/200478716/20043975/250050165/Environmental%20Assessment%201-Main%20Text.pdf.*

[70] U.S. Dep't of State (DOS) & U.S. Exec. Off. of the President (EOP), *The Long-Term Strategy of the United States: Pathways to Net-Zero Greenhouse Gas Emissions by 2050* (Nov. 2021), *https://www.whitehouse.gov/wp-content/uploads/2021/10/US-Long-Term-Strategy.pdf.*

[71] For example, see the scientific studies referenced in section III(B).

[72] In addition, newer tools or modelling may enable agencies in some cases to provide information on localized or ''downscaled'' climate effects in addition to global effects. *See, e.g.,* Romany M. Webb et al., *Evaluating Climate Risk in NEPA Reviews: Current Practices and Recommendations for Reform,* 29, *https://blogs.edf.org/climate411/files/2022/02/Evaluating-Climate-Risk-in-NEPA-Reviews-Full-Report.pdf.*

[73] *See* EPA's equivalency calculator, *https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator.*

[74] *See* 42 U.S.C. 4332(2)(C) and (2)(E).

[75] *See* 42 U.S.C. 4332(2)(C)(iii); 40 CFR 1502.1, 1502.14.

the risks from or resilience to climate change inherent in a proposed action and its design.

Agencies must consider a range of reasonable alternatives, as well as reasonable mitigation measures if not already included in the proposed action or alternatives, consistent with the level of NEPA review (*e.g.,* EA or EIS) and the purpose and need for the proposed action.[76] Agencies should leverage the early phases of their existing planning processes to help identify potential alternatives to address an action's anticipated environmental effects. When analyzing alternatives, agencies should compare the anticipated levels of GHG emissions from each alternative—including the no action alternative—and mitigation to provide information to the public and enable the decision maker to make an informed choice. To help provide clarity, agencies should consider presenting charts, tables, or figures, as appropriate, to compare GHG emissions and climate effects across alternatives.

Neither NEPA, the CEQ Regulations, or this guidance require the decision maker to select the alternative with the lowest net GHG emissions or climate costs or the greatest net climate benefits. However, and in line with the urgency of the climate crisis, agencies should use the information provided through the NEPA process to help inform decisions that align with climate change commitments and goals. For instance, agencies should evaluate reasonable alternatives that may have lower GHG emissions, which could include technically and economically feasible clean energy alternatives to proposed fossil fuel-related projects, and consider mitigation measures to reduce GHG emissions to the greatest extent possible.

Where relevant—such as for proposed actions that will generate substantial GHG emissions—agencies should identify the alternative with the lowest net GHG emissions or the greatest net climate benefits among the alternatives they assess. And, as described throughout this guidance, they should use the NEPA process to make informed decisions grounded in science that are transparent with respect to how Federal actions will help meet climate change goals and commitments, or alternately, detract from them.

D. Baseline for Considering Environmental Effects

A NEPA review must identify the area affected by a proposed action (*i.e.,* the affected environment).[77] Identification of the affected environment includes identifying and describing reasonably foreseeable environmental trends, including climate change effects. The NEPA review also must identify the current and projected future state of the affected environment without the proposed action (*i.e.,* the no action alternative), which serves as the baseline for considering the effects of the proposed action and its reasonable alternatives.[78] For an estimate of GHG emissions from the proposed action to have meaningful context, an accurate estimate of GHG emissions without the proposed action should be included in a NEPA review. The temporal bounds for the analysis are determined by the projected initiation of the action and the expected life of the proposed action and its effects.[79] It is noteworthy that the impacts of GHGs can be very long-lasting.[80]

E. Direct and Indirect Effects

NEPA requires agencies to consider the reasonably foreseeable direct and indirect effects of their proposed actions and reasonable alternatives (as well as the no-action alternative).[81] The term ''direct effects'' refers to reasonably foreseeable effects that are caused by the action and occur at the same time and place.[82] The term ''indirect effects'' refers to effects that are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable.[83] Indirect effects generally include reasonably foreseeable emissions related to a proposed action that are upstream or downstream of the activity resulting from the proposed action.[84] For example, where the proposed action involves fossil fuel extraction, direct emissions typically include GHGs emitted during the process of exploring for and extracting the fossil fuel. The reasonably foreseeable indirect effects of such an action likely would include effects associated with the processing, refining, transporting, and end-use of the fossil fuel being extracted, including combustion of the resource to produce energy. Indirect emissions[85] are often reasonably foreseeable since quantifiable connections frequently exist between a proposed activity that involves use or conveyance of a commodity or resource, and changes relating to the production or consumption of that resource.[86]

As discussed in Section IV(A), agencies generally should quantify all reasonably foreseeable emissions associated with a proposed action and reasonable alternatives (as well as the no-action alternative). Quantification should include the reasonably foreseeable direct and indirect GHG emissions of their proposed actions. Agencies also should disclose the information and any assumptions used in the analysis and explain any uncertainty.[87] In assessing a proposed action's, and reasonable alternatives', reasonably foreseeable direct and indirect GHG emissions, the agency should use the best available information.[88] As with any NEPA review, the rule of reason should guide the agency's analysis and the level of

[76] *See* 42 U.S.C. 4332(2)(C), 4332(2)(E), and 40 CFR 1502.14(e), 1501.5(c)(2). The purpose and need for action usually reflects both the extent of the agency's statutory authority and its policies.

[77] *See* 40 CFR 1502.15 (providing that environmental impact statements shall succinctly describe the environmental impacts on the area(s) to be affected or created by the alternatives under consideration).

[78] *See, e.g.,* CEQ, Memorandum to Agencies: Forty Most Asked Questions Concerning CEQ's NEPA Regulations, Question 3, ''No-Action Alternative'' (1986) (''This analysis provides a benchmark, enabling decisionmakers to compare the magnitude of environmental effects of the action alternatives'').

[79] CEQ, *Considering Cumulative Effects Under the National Environmental Policy Act* (1997), *https://ceq.doe.gov/publications/cumulative_effects.html.* Agencies also should consider proposed actions pursuant to E.O. 13653, *Preparing the United States for the Impacts of Climate Change,* 78 FR 66817 (Nov. 6, 2013), which considers how capital investments will be affected by a changing climate over time.

[80] Elevated concentrations of carbon dioxide will persist in the atmosphere for hundreds or thousands of years, so the earth will continue to warm in the coming decades. The warmer it gets, the greater the risk for more severe changes to the climate and the earth's system. EPA, *Impacts of Climate Change, https://www.epa.gov/climatechange-science/impacts-climate-change* (last updated Aug. 19, 2022); EPA, *Understanding Global Warming Potentials, https://www.epa.gov/ghgemissions/understanding-global-warming-potentials* (last updated May 5, 2022).

[81] 42 U.S.C. 4332(2)(C)(i); 40 CFR 1508.1(g).

[82] 40 CFR 1508.1(g)(1).

[83] 40 CFR 1508.1(g)(2); *see also Birckhead* v. *Fed. Energy Regul. Comm'n,* 925 F.3d 510, 516 (D.C. Cir. 2019).

[84] These indirect emissions are sometimes referred to as ''upstream'' or ''downstream emissions,'' described in relation to where in the causal chain they fall relative to the proposed action.

[85] As used in this guidance, ''indirect emissions'' refers to emissions that are indirect effects of the proposed action.

[86] For example, natural gas pipeline infrastructure creates the economic conditions for additional natural gas production and consumption, including both domestically and internationally, which produce indirect (both upstream and downstream) GHG emissions that contribute to climate change.

[87] *See* 40 CFR 1502.21.

[88] For example, agencies may consider consulting information available from the U.S. Energy Information Administration, the International Energy Agency, the Federal Energy Management Program, or the Department of Energy. *See, e.g.,* U.S. Energy Info. Admin., Annual Energy Outlook 2022 (Mar. 3, 2022), *https://www.eia.gov/outlooks/aeo/;* International Energy Agency (IEA), *Net Zero by 2050,* (May 2021), *https://www.iea.org/reports/net-zero-by-2050.*

effort can be proportionate to the scale of the net GHG effects and whether net effects are positive or negative, with actions resulting in very few or an overall reduction in GHG emissions generally requiring less detailed analysis than actions with large emissions.[89]

Agencies should seek to obtain the information needed to quantify emissions, including by requesting or requiring information held by other entities (such as project applicants), because such information is generally essential to reasoned decision making.[90] Where information regarding direct or indirect emissions is not available, agencies should make best efforts to develop a range of potential emissions.[91] Agencies can provide an upper bound for effects analysis by treating the resource provided or enabled by the actions they take as new or additional. In the example of fossil fuel extraction or transportation, this is sometimes referred to as a ''full burn'' assumption, as the agency can provide an upper bound estimate of GHG emissions by assuming that all of the available resources will be produced and combusted to create energy.[92]

Some proposed actions, such as those increasing the supply of certain energy resources like oil, natural gas, or renewable energy generation, may result in changes to the resulting energy mix as energy resources substitute for one another on the domestic or global energy market.[93] Different energy resources emit different amounts of GHGs and other air pollutants.[94] For proposed actions involving such resource substitution considerations, where relevant, CEQ encourages agencies to conduct substitution analysis to provide more information on how a proposed action and its alternatives are projected to affect the resulting resource or energy mix, including resulting GHG emissions.[95] Substitution analysis generally is relevant to actions related to the extraction, transportation, refining, combustion, or distribution of fossil fuels, for example. Agencies should not simply assume that if the federal action does not take place, another action will perfectly substitute for it and generate identical emissions, such that the action's net emissions relative to the baseline are zero.[96] Such an assumption of perfect substitution typically contradicts basic economic principles of supply and demand.[97] Instead, where relevant, agencies can use available models to help conduct substitution analysis.[98] Agencies should disclose any assumptions and inputs used in substitution analysis and use models that accurately account for reasonable and available energy substitute resources, including renewable energy. Further, the analysis generally should be complemented with evaluation that compares the proposed action's and reasonable alternatives' energy use against scenarios or energy use trends that are consistent with achieving science-based GHG reduction goals, such as those pursued in the *Long-Term Strategy of the United States.*[99]

In addition to addressing an action's direct and indirect effects, NEPA requires agencies to address the effects of ''connected'' actions.[100] When evaluating a proposed Federal action, agencies should account for other closely related actions that should be discussed in the same EIS or EA. Actions are connected if they: (i) automatically trigger other actions that may require environmental impact statements; (ii) cannot or will not proceed unless other actions are taken previously or simultaneously; or (iii) are interdependent parts of a larger action and depend on the larger action for their justification.[101] For example, NEPA reviews for proposed resource extraction and development projects typically should address the reasonably foreseeable effects of other closely related agency actions that authorize separate phases or aspects of development. Depending on the relationship between any of the phases, as well as the authority under which they may be carried out, agencies should use the analytical scope that best informs their decision making.

F. Cumulative Effects

In addition to analyzing a proposed action's direct and indirect effects, NEPA and CEQ's regulations require an agency to also consider the proposed action's cumulative effects.[102] Cumulative effects are effects on the environment that result from the incremental effects of the action when added to the effects of other past, present, and reasonably foreseeable actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions.[103] In evaluating a proposed action's cumulative climate change effects, an

[89] For example, as noted in section (IV)(A)(1), for proposed actions that involve net GHG emission reductions (such as renewable energy projects), agencies should attempt to quantify net GHG emission reductions, but may apply the rule of reason when determining the appropriate depth of analysis such that precision regarding emission reduction benefits does not come at the expense of efficient and accessible analysis.

[90] *See* 40 CFR 1502.21(b); *see also Birckhead,* 925 F.3d at 520; *Barnes* v. *U.S. Dep't of Transp.,* 655 F.3d 1124 (9th Cir. 2011). Agencies also may consider amendments to their regulations, where appropriate, to ensure they are able to gather from applicants the information needed to analyze the climate change effects of proposed actions.

[91] *See, e.g.,* Jayni Hein, Jason Schwartz, and Avi Zevin, *Pipeline Approvals and Greenhouse Gas Emissions,* 29–30 (Apr. 2019), discussing availability of tools for quantifying substitution effects and noting the need for further modeling tool development.

[92] A full burn assumption is consistent with analyses prepared by some agencies. *See* BLM, Environmental Assessment, DOI–BLM–CO–S010–2011–0074–EA, 81 (2017), *https://eplanning.blm.gov/public_projects/nepa/70895/127910/155610/King_II_Lease_Mod_Final_EA_2017-1012.pdf* (stating that the agency ''assume[d] that the remaining portion of the maximum year coal to be shipped . . . is eventually combusted.'').

[93] *See, e.g., WildEarth Guardians* v. *BLM.,* 870 F.3d 1222, 1235 (10th Cir. 2017) (''[W]hen coal carries a higher price, for whatever reason that may be, the nation burns less coal in favor of other sources. A force that drives up the cost of coal could thus drive down coal consumption.''); *see also* Jayni Hein and Natalie Jacewicz, *Implementing NEPA in the Age of Climate Change,* 10 Mich. J. Envtl L. 1, 40–43 (2020) (describing energy substitution analysis and how agencies can conduct it for NEPA analysis).

[94] *See* Hein & Jacewicz, *supra* note 93, at 42 (citing B.D. Hong & E.R. Slatick, U.S. Energy Info. Admin., *Carbon Dioxide Emission Factors for Coal, https://www.eia.gov/coal/production/quarterly/co2_article/co2.html*).

[95] *See, e.g.,* Peter Howard, Inst. for Pol'y Integrity, N.Y.U. Sch. of L., *The Bureau of Land Management's Modeling Choice for the Federal Coal Programmatic Review* (June 2016), *https://policyintegrity.org/files/publications/BLM_Model_Choice.pdf* (describing multiple power sector models available to Federal agencies for use in NEPA analysis); *see also WildEarth Guardians,* 870 F.3d at 1235 (holding that an agency's ''blanket assertion that coal would be substituted from other sources, unsupported by hard data, does not provide 'information sufficient to permit a reasoned choice' between the preferred alternative and no action alternative.'').

[96] Hein & Jacewicz, *supra* note 93, at 43–44 (describing the fallacy of perfect substitution); *id.* at 51–52 (describing litigation concerning the Wright Area coal leases).

[97] *See, e.g., WildEarth Guardians,* 870 F.3d at 1235–37.

[98] Available models include the Bureau of Ocean Energy Management's Revised Market Simulation Model, the U.S. Energy Information Administration's National Energy Modeling System, and ICF International's Integrated Planning Model.

[99] DOS & EOP, *supra* note 70; *see also* Hein & Jacewicz, *supra* note 93, at 48 (stating, ''[a] far more rational approach would be to model at least two policy scenarios: one taking the ''constant demand'' approach, and the other based on fossil fuel consumption consistent with meeting the 1.5 or 2 degrees Celsius warming targets laid out in the Paris Accord.'').

[100] Note that the concepts of ''connected actions'' and ''indirect effects'' bear some similarities but are analytically distinct. ''Connected actions'' are actions related to a proposed action that an agency must consider in the same environmental impact statement. *See* 40 CFR 1501.9(e)(1). ''Indirect effects'' are not actions in themselves, but rather reasonably foreseeable effects that are caused by the proposed action.

[101] 40 CFR 1501.9(e)(1).

[102] *See* 40 CFR 1502.16, 1508.1(g)(3).

[103] 40 CFR 1508.1(g)(3).

agency should consider the proposed action in the context of the emissions from past, present, and reasonably foreseeable actions. When assessing cumulative effects, agencies should also consider whether certain communities experience disproportionate cumulative effects, thereby raising environmental justice concerns.[104]

All types of GHG emissions contribute to real-world physical changes. Given that climate change is the result of the increased global accumulation of GHGs climate effects analysis is inherently cumulative in nature. Thus, the analysis and public disclosure of cumulative effects can be accomplished by quantifying GHG emissions and providing context for understanding their effects as discussed above, including by monetizing climate damages using estimates of the SC–GHG, placing those damages in the context of relevant climate action goals and commitments, and summarizing and citing to available scientific literature to help explain real world effects.

G. Short- and Long-Term Effects

When considering effects, agencies should take into account both the short- and long-term adverse and beneficial effects using a temporal scope that is grounded in the concept of reasonable foreseeability. Some proposed actions and reasonable alternatives will require consideration of effects from different stages of the action to ensure the direct effects and reasonably foreseeable indirect effects are appropriately assessed; for example, the effects of construction are different from the effects of the operations and maintenance of a facility.

The effects analysis should cover the action's reasonably foreseeable lifetime, including anticipated GHG emissions associated with construction, operations, and decommissioning. Agencies should identify an appropriate lifetime for the proposed action using available indicators and guided by the concept of reasonable foreseeability.

Identifying an appropriate lifetime for the action also will inform assessment of long-term emissions benefits of proposed actions and reasonable alternatives. For example, development of a new wind energy project may result in short-term construction GHG emissions but overall long-term GHG benefits. Agencies should describe both short- and long-term effects in comparison to the no action alternative in NEPA reviews and clearly explain the net effect of their actions even if precision regarding the timing of short- and long-term effects is not possible.

H. Mitigation

Identifying and analyzing potential mitigation measures is an important component of the NEPA process.[105] Evaluating potential mitigation measures generally involves first determining whether impacts from a proposed action or alternatives can be avoided, then considering whether adverse impacts can be minimized, then, when impacts are unavoidable, rectifying them and, if appropriate, requiring compensation for residual impacts.[106] Mitigation plays a particularly important role in how agencies should assess the potential climate change effects of proposed actions and reasonable alternatives. Agencies should consider mitigation measures that will avoid or reduce GHG emissions. Given the urgency of the climate crisis, CEQ encourages agencies to mitigate GHG emissions to the greatest extent possible.

Agencies should consider mitigation, particularly avoidance and minimization, as early as possible in the development of their actions, including during scoping, public engagement, and alternatives analysis. As part of early and meaningful public engagement, agencies should solicit public input on potential mitigation measures, including from communities that the proposed action and reasonable alternatives may affect. In their NEPA documents, agencies should discuss any mitigation measures considered and whether they included those measures in the preferred alternative. Where potential mitigation measures are not adopted, agencies should explain why as early as practicable in the NEPA process.

Agencies should consider available mitigation measures that avoid, minimize, or compensate for GHG emissions and climate change effects when those measures are reasonable and consistent with achieving the purpose and need for the proposed action. Such mitigation measures could include enhanced energy efficiency, renewable energy generation and energy storage, lower-GHG-emitting technology, reduced embodied carbon in construction materials, carbon capture and sequestration, sustainable land management practices, and capturing GHG emissions such as methane.

Federal agencies also should evaluate the quality of that mitigation by ensuring it meets appropriate performance standards.[107] Appropriate performance standards help ensure that GHG mitigation is additional, verifiable, durable, enforceable, and will be implemented.[108] NEPA does not limit consideration of mitigation to actions involving significant effects. However, mitigation can be particularly effective in helping agencies reduce or avoid significant effects.[109] Agencies can discuss the scope of their mitigation authority to support any mitigation commitments relied upon in NEPA analysis, including mitigation supporting a finding of no significant impact.[110] In addition, consistent with existing agency best practice, an agency's decision on a proposed action should identify the mitigation measures that the agency commits to take, recommends, or requires others to take.[111]

The CEQ Regulations and guidance also recognize the value of monitoring to ensure that mitigation is carried out as provided in a record of decision or finding of no significant impact.[112] Monitoring intensity and duration

[104] *See infra* section VI(E).

[105] *See* 42 U.S.C. 4332(2)(C) (requiring consideration of mitigation measures in impact statements by requiring the consideration of ''any adverse environmental effects which cannot be avoided'').

[106] *See* 40 CFR 1508.1(s), 1501.9(e)(2) (alternatives include mitigation measures not included in the proposed action); *see generally* 10 CFR 900.3 (2019) (identifying ''mitigation hierarchy'' as ''first seeking to avoid, then minimize impacts, then, when necessary, compensate for residual impacts''); U.S. Fish and Wildlife Service (FWS) Mitigation Policy (Nov. 21, 2016), *https://www.federalregister.gov/d/2016-27751.*

[107] *See* CEQ, Memorandum to Heads of Federal Agencies, Appropriate Use of Mitigation and Monitoring and Clarifying the Appropriate Use of Mitigated Findings of No Significant Impact (''Appropriate Use of Mitigation and FONSI Memo''), 8–9, 76 FR 3843 (Jan. 21, 2011), *https://ceq.doe.gov/docs/ceq-regulations-and-guidance/Mitigation_and_Monitoring_Guidance_14Jan2011.pdf.*

[108] *See id.; see also* U.S. Army Corps of Engineers and EPA, Final Rule, Compensatory Mitigation for Losses of Aquatic Resources, 73 FR 19593 (Apr. 10, 2008) (discussing verifiable and enforceable performance standards for mitigation).

[109] See 40 CFR 1501.6(c).

[110] *See id.* (The finding of no significant impact shall state the authority for any mitigation that the agency has adopted and any applicable monitoring or enforcement provisions. If the agency finds no significant impacts based on mitigation, the mitigated finding of no significant impact shall state any enforceable mitigation requirements or commitments that will be undertaken to avoid significant impacts.); *see also* CEQ, Appropriate Use of Mitigation and FONSI Memo, *supra* note 107, at 7 (''Mitigation commitments needed to lower the level of impacts so that they are not significant should be clearly described in the mitigated FONSI document and in any other relevant decision documents related to the proposed action.'').

[111] *See* CEQ, Appropriate Use of Mitigation and FONSI Memo, *supra* note 107, at 13–14.

[112] See 40 CFR 1505.2(a)(3), 1505.3; *see also* CEQ, Appropriate Use of Mitigation and FONSI Memo, *supra* note 107.

should be aligned with the mitigation action taken.

Finally, while this subsection primarily addresses mitigating a proposed action's GHG emissions, agencies also should consider environmental design features, alternatives, and mitigation measures to address the effects of climate change on the proposed action, including to enhance resilience and adaptation. See Section IV(D).

I. Special Considerations for Biological GHG Sources and Sinks

Many GHG emissions come from combusting fossil fuels and releasing substances into the atmosphere.[113] In addition to these sources, some GHG emissions are related to the natural carbon cycle,[114] or result from the combustion, harvest, decomposition, or other processing of biologically based materials.[115] These types of emissions are referred to as ''biogenic.'' [116] Biogenic GHG emissions from land management actions—such as prescribed burning, timber stand improvements, fuel load reductions, and scheduled harvesting—involve GHG emissions and carbon sequestration that operate within the global carbon and nitrogen cycle, which may be affected by those actions. Similarly, some water management practices have GHG emission consequences that may require unique consideration (*e.g.,* reservoir management practices can reduce methane releases, wetlands management practices can enhance carbon sequestration, and water conservation can improve energy efficiency).

In the land and resource management context, how a proposed action and reasonable alternatives (as well as the no-action alternative) affects a net carbon sink or source will depend on multiple factors such as the local or regional climate and environment, the distribution of carbon across carbon pools in the action area, ongoing activities and trends, and the role of natural disturbances in the relevant area.

In NEPA reviews, for actions involving potential changes to biological GHG sources and sinks, agencies should include a comparison of net GHG emissions and carbon stock [117] changes that are anticipated to occur, with and without implementation of the proposed action and reasonable alternatives. The analysis should consider the estimated GHG emissions (from biogenic and fossil-fuel sources), carbon sequestration potential, and the net change in relevant carbon stocks in light of the proposed actions and timeframes under consideration, and explain the basis for the analysis.

Some actions that involve ecosystem restoration [118] can generate short-term biogenic emissions while resulting in overall long-term net reductions of atmospheric GHG concentrations through increases in carbon stocks or reduced risks of future emissions. One example is certain vegetation management practices that affect the risk of wildfire, insect and disease outbreak, or other disturbance. Some resource management activities, such as a prescribed burn or certain non-commercial thinning of forests or grasslands conducted to reduce wildfire risk or insect infestations, might result in short-term GHG emissions or loss of stored carbon but greater long-term ecosystem health, including an overall net increase in carbon sequestration and storage. However, other types of land-use changes, such as permanent deforestation, can adversely alter ecosystem long-term carbon dynamics, resulting in net emissions. Agencies can use relevant tools to analyze the anticipated long-term GHG emissions implications from proposed ecosystem restoration actions.

Federal land and resource management agencies should consider developing and maintaining agency-specific principles and guidance for considering biological carbon in management and planning decisions.[119] Such guidance can help address the importance of considering biogenic carbon fluxes and storage within the context of other management objectives and ecosystem service goals, and integrating carbon considerations as part of a balanced and comprehensive program of sustainable management, climate change mitigation, and climate change adaptation.

V. Considering the Effects of Climate Change on a Proposed Action

According to the USGCRP and others, GHGs already in the atmosphere will continue altering the climate system into the future, even with current or future emissions control efforts.[120] To illustrate how climate change may impact proposed actions and alternatives and to consider climate resilience, NEPA reviews should consider the ongoing impacts of climate change and the foreseeable state of the environment, especially when evaluating project design, siting, and reasonable alternatives. In addition, climate change resilience [121] and adaptation [122] are important

[113] Burning fossil fuels (such as oil, coal, and natural gas), wood, and other forms of carbon releases stored carbon into the atmosphere, where it becomes a GHG. GHGs are gases in the atmosphere that absorb and release heat. Dep't of Energy, Off. of Science, *DOE Explains...the Carbon Cycle, https://www.energy.gov/science/doe-explainsthe-carbon-cycle.*

[114] The carbon cycle is the process that moves carbon between plants, animals, and microbes; minerals in the earth; and the atmosphere. Most carbon on Earth is stored in rocks and sediments. The rest is in the ocean, atmosphere, and in living organisms. Scientists use the term ''carbon sinks'' to refer to places where carbon is stored away from the atmosphere. *Id.*

[115] Fossil fuels are not considered biologically based materials. *See, e.g.,* EPA, *Framework for Assessing Biogenic CO_2 Emissions from Stationary Sources,* 5 (Nov. 2014), *https://www.epa.gov/sites/default/files/2016-08/documents/framework-for-assessing-biogenic-co2-emissions.pdf* (''In contrast to the relatively short timescale of the biological carbon cycle, carbon in fossil fuel reservoirs, such as coal seams and oil and gas deposits, was removed from the atmosphere by plants over millions of years but was not returned to the atmosphere through the natural processes described above. Instead, because of geologic processes, the carbon that accumulated in these deposits has been isolated from the active biological cycling of carbon to and from the atmosphere. Without human intervention, carbon in fossil fuel reservoirs could remain isolated from the biogeochemical cycling of carbon long into the future.'')

[116] EPA, *Carbon Dioxide Emissions Associated with Bioenergy and Other Biogenic Sources, https://19january2017snapshot.epa.gov/climatechange/carbon-dioxide-emissions-associated-bioenergy-and-other-biogenic-sources_.html; see also* Merriam-Webster Dictionary, *Biogenic* (Online Ed., last updated Oct. 21, 2022), *https://www.merriam-webster.com/dictionary/biogenic* (defining ''biogenic'' as ''produced by living organisms'').

[117] *See, e.g.,* 10 CFR 300.2 (''Carbon stocks mean the quantity of carbon stored in biological and physical systems including: trees, products of harvested trees, agricultural crops, plants, wood and paper products and other terrestrial biosphere sinks, soils, oceans, and sedimentary and geological sinks.'').

[118] For example, Federal agencies sometimes consider actions that would benefit ecosystems by restoring degraded lands or restoring shoreline.

[119] *See, e.g.,* USDA Forest Service, *Considering Forest and Grassland Carbon in Land Management* (2017), *https://www.fs.usda.gov/research/treesearch/54316; see also* U.S. Dep't of the Interior, Order No. 3399, *Department-Wide Approach to the Climate Crisis and Restoring Transparency and Integrity to the Decision-Making Process* (Apr. 16, 2021), *https://www.doi.gov/sites/doi.gov/files/elips/documents/so-3399-508_0.pdf.*

[120] *See* USGCRP, Fourth National Climate Assessment, *supra* note 28, Chapter 2, *Our Changing Climate, https://nca2018.globalchange.gov/chapter/2/.*

[121] Resilience refers to the ability to prepare for and adapt to changing conditions and withstand and recover rapidly from disruption. U.S. Dep't of Commerce Nat'l Inst. of Standards and Tech. (NIST), SP 800–160 Vol. 2, Rev. 1, 76, *https://csrc.nist.gov/glossary/term/resilience#:~:text=with%20mission%20needs.-,Source(s)%3A,naturally%20occurring%20threats%20or%20incidents.*

[122] Adaptation refers to actions taken at the individual, local, regional, and national levels to reduce risks from even today's changed climate conditions and to prepare for impacts from additional changes projected for the future. USGCRP, Fourth National Climate Assessment, *supra* note 28, Chapter 28, *Reducing Risks Through*

Continued

considerations for agencies contemplating and planning actions.[123]

A. Affected Environment

Agencies should identify the affected environment to provide a basis for comparing the current and future state of the environment as affected by the proposed action or its reasonable alternatives.[124] As discussed in Section IV(D), the current and projected future state of the environment without the proposed action (*i.e.,* the no action alternative) represents the reasonably foreseeable affected environment. In considering the effects of climate change on a proposed action, the agency should describe the affected environment for the proposed action based on the best available climate change reports,[125] which often project at least two possible future emissions scenarios.[126] The temporal bounds for the description of the affected environment are determined by the projected initiation of implementation and the expected life of the proposed action and its effects.[127]

B. Effects

The analysis of climate change effects should focus on those aspects of the human environment that are impacted by the agency's potential action (*i.e.,* the proposed action or its alternatives) and climate change. The analysis also should consider how climate change can make a resource, ecosystem, human community, or structure more vulnerable to many types of effects and lessen its resilience to other environmental effects. This increase in vulnerability can exacerbate the environmental effects of potential actions, including environmental justice impacts. For example, a proposed action or its alternatives may require water from a stream that has diminishing quantities of available water because of decreased snow pack in the mountains, or add heat to a water body that is already warming due to increasing atmospheric temperatures. Such considerations are squarely within the scope of NEPA and can inform decisions on siting, whether to proceed with and how to design potential actions and reasonable alternatives, and to eliminate or mitigate effects exacerbated by climate change. They also can inform possible adaptation measures to address the effects of climate change, ultimately enabling the selection of smarter, more resilient actions.

C. Using Available Assessments and Scenarios To Assess Present and Future Impacts

In accordance with NEPA's rule of reason and standards for obtaining information regarding reasonably foreseeable effects on the human environment, agencies may summarize and incorporate by reference relevant scientific literature concerning the physical effects of climate change.[128] For example, agencies may summarize and incorporate by reference the relevant chapters of the most recent national climate assessments or reports from the USGCRP and the IPCC.[129] Particularly relevant to some proposed actions and reasonable alternatives are the most current reports on climate change effects on water resources, ecosystems, vulnerable communities, agriculture and forestry, health, coastlines, and ocean and arctic regions in the United States.[130]

Agencies should remain aware of the evolving body of scientific information as more refined estimates of the effects of climate change, both globally and at a localized level, become available.[131] Agencies should use the most up-to-date scientific projections available, identify any methodologies and sources used, and where relevant, disclose any relevant limitations of studies, climate models, or projections they rely on.[132]

In addition to considering climate change effects at the relevant global and national levels, agencies should identify and use information on future projected GHG emissions scenarios to evaluate potential future impacts (such as flooding, high winds, extreme heat, and other climate change-related impacts) and what those impacts will mean for the physical and other relevant conditions in the affected area. Such information should help inform development of the proposed action and alternatives, including by ensuring that proposed actions and alternatives consider appropriate resilience measures, environmental justice issues, and existing State, Tribal, or local adaptation plans. When relying on a single study or projection, agencies should consider any relevant limitations and discuss them.[133]

D. Resilience and Adaptation

As discussed in Section III(B), climate change presents risks to a wide array of potential actions across a range of sectors. Agencies should consider climate change effects on the environment and on proposed actions in assessing vulnerabilities and resilience to the effects of climate change such as increasing sea level, drought, high intensity precipitation events, increased fire risk, or ecological change. Consistent with NEPA, environmental reviews should provide relevant information that agencies can use to consider siting issues, the initial project design and consistency with existing State, Tribal, and local adaptation plans, as well as reasonable alternatives with preferable overall environmental outcomes and improved resilience to climate effects.[134] Climate resilience and adaptation may be particularly relevant to the description of a proposed action, the alternatives analysis, and the description of environmental consequences. For instance, agencies should consider increased risks associated with development in floodplains, avoiding such development wherever there is a practicable alternative, as required by Executive Orders 11988 and 13690.[135] Agencies also should consider the likelihood of increased temperatures and more frequent or severe storm events over the lifetime of the proposed action, and reasonable alternatives (as well as the

Adaptation Actions, https://nca2018.globalchange.gov/chapter/28/.

[123] *See* E.O. 14008, *supra* note 7 and E.O. 14057, *supra* note 7.

[124] *See* 40 CFR 1502.15 (providing that environmental impact statements shall succinctly describe the environmental impacts on the area(s) to be affected or created by the alternatives under consideration). Note, however, that GHG emissions have effects that are global in scale.

[125] *See, e.g.,* USGCRP, Fourth National Climate Assessment, *supra* note 28 (regional impacts chapters).

[126] *See, e.g., id.* (considering a low future global emissions scenario and a high emissions scenario).

[127] CEQ, *Considering Cumulative Effects Under the National Environmental Policy Act, supra* note 79. Agencies also should consider their work under relevant executive orders. *See* E.O. 13990, *supra* note 16; E.O. 14008, *supra* note 7; E.O. 14057, *supra* note 7. Note that the effects of GHG emissions by their nature can be very long-lasting.

[128] *See* 40 CFR 1501.12 (material may be incorporated by reference if it is reasonably available for inspection by potentially interested persons during public review and comment).

[129] *See* USGCRP, Fourth National Climate Assessment, *supra* note 28; IPCC, *The Physical Science Basis, supra* note 28.

[130] *See* USGCRP, Fourth National Climate Assessment, *supra* note 28. Agencies should consider the latest final assessments and reports as they are updated.

[131] *See, e.g., id.*

[132] *See* 40 CFR 1502.23. Agencies can consult *www.data.gov/climate/portals* for model data archives, visualization tools, and downscaling results.

[133] *Id.*

[134] See 40 CFR 1502.16(a)(5), 1506.2(d).

[135] *See* E.O. 11988, *Floodplain Management,* 42 FR 26951 (May 24, 1977), *http://www.archives.gov/federal-register/codification/executive-order/11988.html;* E.O. 13690, *Establishing a Federal Flood Risk Management Standard and a Process for Further Soliciting and Considering Stakeholder Input,* 80 FR 6425 (Jan. 30, 2015), *https://www.federalregister.gov/d/2015-02379* (reinstated by E.O. 14030, *Climate-Related Financial Risk,* 86 FR 27967 (May 20, 2021), *https://www.federalregister.gov/d/2021-11168*).

no-action alternative).[136] For example, an agency considering a proposed development of transportation infrastructure on a coastal barrier island should consider climate change effects on the environment and, as applicable, consequences of rebuilding where sea level rise and more intense storms will shorten the projected life of the project and change its effects on the environment.[137]

Agencies should integrate the NEPA review process with the agency's planning, siting, and design efforts at the earliest possible time that would allow for a meaningful analysis.[138] Agencies may incorporate information developed during early planning processes that precede a NEPA review into the NEPA review. Decades of NEPA practice have shown that integrating environmental considerations with the planning processes provides useful information that program and project planners can consider in designing the proposed action, alternatives, and potential mitigation measures.

Agencies also may consider co-benefits of the proposed action, alternatives, and potential mitigation measures for human health, economic and social stability, ecosystem services, or other benefits that increase climate change preparedness or resilience. Individual agency adaptation plans and interagency adaptation strategies, such as agency Climate Adaptation Plans, the National Fish, Wildlife and Plants Climate Adaptation Strategy, and the National Action Plan: Priorities for Managing Freshwater Resources in a Changing Climate, provide other good examples of the type of relevant and useful information that agencies can consider.[139]

Considering the effects of climate change on a proposed action, and reasonable alternatives (as well as the no-action alternative), also helps to develop potential mitigation measures to reduce climate risks and promote resilience and adaptation. Where the analysis identifies climate-related risks to a proposed action or to the area affected by the proposed action, the agency should consider possible resilience and adaptation measures—including measures consistent with State, Tribal, or local adaptation plans—that could be employed to manage those effects. For example, where one or more climate effects could impair the operation of the proposed action, the agency should identify possible adaptation measures to enhance the action's climate resilience. The agency should indicate whether the proposed action includes measures to adapt to climate change and, if so, describe those measures and the climate projections that informed them. The agency also should consider whether any potential measures undertaken to address a proposed action's climate risk could result in any undesirable or unintended consequences.[140]

In addition, agencies should consider their ongoing efforts to incorporate environmental justice principles into their programs, policies, actions, and activities, including the environmental justice strategies required by Executive Orders 12898 and 14008, and consider whether the effects of climate change in association with the effects of the proposed action may result in disproportionately high and adverse effects on communities with environmental justice concerns, which often include communities of color, low-income communities, and Tribal Nations and Indigenous communities, in the area affected by the proposed action.[141] Federal agencies should identify any communities with environmental justice concerns, including communities of color, low-income communities, and Tribal Nations and Indigenous communities, impacted by the proposed action, and consider how impacts from the proposed action could potentially amplify climate change-related hazards such as storm surge, heat waves, drought, flooding, and sea level change.[142] Moreover, Executive Order 13985 calls for an all-of-government approach to advancing equity for underserved populations, including rural communities and persons with disabilities. Agencies should meaningfully engage with affected communities regarding their proposed actions and consider the effects of climate change on vulnerable communities in designing the action or selection of alternatives, including alternatives that can reduce disproportionate effects on such communities. For example, chemical facilities located near the coastline could have increased risk of spills or leaks due to sea level rise or increased storm surges, putting local communities and environmental resources at greater

[136] *See, e.g.,* E.O. 14030, *supra* note 135.

[137] *See* U.S. Dep't of Transp., FHWA–HEP–15–007, *Assessing Transportation Vulnerability to Climate Change Synthesis of Lessons Learned and Methods Applied, Gulf Coast Study, Phase 2* (Oct. 2014), *http://www.fhwa.dot.gov/environment/climate_change/adaptation/ongoing_and_current_research/gulf_coast_study/phase2_task6/fhwahep15007.pdf* (focusing on the Mobile, Alabama region); U.S. Climate Change Science Program, *Impacts of Climate Change and Variability on Transportation Systems and Infrastructure, Gulf Coast Study, Phase I* (Mar. 2008), *https://downloads.globalchange.gov/sap/sap4-7/sap4-7-final-all.pdf* (focusing on a regional scale in the central Gulf Coast). Information about the Gulf Coast Study is available at *https://www.fhwa.dot.gov/environment/sustainability/resilience/ongoing_and_current_research/gulf_coast_study/index.cfm; see also* Third National Climate Assessment, *supra* note 30, Chapter 28, *Adaptation,* 675, *http://nca2014.globalchange.gov/report/response-strategies/adaptation#intro-section-2* (noting that Federal agencies in particular can facilitate climate adaptation by ''ensuring the establishment of [F]ederal policies that allow for 'flexible' adaptation efforts and take steps to avoid unintended consequences'').

[138] *See* 42 U.S.C. 4332 (''agencies of the Federal Government shall . . . utilize a systematic, interdisciplinary approach which will insure the integrated use of the natural and social sciences and the environmental design arts in planning and in decision-making''); 40 CFR 1501.2 (''Agencies should integrate the NEPA process with other planning and authorization processes at the earliest reasonable time. . . .''); *see also* CEQ, Memorandum for Heads of Federal Departments and Agencies, *Improving the Process for Preparing Efficient and Timely Environmental Reviews under the National Environmental Policy Act* (''Efficient Environmental Reviews''), 77 FR 14473 (Mar. 12, 2012), *https://ceq.doe.gov/docs/ceq-regulations-and-guidance/Improving_NEPA_Efficiencies_06Mar2012.pdf.*

[139] *See https://www.sustainability.gov/progress.html* for agency sustainability plans and agency adaptation plans; *see also* U.S. Climate Resilience Tool Kit, *National Fish, Wildlife, and Plants Climate Adaptation Strategy, https://toolkit.climate.gov/tool/national-fish-wildlife-and-plants-climate-adaptation-strategy;* Interagency Climate Adaptation Task Force, *National Action Plan: Priorities for Managing Freshwater Resources in a Changing Climate* (Oct. 2011), *https://www.epa.gov/sites/default/files/2016-12/documents/2011_national_action_plan_1.pdf;* and CEQ, Off. of the Federal Chief Sustainability Officer, *Climate Resilient Infrastructure and Operations, https://www.sustainability.gov/adaptation/.*

[140] *See, e.g.,* Jane Ebinger & Walter Vergara, World Bank, *Climate Impacts on Energy Systems: Key Issues for Energy Sector Adaptation,* 89–90 (2011), *https://openknowledge.worldbank.org/bitstream/handle/10986/2271/600510PUB0ID181mpacts09780821386972.pdf?sequence=1&isAllowed=y* (describing the potential for adaptation-related decision errors including ''maladaptation,'' in which actions are taken that constrain the ability of other decision makers to manage the impacts of climate change).

[141] *See infra Section* VI(E); E.O. 12898, *Federal Actions to Address Environmental Justice in Minority and Low-Income Populations,* 59 FR 7629 (Feb. 16, 1994), *https://www.archives.gov/files/federal-register/executive-orders/pdf/12898.pdf,* as amended by E.O. 14008, *supra* note 7, section 219 (''Agencies shall make achieving environmental justice part of their missions by developing programs, policies, and activities to address the disproportionately high and adverse human health, environmental, climate-related and other cumulative impacts on disadvantaged communities, as well as the accompanying economic challenges of such impacts.''); CEQ, *Environmental Justice Guidance Under the National Environmental Policy Act* (Dec. 1997), *https://ceq.doe.gov/docs/ceq-regulations-and-guidance/regs/ej/justice.pdf.*

[142] *See, e.g.,* Federal Interagency Working Group on Environmental Justice & NEPA Committee, *Promising Practices for EJ Methodologies in NEPA Reviews* (Mar. 2016), *https://www.epa.gov/sites/default/files/2016-08/documents/nepa_promising_practices_document_2016.pdf.*

risk. Increased resilience could minimize such potential future effects. Finally, considering climate change preparedness and resilience can help ensure that agencies evaluate the potential for generating additional GHGs if a project has to be replaced, repaired, or modified, and minimize the risk of expending additional time and funds in the future.

VI. Traditional NEPA Tools and Practices

A. Scoping and Framing the NEPA Review

Scoping helps agencies integrate decision making, avoid duplication, and focus NEPA reviews.[143] In scoping, the agency determines the issues that the NEPA review will address and identifies the effects related to the proposed action that the analysis will consider.[144] An agency can use the scoping process to help it determine whether analysis is relevant and, if so, the extent of analysis appropriate for a proposed action.[145] When scoping for the climate change issues associated with the proposed action, and reasonable alternatives (as well as the no-action alternative), the nature, location, timeframe, and type of the proposed action and the extent of its effects will help determine the degree to which to consider climate projections, including whether climate change considerations warrant emphasis, detailed analysis, and disclosure.[146]

Consistent with this guidance, agencies may develop their own agency-specific practices and guidance for framing NEPA reviews. Grounded in the principles of proportionality and the rule of reason, such practices and guidance can help an agency determine the extent to which it should explore climate change effects in its decision-making processes and will assist in the analysis of the no action and proposed alternatives and mitigation.[147] The agency should explain such a framing process and its application to the proposed action to the decision makers and the public during the NEPA review and in the EA or EIS document.

B. Incorporation by Reference

Agencies should consider using incorporation by reference in considering GHG emissions or where an agency is considering the implications of climate change for the proposed action and its environmental effects. The NEPA review for a specific action can incorporate by reference earlier programmatic studies or information such as management plans, inventories, assessments, and research, as well as any relevant programmatic or other NEPA reviews.[148] Agencies should identify situations where prior studies or NEPA analyses are likely to cover emissions or adaptation issues, in whole or in part, and incorporate them by reference in NEPA documents (including tiered NEPA documents) where appropriate. Agencies should confirm that prior studies or programmatic documents were conducted within a reasonable timeframe of the proposed action under consideration such that underlying assumptions are still applicable. Incorporation by reference may be helpful when larger scale analyses have considered climate change effects and GHG emissions, and calculating GHG emissions for a specific action would provide only limited information beyond the information already collected and considered in the larger scale analyses.

Agencies should use the scoping process to consider whether they should incorporate by reference GHG analyses from other programmatic studies, action specific NEPA reviews, or programmatic NEPA reviews to avoid duplication of effort. Furthermore, agencies should engage other agencies and stakeholders with knowledge of related actions to participate in the scoping process to identify relevant GHG and adaptation analyses from other actions or programmatic NEPA documents. In addition, agencies are encouraged to use searchable databases, websites, GIS tools, and other technology to share NEPA reviews with relevant agencies, stakeholders, and the public.

C. Programmatic or Broad-Based Studies and NEPA Reviews

In the context of long-range energy, transportation, resource management, or similar programs or strategies, an agency may decide that it would be useful and efficient to provide an aggregate analysis of GHG emissions or climate change effects in a programmatic analysis and then incorporate it by reference into future NEPA reviews. These broad analyses may occur through programmatic NEPA documents, or they may occur through other processes by which agencies conduct analyses or studies at the national or other broad scale level (*e.g.,* landscape, regional, or watershed) to assess the status of one or more resources or to determine trends in changing environmental conditions.[149] In appropriate circumstances, agencies may rely on programmatic analyses to make project-level NEPA reviews more efficient by evaluating and analyzing effects at an earlier stage and at a broader level than project-specific actions. Agencies also can use programmatic analysis to analyze emissions from related activities in a given region or sector, or to serve as benchmark against which agencies can measure site-specific actions.[150]

A tiered, analytical decision-making approach using a programmatic NEPA review is used for many types of Federal actions and can be particularly relevant to addressing proposed land, aquatic, and other resource management plans. Under such an approach, an agency conducts a broad-scale programmatic NEPA analysis for decisions such as establishing or revising the USDA Forest Service land management plans, Bureau of Land Management resource

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[143] *See* 40 CFR 1501.9 (''Agencies shall use an early and open process to determine the scope of issues for analysis in an environmental impact statement, including identifying the significant issues and eliminating from further study non-significant issues.''); *see also* CEQ, Efficient Environmental Reviews, *supra* note 139 (the CEQ Regulations explicitly require scoping for preparing an EIS; however, agencies also can take advantage of scoping whenever preparing an EA).

[144] *See* 40 CFR 1500.4(d), 1500.4(i), 1501.9(a) and (e).

[145] *See* 40 CFR 1501.9 (The agency preparing the NEPA analysis must use the scoping process to, among other things, determine the scope and identify the significant issues to be analyzed in depth); CEQ, *Memorandum for General Counsels, NEPA Liaisons, and Participants in Scoping* (Apr. 30, 1981), *https://www.energy.gov/sites/default/files/nepapub/nepa_documents/RedDont/G-CEQ-scopingguidance.pdf.*

[146] As noted *infra* in section VI(E), to address environmental justice concerns, agencies should use the scoping process to identify potentially affected communities and provide early notice of opportunities for public engagement.

[147] *See, e.g.,* U.S. Forest Service, *The Science of Decisionmaking: Applications for Sustainable Forest and Grassland Management in the National Forest System* (2013), *https://www.fs.usda.gov/research/treesearch/44326;* U.S. Forest Service, *The Comparative Risk Assessment Framework and Tools* (2010), *https://www.fs.usda.gov/treesearch/pubs/34561;* Julien Martin, et al., *Structured decision making as a conceptual framework to identify thresholds for conservation and management,* 19 Ecological Applications 1079–90 (2009), *https://pubs.er.usgs.gov/publication/70036878.*

[148] *See* 40 CFR 1502.4(b), 1501.12.

[149] Programmatic studies may be distinct from programmatic NEPA reviews in which the programmatic action itself is subject to NEPA requirements. *See* CEQ, *Memorandum for Heads of Federal Departments and Agencies, Effective Use of Programmatic NEPA Reviews,* section I(A), 9 (Dec. 18, 2014), *https://ceq.doe.gov/docs/ceq-regulations-and-guidance/Effective_Use_of_Programmatic_NEPA_Reviews_Final_Dec2014_searchable.pdf* (discussing non-NEPA types of programmatic analyses such as data collection, assessments, and research, which previous NEPA guidance described as joint inventories or planning studies).

[150] For instance, where a planning level programmatic review of GHG emissions indicates that a collection of individual actions will collectively reduce GHG emissions, the NEPA analyses for the individual actions can demonstrate that the action is consistent with the emission reductions examined in the programmatic review.

management plans, or Natural Resources Conservation Service conservation programs. Subsequent NEPA analyses for proposed site-specific decisions—such as proposed actions that are consistent with land, aquatic, and other resource management plans—may be tiered from the broader programmatic analysis, drawing upon its basic framework analysis to avoid repeating analytical efforts for each tiered decision. Examples of project- or site-specific actions that may benefit from being able to tier to a programmatic NEPA review include: siting and constructing transmission lines; siting and constructing wind, solar or geothermal projects; conducting wildfire risk reduction activities such as prescribed burns or hazardous fuels reduction; approving grazing leases; granting rights-of-way; and approving site-specific resilience or climate adaptation actions.

A programmatic NEPA review also may serve as an efficient mechanism in which to assess Federal agency efforts to adopt broad-scale sustainable practices for energy efficiency, GHG emissions avoidance and emissions reduction measures, petroleum product use reduction, and renewable energy use, as well as other sustainability practices.[151] While broad department- or agency-wide goals may be of a far larger scale than a particular program, policy, or proposed action, an analysis that informs how a particular action affects that broader goal can be of value.

D. Using Available Information

Agencies should make decisions using current scientific information and methodologies. CEQ does not necessarily expect agencies to fund and conduct original climate change research to support their NEPA analyses or for agencies to require project proponents to do so. Agencies should exercise their discretion to select and use the tools, methodologies, and scientific and research information that are of high quality and available to assess relevant effects, alternatives, and mitigation.[152]

E. Environmental Justice Considerations

Numerous studies have found that environmental hazards (including those driven by climate change) are more prevalent in and pose particular risks to areas where people of color and low-income populations represent a higher fraction of the population compared with the general population.[153] The NEPA process calls for identifying potential environmental justice-related issues and meaningfully engaging with communities that proposed actions and reasonable alternatives (as well as the no-action alternative) may affect.

Agencies should be aware of the ongoing efforts to address the effects of climate change on human health and vulnerable communities.[154] Certain groups, including children, the elderly, communities with environmental justice concerns, which often include communities of color, low-income communities, Tribal Nations and Indigenous communities, and underserved communities are more vulnerable to climate-related health effects and may face barriers to engaging on issues that disproportionately affect them. CEQ recommends that agencies regularly engage environmental justice experts and leverage the expertise of the White House Environmental Justice Interagency Council [155] to identify approaches to avoid or minimize adverse effects on communities of color and low-income communities.[156]

When assessing environmental justice considerations in NEPA analyses, agencies should use the scoping process to identify potentially affected communities and provide early notice of opportunities for public engagement. This is important for all members of the public and stakeholders, but especially for communities of color and low-income communities, including those who have suffered disproportionate public health or environmental harms and those who are at increased risk for climate change-related harms. Agencies should engage such communities early in the scoping and project planning process to understand any unique climate-related risks and concerns. Agencies also should use the NEPA process to identify and analyze reasonably foreseeable effects, reasonable alternatives, and measures to avoid or minimize any such effects.

F. Monetizing Costs and Benefits

NEPA does not require a cost-benefit analysis where all monetized benefits and costs are directly compared. In a NEPA review, the weighing of the merits and drawbacks of the various alternatives need not be displayed using a monetary cost-benefit analysis and should not be when there are important qualitative considerations.[157] Using the SC–GHG to provide an estimate of the cost to society from GHG emissions—or otherwise monetizing discrete costs or benefits of a proposed Federal action—does not necessitate conducting a benefit-cost analysis in NEPA documents. As described in Section IV(B), the SC–GHG estimates are useful information disclosure metrics that can help decision makers and the public understand and contextualize GHG emissions and climate damages. Agencies can use the SC–GHG to provide information on climate impacts even if other costs and benefits cannot be quantified or monetized.

If an agency determines that a monetary cost-benefit analysis is appropriate and relevant to the choice among different alternatives the agency is considering, the agency may include the analysis in or append it to the NEPA document, or incorporate it by reference [158] as an aid in evaluating the environmental consequences. For example, a rulemaking could have useful information for the NEPA review in an associated regulatory impact analysis, which the agency could incorporate by reference in a NEPA document.[159]

When using a monetary cost-benefit analysis, just as with tools to quantify emissions, an agency should disclose the assumptions, alternative inputs, and

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[151] *See* E.O. 14057, *supra* note 7 (establishing government-wide and agency GHG reduction goals and targets).

[152] *See* 40 CFR 1502.23 (requiring agencies to ensure the professional and scientific integrity of the discussions and analyses in environmental impact statements).

[153] *See, e.g.,* USGCRP, Fourth National Climate Assessment, *supra* note 28, Volume II, 342 and 1077–78; USGCRP, *The Impacts of Climate Change on Human Health in the United States: A Scientific Assessment* (Apr. 2016), *https://health2016.globalchange.gov/downloads;* EPA, *Six Impacts, supra* note 41, at 8 (Figure ES.2), *https://www.epa.gov/system/files/documents/2021-09/climate-vulnerability_september-2021_508.pdf.*

[154] USGCRP, *The Impacts of Climate Change on Human Health in the United States: A Scientific Assessment, supra* note 153.

[155] For more information on the White House Environmental Justice Interagency Council, *see https://www.energy.gov/lm/white-house-environmental-justice-interagency-council-resources.*

[156] President's Memorandum for the Heads of All Departments and Agencies, Executive Order on Federal Actions to Address Environmental Justice in Minority and Low-Income Populations (Feb. 11, 1994), *https://www.epa.gov/sites/production/files/2015-02/documents/clinton_memo_12898.pdf;* CEQ, *Environmental Justice Guidance Under the National Environmental Policy Act* (Dec. 10, 1997), *https://ceq.doe.gov/docs/ceq-regulations-and-guidance/regs/ej/justice.pdf.*

[157] *See* 40 CFR 1502.22.

[158] *See* 40 CFR 1501.12 (material may be cited if it is reasonably available for inspection by potentially interested persons within the time allowed for public review and comment).

[159] For example, the regulatory impact analysis was used as a source of information and aligned with the NEPA review for Corporate Average Fuel Economy (CAFE) standards. *See* Nat'l Highway Traffic Safety Admin., *Corporate Average Fuel Economy Standards, Passenger Cars and Light Trucks, Model Years 2017–2025, Final Environmental Impact Statement*, Docket No. NHTSA–2011–0056, section 5.3.2 (July 2012), *https://www.nhtsa.gov/corporate-average-fuel-economy/environmental-impact-statement-cafe-standards-2017-2025.*

levels of uncertainty associated with such analysis. Finally, if an agency chooses to monetize some but not all effects of an action, the agency providing this additional information should explain its rationale for doing so.[160]

VII. Conclusions and Effective Date

Agencies should use this guidance to inform the NEPA review for all new proposed actions. Agencies should exercise judgment when considering whether to apply this guidance to the extent practicable to an on-going NEPA process. CEQ does not expect agencies to apply this guidance to concluded NEPA reviews and actions for which a final EIS or EA has been issued. Agencies should consider applying this guidance to actions in the EIS or EA preparation stage if this would inform the consideration of alternatives or help address comments raised through the public comment process.

Dated: January 4, 2023.

Brenda Mallory,

Chair.

[FR Doc. 2023–00158 Filed 1–6–23; 8:45 am]

BILLING CODE 3325–F3–P

DEPARTMENT OF EDUCATION

[Docket No.: ED–2022–SCC–0112]

Agency Information Collection Activities; Submission to the Office of Management and Budget for Review and Approval; Comment Request; Federal Direct Loan Program Regulations for Forbearance and Loan Rehabilitation

AGENCY: Federal Student Aid (FSA), Department of Education (ED).

ACTION: Notice.

SUMMARY: In accordance with the Paperwork Reduction Act (PRA) of 1995, the Department is proposing an extension without change of a currently approved information collection request (ICR).

DATES: Interested persons are invited to submit comments on or before February 8, 2023.

ADDRESSES: Written comments and recommendations for proposed information collection requests should be submitted within 30 days of publication of this notice. Click on this link *www.reginfo.gov/public/do/PRAMain* to access the site. Find this information collection request (ICR) by selecting ''Department of Education'' under ''Currently Under Review,'' then check the ''Only Show ICR for Public Comment'' checkbox. *Reginfo.gov* provides two links to view documents related to this information collection request. Information collection forms and instructions may be found by clicking on the ''View Information Collection (IC) List'' link. Supporting statements and other supporting documentation may be found by clicking on the ''View Supporting Statement and Other Documents'' link.

FOR FURTHER INFORMATION CONTACT: For specific questions related to collection activities, please contact Beth Grebeldinger, 202–377–4018.

SUPPLEMENTARY INFORMATION: The Department is especially interested in public comment addressing the following issues: (1) is this collection necessary to the proper functions of the Department; (2) will this information be processed and used in a timely manner; (3) is the estimate of burden accurate; (4) how might the Department enhance the quality, utility, and clarity of the information to be collected; and (5) how might the Department minimize the burden of this collection on the respondents, including through the use of information technology. Please note that written comments received in response to this notice will be considered public records.

Title of Collection: Federal Direct Loan Program Regulations for Forbearance and Loan Rehabilitation.

OMB Control Number: 1845–0119.

Type of Review: An extension without change of a currently approved ICR.

Respondents/Affected Public: Individuals and households.

Total Estimated Number of Annual Responses: 129,027.

Total Estimated Number of Annual Burden Hours: 35,094.

Abstract: This information collection for the Direct Loan (DL) Program regulations is related to regulations for forbearance in § 685.205 and reasonable and affordable loan rehabilitation in § 685.211. The Department of Education is requesting an extension without change of the current burden calculated for this information collection. Due to the COVID–19 pandemic and loan payment pause, there is not sufficient information to estimate burden changes. These regulations provide additional flexibilities for DL borrowers and permit oral requests for forbearance, as well as allow a borrower to object to the initially established reasonable and affordable loan repayment amount. In addition, if a borrower incurs changes to his or her financial circumstances, the borrower can provide supporting documentation to change the amount of the reasonable and affordable loan monthly repayment amount. There has been no change to the regulatory language.

Dated: January 4, 2023.

Juliana Pearson,

PRA Coordinator, Strategic Collections and Clearance, Governance and Strategy Division, Office of Chief Data Officer, Office of Planning, Evaluation and Policy Development.

[FR Doc. 2023–00160 Filed 1–6–23; 8:45 am]

BILLING CODE 4000–01–P

ELECTION ASSISTANCE COMMISSION

Sunshine Act Meetings

AGENCY: U.S. Election Assistance Commission.

ACTION: Sunshine Act notice; notice of public meeting agenda.

SUMMARY: Public Meeting: U.S. Election Assistance Commission Technical Guidelines Development Committee Annual Meeting.

DATES: Thursday, January 26, 2023, 1:00–4:30 p.m. ET.

ADDRESSES: The virtual meeting is open to the public and will be livestreamed on the U.S. Election Assistance Commission YouTube Channel: *https://www.youtube.com/channel/UCpN6i0g2rlF4ITWhwvBwwZw.*

FOR FURTHER INFORMATION CONTACT: Kristen Muthig, [redacted]

SUPPLEMENTARY INFORMATION:

Purpose: In accordance with the Government in the Sunshine Act (Sunshine Act), Public Law 94–409, as amended (5 U.S.C. 552b), the U.S. Election Assistance Commission (EAC) will conduct the virtual annual meeting of the EAC Technical Guidelines Development Committee (TGDC) to discuss regular business of the board.

Agenda: The EAC and TGDC members will hold a virtual meeting to discuss program updates for EAC Testing and Certification and the National Institute of Standards and Technology (NIST) Voting Program. The meeting will also include the status of the Voluntary Electronic Pollbook Pilot Program, the annual review of proposed changes to the Voluntary Voting System Guidelines (VVSG), as well as public feedback from the October 2022 Path to

[160] For example, the information may be responsive to public comments or useful to the decision maker in further distinguishing between alternatives and mitigation measures. In all cases, the agency should ensure that its consideration of the information and other factors relevant to its decision is consistent with applicable statutory or other authorities, including requirements for the use of cost-benefit analysis.

Attachment 12

TVA Charts Path to Clean Energy Future

May 6, 2021

KNOXVILLE — The Tennessee Valley Authority will continue to fulfill its mission for future generations by building on its industry-leading carbon reduction by aspiring to move toward net-zero carbon emissions by 2050 based on a set of guiding principles endorsed by the TVA Board of Directors at its quarterly business meeting Thursday.

As outlined in TVA's most recent Sustainability Report, TVA's continuing execution of its nearly 88-year-old mission – supplying reliable energy at the lowest feasible cost, being a steward of the region's natural resources, and serving as a catalyst for continued economic development – must be viewed through the lens of future sustainability.

Businesses and industries are already seeing the unique value of that approach. In the first six months of fiscal year 2021, TVA helped attract or retain more than 45,200 jobs and $3.9 billion in investment to the region, not including recent significant news from LG, Milwaukee Tools and Oracle. Building a clean energy future is an essential path TVA is following to attract even more jobs and investment to continue that success.

Since 2005, TVA has reduced carbon emissions by 63% primarily through creating one of the most diverse generation portfolios in the nation. This includes adding 1,600 megawatts of new nuclear capacity – the most of any utility in the nation; an additional 1,600 megawatts of wind and solar capacity; retiring 8,600 megawatts of coal capacity that was at the end of its useful life by the end of 2023 and investing more than $400 million to promote energy efficiency.

"The steps we've already taken operationally and financially have created a strong foundation for supplying cleaner energy without impacting reliability or low cost," said Jeff Lyash, TVA president and CEO. "TVA is an industry leader in carbon reduction, but we aren't satisfied. We are focused on increasing carbon reduction while maintaining our commitment to the low-cost, reliable energy our customers expect and deserve."

The Board approved a resolution endorsing TVA's Strategic Intent and Guiding Principles, which outlines the TVA leadership team's intent to align its people, operational and innovation efforts to business strategies that provide reliable, resilient, low-cost, and clean energy to the region.

The document establishes a series of decarbonization milestones over the next three decades. By 2030, TVA will focus on growing its current 63% carbon reduction to 70% by:

- Continuing to expand renewable generation, including 2,300 megawatts that is already committed and will be online by 2023.
- Expanding battery storage capacity as technology develops and costs decline.
- Further reducing coal generation as plants reach the end of their service lives – TVA's current planning assumptions indicate the retirement of all coal units by 2035.
- Leveraging natural gas generating facilities as a bridging strategy to effectively allow the addition of more renewable energy without impacting system reliability.

Specific plans to achieve this milestone, including any decisions affecting existing or new facilities, will be developed over the coming months and will include detailed environmental assessments that will seek public input before any actions are taken.

TVA has a path to an 80% reduction by 2035 with up to 10,000 megawatts of solar capacity online and continued investment in extending the lives of our current nuclear and hydro fleets, as well as the integrated systems necessary to support the energy system of the future, while moving toward

its aspirational goal of net-zero carbon emissions by 2050.

"We are confident we can approach an 80% reduction by 2035 using existing technology and without impacting TVA's reliability or costs," said Lyash. "Moving to net-zero carbon emissions will require public and private partnerships to further evolve existing technologies, such as energy storage systems and carbon capture, and develop new capabilities, such as advanced nuclear solutions. TVA stands ready to lead in these innovation efforts."

Leveraging its extensive experience in nuclear power operations, TVA is partnering with Kairos Power to assist with the deployment of a Hermes low-power demonstration reactor in the East Tennessee Technology Park in Oak Ridge. In addition, TVA continues to explore the potential of light-water-based small modular reactors at the Clinch River Site, which holds the nation's only NRC early site permit for small-modular reactor development.

"Our Sustainability report recognizes that power generation is only one part of the overarching challenge of decarbonizing our economy and TVA remains actively engaged in supporting the electrification of transportation and other initiatives to help achieve that goal," said Lyash. "Our current partnerships with state and utility partners to expand electric vehicle charging infrastructure in our region is one example of how TVA is leading this effort."

Current and future initiatives are supported by TVA's continued strong operational and financial performance with lower debt levels, which has enabled TVA to continue to support local power companies and communities to recover from the pandemic while effective wholesale rates remain lower than 10 years ago.

"Our employees' hard work driving efficiencies into our business and improving our balance sheet over the past eight years means that executing our decarbonization goals will not impact our intent to maintain stable rates through at least 2030," said John Thomas, TVA's chief financial officer.

Over the first six months of TVA's fiscal year, total operating revenues decreased 4% over the same period in the previous year, primarily due to lower base rates and lower fuel costs, both of which supported lower costs for customers. Interest expenses were 3% lower than last year due to lower debt levels. During the same period, the TVA team also:

- Provided $104 million in Pandemic Relief Credits to all 153 local power companies, their large commercial and industrial customers, and TVA directly served customers in the first six months of fiscal year 2021.
- Generated 60% of TVA's energy from carbon-free sources.
- Continued to manage wetter-than-normal conditions throughout the Tennessee River system.

The Tennessee Valley Authority is a corporate agency of the United States that provides electricity for business customers and local power distributors serving nearly 10 million people in parts of seven southeastern states. TVA receives no taxpayer funding, deriving virtually all of its revenues from sales of electricity. In addition to operating and investing its revenues in its electric system, TVA provides flood control, navigation and land management for the Tennessee River system and assists local power companies and state and local governments with economic development and job creation.

Contact

TVA Public Relations
tvainfo@tva.gov
865-632-6000

TVA Media Line

Our media staff is available 24 hours a day. If you cannot reach the contact above, please call our media line at 865-632-6000.

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TENNESSEE VALLEY AUTHORITY

TOOLS AND RESOURCES:

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- TVA POLICE
- TVA STEM

POLICIES:

- ACCESSIBILITY INFORMATION
- EQUAL EMPLOYMENT OPPORTUNITY POLICY
- FREEDOM OF INFORMATION ACT
- LEGAL NOTICES
- NO FEAR ACT DATA
- PRIVACY POLICY
- REASONABLE ACCOMMODATION
- VULNERABILITY DISCLOSURE POLICY

CONTACT:

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KNOXVILLE, TN 37902
(865) 632-2101
TVAINFO@TVA.COM

ISSUES / SUGGESTIONS:

- INFORMATION QUALITY
- WEBSITE FEEDBACK

From:	Amanda Garcia
To:	nepa
Cc:	Gabriela Sarri-Tobar; Amy Kelly; Amanda Garcia; Mississippi Rising Coalition; Catherine Robinson
Subject:	Community Groups" comments on New Caledonia Gas Plant scoping
Date:	Friday, January 19, 2024 1:39:10 PM
Attachments:	2024-01-19 Community Groups Comments on New Caledonia Gas Plant Scoping.pdf 2024-01-19 Attachments to Community Groups" Comments on TVA"s New Caledonia Gas Plant.pdf

Dear Ms. McLamb:

Please find attached the comments of Southern Environmental Law Center, Sierra Club, Center for Biological Diversity, Mississippi Rising Coalition, and One Voice on scoping for the New Caledonia Gas Plant proposal.

Sincerely,
Amanda

Amanda Garcia (she/her/hers)
Senior Attorney
[redacted]

[redacted]

[redacted]

southernenvironment.org

SOUTHERN ENVIRONMENTAL LAW CENTER

1033 Demonbreun Street, Suite 205
Nashville, TN 37203

Telephone 615-921-9470
Facsimile 615-921-8011

January 19, 2024

Via email to nepa@tva.gov

Erica McLamb, NEPA Compliance Specialist
Tennessee Valley Authority
1101 Market Street, BR 2C-C
Chattanooga, TN 37402

RE: Community Groups' Comments on the Tennessee Valley Authority's Notice Regarding New Caledonia Gas Plant Proposal

Dear Ms. Johnson:

Sierra Club, Center for Biological Diversity, Mississippi Rising Coalition, One Voice, and Southern Environmental Law Center ("SELC") (collectively, "Community Groups") respectfully submit the comments below in response to TVA's November 28, 2023 scoping notice[1] (the "Scoping Notice") describing a proposed new 500 MW gas plant in Lowndes County, Mississippi ("New Caledonia Gas Plant" or "Plant"). The New Caledonia Gas Plant proposal conflicts with federal climate policy, leaves Inflation Reduction Act money on the table, ignores reasonable, cost-effective clean alternatives, and puts ratepayers on the hook for an expensive new gas plant.

Since February 2021, TVA has proposed roughly 6,500 megawatts of new gas generation across its fleet—the largest new investment in fossil fuel plants in the nation. Several of TVA's individual gas plant proposals (including this one) are currently undergoing NEPA review. At the same time, TVA has also opened a new long-range energy planning process. In doing so, TVA has acknowledged uncertainties about the agency's generation needs in the future and that it must complete a new integrated resource plan (IRP) to comply with the agency's statutory obligation to engage in least-cost planning before making decisions on generation assets.

The non-exhaustive list of items that Community Groups describe below are in addition to the critical components of an environmental review that TVA already identified in the Scoping Notice. TVA's announcement in the Scoping Notice raises additional serious questions that TVA must address in a way that fully and candidly describes the New Caledonia Gas Plant in context.

First, TVA must not plan or decide to build new gas plants before completing the statutorily mandated least-cost planning process that will govern the agency's

[1] TVA, Notice of Intent, New Caledonia Generation Site Project, 88 Fed. Reg. 83202 (November 28, 2023) [hereinafter "Scoping Notice"].

decisions when a final decision on this project is made. The Scoping Notice indicates that TVA does not expect to make a final decision on this project until late 2024[2] *after* the planned completion of TVA's 2024 Integrated Resource Plan ("IRP") process.[3] But TVA cites analysis in the *2019* IRP to justify building this new plant. The 2019 IRP is outdated for several reasons, as explained by EPA in recent comments on the Cheatham County Gas Plant proposal and in a recent report published by Applied Economics Clinic.[4]

Relying on the 2019 IRP to inform a decision to build a new gas plant in 2024 is irresponsible and arbitrary because neither that document nor the modeling exercise on which it is based reflect TVA's climate commitments, coal retirement plans, major climate legislation, and significant changes in the energy market. Among other things, the 2019 IRP does **not**:

- Incorporate and model TVA's own commitment to an 80 percent greenhouse gas ("GHG") emissions reduction by 2035 from 2005 levels and to achieving net-zero emissions by 2050;[5]
- Incorporate and model TVA's obligation to comply with federal decarbonization targets, including decarbonizing the electric grid by 2035, as set forth in a series of executive orders;[6]
- Ground-truth its modeling assumptions through an all-resources Request for Proposals;[7]
- Incorporate incentives from two groundbreaking pieces of legislation: the *Infrastructure Investment and Jobs Act ("IIJA") and the Inflation Reduction Act ("IRA"),* which are both expected to lower transmission, wind, solar, and storage investment costs;

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[2] Scoping Notice at 83203.

[3] TVA plans on Board adoption of the 2024 IRP in "Summer 2024." *See* TVA Public Webinar Meeting Presentation (Dec. 14, 2023) at slide 59, *available at* https://tva-azr-eastus-cdn-ep-tvawcm-prd.azureedge.net/cdn-tvawcma/docs/default-source/environment/environmental-stewardship/integrated-resource-plan/2024/irp-public-webinar-presentation-dec-14.pdf?sfvrsn=fd9a54a7_1.

[4] ENVIRONMENTAL PROTECTION AGENCY, EPA COMMENTS ON THE NOTICE OF INTENT TO PREPARE AN ENVIRONMENTAL IMPACT STATEMENT FOR THE CHEATHAM COUNTY GENERATION SITE, CHEATHAM COUNTY, TENNESSEE 2 (July 7, 2023), Att. 1; CHIRAG T. LALA ET AL., APPLIED ECON. CLINIC, ASSESSING TVA'S IRP PLANNING PRACTICES 25-27, 32-33 (June 2023) [hereinafter AEC IRP REPORT], Att. 2, https://static1.squarespace.com/static/5936d98f6a4963bcd1ed94d3/t/64b1cc782136dd78a647c355/1689373816613/FINAL_TVA+IRP+Analysis+Report_AEC_30June2023+%281%29.pdf.

[5] AEC IRP REPORT at 1; *see also* TVA, STRATEGIC INTENT AND GUIDING PRINCIPLES 20–21 (May 2021).

[6] AEC IRP REPORT at 1.

[7] *Id.* at 31.

- Reflect the effect of recent price volatility, supply chain challenges, and winter reliability challenges; or
- Consider resources that require new high voltage DC transmission (HVDC), including wind located in the Southwest Power Pool (SPP), Midcontinent Independent System Operator (MISO), and Electric Reliability Council of Texas (ERCOT) territories.

Further, the Scoping Notice fails to acknowledge that TVA has already been taking public input on its next integrated resource plan (the "2024 IRP").[8] In its May 2023 notice seeking scoping comments the 2024 IRP, TVA acknowledges that the agency needs to resolve significant, open questions about its future resource needs by asking for the public's input on, among other questions: "How do you think the demand for energy will change between now and 2050 in the TVA region?"; "Should the diversity of the current power generation mix . . . change?"; "And how will the resource decisions discussed [in the 2024 IRP notice] affect the reliability, dispatchability . . . , and cost of electricity?"[9]

Evaluating large new gas-burning assets before answering those questions deprives the public of the opportunity to have meaningful input on TVA's decision-making in both the IRP and New Caledonia Gas Plant NEPA processes. And essentially locking in major new assets before completing the next IRP process undermines TVA's own ability to freely "determine[e] potential supply-side and demand-side energy resources options"—as TVA claims is the agency's aim in the IRP process—without the prior restraint of unrecoverable investments in specific resource options.

Without an up-to-date IRP, TVA has no basis to conclude that its massive investment in new gas plants contributes to a portfolio that achieves the lowest system cost. TVA should not make decisions to invest in additional gas plants, including the New Caledonia Gas Plant, until after TVA has completed updated long-term resource planning. Further, because TVA has relied on flawed and outdated analysis, proposed gas plants like New Caledonia should not be considered existing resources in the 2024 IRP but instead should be considered potential capacity additions that must compete with other resources, including wind, solar, energy efficiency, battery storage of various durations, and demand response.

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[8] TVA, *Integrated Resource Plan*, https://www.tva.com/environment/environmental-stewardship/integrated-resource-plan (last visited Jan. 18, 2024), Att. 3.

[9] TVA, Notice of Intent, Integrated Resource Plan and Environmental Impact Statement, 88 Fed. Reg. 32265, 32266 (May 19, 2023), https://tva-azr-eastus-cdn-ep-tvawcm-prd.azureedge.net/cdn-tvawcma/docs/default-source/environment/environmental-stewardship/integrated-resource-plan/2024/irp-noi-5.19.2023.pdf?sfvrsn=38fd2bdb_1.

TVA plans to finalize the 2024 IRP by summer 2024, *before* making a final decision on the New Caledonia Gas Plant.[10] There is no reasonable basis for relying on the outdated 2019 IRP to rush forward with the New Caledonia Gas Plant proposal now.

Second, TVA must address the cost competitiveness of its preferred alternative relative to more affordable renewable and zero-GHG options. The Inflation Reduction Act increases the economic benefits of selecting renewable power instead of new fossil fuel assets. A study of 76 GW of new gas-burning power plants found that 93% were more expensive than clean energy in light of the IRA's tax credits.[11] Battery storage, a key component of firming the intermittency of renewable generation resources, has declined in price over the past decade.[12] And although in the immediate aftermath of the pandemic the prices of lithium-ion batteries increased, that trend is expected to reverse in 2024—before TVA reaches a final decision on this project—as supply chain issues resolve and new lithium production comes online.[13] TVA must consider and address in its draft environmental review document the ways that the costs of a solar and storage option are expected to change by the time a final decision is reached.

TVA must also consider and disclose the risk that the cost of new fossil-fuel burning generation assets will change in the near future. EPA's proposed rule establishing more environmentally protective standards for fossil fuel burning power plants will impose compliance costs on the owners of those plants, increasing the economic attractiveness of renewables further still.[14] Similarly, decarbonization

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[10] TVA, Scoping Report, 2024 Integrated Resource Plan 4 (October 26, 2023), https://tva-azr-eastus-cdn-ep-tvawcm-prd.azureedge.net/cdn-tvawcma/docs/default-source/environment/environmental-stewardship/integrated-resource-plan/2024/2024-irp-scoping-report-10-26-23.pdf?sfvrsn=e8adae8b_1.

[11] Lauren Shisberg, Rocky Mountain Institute, *The Business Case for New Gas is Shrinking* (Dec. 8, 2022), Att. 4, https://rmi.org/business-case-for-new-gas-is-shrinking/.

[12] *Lithium-ion Battery Pack Prices Rise for First Time to an Average of $151/kWh*, BloombergNEF (Dec. 6, 2022), https://about.bnef.com/blog/lithium-ion-battery-pack-prices-rise-for-first-time-to-an-average-of-151-kwh/, Att. 5.

[13] *Top 10 Energy Storage Trends in 2023*, BloombergNEF (Jan. 11, 2023), https://about.bnef.com/blog/top-10-energy-storage-trends-in-2023/, Att. 6, ("Energy storage system costs stay above $300/kWh for a turnkey four-hour duration system. In 2022, rising raw material and component prices led to the first increase in energy storage system costs since BNEF started its ESS cost survey in 2017. Costs are expected to remain high in 2023 before dropping in 2024.")

[14] New Source Performance Standards for Greenhouse Gas Emissions From New, Modified, and Reconstructed Fossil Fuel-Fired Electric Generating Units; Emission Guidelines for Greenhouse Gas Emissions From Existing Fossil Fuel-Fired Electric Generating Units; and Repeal of the Affordable Clean Energy Rule, 88 Fed. Reg. 33240 (May 23, 2023).

targets under the Paris Agreement,[15] multiple executive orders,[16] and TVA's own climate strategy[17] mean any new gas plant would require costly greenhouse gas mitigation during the useful life of TVA's proposed New Caledonia Gas Plant. And in addition, TVA must account for the volatility of gas prices—which has been extreme in recent years—as yet another significant financial burden that the agency could avoid by selecting renewable options to meet its generation needs.[18]

Third, TVA must consider in its environmental review all reasonable alternatives, not only its preferred action and a no-action alternative. NEPA's implementing regulations and long-standing judicial precedent are clear that the Act in fact "prevents federal agencies from effectively reducing the discussion of environmentally sound alternatives to a binary choice between granting or denying an application."[19] TVA cannot define the project in so narrow a way as to artificially foreclose every alternative aside from the one it prefers.[20] Simply reciting its unexplained assumption that the only solution is gas fails to demonstrate to the

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[15] *Fact Sheet: President Biden Sets 2030 Greenhouse Gas Pollution Reduction Target Aimed at Creating Good-Paying Union Jobs and Securing U.S. Leadership on Clean Energy Technologies*, The White House (Apr. 22, 2021), Att. 7, https://www.whitehouse.gov/briefing-room/statements-releases/2021/04/22/fact-sheet-president-biden-sets-2030-greenhouse-gas-pollution-reduction-target-aimed-at-creating-good-paying-union-jobs-and-securing-u-s-leadership-on-clean-energy-technologies/.

[16] *See, e.g.,* Exec. Order 14,082, Implementation of the Energy and Infrastructure Provisions of the Inflation Reduction Act of 2022, 87 Fed. Reg. 56,861 (Sept. 12, 2022).

[17] TVA, STRATEGIC INTENT AND GUIDING PRINCIPLES 20–21 (May 2021).

[18] *U.S. natural gas price saw record volatility in the first quarter of 2022*, EIA (Aug. 24, 2022), https://www.eia.gov/todayinenergy/detail.php?id=53579, Att. 8.

[19] *Save Our Cumberland Mountains v. Kempthorne*, 453 F.3d 334, 345 (6th Cir. 2006) (collecting cases); *see also* 40 C.F.R. § 1502.14 (directing agencies to valuate "reasonable alternatives to the proposed action," to discuss "each alternative considered in detail" and to explain, for alternatives eliminated from detailed study "the reasons for their elimination.").

[20] *Simmons v. U.S. Army Corps of Engineers*, 120 F.3d 664, 666 (7th Cir. 1997) ("One obvious way for an agency to slip past the strictures of NEPA is to contrive a purpose so slender as to define competing "reasonable alternatives" out of consideration (and even out of existence). . . . If the agency constricts the definition of the project's purpose and thereby excludes what truly are reasonable alternatives, the EIS cannot fulfill its role. Nor can the agency satisfy [NEPA]."); *Colorado Env't Coal. v. Dombeck*, 185 F.3d 1162, 1175 (10th Cir. 1999) (clarifying that agencies must "take responsibility for defining the objectives of an action and then provide legitimate consideration to alternatives that fall between the obvious extremes."); *Webster v. U.S. Dep't of Agric.*, 685 F.3d 411, 423 (4th Cir. 2012) (being satisfied that an agency defined purpose and need appropriately where it "conducted a searching, independent review of the stated purposes and needs . . . which demonstrates that it exercised a degree of skepticism in establishing them," even though "it is entirely appropriate for an agency to consider the applicant's needs and goals").

public (and reviewing courts) that TVA has in fact considered need in a way thatcomplies with NEPA.

TVA must consider, as the statute requires, reasonable alternatives that would meet the project's needs. Here, reasonable alternatives include renewable power paired with storage technology, as well as hybrid alternatives that make use of demand response, energy efficiency, and other methods of meeting electricity demand and maintaining reliability without burning fossil fuels.

Fourth, TVA cannot announce that the project is needed to integrate renewable resources without explaining what those resources are, where they would be located, and how they interact with the generation needs connected to this project. The Scoping Notice generally avers that "TVA needs flexible, dispatchable power that can successfully integrate increasing amounts of renewable energy sources while ensuring reliability."[21] But materially identical justifications have propelled TVA through each step of what is now one of the largest investments in new fossil-fuel generation in the country—since February 2021, TVA has proposed roughly 6,500 megawatts of new gas generation across its fleet citing for each project the agency's need to integrate solar onto the grid.[22] TVA must explain why, despite already committing to thousands of megawatts of new gas-fired generation, it can justify still greater investments in these resources while not appearing to aggressively pursue the same renewable projects that the agency claims justifies these decisions.[23] TVA must also evaluate whether storage, either alone or in combination with other zero-carbon resources such as energy efficiency and demand response, could *better* integrate 10,000 MW of solar. Storage is more flexible than gas and is uniquely capable of absorbing excess energy from solar, avoiding curtailment. Demonstrating to the public that TVA has taken a hard look at the environmental consequences of its decision requires TVA to identify specific sites where TVA expects to integrate renewables and explaining all the reasonable alternatives the agency could undertake.

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[21] Scoping Notice at 83203.

[22] Paradise and Colbert Final EA; TVA, Johnsonville Aeroderivative Combustion Turbine Project Finding of No Significant Impact (July 12, 2022); Cumberland Fossil Plant Retirement Environmental Impact Statement, 88 Fed. Reg. 3,767 (Jan. 20, 2023); Environmental Impact Statement for Kingston Fossil Plant Retirement, 86 Fed. Reg. 31,780 (June 15, 2021); Cheatham County Generation Site Environmental Impact Statement Notice of Intent, 88 Fed. Reg. 32,267 (May 19, 2023).

[23] For its year ended September 30, 2023, TVA reported 4% of its total power supply coming from non-hydro renewable sources. *See* TVA, *Annual Report Pursuant to Section 13, 15(d), or 37 of the Securities Exchange Act of 1934 [Form 10-K]* at 70 (Nov. 14, 2023), Att. 9; *see id.* at 17 (less than 1 GW solar operating on TVA system as of September 30, 2023).

Fifth, TVA must publicly disclose its updated load forecast and other relevant information so that the public and decisionmakers can meaningfully evaluate TVA's claimed purpose and need for the New Caledonia Gas Plant to "to support continued load growth in the TVA power service area."[24] In particular, TVA must disclose the assumptions underlying its statement in the Scoping Notice that "[f]orecasted electric demand is expected to grow more than one percent per year on average between 2023–2026."[25]

TVA must define the need for agency action broadly enough to consider alternatives that would *avoid* or *minimize* load growth rather than accepting it as a given. Avoiding or minimizing load growth would help avoid the need for investment in economically, socially, and environmentally costly new fossil fuel infrastructure. Further, defining the need for the Project broadly enough to include consideration of demand-side resources would be consistent with TVA's statutory mandates to "promote the wider and *better* use of electric power for agricultural and domestic use"[26] and to "treat demand and supply resources on a consistent and integrated basis."[27]

TVA must disclose current information regarding the availability of demand response and energy efficiency to avoid, minimize or offset some or all of the need for the New Caledonia Gas Plant. In the 2019 IRP, TVA committed to preparing an energy efficiency and demand response market potential study.[28] But nearly five years later, and despite a long-pending FOIA request from SELC, TVA has not publicly disclosed the results of that study. TVA has, however, made public statements about the increased availability of energy efficiency and demand response, including an announcement by CEO Jeff Lyash of 1,000 MW of additional demand response resources[29] and TVA's plan to offset at least one-third of its load

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[24] Scoping Notice at 83203.
[25] *Id.* at 83202.
[26] 16 U.S.C. § 831i.
[27] *Id.* § 831m-1.
[28] TVA, 2019 Integrated Resource Plan Volume I – Final Resource Plan at ES-5 (2019), https://tva-azr-eastus-cdn-ep-tvawcm-prd.azureedge.net/cdn-tvawcma/docs/default-source/default-document-library/site-content/environment/environmental-stewardship/irp/2019-documents/tva-2019-integrated-resource-plan-volume-i-final-resource-plan.pdf?sfvrsn=44251e0a_4.
[29] *See Streaming Video*, TVA (Feb. 16, 2023), https://www.tva.com/about-tva/our-leadership/board-of-directors/streaming-video (video of Board Meeting at timestamp 2:04:35–49).

growth over the next ten years with energy efficiency and demand response.[30] TVA must disclose its market potential study and explain whether resources identified in that study or otherwise identified by TVA can avoid, minimize or offset the need for the New Caledonia Gas Plant.

Not only should TVA consider ways to reduce end-use customer demand, but TVA should also consider ways for local power companies to reduce their demand for TVA electricity. Such options include removing the 5% cap on local power company self-generation[31] and supporting local power companies to promote energy efficiency, demand response, and battery storage resources on the distribution level.

To the extent TVA insists on arbitrarily relying on the outdated 2019 IRP, TVA must evaluate shifting its strategy to include more elements of the 2019 IRP's "Promote DER" strategy. In Promote DER, energy efficiency, demand response, distributed generation, and battery storage are incentivized and low-income energy efficiency programs are promoted.[32] The 2019 IRP's results demonstrated that promoting DER would reduce system costs, increase economic development in the region, provide more clean energy, reduce financial risk, and improve and preserve the environmental quality of the Valley. Additionally, promoting DER would increase consumer freedom to manage their demand on the system, and expand market choice for ratepayers.[33] TVA must evaluate all of the resources and incentives available in Promote DER as an alternative to the proposed New Caledonia Gas Plant.

Sixth, TVA must include a GHG analysis that is complete, accurate, and that acknowledges federal climate policy. CEQ's March 2023 guidance on climate change in NEPA reviews addresses projects of exactly this kind. TVA must follow that guidance including, for example, by assessing "changes relating to the production or consumption" of gas that are indirect effects of projects using gas; by clearly identifying "the alternative with the lowest net GHG emissions or the greatest net climate benefits"; by explaining how the alternatives will "help meet climate change goals and commitments, or alternately, detract from them"; and by going beyond "a statement that emissions from a proposed Federal action or its alternatives represent

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[30] TVA Press Release, TVA Plans to Invest $15 Billion Over the Next Three Years to Meet Region's Growth (Aug. 24, 2023) (TVA intention to "invest in energy efficiency and demand response programs to help lower energy bills and offset more than 30% of new load growth in the next 10 years"), https://www.tva.com/newsroom/press-releases/tva-plans-to-invest--15-billion-over-the-next-three-years-to-meet-region-s-growth.

[31] Caroline Eggers, *NES plots future for solar, beyond TVA*, WPLN News (Apr. 4, 2023), https://wpln.org/post/nes-plots-future-for-solar-beyond-tva/ (quoting local power company president as stating, "I would like 15%" under the "Flexibility" program), Att. 10.

[32] TVA 2019 IRP Volume I at 6-7.

[33] *See generally* S. Env't L. Ctr. et al. Comments on TVA's 2019 Draft Integrated Resource Plan and Draft Environmental Impact Statement (Apr. 7, 2019).

only a small fraction of global or domestic emissions."[34] CEQ unambiguously instructs that "such comparisons and fractions are not an appropriate method for characterizing the extent of a proposed action's and its alternatives' contributions to climate change."[35]

For this Project, as well as for the cumulative total of TVA's 6,500+ MW gas buildout since February 2021, TVA must analyze the greenhouse gas emissions of new gas plants in the context of President Biden's executive orders directing all federal agencies to prioritize decarbonizing the electricity sector by 2035.[36] TVA must also address how building 6,500 MW of new gas-burning assets with decades of useful life can square with even its own, separate emissions mitigation targets.[37]

Sixth, the data and resources provided in these comments and already in TVA's possession indicate that the New Caledonia Gas Plant is likely to significantly affect the environment, requiring the preparation of an environmental impact statement ("EIS"). Over a baseline of *zero* gas generation, firing up 500 MW of new fossil fuel generation capacity is likely to have significant impacts on human and natural resources both now and for the project's lifetime.[38] The aggregate and cumulative effects of this project, including air and GHG pollution, considered in the appropriate geographic and historical contexts, demand detailed study through an EIS.

Finally, in the Scoping Notice, TVA supports its proposal to construct the New Caledonia Gas Plant by referring to several studies and other resources that, to our knowledge, have not been provided to the public. These studies and resources include:

- Electric demand forecast ("expected to grow more than one percent per year on average between 2023-2026"); and
- Current system modeling ("with increased residential migration and commercial development, TVA must add capacity to the system to maintain adequate operating reserves").[39]

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[34] Council on Envtl. Quality, National Environmental Policy Act Guidance on Consideration of Greenhouse Gas Emissions and Climate Change, 88 Fed. Reg. 1196-1212 (Jan. 9, 2023) [hereinafter "2023 CEQ Climate Guidance"], Att. 11, https://www.regulations.gov/document/CEQ-2022-0005-0001.
[35] 2023 CEQ Climate Guidance at 1203.
[36] See Exec. Order 14,082, Implementation of the Energy and Infrastructure Provisions of the Inflation Reduction Act of 2022, 87 Fed. Reg. 56,861 (Sept. 12, 2022).
[37] *See TVA Charts Path to Clean Energy Future*, TVA (May 6, 2021) (for targets), Att. 12, https://www.tva.com/newsroom/press-releases/tva-charts-path-to-clean-energy-future.
[38] *See S. Fork Band Council of W. Shoshone of Nev.*, 588 F.3d at 725–726.
[39] Scoping Notice at 83202.

In order for the public to provide meaningful comments on TVA's draft environmental document, TVA must disclose these studies and resources. In addition, Groups have identified several other categories of information that are necessary to adequately inform TVA's decisionmakers and the public of the impacts of the Project and to explore reasonable alternatives to the Project, including:

- Hourly load forecast to identify projected peak demand and identify alternatives that could reduce that demand;
- Energy efficiency and demand response potential study referred to in the 2019 IRP;
- Projected capacity factor for the New Caledonia Gas Plant;
- Air pollutant dispersion modeling for all pollutants, including NOx, PM2.5, and formaldehyde, from the proposed Plant;
- Projected water usage amounts for the New Caledonia Gas Plant;
- Project greenhouse gas emissions of the Project and the projected cumulative emissions from TVA's gas buildout, including upstream methane emissions, including both the rate and the total emissions over the life of the gas plants.
- An updated integrated resource plan that takes into account regulatory, economic, and technological changes that have occurred since the 2019 plan was adopted.

TVA must provide this information to the public in or alongside the draft environmental document in order to ensure that the public can integrate it into their comments on the Project. Thank you for the opportunity to comment on this Scoping Notice.

Sincerely,

Gaby Sarri-Tobar
Campaigner, Energy Justice Program
Center for Biological Diversity

Amanda Garcia
Senior Attorney
Southern Environmental Law Center

Amy Kelly
Field Organizing Strategist,
Tennessee Valley Region
Sierra Club

Lea Campbell
Organizer
Mississippi Rising Coalition

Catherine Robinson
Program Manager
One Voice

CC:

[redacted]

From: John Fortuin
To: nepa
Subject: Comment: New Caledonia Gas Plant, Caledonia Mississippi
Date: Thursday, January 18, 2024 5:36:35 PM

Date: 01/18/24

To: Erica McLamb

NEPA Project Manager

esmclamb@tva.gov

1101 Market St.

Chattanooga, TN 37402

Re: New Caledonia Gas Plant, Caledonia Mississippi

Dear Ms. McLamb and TVA staff,

The carbon emissions from fossil fuels have impacted the climate globally and are impacting farm yields that have caused famine and subsequent migration of millions of people globally. Yet providing energy to a country's citizens does not necessarily need to be curtailed, but instead modified to renewable energy production. Note the country of Uruguay, a country with a high standard of living with its citizens using modern conveniences in their homes like the US. In 2008, Uruguay adopted the "Energy Policy of Uruguay 2008-2030" plan and began transitioning off fossil fuels to renewable energy. Today, renewable energy provides 90 to 98% of Uruguay's energy needs. TVA needs to adopt a similar, regionally appropriate plan. The United States is in a superior economic position to Uruguay, and the US and TVA should be able to exceed the Uruguayan model in a shorter time period.

While my family favors expanding renewable energy capacity in our nation's and region's energy grid, we do not support **any** expansion of fossil fuel based energy sources and infrastructure. We must stop the catastrophic increase in CO2 levels. At best, installation of Combustion Turbine systems would be stranded assets, a waste of valuable funds better spent on renewable energy and storage systems for renewable energy.

The climate crises has already made December 2023 the hottest month in recorded history. This region of Mississippi is already experiencing *severe drought, with neighboring areas designated as extreme and exceptional drought*. No expansion of infrastructure for burning fossil fuels can be justified, fossil fuels must be left in the ground.

The Caledonia site and region may prove to be an ideal location for cost-effective renewable energy storage such as CAES (Compressed Air Energy Storage) or hydrogen systems, solar and battery energy storage systems, but these are not included in the proposal.

We have concerns that the proposal may increase the exposure of the TVA, its executives and board members, to billions in liabilities for TVA's role in the climate crises.

We note that TVA has recently invested in photovoltaic and renewable energy storage infrastructure in this region. We encourage proposals for more renewable energy and energy storage systems.

As the Notice of Intent **does not** propose production of renewable energy onsite in Caledonia, nor does the Notice of Intent propose storage of renewable energy onsite, we reject this proposal as written, and request a full Environmental Impact Statement which fully considers an alternative proposal for renewable energy generation and storage systems.

Sincerely,

John Fortuin

[redacted]

[redacted]

PS: Please add my email address to the list of interested parties for future developments regarding the proposed plant.

McLamb, Erica S

From: Zoey Fortuin [redacted]
Sent: Friday, January 19, 2024 4:57 PM
To: nepa; McLamb, Erica S
Subject: Comment: New Caledonia Gas Plant, Caledonia Mississippi

Jan. 19, 2024

To: Erica McLamb

NEPA Project Manager

esmclamb@tva.gov

1101 Market St.

Chattanooga, TN 37402

Dear Ms. McLamb and TVA staff,
The carbon emissions from fossil fuels have impacted the climate globally and are impacting farm yields that have caused famine and subsequent migration of millions of people globally. The TVA has the capacity to either contribute to stopping this or help it continue. While my family favors expanding renewable energy capacity in our nation's and region's energy grid, we do not support **any** expansion of fossil fuel based energy sources and infrastructure. At best, installation of Combustion Turbine systems would be stranded assets, a waste of valuable funds better spent on renewable energy and storage systems for renewable energy.
The climate crisis has already made December 2023 the hottest month in recorded history. This region of Mississippi is already experiencing *severe drought, with neighboring areas designated as extreme and exceptional* . This proposal may increase the exposure of the TVA, its executives and board members, to billions in liabilities for TVA's role in the climate crises. Expansion of infrastructure for burning fossil fuels cannot be justified any longer. We must stop the catastrophic increase in CO2 levels.
The Caledonia site and region may prove to be an ideal location for cost effective renewable energy storage, such as CAES (Compressed Air Energy Storage), hydrogen systems, solar and battery energy storage systems, etc, but these are not included in the proposal. Mississippi is already confronting severe drought and reduced crop yields caused by climate change, and the proposed power plant will only exacerbate the worsening climate crises.
We note that TVA has recently invested in photovoltaic and renewable energy storage infrastructure in this region. We encourage further proposals for more renewable energy and energy storage systems. Providing energy to a country's citizens does not necessarily need to be curtailed, but instead modified to renewable energy production. Note the country of Uruguay, a country with a high standard of living with its citizens using modern conveniences in their homes like the US. In 2008, Uruguay adopted the "Energy Policy of Uruguay 2008-2030" plan and began transitioning off fossil fuels to renewable energy. Today, renewable energy provides 90 to 98% of Uruguay's energy needs. TVA needs to adopt a similar, regionally

appropriate plan. The United States is in a superior economic position to Uruguay, and the US and TVA should be able to exceed the Uruguayan model in a much shorter time period.

As the Notice of Intent **does not** propose production of renewable energy onsite in Caledonia, nor does the Notice of Intent propose storage of renewable energy onsite, we reject this proposal as written, and request a full Environmental Impact Statement which fully considers an alternative proposal for renewable energy generation and storage systems.

Sincerely,

Zoey Fortuin

[redacted]

[redacted]

From: Wufoo
To: nepa
Subject: New Caledonia Gas Plant [#1]
Date: Monday, December 4, 2023 9:48:13 AM

Name	Tiziana Bottino
City	[redacted]
State	[redacted]
Email	[redacted]

Please provide your comments by uploading a file or by entering them below. *

Continuing fracked gas plants expansion is reckless and it harms us all, regardless where we live. The climate crisis is wreaking havoc on the planet right now and the United States is one of the major polluters contributing to this crisis. We must to swiftly and aggressively reverse course, and transition to clean renewable energy as soon as possible and ban any further fossil fuel plant build out. Not to mention that the TVA had to implement rolling blackouts last year because it couldn't fully operate two-thirds of its fossil fuel plants in frigid weather. Fracked gas does not provide a reliable source of energy and without the millions of taxpayer subsidies that we provide is completely uneconomical as well. Clean renewable energy is the only right solution, to preserve our planet for future generations as well as saving people money and having reliable sources of electricity if done right (solar + battery, offshore and onshore wind, geothermal, tidal, hydropower). Time to end further construction of fossil fuel infrastructure, and rather focus on shutting down existing plants!

From: Wufoo
To: nepa
Subject: New Caledonia Gas Plant [#2]
Date: Monday, December 4, 2023 5:06:36 PM

Name	Angela Mummaw
City	[redacted]
State	[redacted]
Organization	Appalachian Voices
Email	[redacted]
Phone Number	[redacted]

Please provide your comments by uploading a file or by entering them below. *

Right now, the Tennessee Valley Authority is planning the largest methane gas buildout in our country! At a time when it is crucial that we stop greenhouse gas (GHG) emissions to combat climate change, TVA is planning to replace one fossil fuel with another, one that requires destroying more land and lives with dangerous gas pipelines that are necessary to run the proposed gas plants. Our country has an Executive Order (EO) for a carbon pollution-free electricity sector by 2035, yet somehow TVA gets away with planning to achieve this goal fifteen years after the EO, by 2050! Burning methane gas, or "natural" gas as TVA prefers to call it, is just as polluting to the environment as burning "natural" coal. When methane is fracked from the earth, unavoidably, 2% leaks into the atmosphere. There are also leaks that happen with processing and transporting, as well as those that occur when methane is burned for fuel. Recently in TX, methane pipes had to be vented, releasing harmful methane gas into the air, because of the extreme heat – the same kind of extreme heat we have in TN and MS. Methane is 80 times more potent a GHG than carbon dioxide, but (thankfully) it is not as abundant in our atmosphere. Methane should be just as much, if not more, of a concern as carbon dioxide. When TVA does its environmental impact statements, they don't consider the GHG emissions that result from fracking, processing, transporting, and venting. If they were to include those numbers, the public would see that burning methane is no better than burning coal, in fact it may even be worse. TVA claims gas buildouts would be cheaper than solar which is deceptive. TVA wants to build more fossil fuel plants because they do not have to foot the bill for the gas pipelines (the gas companies will be responsible for building and maintaining them) and as a partner of these gas giants TVA can simply pass those volatile gas prices on to the consumers, as their gas endeavors have already shown, resulting in recent rate increases. Additionally, gas plants are not as reliable as renewables. An example of this occurred in December 2022, during winter storm Elliot, when TVA had to issue rolling blackouts because of malfunctioning methane gas plants and its aging coal fleet, while renewables continued to perform as expected. Methane gas plants and pipelines are expensive, destructive, polluting, and dangerous. They will also soon be outdated as solar and other renewables, battery storage, and energy efficiency upgrades continue to gain momentum. Destroying communities and spending so much money for more fossil fuels, while it is only a temporary fix, does not make sense when investing in clean energy is the way of the future. Solar prices have dropped 90% in the last decade and will continue to

fall, as TVA continues to deny net-metering for its service area. Tennessee is one of only three states where net metering is not allowed. If TVA is so worried about the increasing energy demand, why not do other things to offset that, like allow net metering so more residents can start generating their own power? Also, with all the government incentives to build green energy projects, why is TVA dragging its feet? There is a real opportunity here for TVA to step up and lead the nation into a clean energy future. Stop planning gas buildouts! Stop ruining the lives of so many unfortunate souls that happen to live in TVA's "sacrifice zones" and do something that puts the environment and public health first. Rural America has suffered long enough. Help us make the transition to something better.

From: Wufoo
To: nepa
Subject: New Caledonia Gas Plant [#3]
Date: Tuesday, December 5, 2023 11:40:02 AM

Name	Eric Matravers
City	[redacted]
State	[redacted]
Email	[redacted]

Please provide your comments by uploading a file or by entering them below. *

Please spend as many dollars as necessary at this and other new LNG plants on carbon capture, utilization and sequestration or storage (CCUS). I recognize that the agency's main carbon-reduction strategy is to replace coal with gas, and that the demand for reliable power is a high priority. That said, the need to immediately and dramatically reduce GHG emissions can not be overstated, and sharp cuts in methane emissions are among the most critical actions the United States can take in the short term to slow the rate of climate change. TVA has an enormous responsibility to meaningfully address this problem.

Every new LNG plant should contribute as little GHG as possible to existing emissions. Implement CCUS technologies/strategies at these new plants and market that to detractors/critics to support the argument for new fossil fuel facilities. The costs of implementing these technologies/strategies should be considered beyond the immediate context of debts and revenues, and in the context of avoiding a rapidly approaching new global paradigm (read: within the same timeframe of this facility's operational lifespan) where energy reliability and affordability will become secondary to human health catastrophes due to food insecurity, wet bulb temperature heat waves/domes, and more frequent and devastating super storms.
https://www.energy.gov/fecm/articles/carbon-capture-opportunities-natural-gas-fired-power-systems

From: Wufoo
To: nepa
Subject: New Caledonia Gas Plant [#4]
Date: Tuesday, December 5, 2023 12:16:45 PM

Name	Mark Puckett
City	[redacted]
State	[redacted]
Organization	[redacted]
Email	[redacted]
Phone Number	[redacted]

Please provide your comments by uploading a file or by entering them below. *

I strongly encourage TVA to move away from burning fossil fuels and drop the plans for investing in a new gas-powered power plant in New Caledonia, MS. Such investments mean that fossil fuels will continue to be burned for decades in a time when humans need to move away from adding more carbon to the atmosphere. Everyone now knows that adding greenhouse gases to the atmosphere strengthens the greenhouse effect, causing climate change and a host of ill effects. Consider investing in the next generation of small modular reactors, which are much safer and cheaper than the current dinosaur reactors and do not emit greenhouse gases.

From: Wufoo
To: nepa
Subject: New Caledonia Gas Plant [#5]
Date: Thursday, December 7, 2023 1:19:04 PM

Name	Chelsea Howard
City	[redacted]
State	MS
Email	[redacted]
Phone Number	[redacted]
Please provide your comments by uploading a file or by entering them below. *	NO more fossil fuels!! transition to a fossil fuel-free energy future!

From: Wufoo
To: nepa
Subject: New Caledonia Gas Plant [#6]
Date: Thursday, December 7, 2023 9:13:06 PM

Name	Tiffany Priest
City	[redacted]
State	TN

Please provide your comments by uploading a file or by entering them below. *

I am opposed to the addition of another natural gas plant. According to climate scientists and environmental organizations, greenhouse gas emissions must be reduced drastically and quickly to avoid the most catastrophic impacts of climate change. This requirement includes halting all new fossil fuel projects. The science is clear. The TVA must prioritize clean energy sources, such as solar and wind, to provide reliable energy, meet the needs of their customers, and act responsibly as an energy producer.

From: Wufoo
To: nepa
Subject: New Caledonia Gas Plant [#7]
Date: Saturday, December 9, 2023 11:57:59 AM

Name	Aria Blackard
City	[redacted]
State	[redacted]
Organization	Mississippi Rising Coalition
Email	[redacted]

Please provide your comments by uploading a file or by entering them below. *

I just received word that the TVA is planning to build more gas combustion turbines in New Caledonia, MS. I implore you to rethink this decision. The burning of fossil fuels has many negative impacts.

First of all, it produces a large amount of carbon dioxide and methane. These two compounds are what are known as greenhouse gases, atmospheric gases that allow sunlight to pass through to Earth's surface but trap most infrared radiation reflecting back from the surface. This, as I'm sure you know, leads to global warming, which is contributing to a wide array of global alterations in climate that are damaging ecosystems harboring wildlife and humans. Burning fossil fuels also causes acid deposition, or acid rain, which can be extremely detrimental to wildlife habitats as well as people's property and livelihoods (mostly farmers).

In other words, the burning of fossil fuels has a negative impact on biodiversity, which has been found to have a direct effect on human wellbeing. As an avid conservationist and humanitarian, I am adamant about biodiversity, especially that of Mississippi, being preserved.

I am not asking that you completely abandon the use of fossil fuels. I recognize that their combustion acts as a source of consistent energy, which is necessary for your corporation because the TVA provides energy to many businesses and homes across multiple states. However, it is also in the best interests of all of Earth's inhabitants, of today and tomorrow, to lean more towards implementing renewable energy and not expanding the use of fossil fuels.

From: Wufoo
To: nepa
Subject: New Caledonia Gas Plant [#8]
Date: Saturday, December 9, 2023 2:02:17 PM

Name	Bob Norton
City	[redacted]
State	AL
Organization	Hop
Email	[redacted]
Phone Number	[redacted]
Please provide your comments by uploading a file or by entering them below. *	Many other options to fossil fuel please choose already

From: Wufoo
To: nepa
Subject: New Caledonia Gas Plant [#9]
Date: Saturday, January 6, 2024 10:40:03 PM

Name	Todd Jenkins
City	[redacted]
State	MS
Organization	N/A
Email	[redacted]
Phone Number	[redacted]
Please provide your comments by uploading a file or by entering them below. *	Wasn't aware that one of the plants in Caledonia had been dismantled. I support a new power plant be built. We in Lowndes County already experienced our first rolling brown outs Christmas weekend of 2022 due to overload of the current system in place.

From: Wufoo
To: nepa
Subject: New Caledonia Gas Plant [#11]
Date: Saturday, January 13, 2024 4:32:27 PM

Name	TJ
City	[redacted]
State	MS
Please provide your comments by uploading a file or by entering them below. *	It is critically urgent, for the future of our planet and our children and all life on earth, that we divest from damaging and non renewable energy sources and invest in sustainable energy that moves us towards having a future with lives worth living. It's both reprehensible and nonsensical to continue sinking time, money, and effort in advancing the chaos, destruction, terror, and loss of life wrought by human induced climate change.

From: Wufoo
To: nepa
Subject: New Caledonia Gas Plant [#12]
Date: Saturday, January 13, 2024 5:36:42 PM

Name	Mark Isaacs
City	[redacted]
State	MS
Organization	GS Research LLC
Email	[redacted]
Phone Number	[redacted]

Please provide your comments by uploading a file or by entering them below. *

I remember back to the '70s and '80s when TVA took the lead on such pioneering concepts as Zero Net Energy naturally daylit office buildings and solar 'breeder reactor' factories where rooftop solar would power the domestic production of solar panels. The Biden Administration has invested heavily to expand semiconductor and photovoltaic production in the US AND in Greenhouse Gas reduction to meet climate goals of utmost urgency and importance to American security AND the longterm well-being of humanity.

As a long-term solar advocate that lives in a Net Zero Energy home, I understand how natural gas is a bridge fuel, and how decentralized NG fired tweaker plants, ideally offering Combined Heat and Power to large users and communities, can help level night time loads from utility scale solar.

THAT's what New Caledonia should be; and that is NOT what is proposed.

Investor-Owned utilities and rural cooperatives in Mississippi have proven the cost-effectiveness of solar and its many benefits over fossil fueled plants, which ALWAYS needs to be fed more fuel, producing more GHG.

With solar, the nuclear plant that powers it is safely located 93 million miles away and will reliably deliver its Least Cost of Energy power for the long term, with weather-monitoring software leading to predictable dispatchable power. Our state's sunbelt is recognized offering ideal solar production.

TVA should redesign New Caledonia harkening back to the solar breeder factory days to bring meaningful economic development to the TVA region. The NEW New Caledonia could become a model agri-voltaic power plant, combining utility scale solar with agricultural uses, building an environmentally responsible and economically successful region.

From: Wufoo
To: nepa
Subject: New Caledonia Gas Plant [#13]
Date: Saturday, January 13, 2024 7:39:45 PM

Name	Lilllian Baxter
City	[redacted]
State	MS
Organization	Mississippi Rising Coalition
Email	[redacted]
Phone Number	[redacted]

Please provide your comments by uploading a file or by entering them below. *

We all know that fossil fuel plants are a big contributor to pollution and climate change. We can no longer ignore the damage that our energy resources are causing. It is time to transition to a cleaner energy. Have you looked at perhaps opening nuclear power plants? Your company will still make money with less destruction. Or perhaps you can focus on creating a completely new form of collecting and storing energy. Please do not build the gas plant. You can still make money without destroying the planet.

From: Wise, Julia Rowe
To: Mark Robbins
Cc: nepa
Subject: RE: Secure Public Opinion regarding TVA"s proposed Natural Gas Plat at New Caledonia
Date: Monday, December 18, 2023 10:28:26 AM

Thank you for your feedback, Mark.

I have passed your thoughts along to our NEPA team.

Thanks!

Julia

From: Mark Robbins [redacted]
Sent: Thursday, December 7, 2023 3:12 PM
To: Wise, Julia Rowe [redacted]
Subject: Secure Public Opinion regarding TVA's proposed Natural Gas Plat at New Caledonia

Hi Julia,

I do not have enough specific information about why TVA wishes to open a fossil fuel plant verses a clean energy plant. Also, this area is not my expertise. However, I assume that you have evaluated both options and have determined that a fossil fuel plant is a less costly alternative. However, we are facing a problem with the warming of our atmosphere. The resulting consequences are much greater than whatever cost savings you hope to achieve. Therefore, please reconsider and take the long view. We are living in the most miraculous place in the universe, as of our current understanding. But we can also spoil this paradise if we do not correct our mistakes.

Thank you!

Mark Robbins
Principal
Robbins Properties®
[redacted]

From: Wufoo
To: nepa
Subject: New Caledonia Gas Plant [#14]
Date: Saturday, January 13, 2024 7:48:42 PM

Name	Hope E. Landis
City	[redacted]
State	MS
Organization	Gulf Coast for a Sustainable Future
Email	[redacted]
Phone Number	[redacted]
Please provide your comments by uploading a file or by entering them below. *	Please don't go forward with building new gas combustion turbines. We need to move forward with sustainable energy for a healthy future for all of us. thank you, Hope Landis

From: Wufoo
To: nepa
Subject: New Caledonia Gas Plant [#15]
Date: Saturday, January 13, 2024 10:37:07 PM

Name	Gwenevier Hightower Pevey
City	[redacted]
State	MS
Email	[redacted]
Phone Number	[redacted]
Please provide your comments by uploading a file or by entering them below. *	I think swapping to green energy is the best economic and health decision, as reducing our dependency on a dwindling and polluting resource will reduce long term costs and increase positive long term health outcomes. While up front costs are high, the cost for oil will only increase as supply decreases, and the long term health savings will make it worth it not just monetarily but also in overall quality of life.

From: Wufoo
To: nepa
Subject: New Caledonia Gas Plant [#16]
Date: Sunday, January 14, 2024 9:46:12 AM

Name	Meghan Blancher

Please provide your comments by uploading a file or by entering them below. *

Missippians – and all Americans – deserve truly green, greenhouse gas free energy. Not only is it possible, it is necessary given 2023 was the first year in history to see average temperatures rise above the 1.5°C threshold our governments have promised to keep us under. Proceeding with this project would constitute a moral, political and leadership failure on the parts of TVA, and EPA.

Do not contribute to the history of environmental justice infringement of sacrificial zones in Mississippi and Gulf states – this gas (methane) plant cannot go on.

From: Wufoo
To: nepa
Subject: New Caledonia Gas Plant [#17]
Date: Sunday, January 14, 2024 10:42:13 AM

Name	Will Sawyer
City	[redacted]
State	MS
Organization	Retired
Email	[redacted]
Phone Number	[redacted]

Please provide your comments by uploading a file or by entering them below. *

We need more renewable energy sources and not expansion of existing fossil fuel energy generation for the future. This approach does not exemplify a wise choice for taxpayer funds in the production of energy via fossil fuels with its inherent pollution considerations and global warming influence.
From TVA 2021
2022 TVA Federal Sustainability Plan
"1. TVA Sustainability Plan Summary
Sustainability is engrained in TVA's mission, which guides us to provide energy that is reliable, resilient, low-cost and clean; environmental stewardship that protects and preserves public lands, water and air; and economic development that attracts investment and creates jobs in the region. TVA is committed to serving Valley communities as a community leader and trusted partner; to continued investment in our increasingly clean, diverse generation portfolio; to being a leader in innovation; to being a leader in low-carbon energy; to prioritizing diversity and inclusion in our workforce, suppliers and partners; and to maintaining financial strength and stability as a self sustaining and self-funded agency."

Emphasis on the mission statement "provide energy that is reliable, resilient, low-cost and clean; environmental stewardship that protects and preserves public lands, water and air;",
this part of the mission, the proposed new gas combustion turbines for the New Caledonia, MS Plant go against TVA's mission.

Please reconsider this initiative and review alternative environmentally smart choices for the taxpayer citizens of Mississippi.

From: Wufoo
To: nepa
Subject: New Caledonia Gas Plant [#18]
Date: Tuesday, January 16, 2024 1:01:09 AM

Name	Blake Feldman
City	[redacted]
State	MS
Email	[redacted]
Phone Number	[redacted]
Please provide your comments by uploading a file or by entering them below. *	More fossil fuels means more pollution and health hazards and more volatile electricity prices. TVA's reliance on dirty energy also fuels extreme weather. TVA should abandon this unnecessary, risky and deadly gas build-out and transition to a renewable energy future.

From: Wufoo
To: nepa
Subject: New Caledonia Gas Plant [#19]
Date: Tuesday, January 16, 2024 11:13:29 PM

Name	DeBorah Williams
City	[redacted]
State	MS
Organization	Legavy Villsge Inc
Phone Number	[redacted]
Please provide your comments by uploading a file or by entering them below. *	I am not familiar with the ins and outs of this plan, but I can bet the plans are to build it in an underserved community, where no one gives any accoutability or care about how many people will die from the envirnomental hazards!! Hoe many meetings have there been held with the identified community. If so, have those meetings been coordinated by State Reps, City and County reps.?

From: Wufoo
To: nepa
Subject: New Caledonia Gas Plant [#21]
Date: Wednesday, January 17, 2024 8:42:52 PM

Name	Joe Schiller
City	[redacted]
State	Tennessee
Organization	Homeowner
Email	[redacted]
Phone Number	[redacted]

Please provide your comments by uploading a file or by entering them below. *

Comments on New Caledonia Notice of Intent

The TVA has announced its intention to construct approximately 500MW of frame methane gas combustion turbines (CT) at its former New Caledonia gas plant and adjacent substation. TVA has stated it anticipates evaluating two action alternatives—the statutory required "no action" alternative" and the 500MW frame CT plant alternative. In other words, TVA is not seriously considering any alternative other than building new gas plants.

This proposed course of action is a subversion of the NEPA process because it does not consider other reasonable alternatives to the proposed action alternative. Specifically, TVA justifies the proposed action alternative as providing the increased system capacity to meet increasing load growth, while providing dispatchability and grid stabilization necessary to support increased renewable energy integration onto the TVA grid. However, Renewable energy sources such as wind and solar combined with battery storage, especially if combined with efficiency upgrades and virtual power plant (VPP) technologies are equally capable of fulfilling these needs at a lower cost.

The Notice of Intent cites the findings of the soon to be obsolete 2019 IRP to justify the proposed action alternative because the 2019 IRP identified coal plant closures and methane gas generation as possible strategies for meeting future load growth. However, the 2019 IRP also identified up to 14GW of new renewable generation as a viable strategy for meeting future load growth. While TVA has added significant amounts of natural gas generation as per the 2019 IRP, it has lagged badly in the implementation of renewable energy development despite the economics of renewables consistently improving relative to the already established viability of this strategy in the 2019 IRP.

TVA continues to apply simplistic, reductionist thinking to the analysis of its proposed power generation strategies. Rather than pursuing a holistic, adaptive approach by analyzing how much renewable energy its current gas and hydro generating sources can support on the TVA grid and building that amount of renewables and storage, it continues building all the gas generation it might conceivably ever need before advancing on the renewables resources it could already support at

lower cost. A valid EA or EIS process should include more than only one action alternative, including alternatives consisting of combinations of technologies, if other equally effective action alternatives are available. This is required by NEPA and can also yield a better outcome for all stakeholders.

Joe Schiller

From: Wufoo
To: nepa
Subject: New Caledonia Gas Plant [#22]
Date: Thursday, January 18, 2024 7:49:16 PM

Name	Elise Mallette
City	[redacted]
State	MS
Email	[redacted]
Phone Number	[redacted]

Please provide your comments by uploading a file or by entering them below. *

Hello TVA,

I am writing to state my opposition to the proposed methane gas plant in New Calendonia, MS.

Firstly, I would like to point out that the statement included on this page which states, "Comments that are solution-oriented and provide specific examples will be more effective than those that simply oppose the proposed action," is a bad faith premise that takes the creation of this plant as for granted. My opposition comment is, in fact, solution-oriented. The solution is the absence of yet another fossil fuel plant.

Secondly, the world cannot afford to create any new fossil fuel plants, particularly ones such as methane which is an extremely potent atmospheric pollutant, absorbing significantly more energy than CO2 and leading to higher levels of ozone. This proposed methane gas plant will not only harm the global efforts at minimizing the impacts of climate change, it will directly harm the people who live around it by exacerbating air pollution. The overall air quality in the US has improved over the past few decades, until recently when Trump-era regulation and financing rollback gutted the EPA and protective legislation. This plant and others like it will only worsen this downward shift in air quality, and therefore quality of life for Americans, particularly Mississippians.

Thirdly, fossil fuel projects such as this have disproportionately negative impacts on low-income communities, predominantly BIPOC communities, and the elderly, young, and disabled.

While this plant may generate some income in the short term, it will only do damage in the long run.

Lastly, I would like to reiterate and support the comments from Senators included in this letter [chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://www.markey.senate.gov/imo/media/doc/letter_to_tva_leadership_on_clean_energy.pdf].

Sincerely,
EM

McLamb, Erica S

From: Wufoo [redacted]
Sent: Saturday, January 13, 2024 4:20 PM
To: nepa
Subject: New Caledonia Gas Plant [#10]

Name	Gizelle Alvarez
City	[redacted]
State	Mississippi
Please provide your comments by uploading a file or by entering them below. *	There are environmental, social, and cultural impacts to building a methane gas plant and pipeline. Please take this into consideration and conduct a full Environmental Impact Study (EIS) in order to determine energy efficiency programs, solar and battery storage, and other renewable energy options!

www.robbins-properties.com

From: Wufoo
To: nepa
Subject: New Caledonia Gas Plant [#24]
Date: Friday, January 19, 2024 3:57:54 PM

Name	Amy Kelly
City	[redacted]
State	TN
Organization	Sierra Club
Email	[redacted]
Phone Number	[redacted]
Please provide your comments by uploading a file or by entering them below. *	The Sierra Club submits the attached 118 digital signatures on the behalf of our members and supporters.
Upload File #1	tva_ms_comments.pdf 243.76 KB · PDF

Friday, January 19, 2024

To the TVA Board of Directors, CEO Lyash, and NEPA Program Specialists,

The Sierra Club submits the following 118 digital signatures on the behalf of our members and supporters with the following petition language and 38 personalized messages:

Dear TVA Board of Directors, CEO Lyash, and NEPA Program Specialists,

TVA should conduct a full Environmental Impact Statement (EIS) on the proposed New Caledonia Gas Plant and conduct a full analysis for energy generation that includes cheaper and more environmentally sustainable energy efficiency, solar and battery storage, and other renewable energy options.

Customers have already suffered from mandatory rolling blackouts during Winter Storm Elliott a year ago. Data from TVA and NERC/ FERC reports the blackouts were caused by coal and gas plant failures and TVA's lack of well-performing solar, wind, and energy efficiency and demand response resources to compensate. TVA should reconsider its largest planned gas buildout in the nation and focus on resilience during severe weather when adding new generation.

Furthermore, choosing gas instead of lower-cost renewable energy will lead to stranded assets and higher costs for customers, as many studies have already demonstrated. Burning gas results in carbon emissions which will require additional investments in carbon capture technologies -- only adding to the volatile price of methane gas. Gas plants will not provide the jobs that residential solar and energy efficiency programs could. Replacing one fossil fuel with another hurts economies during one of the largest clean energy manufacturing booms in our area. Gas pipelines can pollute streams and drinking water and be dangerous.

TVA is not aligning with federal climate goals, and the agency's foot-dragging on replacing fossil energy with renewable energy sources, such as solar and wind, is setting the decarbonization bar and timeline too low and too slow. By embedding carbon-emitting pollution in the TVA grid for decades to come, TVA is discouraging economic development by removing the region's ability to offer a clean energy grid and by forcing ratepayers to shoulder the additional cost of

fossil fuel plants that will soon be abandoned due to global and national commitments to climate change mitigation.

The TVA Board of Directors should choose to invest in clean, renewable energy.

Thank you for considering my comment,

1. **Al Hansen**
   [redacted]

2. **Alan Katz**
   [redacted]
   With global climate change, this decision is unconscionable. Other power providers are trying to at least some extent to mitigate the release of greenhouse gases. It's time for TVA to take some responsibility for reducing carbon and other climate changing gases into the atmosphere. Get on the bandwagon and begin investing in renewables.

3. **Allison Sokol**
   [redacted]

4. **Amy M**
   [redacted]

5. **Ann Freeman**
   [redacted]
   My family farm hosts solar panels sponsored by TVA through my local coop. I expect more access to solar energy as grid needs increase. Science is your only option to secure efficient increase in electricity for demand in medical, educational, industrial, and home changes intensify.

6. **Anne Hansen**
   [redacted]

7. **Annemarie Pelliccia**
   [redacted]

8. **Athene Grant**
   [redacted]

9. **Belinda Hedge**
   [redacted]
   Replacing one fossil fuel with another hurts our economy during one of our area's largest clean energy manufacturing booms. WE NEED LOWER COST CLEAN RENEWABLE ENERGY

10. **Bill Moore**
    [redacted]

11. **Bill Askew**
    [redacted]

12. **Bonnie Swinford**
    [redacted]

13. **Brady Watson**

[redacted]

14. **Brianna Hedge**

    [redacted]

    CLEAN RENEWABLE ENERGY!!!! MAYBE THE TVA CEO SHOULD TAKE HIS UNDESERVED MILLIONS AND LIVE NEXT DOOR TO THE DIRT N FILTH FROM THE POWER PLANT!!!!

15. **Carla Holder**

    [redacted]

    In North Alabama we've experienced climate change just in the last 15 years. Please revise your investment strategies to move to sustainable opportunities.

16. **Carol Mackey**

    [redacted]

17. **Carolyn Nevin**

    [redacted]

    Because of human-caused climate change, we are stranded here in Knoxville during the most damaging winter storm in decades., perhaps centuries for this area. The streets in our neighborhood are ice sheets, and we have no hot water because of a frozen vent which may not thaw until next week. My husband has Alzheimer's, and the caregivers cannot get here to help us. My son had to put off surgery because of the dangerous road conditions. When summer comes again, we will be hit with record heat waves, because the burning of fossil fuels has so damaged earth's natural regulatory systems, that huge parts of the planet will soon be uninhabitable. I know this because I am a former science teacher who used to teach about earth's systems. You must not keep planning to use even more fossil fuels. You owe it to the world to transition to renewables like solar and wind. You at TVA must set the example for all other energy companies and do the right thing!

18. **Cassandra Gronendyke**

    [redacted]

    I am a TVA ratepayer and Tennessee homeowner and I am extremely concerned about global warming and impending climate disasters that will affect my quality of life and my community. We must invest in clean energy now to avert the worst consequences. The time for starting new fossil fuel plants is long past.

19. **Catherine Gonzales**

    [redacted]

20. **Ceci Sachs**

    [redacted]

21. **Charles & Dinah Crow**

    [redacted]

22. **Cherie Martinez**

    [redacted]

    I demand clean air and water.

23. **Chet Hunt**

    [redacted]

Let?s get going. Let?s lead the country to a clean energy transition from fossil fuels, including gas. The urgency couldn?t be more clearer.

24. **Chris Dacus**

25. **Chris and Miranda O'Shields**

26. **Christine Ackerson**

27. **Craig Drew**

28. **Craig Runciman**

29. **Curtis Tomlin**

PLEASE DO THIS NOW! FOR THE CHILDREN & THE PLANET!

30. **Davide Fergnani**

31. **Diane Price**

32. **Diane Keeney**

33. **Donald Potter**

TVA, in its early days, was a nationally-respected organization. I think we will well on our way to regaining that status if TVA takes the initiative to turn towards renewable energy whenever possible.

34. **Donna Gurecki**

We need to invest in clean renewal energy! The gas plant in MS is not clean!

35. **Donna Duncan**

36. **Earl Hockin**

It is critical for the future of our children and future generations that we if and when we need to increase out energy production we do so using green energy sources such as solar and wind. Spend time, money and research developing increased efficency of these sources for energy. Also support and do research on making appliance etc. needing electricity more energy efficient. No more fossil fuel energy production.

37. **Emmett Bledsoe**

People we are way behind. We need to act now.

38. **Frances M**

[redacted]

39. **Geneva Andrews**

[redacted]

40. **Gerald Gonyea**

[redacted]

41. **Gerald Mackey**

[redacted]

42. **Gerald Thornton**

[redacted]

43. **Gerry Kaller**

[redacted]

I used to be so proud of TVA. No longer. Most important is safety, but methane is dirty and dangerous. TVA is turning to dirty, more expensive and dangerous power generating. Make us proud again by using renewable energy. That's good business!

44. **Gloria Cash-Procell**

[redacted]

Stop polluting and destroying our planet.

45. **Heidemarie Weidner**

[redacted]

Please take an impact study and re-consider spending money and effort in renewable energy ventures.

46. **Helen Buckley**

[redacted]

[redacted]

47. **Hiasaura Rubenstein**

[redacted]

48. **Hiediliza Tan**

[redacted]

Time is running out.

49. **James Carroll**

[redacted]

The hope for our future depends on making what seem like hard choices now, in order to avoid having no good choices later. We have to move from burning of fossil fuels to REAL sustainable energy production and conservation.

50. **Jarrod TRUE**

[redacted]

51. **Jean Zeller**

[redacted]

We can only have a clean energy future if it doesn't trade one fossil fuel for another. If you do more with solar, the right way, it will cost less in the long run.

52. **Jean Johnston**

[redacted]

53. **Jean Ross**

[redacted]

54. **Jeffry Stein**

[redacted]

55. **Jennie Boyd Bull**

[redacted]

I grew up in Knoxville, TVA land, and want to see an environmental impact study to support creation of clean energy like solar and other cleaner options with no pipelines.

56. **Jerry & Debbie Brown**

[redacted]

No more gas

57. **Jesse Gore**

[redacted]

Tidal/wave, geothermal, utility solar, on and offshore wind are what we need, not more deadly toxic fossil fuel.

58. **Jessica Claudio**

[redacted]

59. **Jo Tilley Dortch**

[redacted]

60. **Joe Franklin**

[redacted]

61. **Judy Fields**

[redacted]

62. **Karen Reynolds**

[redacted]

63. **Karen Spradlin**

[redacted]

64. **Katherine Sewell**

[redacted]

As an environmental scientist, outdoor enthusiast, parent, and longtime TVA resident, I urge you to hold a full EIS to find the best source of clean energy for our area.

65. **Kathleen Mohning**

[redacted]

66. **Ken Sleeper**

[redacted]

I personally encourage the TVA to make a full faith effort to move beyond fossil fuels to power our economy. Our long term lively hood depends on it. Renewables are the way forward. To consider fossil fuels as ?reliable? is to ignore the fact that they are the cause, not the solution, to our current energy crises.

67. **Kent Minault**

[redacted]

68. **Kurt Emmanuele**

[redacted]

We want clean renewable energy rather than costly carbon-polluting alternatives.

69. **L Franklin**

[redacted]

70. **Layne McInturff**

71. **Leslie Bond**

72. **Linda Inness**

73. **Linda Newkirk**

74. **Linds Singer**

75. **Marcus James**

76. **Margaret Brown**

No one should be a part of further destroying the environment. Choose solar and wind power instead.

77. **Margaret Davitt**

78. **Marilyn Lee**

79. **Mark Klugiewicz**

80. **Mary Bristow**

81. **Maureen May**

82. **Megan Ross**

83. **Mel Lencioni**

84. **Melissa Harris**

85. **Michael Dubrick**

86. **Michele Villeneuve**

87. **Misty Hughes**

The fact that you offer consumers the option to play? for green power then build methane plants is insanely infuriating and disgusting.

88. **Nellie Medlin**

89. **Nick And Carla Nicholson**

90. **Nora Reinke**

91. **Patricia Dishman**

92. **Paulette Walton**

93. **Peter Evans**

94. **Phil weaver**

I would like to see my Grandkids and there children grow up in a CLEAN MOTHER EARTH!

95. **phil huss**

Solar is cheaper than gas. Even if it weren't for all the environmental issues investing in gas is a poor financial decision. So, please stop doing it.

96. **Rachel Martin-Still**

Clean energy is important to all of us. Can?t you see what climate change is doing to this world? Please choose to invest in clean, renewable energy.

97. **Rebecca Cummings**

Please don't saddle us with decades of energy production that depends upon fossil fuels. Choose renewables and power storage that creates true energy independence with near zero pollution.

98. **Richard Gillaspie**

99. **Rocquelle Woods**

100. **Russell Kennedy**

No more Methane. Move to more renewables and battery storage. No one wants to breathe in the toxins from fossil fuels. Let?s lead going into the future. More solar and storage. Wind generation where feasible. Be a leader as one of the biggest utilities we have an outsized effect on the rest of the industry. Renewables now!!

101. **Sarah Denslow**

102. **Scott Thile**

We need to take every opportunity to transition away from fossil fuels. A gas plant is a step back, while we should be moving forward. We need a full EIS that weighs the proposed gas plant against solar, battery storage, and other renewable energy options.

103. **Shelby Hood**

104. **sonja hunter**

[redacted]

TVA needs to move to renewables and NOT build more gas plants which are definitely NOT clean energy, no matter what the TN legislature has decided.

105. **Susan Thomas**

[redacted]

106. **Susan Ilgner**

[redacted]

107. **Susan Fletcher**

[redacted]

108. **Su-Shen Huang**

[redacted]

109. **Tim Hacker**

[redacted]

110. **Tobias Ray**

[redacted]

111. **Tom Jenkins**

[redacted]

112. **Tom Willliams**

[redacted]

113. **Tom Dancer**

[redacted]

114. **Tonya Morrison**

[redacted]

115. **Tracy Pedersen**

[redacted]

I urge TVA to build renewable energy generation systems rather than fossil fuel systems.

116. **Vance Sterling**

[redacted]

117. **Wilfred Post**

[redacted]

Choosing gas instead of lower-cost renewable energy will lead utility customers like you to pay higher bills for years to come. Gas plants will not provide the jobs that residential solar and energy efficiency programs could. Replacing one fossil fuel with another hurts our economy during one of our area's largest clean energy manufacturing booms.

118. **York Quillen**

[redacted]

From: Wufoo
To: nepa
Subject: New Caledonia Gas Plant [#25]
Date: Friday, January 19, 2024 4:26:59 PM

Name	Joan White
City	[redacted]
State	D.C.
Organization	Solar Energy Industries Association
Email	[redacted]
Phone Number	[redacted]
Please provide your comments by uploading a file or by entering them below. *	Please see attached.
Upload File #1	tva_ms_eis_letter_1_19_2024.pdf 141.49 KB · PDF

January 19, 2024

Tennessee Valley Authority (TVA)
1101 Market Street, BR 2C-C
Chattanooga, TN 37402

Re: New Caledonia Gas Plant NEPA Notice of Intent

Chair and Board of Directors,

The Solar Energy Industries Association (SEIA) submit these comments to urge you to include solar and storage in alternatives considered in an Environmental Assessment (EA) or Environmental Impact Statement (EIS). SEIA and our members believe that solar and energy storage are affordable and an effective substitute for much of the capacity shortfalls projected in TVA.

SEIA commends the Board of Directors for moving in the direction of retiring many coal units and for considering upcoming power supply shortfalls well in advance of when they are projected to occur. However, plans to build 500 MW of natural gas generation at the New Caledonia Site (NCG) will result in unnecessary carbon and air pollution, price risk, black out risk, and a missed opportunity to achieve TVA's climate goals.

Specifically, the Notice of Intent requests that respondents comment on "the scope of the review, alternatives being considered, and environmental issues that should be addressed."

Scope of review and Environmental Issues that Should be Addressed

A project of this magnitude and nature warrants a full EIS rather than the less comprehensive EA. The construction of 500 MW natural gas plant is a "major Federal action significantly affecting the quality of the human environment."[1] A gas plant of this size will significantly impact air quality and add significant carbon pollution to the atmosphere.

TVA should conduct a thorough review that fully quantifies risks in the following areas:

1. Climate stability and the financial impact of natural disasters, economic decline, and human health impacts of emissions of the proposed plant that will contribute to climate change.
    a. This assessment should include upstream fugitive methane emissions projected to occur during extraction and transportation of natural gas to the proposed facility.
2. Air quality and emissions associated with the proposed plant, including the human health impact to vulnerable environmental justice communities.[2]

[1] 40 CFR 1502.3

[2] TVA should use the EPA Environmental Justice Screening and Mapping tool (among others) to identify environmental justice communities potentially impacted by the plant, and any proposed associated infrastructure such as pipelines and transmission line corridors. https://www.epa.gov/ejscreen. A preliminary review of Environmental Justice indices in Lowndes County indicated that there is a high concentration of vulnerable populations there, including high rates of asthma, cancer, and other disease related to air pollution.

3. Financial risk that comes with variable-priced fuel source (natural gas) which can frequently fluctuate. Any modeling should include scenarios with relatively high natural gas prices.
4. The realistic risk of outages during winter storms and extreme cold events. Natural gas is generally in high demand during winter events, and without firm capacity delivery (which is quite expensive and would worsen project economics), the new plant is at risk of being without fuel during critical winter peaking events.

Alternatives

TVA should consider a high-renewable scenario with a blend of solar, battery energy storage, wind, and long-duration storage such as pumped hydro. A blend of renewable energy is likely more affordable, more stable, and capable of delivering reliable peaking power – particularly with the addition of on-demand energy storage.

Solar and battery energy storage systems (BESS) offer a cleaner, more affordable alternative than natural gas. Maintaining a safe, reliable, and affordable power system is central to TVA's mission as is the economic development of the region. Solar and storage offer superior economic and environmental performance when compared to natural gas and are quickly becoming the preferred resource for capacity and energy shortfalls.

Solar and BESS offer significant economic development opportunities: a core part of TVA's mission. Natural gas facilities require fuel to be purchased from regions outside of TVA and cause significant financial resources to flow outside the region. The use of local, renewable energy offers many economic benefits including reduced overall energy costs, increased property values, energy independence, stable energy prices, and more jobs in construction, manufacturing, and maintenance. Data show that the levelized cost of solar + BESS is currently around $31-88, significantly less than the values presented in a recent TVA EIS.[3] The economics of solar + BESS are improving every quarter.

TVA has an historic opportunity to move away from polluting and economically risky fossil fuels. Energy infrastructure is very long-lived. If TVA chooses to build the NCG plant, it will likely remain in service for several decades, emitting upstream fugitive methane, on-site carbon dioxide and other harmful air pollutants. Alternatively, if it is retired early to achieve TVA's ambitious climate goals, the NCG Plant and associated infrastructure will become stranded assets, causing unnecessary upward pressure on rates. Furthermore, the price of natural gas is highly variable and represents a significant financial risk to TVA customers, especially during winter peaking periods. As uncommonly high natural gas prices demonstrated during winter 2022-2023, fossil fuel prices are subject to wide fluctuations depending on global circumstances outside TVA's control.

TVA should work to reduce long timelines for solar projects to allow solar and BESS to be built in time. TVA has often cited the long timeline for solar development as a major barrier to renewable

[3] Lazard's Levelized Cost Of Energy Analysis, V. 16.0, April, 2023 at 3. Available at https://www.lazard.com/research-insights/2023-levelized-cost-of-energyplus/.

alternatives. Historically, utility-scale solar facilities have taken years to develop, but this is due to the delays are a combination of:

- Large interconnection queues that don't allow for projects to temporarily suspend their status without losing their position in the queue (a policy known as "suspension"). If TVA implemented a suspension policy, it could speed timelines for project development.
- Long Interconnection Facilities and Network upgrade construction timelines
- Slow and onerous TVA contracting process.
- NEPA permitting.

The renewable industry stands ready to provide sufficient energy and capacity; however, TVA's interconnection process remains the most significant driver of delays. Given that the targeted online date for projected capacity shortfalls is rapidly approaching, we recommend that TVA take two major actions to speed the deployment of solar and storage resources: 1) create an expedited process for solar and BESS in the TVA region and 2) allow an increased deployment of solar and BESS by the Local Power Companies (LPCs).

Regardless of whether TVA moves forward a suite of renewable energy technologies as an alternative to the NCG Plant, expedited interconnection and contracting and higher use of LPC authority will be necessary to build the 10,000 MW of solar that TVA plans to procure in the coming years.

Solar paired with BESS is reliable. When combined with storage, variable solar energy becomes a reliable, dispatchable resource that provides energy and ancillary services. Solar and storage can also defer or mitigate large, expensive transmission and distribution grid projects. A study by the three California investor-owned utilities found solar and storage have a capacity value of 99.8%, achieving a theoretical "perfect generator" in CAISO's grid.[4] With such a high capacity factor, solar and BESS deployed in TVA would bring economic value throughout the year for customers.

Increased natural gas use is risky, where pipeline constraints were a major issue in the recent winter storms. All gas plants in the region are subject to this availability risk. Battery storage plants would not be subject to that same systemic risk. Grids are planned for contingencies like those that have happened for single loss of resources like storage, whereas grids now need to be planned for systemic risk like gas pipeline constraints and winterization. The proposed NCG Plant would require the permitting and construction of new natural gas infrastructure. Such infrastructure has been plagued by long permitting timelines, local opposition, and project delays. If TVA creates an expedited interconnection and contracting process, solar and storage can be sourced and constructed on a much more rapid timeline.

Compared to a gas plant, Solar+BESS has many benefits that make it more effective than natural gas.

Key benefits include:

- Quickly deployed
- Faster and more accurate current and voltage response, both for ramping up and down

[4] Joint IOU utilities of CA, 2020. Contextualized here: https://www.pv-magazine.com/2020/07/20/solar-plus-storage-has-a-99-8-capacity-value-in-california/

- Modular and able to easily scale as needed
- Doubles ramping support via absorbing excess solar and then deploying during demand peaks
- Providing blackstart
- Avoiding startup costs of other generators
- Easier to site and locate near loads, providing locational value and avoided transmission and distribution upgrade costs
- Provides emission reductions, especially for those tied to higher community health complications like sulfur dioxide (SO_2), nitrogen oxides (NO_x) and ozone (0_3)

We ask the Board of Directors to drastically reduce the size of the proposed NCG Plant and replace that capacity with clean, reliable solar and BESS and renewable technologies.

At a minimum, TVA should consider several high-renewable alternative scenarios to the NCG Plant.

Respectfully,

Joan White

Director of Storage and Interconnection Policy
Solar Energy Industries Association
[redacted]

From: Maggie Shober
To: McLamb, Erica S
Subject: Late submission of comments in New Caledonia scoping
Date: Monday, January 22, 2024 12:27:20 PM
Attachments: New Caledonia gas plant proposal 2024 - SACE scoping comments.pdf

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Dear Erica,

I hope you will still be able to accept the attached comments on the environmental review of new gas CTs at the New Caledonia site. SACE missed the deadline on Friday due to ongoing inclement weather in Knoxville, so appreciate your efforts in including these comments even though they are past the deadline.

Thank you,
Maggie

--

Maggie Shober (she/her)
Research Director
Southern Alliance for Clean Energy
[redacted]
http://www.cleanenergy.org

Erica McLamb
NEPA Project Manager
esmclamb@tva.gov
1101 Market St.
Chattanooga, TN 37402

Re: Scoping comments for TVA's Draft Environmental Impact Statement on the New Caledonia Gas Plant

Dear Ms. McLamb:

The Southern Alliance for Clean Energy is using this part of the NEPA process to comment on TVA's proposed gas-fired combustion turbines (CTs) at the New Caledonia site.

The National Environmental Protection Act of 1970 remains an important regulation to evaluate the environmental impacts of actions taken by federal agencies. The NEPA process is not, however, a sufficient substitute for a publicly accessible and transparent process that monopoly utilities should go through when making critical resource decisions.

Therefore the process for adding gas CTs at New Caledonia should not move forward until the 2024 Integrated Resource Plan (IRP) is approved by TVA's Board of Directors. TVA has publicly stated that it is current and forecasted load growth that is much higher than even the highest scenario included in the 2019 IRP. The NOI for the New Caledonia CTs rely on the 2019 IRP, even while the release of the draft 2024 IRP is imminent. The change in load forecasts alone is enough to make it clear that TVA's 2019 IRP is no longer applicable moving forward. Other changes include resource incentives and costs, transmission processes, environmental regulations, and recent experience that calls into question the reliability of gas power plants in extreme weather.

If TVA moves forward with a plan to build CTs at the site because it is supported by the 2024 IRP, the addition should require an Environmental Impact Statement (EIS) and not an Environmental Assessment (EA) because of the potential for environmental impacts associated with building new fossil fuel infrastructure and increasing demand for and reliance on fossil fuels.

If, after the 2024 IRP, TVA decides to move forward with an EIS for new CTs at the New Caledonia site, it should include the following in its review.

- Two alternatives to compare the proposed gas CTs to an option that is exclusively solar and storage, where the costs of the solar and storage projects include all federal financial incentives now available, where the timeline to integrate solar and storage onto the grid accounts for TVA's proposed updated interconnection process that complies with FERC Order 2023, and the solar and storage projects are modeled with the latest technologies and practices for integrating inverter-based resources onto the electricity grid.
- The EIS should include all incentives available through the Inflation Reduction Act (IRA) for the solar and storage alternative, including direct pay of clean energy tax credits and adders as well

as the Energy Infrastructure Reinvestment program (see program overview here: https://www.energy.gov/lpo/energy-infrastructure-reinvestment).

- The environmental review of the potential CTs should include environmental and cost implications associated with switching the units to run on hydrogen in the future. This would include costs and environmental impacts of the surplus electricity generation required to run electrolysis to convert water to hydrogen and/or the cost and environmental impacts of generating hydrogen from natural gas. This would also include the costs and environmental impacts of updating pipelines to be able to transport hydrogen, if the above-mentioned excess generation and electrolysis is not on-site, and the potential for leaks and other harms associated with the transport of hydrogen through pipelines.
- The environmental review of the potential CTs should include the likelihood that the units become stranded units and thus have much shorter expected lives if they are not able to switch to hydrogen. Stranded assets drive up costs, which can disproportionately harm communities already struggling with high energy burdens across the TVA service territory, particularly low-income communities.
- The financial and system analysis used in the EIS should be made public as part of the draft EIS.
- The EIS should include potential specific transmission upgrades to facilitate any of the alternatives, and any additional benefits these transmission upgrades may provide, such as expanding the ability to interconnect solar and storage resources beyond the amounts considered in a clean energy alternative.
- The EIS should include analysis of how an increase in fuel costs and the variability of fuel costs could potentially impact low-income customers, since TVA passes its fuel costs on to customers. TVA should not ignore this impact because its local power companies (LPCs) are the ones billing customers.
- TVA should use the latest Social Cost of Carbon with proposed updated discount rates of 1.7% from the Office of Information and Regulatory Affairs (OIRA).

In addition to these recommendations on the EIS specifically, we have the following recommendations for the financial and system modeling that TVA will perform to assess the economic and environmental costs and benefits of each alternative.

- TVA's modeling should utilize accurate cost assumption forecasts from reputable and public sources that include all incentives, as well as a wide range of fuel cost sensitivities that take into account potential unknowable events like the impact the war in Ukraine has had on natural gas prices.
- TVA's modeling should consider increasing transmission transfer capability and resources located outside TVA's service territory. This could specifically include revisiting whether the Clean Line transmission connection to wind in Oklahoma is still a viable option. If so, the economic benefits of its impact on reliability should be included in the analysis. For instance, analysis by RMI showed that on December 23, 2022, the SPP market (which includes Oklahoma) experienced about 3 GW of wind curtailments.[1] That is one of the days TVA had to implement rolling blackouts due to outages at coal and natural gas plants. Analysis by Grid Strategies showed millions of dollars of potential benefits to TVA customers for increased connections to the midcontinent Independent System Operator (MISO) and $1 billion in value for a 1 GW connection between the Electric Reliability Council of Texas (ERCOT) and TVA.[2] The Department of Energy's Transmission Needs

[1] See RMI's analysis here: https://rmi.org/wasted-wind-and-tenable-transmission-during-winter-storm-elliott/.
[2] See Grid Strategies' report here: https://acore.org/wp-content/uploads/2023/02/The-Value-of-Transmission-During-Winter-Storm-Elliott-ACORE.pdf.

Study states that the Southeast needs to increase transmission capacity within the region by 77-102%, and found the need to increase interregional transfer capacity between the Southeast and the Mid-Atlantic, Midwest, Delta, and Florida.[3] So there are both economic and reliability benefits to TVA customers to increasing transmission capacity between TVA and neighbors.

- TVA should model the EPA's proposed rule regulating greenhouse gas emissions from new natural gas-fired sources, to ensure it does not make a terribly imprudent investment with TVA ratepayer dollars.

On June 22, 2023, TVA's CEO, Jeff Lyash, testified in Congress that TVA is trying to move its net zero goal forward as fast as possible, and that as it adds carbon-free resources it would use its natural gas-fired power plants, including the New Caledonia CTs, less until they are only capacity resources. It is important, as TVA evaluates the economic and environmental impacts of the New Caledonia CTs, that it use consistent and reasonable assumptions about how much the plant will actually be used. If TVA expects to use the New Caledonia CTs for only a few years, and operate them at lower capacity factors after that, it will significantly impact the cost effectiveness of the project. If TVA expects to continue to use the New Caledonia CTs at levels that make them cost effective, they will likely have too high an environmental impact to be a reasonable investment. TVA cannot have it both ways: either the plant will be used often for a long time or it will not.

To conclude our comments on the scoping of this environmental review, we again emphasize that this should not be a separate process at all, but a decision made as part of the IRP, particularly considering the public release of the draft IRP is imminent. If the Board-approved 2024 IRP indicates value in CTs or solar and storage at the New Caledonia site, an environmental review can be revisited at that time.

[3] See DOE National Transmission Needs Study. Charts showing the in-region and interregional transmission needs under different levels of load growth and clean energy growth appear on pages ix and x. https://www.energy.gov/sites/default/files/2023-12/National%20Transmission%20Needs%20Study%20-%20Final_2023.12.1.pdf.