

**FY2019**  
Sustainability Report



**SERVING  
THE PEOPLE**



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**FORWARD-LOOKING STATEMENTS**

This document contains forward-looking statements relating to future events and future performance. All statements other than those that are purely historical may be forward-looking statements. In certain cases, forward-looking statements can be identified by the use of words such as “may,” “will,” “should,” “expect,” “anticipate,” “believe,” “intend,” “project,” “plan,” “predict,” “assume,” “forecast,” “estimate,” “objective,” “possible,” “probably,” “likely,” “potential,” “speculate,” or other similar expressions. TVA believes that the assumptions underlying the forward-looking statements are reasonable. Numerous factors could cause actual results to differ materially from those in the forward-looking statements. For a discussion of these factors, please see the annual, quarterly, and periodic reports that TVA files with the Securities and Exchange Commission. New factors emerge from time to time, and it is not possible for management to predict all such factors or to assess the extent to which any factor or combination of factors may impact TVA’s business or cause results to differ materially from those contained in any forward-looking statement. TVA undertakes no obligation to update any forward-looking statement to reflect developments that occur after the statement is made.

**Reporting:** All references to years in this annual Sustainability Report refer to TVA’s fiscal years ending September 30, unless specifically identified as calendar years. All financial data is reported in U.S. dollars. This report contains key measures of the progress being made and describes our strategies for the future. TVA is committed to continual improvement in reducing environmental impact and modernizing the electricity grid to support new technologies.

**Publication Date:** July 2020

**Reporting Period:** October 1, 2018 to September 30, 2019

**Contact:** [sustainability@tva.gov](mailto:sustainability@tva.gov)



We improve quality of life for Valley individuals and businesses by delivering reliable, affordable, and increasingly clean energy.

Deliver



Invest



We invest in the Valley through quality job creation; using a competitive, diverse supplier base; and advancing innovation.



We care for our employees, natural and cultural resources, and the Valley.



Care



Partner

We partner with communities and customers to improve quality of life in the Tennessee Valley.



*“TVA serves the people of the Valley to make life better. The strength of TVA and of public power is a passionate commitment to serve people over balance sheets. This is perhaps more critical today than it has ever been.”*

**JEFF LYASH**  
President and CEO

## Message from the CEO

The fundamental principles of sustainability have been a driving force at TVA since its creation in 1933.

Our unique, long-standing mission of service is just as relevant today as it was more than 87 years ago. To serve the people of the Tennessee Valley to make life better. To deliver on our commitment to the 10 million people we serve, we build sustainability into everything we do—every decision we make, every project we undertake.

Our focus on sustainability strengthens our ability to safely provide reliable, affordable and increasingly cleaner energy; to engage in proactive stewardship of the Tennessee River system and natural resources; and to support sustainable economic growth.

Our emphasis on sustainability enables us to view our mission of service today through the lens of tomorrow. It helps us balance present capabilities with the anticipated future needs of the Valley. In so doing, it helps us protect the environment while promoting the Valley’s prosperity for generations to come.

As the pace of change accelerates, we at TVA are committed to working with our customers and communities to continue on a transformative path for

the Valley’s energy future. Enhancing sustainability through partnerships is an essential part of our journey, challenging each of us to work together for a healthy today...and an even healthier tomorrow.

We’re proud of the partnerships through which great progress has been made, even as we recognize there is still more to do. The 2019 TVA Sustainability Report reflects on our accomplishments and challenges over the past year. As we look to build on these accomplishments, we want to hear from you.

Please share your thoughts with us. We welcome your input as we work together to build a sustainable future for the people and communities we are honored to serve.

**JEFF LYASH**  
President & Chief Executive Officer  
Tennessee Valley Authority

# Serving the People to Make Life Better



**PARTNERING**  
with **153**  
Local Power  
COMPANIES  
AS OF JULY 2020

**EVERY DAY WE SERVE**  
**10** MILLION  
PEOPLE  
700,000  
Businesses  
IN PARTS OF  
**7** STATES  
Directly Serve  
**57**  
LARGE corporations &  
federal installations  
AS OF JULY 2020

## How we made life better in FY19

ON TRACK TO ACHIEVE

# 60%

CARBON REDUCTION BY END OF 2020

APPROVED NEW

## Integrated Resource Plan

A ROADMAP FOR THE FUTURE

SINCE 2000

# 99.999%

TRANSMISSION RELIABILITY RATING

CONTRACTED OR OPERATING

# 6,000

MEGAWATTS OF RENEWABLE ENERGY

Deliver

BEST IN CLASS FOR

# SAFETY

0 WORK-RELATED FATALITIES

RECOGNIZED AS

## LEADING Employer

BY THE NATIONAL ORG ON DISABILITY AND G.I. JOBS

NITROGEN OXIDE REDUCED

# 96%

SINCE PEAK CY 1995 LEVELS

CHIEF LEARNING OFFICER MAGAZINE

## Learning Elite Silver Award

FOR OUR TRAINING PROGRAMS

Care

Invest

AVOIDED

# \$1.6

BILLION IN FLOOD DAMAGES

TOP 10 UTILITY

# 14<sup>th</sup>

YEAR FOR ECONOMIC DEVELOPMENT

STIMULATED OVER

# \$8.9

BILLION CAPITAL INVESTMENT IN THE VALLEY

SPENT

# \$395

MILLION IN TRANSACTIONS WITH DIVERSE BUSINESSES

Partner

RATES BETTER THAN

# 70%

OF THE TOP 100 UTILITIES

CREATED PARTNERSHIP AGREEMENT

# 20

YEAR TO STRENGTHEN PUBLIC POWER MODEL

SUPPORTED

# 600+

ENVIRONMENTAL EDUCATION & COMMUNITY ENGAGEMENT PROGRAMS

IMPLEMENTED STEWARDSHIP PROJECTS

# 340+

TO IMPROVE VALLEY RESOURCES

# TVA'S APPROACH TO SUSTAINABILITY

Sustainability for TVA means ensuring our ability to provide the people of the Tennessee Valley with low-cost and reliable electricity, a healthy environment, and a prosperous economy—without compromising the ability of future generations to do the same.

This Sustainability Report provides a comprehensive view of TVA's progress as a business and community partner to build a stronger, more sustainable future together. TVA's first formal Sustainability Report highlights these efforts and reflects TVA's longstanding commitment to stewardship and transparency. At TVA, our sustainability aspirations include:

- Being best-in-class in reliability and price to power the future of the Valley;
- Setting the standard by taking smart risks to drive creative solutions for TVA and the communities we serve;
- Being the destination for difference makers – we believe the best in each other, give our best to each other, and expect the best from each other;
- Standing for progress in our communities – earning the trust and advocacy of our customers and stakeholders;
- Delivering affordable rates and investing in the future.

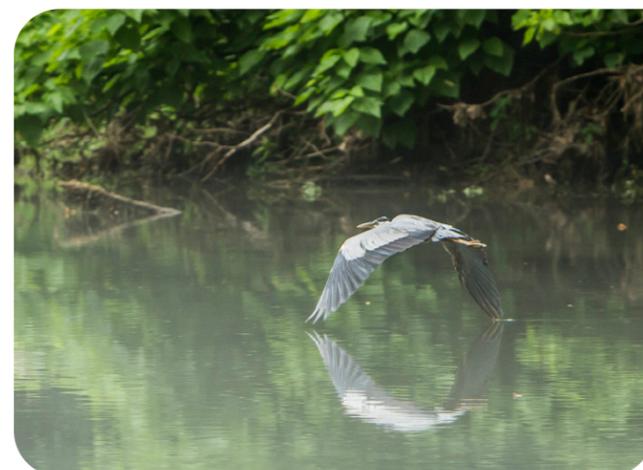
These aspirational statements confirm TVA's vision for the future and establish a basis for developing TVA's sustainability objectives, which align with the United Nations' Sustainable Development Goals and the Global Reporting Initiative. Throughout this report you will see evidence of TVA's continued progress toward our aspirations and our sustainability objectives.

This comprehensive Sustainability Report will serve as a baseline for our annual corporate sustainability reporting, according to global reporting standards. As we mature our sustainability reporting program, we will work with

stakeholders and communities on what sustainability objectives and metrics are most important to the Valley and how we attain those.

TVA will continue to publish two other sustainability-related documents: a *Federal Sustainability Report and Implementation Plan*, which addresses our responsibilities related to federal sustainability performance, and an *Environmental, Social, and Governance (ESG) Sustainability Report*, which uses a utility-focused and investor-driven reporting template developed by the Edison Electric Institute.

At TVA, we are proud to add this Sustainability Report to our portfolio of sustainability documents. Our goal is to provide information that transparently and succinctly highlights the energy, environmental, economic, and societal impacts of TVA's everyday activities. More details on each topic are available on [tva.gov](http://tva.gov).



## Our Sustainability Framework and Objectives

### Aligning With Global Sustainability Goals

As you will see in the charts on this page, TVA's sustainability framework and sustainability objectives align with the United Nations' Sustainable Development Goals. We also align with the Global Reporting Initiative standards. At TVA, the sustainability decisions we make and the programs we put in place are directly related to the guidance we glean from global standards such as these.

### Our Sustainability Objectives for DELIVER

## Deliver

We make life easier for individuals and businesses in the Valley, by delivering low-cost, reliable, clean, safe power.

Energy Affordability	Clean Energy and our Low-Carbon Future	Renewable Energy	Grid Modernization	Resource Planning
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UNITED NATIONS SUSTAINABLE DEVELOPMENT GOALS

#### Energy Affordability:

- Keep rates as low as feasible while understanding economic impact to customers and communities.

#### Clean Energy and our Low-Carbon Future:

- Increase the clean energy percentage for energy delivered by the TVA Generation Fleet.
- Continue to reduce carbon emissions and the carbon footprint of the Valley.

#### Renewable Energy:

- Increase renewable energy opportunities in the Valley, and advance Local Power Co Partnerships with Solar generation.
- Increase renewable generation share of total energy.

#### Grid Reliability and Modernization:

- Continue driving the 10-year strategic initiative to expand TVA's fiber optic network that will better connect our operational assets.

#### Energy Transformation and Resource Planning:

- Deploy TVA's IRP to provide direction on how best to meet future electricity demand within an increasing sustainability focused framework.
- Monitor key signposts that will guide portfolio decisions in the longer term, especially as they relate to changing market conditions, evolving regulations, and technology advancements.
- Advance modeling techniques to integrate our carbon strategy into future planning decisions.

### Our Sustainability Objectives for CARE

## Care

We protect the environment by preserving natural resources and advancing sustainable business practices.

Health and Safety	Environmental Protection	Regulatory and Consumer Protection	Employee Experience
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UNITED NATIONS SUSTAINABLE DEVELOPMENT GOALS

#### Health & Safety:

- Continue to focus on safety to remain best in industry, while striving to have recordable incident rate remain top decile in industry.

#### Environmental Protection:

- Assess climate impacts with TVA's Climate Adaptation and Resiliency Plan.

- Continue to proactively protect biological and cultural resources, and enhance aquatic habitat.
- Execute TVA's Environmental Policy through protection, compliance, and continuous improvement.
- Proactively assess water stress for the Valley and plan accordingly for future generations.

**Regulatory and Consumer Protection:**

- Ensure electric system assets and funds are used for the benefit of the electric system.

future challenges.

- Continue to embrace workplace diversity by improving the minority share and women share of the workforce.

**Employee Experience:**

- Support employee learning and development to prepare for

- Maintain our status as best in industry for military veteran share of the workforce.

**Our Sustainability Objectives for Invest**



Invest

We improve quality of life by investing in communities to promote sustainable capital investment and job growth.

Economic Development

Supplier Sustainability

Technology and Innovation

**UNITED NATIONS SUSTAINABLE DEVELOPMENT GOALS**



**Economic Development:**

- Provide consistent support for economic development programs to remain best-in-class, while striving to retain even more jobs in the Valley.
- Advance sustainable communities program, with an ever higher participant rate with platinum, gold or silver status.
- Maintain best in the nation flood management performance, and flood damage averted will continue to be a significant driver for a strong Tennessee Valley economy.

**Supplier Sustainability:**

- Continue to advance a diverse supplier base, while raising sustainable acquisition standards for our business.

**Technology and Innovation:**

- Invest in science and technological innovations that help us meet future business and operational challenges.
- Explore ways to further reduce carbon emissions, embrace energy efficiency and pursue development of advanced nuclear generation options.

**Our Sustainability Objectives for Partner**



Partner

We carry on our tradition of service by developing meaningful partnerships with employees, local communities and businesses.

Community Partnerships - Public Outreach Programs

Community Partnerships - River and Public Land Stewardship

Community Partnerships - Volunteerism and Community Giving

Customers as Partners

Stakeholder Engagement

**UNITED NATIONS SUSTAINABLE DEVELOPMENT GOALS**



**Community Partnerships:**

- Actively assess and improve natural resources and biodiversity in the Valley.
- Continue advancing community outreach and stewardship initiatives.

**Stakeholder Engagement:**

- Leverage current stakeholder initiatives to continue building trust and further enhancing stakeholder relationships.

**Customers as Partners:**

- Build and enhance partnerships with customers to leverage the strengths of the public power model to provide sustainable energy solutions which positively impact consumers.

**A Word From Our Chief Sustainability Officer**

*Valley residents,*

For the past 87 years, sustainability and integrated planning have been part of TVA's mission to improve quality of life for those who live in the Tennessee Valley and both will be essential as we face new challenges and opportunities. The question "How do we best serve the Valley today and for future generations?" has been at the center of TVA's decision-making process and will guide our operations and our innovations for the future.



We are seeing many changes in the utility industry, and TVA believes the public power model and our work to serve the Valley are strengths that enable us to deliver affordable, reliable, and increasingly clean energy in the future. The nearly 10 million people who depend on us for energy are also depending upon us to adapt to changing conditions. The TVA team is up to that challenge.

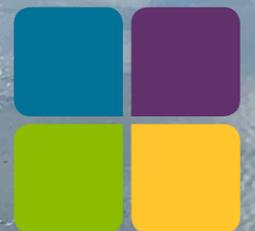
While sustainability and integrated planning have always been parts of TVA's mission, this is the first time we have gathered this information into one report in this format. Our goal is that this report improves the accessibility and transparency of information about TVA's sustainability work. This report will serve as our baseline, and we look forward to working with you on how we improve—year after year—on refining and attaining our sustainability objectives and reporting the information.

We will work together with our stakeholders to continuously improve our actions by identifying issues and opportunities that will help create a sustainable, clean energy future and shared value for all. Whether it is operating the power system, the river system, recruiting jobs or providing recreation opportunities or natural resource protection, we are always striving to balance competing demands with one goal in mind—how do we best serve the Tennessee Valley.

Thank you for taking the time to review TVA's first Sustainability Report. If you have ideas on how to improve this report, please email us at [sustainability@tva.gov](mailto:sustainability@tva.gov).

**REBECCA TOLENE**

Vice President, Environment,  
and TVA Chief Sustainability Officer  
Tennessee Valley Authority



## Reporting and Disclosure Frameworks

TVA uses the Global Reporting Initiative (GRI) framework as the standard by which we structure our sustainability processes and disclosure. The GRI is a recognized international framework for economic, environmental, and social performance disclosure. TVA includes a governance disclosure as an additional pillar for our sustainability focus areas. Sections of this report with information responsive to the GRI indicators/disclosures include the following:

TVA ALIGNMENT						
Global Reporting Initiative criteria addressed [Includes G4 for electric utilities]						
GRI Category Information		Sustainability Focus Area				Sustainability Report
GRI Category	GRI Criteria Description	Economic	Environmental	Social	Governance	Page Number
101	Foundation	✓	✓	✓	✗	About TVA / Our Approach to Sustainability 6-9
102	General Disclosures	✓	✓	✓	✗	Key Sustainability Performance Measures 10-13
103	Management Approach				✗	About TVA 14-23
201	Economic Performance	✗				Invest 44-51
202	Market Presence	✓				About TVA / Partner (Customers) 14-23, 52-65
203	Indirect economic impacts	✗				Invest 44-51
204	Procurement practices	✗			✓	Invest (Supplier) 48
205	Anti-corruption			✓	✗	About TVA (Ethics) 15-16
206	Anti-competitive behavior			✓	✗	About TVA 15-16
301	Materials		✗			Deliver 26,28, 68-70
302	Energy		✗			Deliver 24-31, 68-70
303	Water and Effluents		✗			Care / Appendix 35, 38-40, 68-70
304	Biodiversity		✗			Care 39, 40, 54-57
305	Emissions		✗			Care 36-38
306	Waste and Effluents		✗			Care 38
307	Environmental Compliance		✗			Deliver 36-38
308	Supplier Environmental Assessment		✓	✗	✓	Invest / Appendix 37,48
401	Employment			✗		Care 42,43
402	Labor/Management Relations			✗		About TVA / Care 42
403	Occupational health and safety			✗		Care 33-35, 68-70
404	Training and Education			✗		Care 43, 68-70
405	Diversity and equal opportunity			✗		Care 41-43
406	Non-Discrimination			✗		Care / Partner 41-43
407	Freedom of Association and Collective Bargaining			✗		Care 41-43
408	Child Labor			✗		Care 42
409	Forced or compulsory labor			✗		Care 42
410	Security Practices			✗	✓	Deliver 22-23, 29
411	Rights of Indigenous Peoples	✓		✗		Care 41
412	Human Rights Assessment			✗	✓	Care 42
413	Local Communities			✗	✓	Partner 52-65
414	Supplier Social Assessment			✗		Invest 37, 48
415	Public Policy	✗		✓		About TVA 14-21
416	Customer health and safety	✓		✗		Partner 52-65
417	Marketing and Labeling	✗		✓		Partner 52-65
418	Customer Privacy	✓		✗		Partner 52-65
419	Socioeconomic compliance	✓		✓		Invest 44-51

Note: ✗ = primary emphasis ✓ = secondary emphasis

To deploy the GRI framework, TVA continues to engage with industry, federal, and customer-oriented disclosure initiatives, including CPD (formerly known as Carbon Disclosure Project), Edison Electric Institute - Environmental, Social, and Governance Reporting Pilot, Electric Power Research Institute (EPRI) - sustainability metric assessment and benchmarking supplemental collaborative projects, Office of Management and Budget Scorecard, and Task Force on Climate-Related Financial Disclosures. *See Appendix A for details.*

To further deploy the GRI framework, TVA implements key policies, reports, and plans that support TVA's strategic planning, risk management, and sustainable performance goals. Examples include our Climate Change Adaptation Action Plan, Environmental Policy, Integrated Resource Plan (IRP), Natural Resource Plan (NRP), and National Environmental Policy Act. *See Appendix B for details.*

## Reporting What is Most Relevant

The facts and figures in this annual Sustainability Report are key measures of the progress being made and describe our strategies for the future. This report aims to align with Global Reporting Initiative standards, and it represents TVA's continuous improvement process. We will continue to work with stakeholders to ensure each Sustainability Report is an improvement from the year before.

The Materiality Principle of the GRI Guidelines define materiality in the context of a sustainability report: The report should cover aspects that:

- Reflect the organization's significant economic, environmental and social impacts; or
- Substantively influence the assessments and decisions of stakeholders.

In consideration of the four TVA sustainability focus areas, which support the GRI reporting principles, we have constructed the Key Sustainability Performance Measures table shown below. We also provide a detailed response to GRI indicators as Appendix C to this report and on [tva.gov](http://tva.gov), including indicators in GRI's Electric Utilities Sector Disclosures.

## Key Sustainability Performance Measures

	Metrics	2017	2018	2019	Highlights
<b>Air Emissions</b>					
TVA is in the top quartile of its regional peers for clean energy generation, and we continue to strive to improve air quality.	SO <sub>2</sub> (metric tons) (CY):	42,741	26,744	26,972	99% below 1977 peak level.
	NO <sub>x</sub> (metric tons) (CY):	27,443	21,451	19,430	96% below 1995 peak level.
<b>Assets and Operations</b>					
TVA is evolving our fleet, reducing greenhouse gas emissions, and building out an integrated energy network, while maintaining flat rates and continuing to provide consistent, reliable service.	Coal generation (GWh):	39,019	31,471	27,934	465 MW extended power uprate at Browns Ferry completed.
	Hydroelectric generation (GWh):	10,967	13,736	16,058	
	Natural gas generation (GWh):	25,485	32,104	31,704	
	Nuclear generation (GWh):	58,742	64,194	63,433	
<b>CCR</b>					
TVA is committed to safe, long-term management of the coal combustion residuals (CCR) generated by our operations.	Percent of Coal Combustion Products Beneficially Used:	41%	38%	45%*	TVA continues to beneficially use coal combustion residuals instead of landfilling the materials in order to help protect the environment.
<b>Climate Change</b>					
TVA is a leader in CO <sub>2</sub> emission reductions and is continuing to transition to cleaner, greener energy while keeping rates flat and service reliable (data includes purchased power).	Power from carbon-free sources delivered (%):	50%	52%	54%	TVA average carbon emission rates are on track to be reduced 60% from 2005 levels by the end of 2020, and reduced 70% by 2030 (data includes purchased power). Top quartile ranking amongst industry peers CO in Clean Energy Generation.
	CO <sub>2</sub> Emissions rate (lb/MWh):	850.91	825.09	741.66	

\*The data was updated from 41% to 45% due to a calculation error discovered 8/2020.

	Metrics	2017	2018	2019	Highlights
<b>Community Vitality</b>					
With the signing of the original TVA Act in 1933, Congress charged TVA with ensuring the economic, environmental, social, and physical well-being of the people of the Tennessee Valley. TVA continues this mission of service today.	Number of jobs created or retained (# jobs):	70,076	65,423	66,572	Recognized as top 10 Utility for Economic Development by Site Selection Magazine for the 14 <sup>th</sup> consecutive year.
	Capital Investment in the Valley (\$ Billion):	\$8.3	\$11.3	\$8.9	
	Environmental & Community Engagement (# Children participating)	9,207	11,650	10,325	
	Environmental & Community Engagement (# Group activities)	617	598	805	
<b>Diversity and Inclusion</b>					
At TVA, we are powered by people—and we are enriched by the diversity of a talented, highly skilled workforce made up of people from every sort of background. We draw strength from diversity, and cultivate an atmosphere of active inclusion.	Military share of workforce (%):	17.47%	18.32%	18.1%	Top quartile ranking amongst peers.
	Minority share of workforce (%):	11.17%	11.31%	11.8%	We actively recruit employees of all races, colors, sexual orientations, ethnicities, genders, abilities, religions, and ages.
	Women share of workforce (%):	19.01%	20.12%	20.1%	
<b>Education and Career Development</b>					
TVA invests in employees through training plans and performance improvement. Our approach to development consists of 70% on the job experience, 20% informal learning, and 10% formal training.	Training for career advancement (hours/employee):	76.92	77.71	73.70	TVA ranked best among peers based on industry benchmarks.
	Continuing education contributions (\$)	\$665,753	\$498,041	\$443,789	TVA offers tuition reimbursement to all full-time, annual employees with a minimum of two years of service.
<b>Electricity Affordability</b>					
The TVA Act requires TVA to ensure that rates will always remain as low as feasible and that power produced by TVA is distributed throughout the Valley. Low rates and access for all remain core values at TVA.	Retail Rate (cents/KWh)	9.17	9.16	9.28	As TVA has reconfigured its generation portfolio, TVA in partnership with local power companies has maintained rates lower than 70% of the electricity providers in the U.S.
	Non-Fuel Delivered Cost of Power (cents/KWh)	3.10	3.18	3.46	
<b>Environmental Compliance</b>					
We are committed to sustainability, continuous improvement, proactive stewardship in managing our natural resources and reducing our environmental footprint, and compliance with all applicable environmental regulations.	Compliance: Notice of Violations (#)	3	1	4	TVA is committed to improvement in environmental compliance through employee training and education, continuous improvement, and preventive measures.
<b>Internal Energy Management Program</b>					
TVA seeks to identify and achieve internal energy goals using Federal Energy Management Program best practices. We are continuing to implement new technologies and invest in efficiency improvements in order to reduce our facility energy use.	Building Energy Intensity (% reduction) (EO 13834):	36.90%	62.60%	64.30%	In FY 2019, TVA invested \$4.91 million on improvements resulting in \$542,500 in annual savings and 6,120 megawatt hours in energy consumption savings. Since 2008, TVA has reduced energy usage by nearly 733 GWhs, enough energy to power 50,000 average homes for a year. TVA's CO2 emissions savings from these improvements was 518,500 metric tons of CO2e, equivalent to reducing emissions from 110,100 passenger vehicles driven for one year.
	Building Potable Water Intensity (% reduction) (EO 13834):	28.20%	31.60%	36.90%	
<b>Financial Strength</b>					
TVA's financial strength helps us continue to invest in the asset base, without undue reliance on new debt, which in turn keeps rates low and reduces risks to local power companies and to the people of the Valley.	Operating Revenues (\$M)	\$10,739	\$11,233	\$11,318	<ul style="list-style-type: none"> <li>Lowest debt in almost 30 years.</li> <li>Partnership Agreement option for customers approved.</li> <li>Operating expenses 2% lower than 2018.</li> <li>Interest expense 4% lower than 2018.</li> </ul>
	Operating Cash Flow (\$M)	\$2,728	\$3,938	\$3,720	
	Total Financing Obligations (\$B)	\$26.0*	\$24.3*	\$22.8*	
	Net income (\$M)	\$685	\$1,119	\$1,417	

\*Please see Appendix E for Regulation G Reconciliations.

	Metrics	2017	2018	2019	Highlights
<b>Health and Safety</b>					
Safety is one of TVA's core values. We strive to ensure our facilities are safe for our employees and for the communities we serve.	Recordable Incident Rate:	0.39	0.34	0.44	TVA ranked top among peers for safety based on industry benchmarks..
	Lost-time Case Rate:	0.08	0.12	0.00	
	Days Away, Restricted, and Transferred (DART) RATE:	0.20	0.25	0.00	
	Serious Injury Incident Rate (SIIR)	0.03	0.05	0.06	
<b>Habitat and Biodiversity</b>					
TVA's mission of environmental stewardship includes protecting and enhancing TVA lands for both conservation and recreation purposes.	Total acres of habitat protected, enhanced, or restored that supports natural habitat and biodiversity:	247,706	247,706	247,706	<ul style="list-style-type: none"> <li>TVA ranked best among peers based on industry benchmarks.</li> <li>Public Land Protection Policy</li> <li>Natural Resource Plan updated and expanded in 2020.</li> </ul>
<b>Nuclear Waste</b>					
We are committed to safe, long-term management of the radioactive waste generated by our nuclear operations.	Low-level radioactive waste disposal Rate (ft3/MWh):	0.001726	0.002520	0.003366	Spent fuel stored in accordance with NRC regulations.
<b>Reliability and Resiliency</b>					
TVA is working to further strengthen resiliency and reliability, including in our physical and cyber security operations.	Transmission System Reliability Rating:	99.999%	99.999%	99.999%	Released TVA Resiliency Plan.
<b>Transparency</b>					
TVA's commitment to transparency includes disclosure through TVA FACA councils, board meetings, SEC filings, customer relations, and stakeholder engagement. TVA's website is disclosed for public consumption. For business purposes TVA discloses sustainability performance to federal entities, investors and customers.	Federal Sustainability Report Disclosure	SR&IP and AEMR	SR&IP and AEMR	SR&IP and AEMR	Reporting to Congress, CEO, and DOE. SR&IP and AEMR submitted annually for last 10 years.
	Investor Sustainability Report Disclosure	EI-ESG Industry Working Group	EI-ESG Industry Pilot	EI-ESG Industry Template	Released first Edison Electric Institute ESG Report in 2019. Annual SEC reporting.
	Customer Carbon Accounting Disclosure	Annual Customer Carbon Accounting	Annual Customer Carbon Accounting	Annual Customer Carbon Accounting	Carbon Accounting drives two TVA sponsored awards for both directly served customers and LPC-served businesses.
<b>Supply Chain</b>					
Local, small and diverse suppliers bring great value to TVA, while creating jobs and opportunities in the communities we serve. We will continue to seek their partnership as we work to make life better for the people of the Tennessee Valley.	Total Small Business Spend (\$ million):	\$1,000	\$822	\$766	Top quartile ranking amongst peers for % spend with local suppliers.
	Total Diverse Business Spend (\$ million):	\$390	\$445	\$395	
	Total Valley Business Spend (\$ billion):	\$2.7	\$2.2	\$2.0	
<b>Waste</b>					
We aim to reduce waste and improve efficiency, both internally and in the communities we serve.	Amount of hazardous waste manifested for disposal (metric tons):	117.43	52.44	93.67	TVA is committed to proper management of hazardous wastes.
<b>Water</b>					
We are committed to maintaining a clean water supply. TVA manages the Tennessee River, its tributaries, and certain shorelines to provide year-round navigation, flood control, and affordable, reliable electricity.	Freshwater consumption (billions of liters/Net MWh):	0.0000006	0.0000007	0.0000006	TVA returns 99.2% of the water it withdraws for thermoelectric power production back into the Tennessee River. 2nd quartile industry ranking for freshwater consumption.
	Water withdrawals—non-consumptive (billions of liters/Net MWh):	0.0001001	0.0000978	0.0001116	
	Flood Management: Avoided Flood Damage (\$ million)	\$260	\$260	\$1,600	

# SERVING THE PEOPLE

of the Valley to Make Life Better



*“The work of TVA will never be over. There will always be new frontiers for it to conquer. For in the minds of men the world over, the initials TVA stand for progress—and the people of this area are not afraid of progress.”*

**JOHN F. KENNEDY**  
Muscle Shoals, Alabama  
May 18, 1963

## About TVA

### Introduction

Congress established TVA in 1933 and charged us with making life better in the Tennessee Valley. We serve the Valley by:

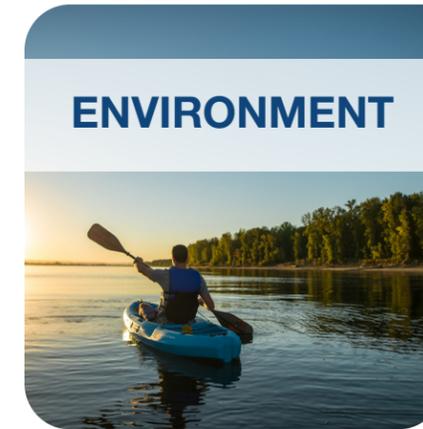
- **Delivering** reliable, affordable, and increasingly cleaner energy;
- **Caring** for our natural and cultural resources, our employees, and the Valley;
- **Investing** in communities to promote sustainable job growth and innovation; and
- **Partnering** with local communities and customers to improve quality of life in the Valley.

As the nation’s largest public power provider, TVA safely delivers cleaner, reliable, affordable energy to 154 local power companies and 57 directly served customers as of May 2020. TVA’s service area, the area in which it sells power, is defined by the TVA Act. TVA supplies power

in most of Tennessee, northern Alabama, northeastern Mississippi, and southwestern Kentucky and in portions of northern Georgia, western North Carolina, and southwestern Virginia, covering 80,000 square miles and serving nearly 10 million people.

This section provides details on the following:

- History, Mission, and Values
- Ethics
- TVA’s Power System
- Transmission System
- River System
- Governance
- Business Model
- Strategic Imperatives
- Enterprise Security and Risk Management.



## History, Mission, and Values

TVA was built for the people, created by Congress in 1933 and charged with a unique mission of service—to improve the quality of life in a seven-state region through the integrated management of the Tennessee River system and the region’s resources. As it helped lift the Tennessee Valley out of the Great Depression, TVA built dams for low-cost power, flood control, and navigation for commercial shipping, and also restored depleted lands and raised the standard of living across the region.

TVA was founded with a mission rooted in social responsibilities—electrifying rural and impoverished areas in the Tennessee Valley, serving as a steward of natural resources, and promoting economic development and job creation. As a not-for-profit government corporation, TVA is self-sustaining and self-funded and receives no public tax dollars. Initially, all TVA operations were funded by federal appropriations. Direct appropriations for the TVA power program ended in 1959, and appropriations for TVA’s stewardship, economic development, and multipurpose activities ended in 1999. Since 1999, TVA has funded all of our operations almost entirely from the sale of electricity and power system financings.

As times have changed, TVA has changed with them by updating and refining our work to accomplish our mission of providing affordable energy, economic development, and environmental stewardship through integrated river system management, partnerships, and technological innovation.

Our mission has remained constant since our inception and focuses on three key areas:

- 1. Energy:** safely delivering affordable, low-cost, increasingly clean power;
- 2. Environment:** responsible stewardship by caring for the region’s natural resources; and
- 3. Economic Development:** creating sustainable economic growth.

TVA’s values are the fundamental beliefs that guide our actions, our behaviors, and our decisions as a company. Our values create a community where we agree about what matters. That’s why we’re committed to bring our values to life—in the behaviors we demonstrate and an environment where fresh ideas and smart risk-taking are welcomed.

## Our Values

### SAFETY

We are **uncompromising in our commitment to the safety** and well-being of our teammates and the communities we serve.

### INCLUSION

We treat everyone with **dignity and respect – emphasizing inclusion** by welcoming each person’s individuality so we can reach our full potential.

### INTEGRITY

We are **honest and straightforward** – always doing the right thing with integrity.

### SERVICE

We **provide service in the communities** in which we live, work, and play.

## Ethics

Since our creation in 1933, TVA has been committed to conducting our affairs with honesty and openness. TVA’s ethics program helps ensure that employees support the integrity and efficiency of TVA operations, make the right decisions for the right reasons, and maintain public confidence. To assist employees with ethical decision-making, the TVA Code of Conduct and the Executive Code of Conduct provide guidance on how we are to live the TVA values, serve the people of the Valley with integrity, and maintain an open, honest, and transparent work environment. As federal government employees,

TVA employees are also responsible for complying with the [Standards of Ethical Conduct for Employees](#) of the Executive Branch.

The best interests of TVA take precedence over the interests of a director or any TVA employee. The TVA Board expects individual directors, officers, and employees of TVA to act ethically at all times. TVA's General Counsel is the agency's designated ethics official, responsible for the administration of TVA's agency-wide ethics program.

### Anti-Corruption

As a federal corporation, TVA's employees are subject to the federal conflict of interest statutes that govern bribery, gratuities, postemployment restrictions, conflicting financial interests, and supplementation of compensation.

All TVA employees and individuals transacting business on behalf of TVA complete mandatory annual ethics training on a variety of important policies and procedures, including conflicts of interests and gifts. TVA's Code of Conduct, which highlights certain key policies and procedures, can be accessed online at any time.

Because of the nature of their positions at TVA, certain employees are required to submit an annual financial disclosure report that is utilized by TVA to identify potential conflicts of interest. While the report is not a net worth statement, it does include information related to financial securities, outside activities, and gifts from external sources. Generally, employees identified as filers for financial disclosure reports have duties that are likely to affect non-governmental entities.

The TVA Board of Directors and the CEO are also subject to a separate conflict of interest policy. Members of the Board of Directors and the CEO hold themselves and each other to the highest standards of integrity, honesty, and ethical conduct.

Learn more about the TVA Code of Conduct online at: [TVA's Code of Conduct](#).

### Anti-Competitive Behavior

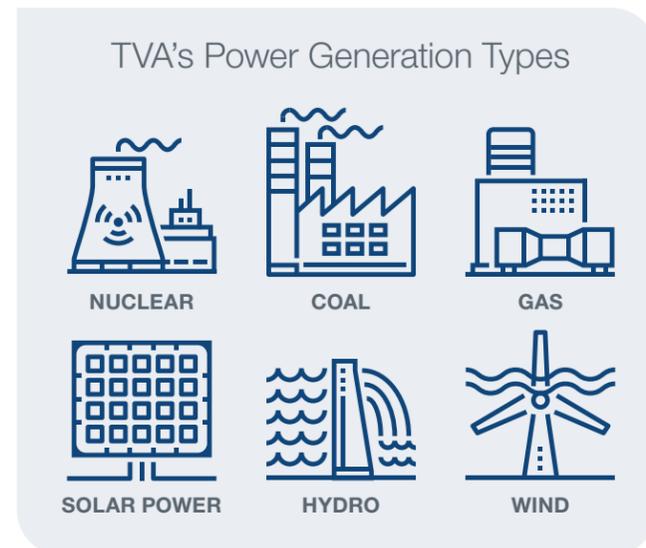
Under the TVA Act, TVA is generally required to compete its contracts for goods and certain services. During the reporting period, TVA was not a participant in any legal actions regarding anti-competitive behavior or violations of anti-trust legislation.

### TVA's Power System

TVA's power portfolio is dynamic and adaptable in the face of changing demands and regulations. Our emphasis has moved toward cleaner forms of power generation. Today, the power we deliver is more than 50 percent carbon-free. TVA efficiently delivered more than 158 billion kilowatt hours of electricity to customers from a power supply that was 39 percent nuclear, 20 percent natural gas, 17 percent coal-fired, 10 percent hydroelectric, 9 percent purchased power (non-renewable), and 5 percent purchased power (renewable). TVA's non-hydro renewable resources from TVA facilities are less than one percent. Purchased power (renewable) contains the majority of non-hydro renewable energy supply. This data is for the year ending September 30, 2019.

Power generating facilities operated by TVA as of September 30, 2019, included 29 conventional hydroelectric sites, one pumped-storage hydroelectric site, six coal-fired sites, three nuclear sites, 17 natural gas and/or oil-fired sites, one diesel generator site, and 14 solar energy sites.

As of September 30, 2019, TVA's 26 coal-fired units



accounted for 7,886 megawatts (MW) of summer net capability. TVA's system also includes 101 generators powered by natural gas and/or oil-fired with a total summer net capability of 12,509 MW. These generators can be quickly started and are vital for meeting peak electricity demands. TVA has gas-co-firing potential at one coal-fired site as well as biomass co-firing potential at all of its coal-fired sites. TVA also purchases a portion of its power supply from third-party operators under long-term power purchase agreements (PPAs).



MORE THAN  
**16,000**  
MILES OF HIGH VOLTAGE LINES



TVA's three nuclear sites had a combined summer net capability of 7,922 MW at September 30, 2019. TVA's nuclear fleet is an important element in a diversified portfolio for the future. As of September 30, 2019, TVA completed upgrades of the Browns Ferry Nuclear plant. The generation capacity is expected to increase 465 MW after sufficient run time to validate the new capacity.

TVA-owned hydroelectric units had a combined summer net capability of 5,400 MW at September 30, 2019. TVA is retiring some of its coal-fired units to make way for new, more efficient forms of power production. Paradise Unit 3 retired in February 2020 and Bull Run is scheduled to retire by December 2023. TVA is continuing to evaluate engineering end-of-life dates of aging fossil units.

### Transmission System

TVA's transmission system is a critical link in moving electricity throughout the eastern United States. In carrying out our responsibility for grid reliability in the TVA service area, TVA has operated with 99.999 percent reliability in delivering electricity to customers since 2000. The TVA transmission system is one of the largest in North America, delivering nearly 158 billion kWh of electricity to TVA customers in FY 2019. We continually invest in transmission assets to strengthen system

reliability and incorporate new technology that provides a clear picture of grid conditions over a wide area at any given time.

TVA's transmission system interconnects with systems of surrounding utilities and consisted primarily of the following assets as of September 30, 2019:

- Approximately 2,500 circuit miles of 500 kilovolt, 11,700 circuit miles of 161 kilovolt, 2,000 circuit miles of other voltage transmission lines, and 3,500 miles of fiber;
- 510 transmission substations, power switchyards, and switching stations; and
- 1,314 customer connection points (customer, generation, and interconnection).

TVA has been focused on upgrading our transmission system to maintain reliability as some coal units are retired. From 2011 through 2020, we plan to spend approximately \$430 million on these upgrades. The upgrades include modifications of existing lines and substations and new installations as necessary to provide adequate transmission capacity, maintain voltage support, and ensure generating plant and transmission system stability.

## River System

The TVA Act of 1933 charged the agency with promoting navigation, controlling floods, and producing power within the Tennessee River system. Approximately 42,000 miles of rivers, streams, and tributaries, including the 652-mile-long Tennessee River, and 49 dams and 14 navigation locks constitute the Tennessee River System.

TVA's hydroelectric facilities consist of 29 power-generating dams with 109 units throughout the Tennessee River system and one pumped storage hydroelectric plant with four units near Chattanooga, Tennessee. TVA also purchases power from eight dams on the Cumberland River operated by the Army Corps of Engineers.

TVA manages the Tennessee River system according to its Reservoir Operating Policy (ROP). The ROP sets water quality, minimum flow, navigation depths, river recreation, and flood risk reduction criteria across the system. The flexibility of the operating policy allows TVA to schedule the river system to meet these criteria through a wide range of possible weather scenarios and then optimize for hydroelectric generation and cooling waters for other generation facilities. Learn more about the study, the EIS, and the operating policy online at: [Reservoir Operations Study](#).

River scheduling takes place in TVA's 24/7 River Forecast Center. With the help of computer models, TVA engineers assimilate and analyze large sets of data, including actual and predicted rainfall, energy load forecasts, dissolved oxygen levels in the reservoirs, water temperatures, and other data. These models provide our experienced forecasters with the situational awareness they need to make the best tradeoffs possible in real-time for daily operations and to make forecasts out to 14 days in the future. After conducting modeling and building a schedule of system flows and generation, TVA sends twice-daily reports to hundreds of internal and external recipients, enabling their own decision-making. Our Lake Info app and webpage help keep our stakeholders well informed of day-to-day conditions on the river system. Learn more about the River Forecast Center online at: [TVA's River Forecast Center](#).

TVA's significant reservoir storage and hydroelectric capability improve the reliability of our power supply, as the turbines can be quickly ramped in order to help TVA balance load and generation. This capability will become more important as non-dispatchable supplies such as wind and solar grow in the TVA energy mix. TVA nuclear plants provide another carbon-free source of power to TVA customers, and TVA's reservoir system supports the nuclear fleet by providing a reliable flow of water for cooling. Forecasting both flows and river temperatures allows TVA to optimize schedules across the nuclear and river fleets for maximum public benefit. TVA recently implemented the world's first operational 3D water temperature models to best maintain both healthy fisheries and nuclear plant cooling operations. Learn more about TVA's water quality efforts online at: [Water Quality](#).

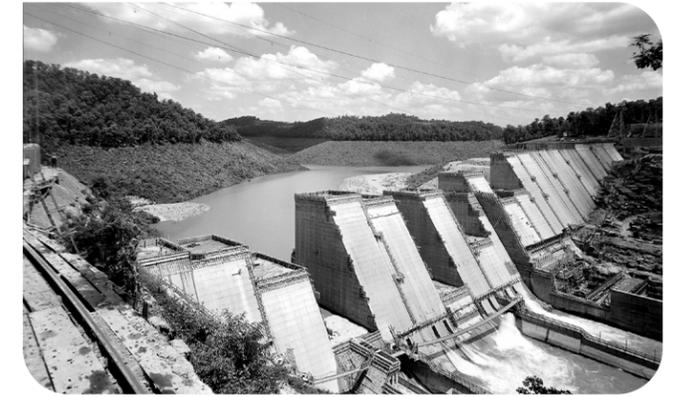


## Governance

TVA is governed by the bylaws of the Tennessee Valley Authority, Board Practices and Committee Charters. These form the framework for the governance of TVA laid forth in the TVA Act. TVA is transparent in its actions, including public disclosure through the Regional Resource Stewardship Council and the Regional Energy Resource Council, TVA Board meetings, and SEC filings. Meeting agendas and information for council and Board meetings, along with TVA's SEC filing, are available on TVA's website. TVA is a government-owned corporation, and our mission of service is fundamentally different from that of publicly traded companies. TVA has oversight similar to other utilities, such as a Board of Directors, Securities and Exchange Commission (SEC) requirements, credit rating agencies, and Sarbanes-Oxley Act requirements. In addition, TVA has oversight from Congress, the Government Accountability Office (GAO), Office of Management and Budget (OMB), the U.S. Treasury, and an independent Office of the Inspector General (OIG).

TVA also submits financial information to Congress, OMB, SEC, Nuclear Regulatory Commission (NRC), U.S. Treasury, Energy Information Administration, and others, in accordance with applicable regulatory and statutory requirements. As required by the TVA Act, TVA maintains our accounting records in accordance with the Federal Energy Regulatory Commission (FERC's) Uniform System of Accounts for Public Utilities. In addition, TVA presents our financial statements and related disclosures in conformity with Generally Accepted Accounting Principles (GAAP) promulgated by the Financial Accounting Standards Board. These financial statements are annually audited by an independent registered public accounting firm.

In December 2004, Congress passed legislation to make TVA's governance structure more like that of other large corporations. The TVA Board changed from three full-time members to nine part-time members who are responsible for providing strategic direction, governance, and oversight. Board members are nominated by the President of the United States and confirmed by the Senate, and each board member may serve a maximum of two five-year terms. In addition, a full-time Chief Executive Officer (CEO) position was established to supervise day-to-day activities. The CEO is appointed by and reports directly to the TVA Board. The December 2004 legislation also amended the Securities Exchange Act of 1934 by adding Section 37. This section requires TVA, as a non-accelerated filer under SEC rules, to file financial reports with the SEC. In December 2006, TVA filed its first Annual Report on Form 10-K with the SEC and now files Annual Reports on Form 10-K, Quarterly



Reports on Form 10-Q, and Current Reports on Form 8-K with the SEC.

The TVA Board has established two separate Public Advisory Councils, the Regional Resource Stewardship Council and the Regional Energy Resource Council, which were formed under the Federal Advisory Committee Act to advise TVA on our stewardship activities and energy resource decisions in the Tennessee Valley region. Both of these councils focus on sustainable decisions and performance to foster a record of responsible stewardship in the Tennessee Valley. Gaining routine input from stakeholders helps TVA manage our priorities in a responsible way to meet the diverse needs of people across the Valley and sustain the vitality of the region.

The TVA Board has established five committees to help the Board of Directors fulfill its responsibilities. The five committees are:

- Audit, Risk, and Regulation Committee,
- External Relations Committee,
- Finance, Rates, and Portfolio Committee,
- Nuclear Oversight Committee,
- People and Performance Committee.

TVA also has an Enterprise Leadership Team, led by the CEO, which drives business strategy and deployment, including decisions relating to sustainable performance. TVA has appointed an executive leader as Chief Sustainability Officer (CSO). TVA's CSO oversees a TVA-wide Environmental Executive Council and a Sustainability Working Group, which together are responsible for the governance of sustainability at TVA. TVA has also appointed an executive leader as Chief Risk Officer (CRO). Both the CSO and the CRO are members of the Enterprise Risk Council (ERC), which is responsible for the highest level of risk oversight at TVA and for communicating enterprise-wide risks with policy implications to the TVA Board or a designated TVA Board committee.

## Business Model

TVA is a leader in public power, a model built on trust and partnerships with the people TVA serves, delivering reliable electricity for nearly 10 million people and 700,000 businesses at the lowest feasible cost. The public power model enables effective, integrated resource management and environmental stewardship in parts of seven southeastern states. TVA promotes alliances with others that help attract and retain jobs and investments that support economic development in the Tennessee Valley.

As primarily a wholesaler of energy, TVA owns and operates a diversified portfolio of generation assets. This includes nuclear, coal, hydroelectric, natural gas, and renewable resources. TVA provides electricity to LPCs, directly served large industrial customers and federal installations, and certain off-system utilities in the open markets. TVA funds asset investments through power revenues, the issuance of bonds up to a limit set by Congress, and alternative financings, including lease financings.

The TVA Business Operating Model describes how we work as an enterprise to accomplish our strategic goals, fulfill our mission of service, and ensure continuity and sustainability of operations over time. The business model depicts how the organization's values, strategic priorities, and executable work processes create value for our customers.

In order to efficiently serve the Valley, TVA works in collaboration with LPCs to deliver electricity in the seven-

state region to their diverse customer base, ranging from residential consumers, to both small and large commercial businesses, to small industrial consumers. LPCs and directly served customers are two of the stakeholders within our business model.

The planning and execution portion of the business model translates the TVA mission into clearly defined performance objectives that are monitored, measured, and achieved by the workforce.

Power rates and rate structures are established by the TVA Board as authorized by the Tennessee Valley Authority Act of 1933, as amended. The TVA Act requires TVA to charge rates for power that will produce gross revenues sufficient to provide funds for operation, maintenance, and administration of its power system; tax equivalent payments to states and counties in lieu of taxes; debt service on outstanding indebtedness; payments to the U.S. Treasury as a return on the government's appropriation investment in TVA's power facilities; and such additional margin as the TVA Board may consider desirable for investment in power system assets, retirement of outstanding bonds in advance of maturity, and other purposes connected with TVA's power business. The TVA Board is charged by the TVA Act to have due regard for the primary objectives of the TVA Act, including the objective that power shall be sold at rates as low as are feasible.



## Strategic Priorities

TVA has a proud record of energy, environment, and economic development leadership. Sustainability resides at the heart of TVA's strategic purpose and plan. TVA develops a three-year business plan, 10-year financial plan, and 20-year integrated resource plan, each aligned to TVA's mission, strategic priorities, and objectives.



# Strategic Priorities

Energy | Environment | Economic Development



### POWERFUL PARTNERSHIPS

Promoting progress through the **shared success** of our customers and stakeholders.



### PEOPLE ADVANTAGE

Amplifying the **energy, passion and creativity** within us all.



### OPERATIONAL EXCELLENCE

Building on our **best-in-class reputation** for reliable service and competitively priced power.



### IGNITING INNOVATION

Pursuing **innovative solutions** for TVA and our customers and communities.



### FINANCIAL STRENGTH

Investing in the future, while keeping energy costs **as low as possible**.



## Enterprise Security and Risk Management

At TVA, we work around-the-clock to monitor and protect our assets and the people of the Valley. We partner with other government agencies such as the Federal Bureau of Investigation (FBI) and the U.S. Department of Homeland Security (DHS) as well as with industry groups and neighboring utilities. TVA business units have established continuity of operations plans and complementary emergency management policies and procedures to ensure continuity of service. We must be sure our power grid is resilient to disruptions such as cybersecurity threats, adverse weather, and atmospheric events. TVA and the LPCs support each other during times of needs. TVA also coordinates with Tennessee Emergency Management Agency (TEMA) during widespread power outages.

Enterprise Risk Management (ERM) is a strategic business function that provides TVA with a comprehensive risk perspective to more effectively identify and manage risks, capitalize on opportunities, and improve risk management behaviors. The TVA Board has established an Enterprise Risk Council (ERC) to oversee TVA's management of enterprise risks and establish an appropriate tone for a risk management culture throughout TVA. The Chief Risk Officer heads TVA's Enterprise Risk Management business unit, with responsibilities that include establishing enterprise risk management policies and guidelines as well as performing frequent risk assessments across all TVA business units.

Periodic audit plans are developed using information from assurance programs and processes supporting performance incentive plans, regulatory obligations, relevant Sarbanes-Oxley (SOX) deficiencies, and business plan results. Priority of audits is based on elements such as the strength of oversight, past performance, time since changes in management, process complexity, appropriateness of risk mitigation plans, and the potential impact to the agency. Results are shared with audit and assurance groups across TVA, including the Office of Inspector General and SOX. Emergent issues are considered throughout the year. To maintain readiness for future disruption, TVA has cataloged major short-term and long-term enterprise level risks, including cyber threats and those impacted by climate change, across the organization.

Although the 2015 Fraud Act was repealed in March 2020, most of the requirements of the Fraud Act were incorporated into the Payment Integrity Information Act of 2019. The law is intended to improve federal agency financial and administrative controls and procedures to assess and mitigate fraud risks and to improve federal agencies' development and use of data analytics for the purpose of identifying, preventing, and responding to fraud, including improper payments.

To oversee compliance with the Act, TVA established a Fraud Risk Management program, adopted the GAO's Framework for Managing Fraud Risks in Federal Programs, and implemented supporting processes and procedures to define roles and responsibilities within its Fraud Program. Additionally, TVA has considered both the fraud risk principles in the Standards for Internal Control in the Federal Government and the OMB Circular A-123 with respect to the leading practices for managing fraud risk. To establish a commitment to combating fraud, TVA issued an executive policy regarding fraud risk management, establishing TVA's approach, designating the guiding principles, and outlining the governance structure.

**Customer Data Privacy and Protection:** TVA employs software programs to monitor network traffic to identify unauthorized attempts to upload or change information, or otherwise cause disruption or damage. Except for authorized law enforcement investigations, no other attempts are made to identify individual users or their usage habits. Electronic communications with TVA may be scanned by government-owned or contractor equipment to look for network traffic indicating known or suspected malicious cyber activity, including malicious content or communications.

A discussion of TVA's significant risks is presented in TVA's 10-K, Item 1A, Risk Factors.

[TVA's Privacy Policy](#)

## Our Resiliency Plan

TVA maintains an active Resiliency Plan that focuses on three areas:

- Ensuring constant equipment reliability
- Monitoring, detecting, and responding to physical or cybersecurity threats
- Recovering from damage if an event occurs

Read more about TVA's resiliency efforts:

[Protecting the Grid](#)

# WE DELIVER CLEAN ENERGY



We deliver reliable, affordable, and increasingly clean energy to improve quality of life for Valley individuals and businesses.

## Deliver

This section provides details on the following:

- Energy Affordability
- Clean Energy and our Low-Carbon Future
- Renewable Energy
- Grid Reliability and Modernization
- Resource Planning
- Energy Transformation.

We are investing in our assets, modernizing the transmission system, and adding new renewable energy resources to ensure sustainable energy for years to come. TVA's current business strategy and resource plans reflect a comprehensive and diverse approach to meeting these needs efficiently and cost-effectively.

## Key Sustainability Issues

As expressed in our key sustainability performance measures table, the following topic areas and their associated metrics are extremely important relating to the DELIVER component:

- Air Emissions,
- Assets and Operations,
- Climate Change,
- Financial Strength, and
- Reliability and Resiliency.

These topic areas impact our employees, our communities, our current and prospective customers, our investors, and our business success.

The energy industry is evolving based on customer preferences, global pressures and expectations, regulatory drivers, and technological advancements.

TVA's energy mix has shifted from a largely fossil fuel-based portfolio to a more diversified generation mix, which utilizes a balance of nuclear, coal, gas, hydroelectric, and renewables.

In 2019, TVA invested capital in environmental projects. TVA environmental project expenditures also result from coal-fired plant decommissioning and from effective coal ash management modernization.

The price of renewable resources, particularly solar, continues to decline, and consumer demand for renewable and distributed energy resources is growing. At TVA, we are actively adjusting and expanding our business model to incorporate these resources, and we are collaborating with LPCs on renewable projects, reducing our carbon emissions while keeping our operating revenues essentially flat. Changes in technology have given customers far more flexibility in how they meet their energy needs. To adapt to future business dynamics, TVA continues to identify strategic possibilities to further optimize our generation and transmission system, while ensuring that rates remain as low as feasible.

## Energy Affordability

Rates as low as feasible are part of TVA's mission, and TVA remains committed to serving our customers with affordable electricity. The strategic debt goal adopted in the previous financial plan was predicated on TVA's Board approving modest annual base rate actions of 1.5 percent of the retail rate, as long as rates remained competitive. Those rate actions were approved from FY 2014 through FY 2019 (six years), but TVA's strong financial and operational performance in recent years allowed TVA to forego the FY 2020 rate action, and TVA does not



anticipate any near-term rate actions as being needed. TVA remains committed to providing all customers with stable wholesale rates while also offering long-term partners the opportunity for wholesale credits via the long-term partner proposal.

TVA continues to improve our operating and financial performance, aligning operating and maintenance (O&M) spending with revenues by reducing non-fuel O&M expenses. Similarly, TVA's efforts to further modernize and diversify our portfolio of generating assets have allowed TVA to reduce our annual fuel and purchased power expense by more than \$1 billion. TVA is working to hold cost escalation below inflation levels.

TVA, LPCs, and directly served industries have worked collaboratively in recent years to develop changes to rates that focus on TVA's long-term pricing efforts and the changing needs of consumers in the Tennessee Valley. These changes have improved pricing by better aligning rates with underlying cost drivers and by sending improved pricing signals, while maintaining competitive industrial rates and keeping residential rates affordable.

In August 2018, the TVA Board approved a revenue neutral rate change to become effective October 2018. This change reduced energy rates for Standard Service by \$0.005/kWh while introducing a

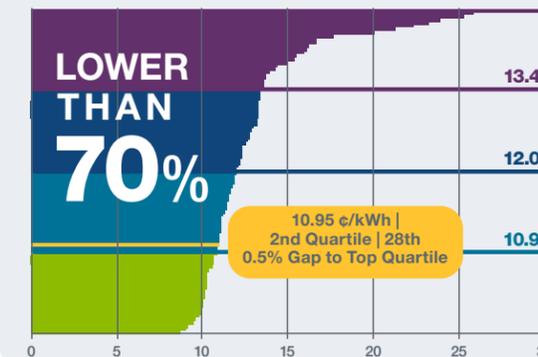
base rate adjustment, called a Grid Access Charge (GAC), at the same rate. The GAC is a flat monthly grid access charge that is set annually based on the Local Power Company's (LPC's) average standard service energy used in the five most recently completed TVA fiscal years. The 2018 rate change better reflects the wholesale cost of energy and recognizes the value of the grid's reliability and associated fixed costs. This modernized approach to pricing provides bill stability while maintaining reliability and fairness for all TVA's customers and future customers.

TVA continues to work with LPCs to provide flexibility to meet future changing needs of consumers. During 2019, TVA implemented a change to the structure of our wholesale electric power rates through pricing that better aligns wholesale rates with the underlying cost to

serve customers. In addition, the TVA Board approved a 20-year partnership agreement option that better aligns the length of LPC contracts with TVA's long-term commitments. In 2019, the TVA Board also approved utility-scale and mid-scale renewable generation options that can facilitate LPCs and TVA to meet customers' demand for renewable energy. Further, TVA issued a request for proposal in April 2019 for up to 200 megawatts of new renewable energy, in response to customer demand. With these proactive solutions, TVA expects

to provide a stable foundation that provides the flexibility to embrace new trends and to continue delivering more innovative energy options.

Residential Rate Competitiveness  
Among Top 100 U.S. Utilities – Dec 2019



## TVA Community Energy Management Programs

TVA is working with local power companies and customers to develop and execute energy programs and services that make life better for the people of the Valley. We offer energy management programs to enable customers, federal agencies, and internal organizations to meet energy-related goals, identify affordable solutions, facilitate public-private partnerships, and leverage best practices. Comprehensive Services Programs are offered in partnership with local power companies to provide engineering services with a goal toward optimizing energy usage.

The TVA EnergyRight® program works to fulfill the TVA mission by providing reliable affordable electricity at rates as low as feasible (Energy), acting as a steward of the Valley's natural resources (Environment), and serving as a catalyst for sustainable economic development (Economic



Development). TVA continues to research and support products and services that benefit TVA's customers in the wise use of energy and manage peaks, as each of these efforts is consistent with TVA's mission of service and keeping rates as low as feasible.

TVA EnergyRight® partners with LPCs to provide products and services that best meet the needs of the Valley through:

- Business and Industry:** Aims to increase energy consciousness by helping businesses and industries optimize and manage their energy usage and meet their sustainability goals. The program provides expert guidance and professional energy evaluation tools to help businesses make the right energy choices while supporting TVA's load optimization goals. In addition, the program works to engage and promote contractors within the Valley through the Preferred Partners Network to provide good resources to Valley businesses.
- Home Uplift:** Helping those with the heaviest energy burden, Home Uplift seeks to create a sustainable, quality program to increase weatherization for low-income families. The program consists of free home upgrades that increase the energy efficiency and comfort of homes and enable low-income families to lower their energy bills. Funded by TVA and strategic partners, Home Uplift has made tremendous improvements to the quality of life for people in the Valley. The program also offers free workshops for residents who may not qualify for the program based on income levels.
- Residential:** Provides confidence, guidance, and reassurance to homeowners in pursuit of their energy goals. The residential program offers a portfolio of tools such as self-audits, home evaluations, and financing to help Valley residents. The Quality Contractor Network also offers consumers a list of professional, qualified contractors to do the work on their home, helping to ensure peace of mind for the homeowner.
- Demand Response:** A key resource for balancing supply with demand at critical times, this program manages the power grid by ramping up power generation at the moment people need it. Demand response adds megawatts to the balance, not by physical power generation plants, but by providing an opportunity for participating consumers to reduce their energy usage when it is needed most. In 2019, more than 1,600 MW of economical capacity was provided while lowering rates for participating customers.

## Clean Energy and our Low-Carbon Future

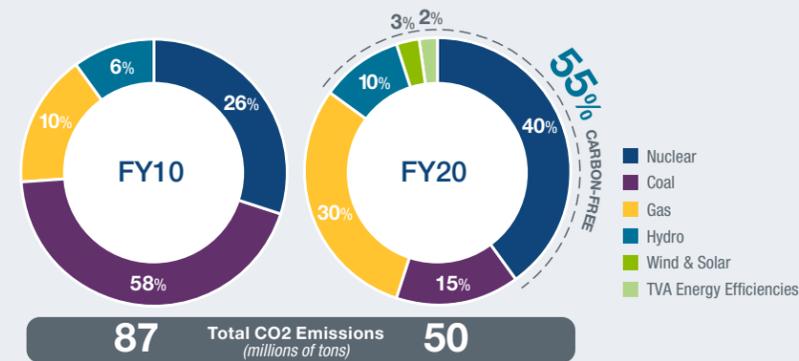
With a focus on reliability, flexibility, and sustainability, TVA is adding cleaner-burning natural gas units so we remain responsive to the Valley's energy needs throughout the year. We have added the 21st century's first new nuclear unit and uprated another to generate more megawatts of low-cost, reliable, carbon-free energy. We are also modernizing our hydroelectric dams to continue to generate clean power. As the price of renewable energy decreases, we continue to offer programs that allow Valley-based businesses and consumers to partner with us to generate solar energy.

TVA's shift toward a more diverse generation mix has led to significant reductions in TVA's carbon emissions rate. Adding nuclear capacity, retiring a number of fossil plants, and adding wind energy to the portfolio has resulted in a

more than 40 percent decline in TVA's carbon emissions rate relative to 2005. Beyond adding or retiring capacity, changes in electricity demand, hydrology, fuel prices, and fleet operations also contribute to fluctuations in the carbon emissions rate over time.

As the energy landscape evolves, consumer demand for access to diverse products and services is increasing, thus creating opportunities for growth in emerging technologies. At TVA, we are flexing our business model to incorporate renewable energy resources, distributed energy resources, and partnerships with the local power companies on renewable projects. As we adapt to future business dynamics, we also are identifying strategic possibilities to further optimize our generation and transmission system.

### TVA Power System Energy, By Source



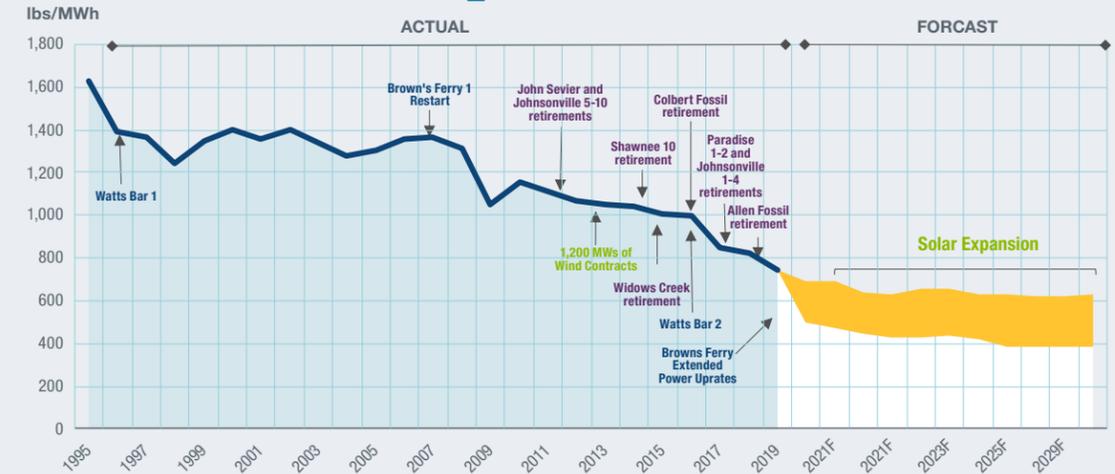
CARBON EMISSIONS RATE IS FORECAST TO APPROACH

# 60%

REDUCTION BY END OF 2020 FROM A 2005 BASELINE

Graphs represent energy. EE includes TVA Energy Efficiency Program impacts on a Net Cumulative Realized at System basis, 2007 base year, and excludes energy efficiency effects from external factors. Purchased power is not represented as a separate percentage, but merged with the other energy source percentages.

### TVA's CO<sub>2</sub> Emissions Rate



\*See Forward-Looking Information in TVA's most recent annual report on Form 10-K and quarterly report on Form 10-Q for a discussion of factors that could cause TVA's actual carbon emissions to differ materially from the estimates included in this slide.

## Renewable Energy

TVA defines renewable energy as energy production that is sustainable and often naturally replenished, such as solar, wind, biomass, geothermal, and hydroelectric. TVA continues to increase our renewable energy portfolio by retiring high-carbon emitting assets, improving existing assets, implementing renewable energy programs, and securing purchased power agreements for wind generation.

For FY 2019, TVA's commitment to renewable energy generation was showcased through more than 6,000 megawatts of contracted or operating renewable energy capacity, including more than 3,700 megawatts of hydropower, 1,100 megawatts of solar, 1,200 megawatts of wind, and 50 megawatts of biomass. We are continuing to grow solar in FY 2020 with several utility-scale solar agreements already signed this fiscal year.

TVA tracks renewable energy commitments and claims, in part, through the management of renewable energy certificates (RECs). This mechanism allows businesses and individuals to purchase RECs through TVA to meet their renewable energy and sustainability goals. TVA offers Green Programs in partnership with LPCs, which makes it easy for end-use consumers to purchase RECs for their personal sustainability goals. Each REC represents one MWh of renewable from wind, solar, biomass, or low-impact hydroelectric renewable purchased power agreements.



**Creating New to the World Solar:** In 2018, TVA developed the framework that led to a groundbreaking new program called Green Invest. Green Invest offers consumers an effective, timely, and cost-competitive solution to meet their sustainability goals. Green Invest is available to local power companies (distributors of TVA power) and consumers across TVA's seven-state service territory (including universities, manufacturing, and business & industry). The program leverages long-term agreements to build new, large-scale renewable energy installations in the Valley through a competitive bid process. This ensures that when businesses choose to partner with TVA, they will receive economical pricing and the support of TVA to execute the deal.

The Green Invest framework was initially created through TVA's work with Facebook and Google, beginning in 2018, to identify new renewable energy for the data centers locating in the region. The Green Invest model has resulted in more than 1,300 MW of contracted utility-scale renewable energy and \$1.6 billion in solar investments, to date.

Within the last year, through Green Invest, Vanderbilt University, Nashville Electric Service (NES), Knoxville Utilities Board (KUB), and General Motors (GM) signed agreements totaling 474 MW of new to the world solar to help meet sustainability goals. Also in this past year, TVA issued a new request for renewable proposals (RFP) seeking new renewable energy projects to support future Green Invest agreements. TVA is committed to meeting the growing demand for consumer-driven renewables in the years to come.



## Grid Reliability and Modernization

In May 2017, the TVA Board authorized up to \$300 million to be spent over the next 10 years, subject to annual budget availability and necessary environmental reviews, to build an enhanced fiber optic network that will better connect TVA's operational assets. Fiber is a vital part of TVA's modern communication infrastructure. The new fiber optic lines will improve the reliability and resiliency of the generation and transmission system while enabling the system to better accommodate DER as they enter the market.

TVA and local power companies are engaged in several initiatives related to grid modernization. Research includes integration of Distributed Energy Resources, analytics for maintenance and management of key transmission assets, and improvements of the grid infrastructure to increase resiliency against cybersecurity attacks and Electromagnetic Pulse events. Grid-connected and behind-the-meter DER is a key change that could affect the reliability and flexibility of the system. TVA is actively working with LPCs to determine architecture and standards requirements to ensure the continuation of reliable, low-cost power for the Valley; and planning ways to satisfy the power and anticipated consumer demands of electric transportation by collaborating with state and local entities to plan new infrastructure. Deployment of



new sensor technologies with new data sources will allow TVA to utilize advanced analytics for asset life-cycle management to ensure reliable operations and minimum outages. Coordinated research in cybersecurity, EMP and GMD impacts, and grid operations technologies will ensure grid resiliency by hardening key assets and systems and creating mitigation plans.

## Solar Power Partnership

TVA has partnered with the East Mississippi Electric Power Association; the Department of Navy; and Silicon Ranch, a solar power company, on a new 6 megawatt solar facility at the Naval Air Station in Meridian, Mississippi. The facility

includes more than 15,000 solar photovoltaic panels that will produce enough energy to power 750 homes.

This solar power site will provide clean, renewable

power to the electric grid at a cost-competitive rate, and it reflects TVA's ongoing commitment to provide clean, local, renewable energy generation as a fully integrated part of the larger power system.



## Resource Planning

At its August 2019 meeting, the TVA Board approved TVA's new Integrated Resource Plan (IRP) and authorized staff to implement the Target Power Supply Mix identified in the final Environmental Impact Statement (EIS) for the IRP. The 2019 IRP will provide direction on how to best meet future electricity demand so that TVA can continue to provide low-cost, reliable electricity, support environmental stewardship, and spur economic development in the Tennessee Valley over the next 20 years.



All portfolios point to a TVA power system that will be LOW-COST, RELIABLE, and CLEAN



TVA will monitor key signposts that will guide decisions in the longer term. Portfolio shifts will be driven by changing market conditions, evolving regulations, and technology advancements.

Resource additions will build on TVA's existing diverse asset portfolio. The IRP provides guideline ranges for potential resource additions or retirements over the next 20 years, with results indicating the following:

- There is a need for new capacity in all scenarios to replace expiring or retiring capacity.
- Solar expansion plays a substantial role in all future scenarios.
- Gas, storage and demand response additions provide reliability and/or flexibility to TVA's system.
- No baseload resources (designed to operate around the clock) are added, highlighting the need for operational flexibility in the resource portfolio.
- Coal retirements may occur in certain futures.
- Energy efficiency levels depend on market depth and cost-competitiveness.
- Wind could play a role if it becomes cost-competitive.
- In all cases, TVA will continue to provide for economic growth in the Tennessee Valley.

## Energy Transformation

Over the past decade, TVA has moved toward a more diverse generation mix (including distributed generation). TVA is ensuring system reliability through transmission system upgrades, expanding the fiber optic network, and investing in new research and technology.

To prepare for the future, TVA is engaging actively in climate change adaptation, proactive regulatory engagement, electric power industry business model change, and customer and community changes. The

effects of electrification, climate change, and customer expectations are challenging TVA to assess core business processes and our commitment as electricity providers in the Valley. We must be willing to transform in this changing landscape. The public and end-users of electricity are interested in more than safe, reliable, and affordable electricity. They are interested in renewable energy options, low carbon content, and focused thought relating to impacts on future generations.

With a focus on sustainability and adaptability, TVA has demonstrated a commitment to providing low-cost, clean, and reliable power.



## Grid Resiliency - Protecting the Grid

With more than 16,700 miles of transmission lines and 510 substations throughout the Tennessee Valley, grid resiliency is an important area of focus for TVA. Grid resiliency refers to the system's ability to quickly recover from—or avoid completely—disruptions such as cybersecurity threats, adverse weather, and atmospheric events.



**CYBERSECURITY THREATS**— TVA has a comprehensive cybersecurity program aligned with applicable regulations, industry requirements, and best practices that operates to predict, protect, detect, and respond to threats. Security controls are integrated into business processes, enabling timely, coordinated, effective, and efficient execution of the program across TVA. Cybersecurity management processes are implemented agency-wide with the goal of being systematic, repeatable, and effective in achieving the strategic security goals of the program.

TVA trains our employees to recognize and resist cyber threats and also adheres to an array of industry and government standards, including NERC Critical Infrastructure Protection (CIP) standards, NRC security requirements, and the Federal Information Security Management Act (FISMA). TVA plans to invest approximately \$60 million to \$80 million in its Cybersecurity program between FY 2020 and FY 2022 to ensure we meet our mission objectives.

**WEATHER EVENTS**— According to the U.S. Department of Energy, weather events such as tornadoes, blizzards, and hurricanes have accounted for more than half of all American outages since 2002. While severe weather may be rarer in the Tennessee Valley than some other regions of the country, high winds, ice, and tornadoes can, and do, affect the grid in our region.

TVA has procedures in place to maintain system reliability following advance notification

of a coming storm by National Oceanic and Atmospheric Administration. These procedures are continually refined as knowledge is enhanced by experience in the field and by industry research, and TVA provides graduated responses to all levels of weather events.

**ATMOSPHERIC EVENTS**— Solar flares peak on an 11-year cycle, though a storm can happen at any time. Currently, we are in a period of low solar activity. If a storm impacts the earth, it can result in very low frequency current in transmission lines, causing geomagnetic induced current. These currents can cause equipment operation interference or even damage. Our geographic location makes us less susceptible than more northern regions; however, TVA experienced some nuisance effects in 2000-2003. TVA has an advanced program to protect our grid against geomagnetic effects, meet all regulatory requirements, and contribute to industry research.

An electromagnetic pulse (EMP) is an instantaneous, intense energy field that can overload or disrupt at a distance numerous electrical systems and microcircuits, which are sensitive to power surges. There are currently no NERC or other regulatory requirements for EMPs, but like other utilities, TVA considers this an emerging concern and works with partners including the U.S. Department of Energy, the Electric Infrastructure Security Council, and Electric Power Research Institute on prevention and recovery issues.





# WE CARE FOR THE VALLEY

We care for our natural and cultural resources, our employees, and the Valley.

## Care

This section provides details on the following:

- Health and Safety
- Environmental Protection
- Regulatory and Consumer Protection
- Employee Experience.

We are investing in our employees, as well as positively affecting the Valley's environment.

Safety is a core value of TVA. We strive to ensure that our facilities are safe for our employees and for the communities we serve as we work to improve our region's quality of life through our programs and partnerships. To ensure community safety, we are working to further strengthen fleet resiliency and reliability, in both our physical and cyber security operations.

## Key Sustainability Issues

As expressed in our Key Sustainability Performance Measures Table, the following topic areas and their associated metrics are extremely important relating to the CARE component:

### Employees:

- Health and Safety,
- Diversity and Inclusion, and
- Education and Career Development.

### Environment:

- Climate Change,
- Coal Combustion Residuals (CCR),
- Environmental Compliance
- Nuclear Waste,
- Waste, and Water Quality.

These topic areas affect our employees, our communities, our current and prospective customers, our investors, and our business success. The energy industry is changing at a rapid pace, and TVA is committed to applying sustainable solutions to the myriad of challenges before us.

We are increasing our use of cleaner energy resources, including solar, natural gas, and other renewable options. Our ability to decrease carbon emissions is helping our customers compete in the marketplace. We are now in the top quartile of regional peers for clean energy generation, achieving more than 50 percent decline in carbon emissions relative to 2005 levels, and we continue to reduce our carbon emissions.

Safety is a core value of TVA. We strive to ensure that our facilities are safe for our employees and for the communities we serve as we work to improve our region's quality of life through our programs and partnerships. To ensure community safety, we are working to further strengthen fleet resiliency and reliability, in both our physical and cyber security operations. Overall, we have always been, and will continue to be, committed to safety, diversity, integrity, respect, honest communication, accountability, teamwork, flexibility, and continuous improvement.

We protect the environment by preserving natural resources and advancing sustainable business practices. Our environmental policy provides objectives for an integrated approach, a vibrant environmental management system, and effective environmental performance. From 1970 to 2019, TVA spent approximately \$6.8 billion on controls to reduce emissions from its coal-fired power plants. In addition, TVA has reduced emissions by idling or retiring some coal-fired units and relying more on cleaner energy resources.

## Health and Safety

At TVA, we are creating a proactive safety culture where we learn from both success and deficiencies to continuously improve. As a result, TVA has seen a consistent decline in injuries for the last seven years and has achieved industry top decile performance in safety for the fifth consecutive year.

The Occupational Health and Safety Administration provides regulatory safety program requirements for federal agencies in 29 CFR 1960, "Basic Program Elements for Federal Employee Occupational Safety and Health Program and Related Matters." TVA establishes TVA's health and safety policy to meet regulatory requirements and to provide a safe and healthful workplace.

TVA's Safety Program is based on the fundamentals of a safety management system, which includes management commitment, employee engagement, hazard recognition and control, worksite analysis, contractor safety management, training, and review and continuous improvement. TVA Safety Procedures provide standardized TVA safety management practices and

other agency-wide requirements for all organizations. TVA Safety Processes and Procedures are found in the TVA Safe Work Requirements Manual (SWRM). The SWRM provides a ready reference to guide managers and employees in the safe and healthful performance of work.

Employee engagement is critical to the success of our program. TVA's four Vital Safety Behaviors are employee driven, and developed with the collaboration of represented employees, union leadership, and management to improve safety behaviors. These four behaviors are:

1. Identify hazards before every task,
2. Take action to remove hazards and reduce risk,
3. Protect yourself and others; intervene when necessary,
4. Take pride in safety and be involved.



1. Identify hazards before every task



2. Take action to remove hazards and reduce risk



3. Protect yourself and others; intervene when necessary



4. Take pride in safety and be involved

TVA maintains one agency level health and safety committee and 31 site or regional level committees. The committees are comprised of management and non-management employees. Participation is voluntary and highly encouraged.

Our safety program has embraced continuous improvement, and has allowed us to always strive to get better. The following examples highlight our improvements:

- **Motor Vehicle Safety:** TVA employees drive more than 37 million miles a year in TVA fleet vehicles alone. Today, our employees and contractors can use enterprise software to electronically report and monitor vehicle safety performance, address adverse trends, and share key learnings across the agency.
- **Safety Dashboard:** TVA made the decision to improve tracking of leading indicators such as good catches, near misses, observations, and safety audits. With the ability to more effectively process data, TVA is now able to identify and correct negative trends, implement corrective actions, monitor safety statistics, target opportunities for improvement, and identify areas that are at risk.
- **Medical and Health Services:** TVA has 15 medical facilities and a mobile health clinic that provide occupational health services across the Valley. TVA has a Disability Accommodation Program that provides consultation to identify appropriate reasonable accommodations for employees' work stations.

Audits and assessments are a key component of continuous improvement, and in overseeing TVA's safety and health program. The Office of the Inspector General regularly audits components of TVA's safety program. TVA's internal auditing group and the Corporate Safety group regularly assesses components of the program. As a federal agency, TVA is required to complete regulatory compliance inspections of its facilities on an annual basis. Approximately 4,725 unannounced inspections and 176 announced regulatory compliance inspections were completed internally in calendar year 2019.

As part of our safety program, our employees receive training on how to work safely and participate in our network of Health and Safety committees. TVA's Technical Training department is responsible for over 140 safety and health courses, most of which are internally developed and instructed. Employee involvement, training, and continuous improvement are important for all parts of our company, and are highlighted below through our Nuclear and Dam safety programs.

### Nuclear safety

Our nuclear plants have multiple safety systems in place to keep our workforce and the communities we serve safe. Safety systems include physical barriers that protect against radiation release, and layer upon layer of redundant and diverse back-up power systems to keep reactors sufficiently cooled—even in the most extreme or unlikely of events.

Our plants operate with oversight by the U.S. Nuclear Regulatory Commission (NRC), which has inspectors physically stationed at each site. After the event at Fukushima in Japan, the NRC required all nuclear plants to install additional backup safety equipment, known as FLEX, to protect plants from even more extreme events—including "stacked" events during which one disaster follows another. In 2014, the industry opened national response centers in Memphis, Tennessee, and Phoenix, Arizona, that can deliver additional safety equipment and resources to any U.S. nuclear power plant within 24 hours.



### Dam safety

TVA Dam Safety teams protect lives and property by helping to ensure that our dams are designed, constructed, operated, and maintained for safety and reliability. TVA operates river dams at 49 sites, 29 of which generate hydroelectric power. But the Dam Safety responsibility goes well beyond these traditional river dams to also include coal ash storage sites, levees, and more—up to 142 structures in all. Of these, 121 are listed on the National Inventory of Dams.

TVA has established a multi-year Dam Safety Assurance Program to reduce the risk of an event; improve safety and preservation of the dams and assets; improve and update dam design basis; and ensure compliance with TVA Dam Safety standards and procedures.

As a result, TVA dams operate to safely deliver flood control, navigation, power generation, water supply, recreation, and water quality. TVA invests in its dams through maintenance, inspections, and upgrades to make them even better able to protect people and property during extreme events. TVA has invested more than \$400 million in dam safety projects since 2010. One example is the Boone Dam in northeastern Tennessee. TVA's Boone Dam Internal Erosion Remediation Project was named

the 2019 Outstanding Environmental and Engineering Geologic Project by the Association of Environmental and Engineering Geologists.

Additionally, TVA installed warning systems at dams to warn reservoir users of potential dangers of increased downstream flow of water. TVA has installed horns, strobe lights, warning signs, and electronic spillway signs with strobe lights and horns. TVA's Lake Level app receives



more than 7 million visits annually and can be a useful tool to share information about rising water levels in the Tennessee River system. Usage soared in February 2019 during the flooding, and on February 24, the app received over 82,000 visits and the Lake Level webpage more than 71,000 visits.

As an overall company performance measure, TVA measures recordable injury rate (RIR), which is an OSHA metric. Current RIR data versus industry top decile for the last seven years are reflected in the chart below.

TVA remains committed to dedicating the resources necessary to ensure our employees can perform work safely in an environment free from recognized hazards. TVA's comprehensive safety program has allowed us to develop the tools necessary to ensure employees go home safe to their families.

## Environmental Protection

### Environmental Strategy and Policy

TVA's Environmental Policy states the following:

"TVA improves quality of life and the environment in the Tennessee Valley by providing reliable, affordable and increasingly clean energy; engaging in proactive stewardship of the TN River system and public lands; and supporting sustainable economic growth."

"We comply with applicable environmental laws, regulations, and commitments. We maintain an Environmental Management System (EMS) that fosters continuous improvement in our proactive stewardship and in reducing our environmental footprint."

The Environmental Policy directs TVA to have an effective Environmental Management System. An effective Environmental Management System identifies and manages risk to continually improve performance and assure compliance. TVA's EMS follows a plan-do-check-act model, and it uses the tenets from ISO 14001 as the basic structure. TVA's Environmental Management System begins with an alignment to strategy and policy. TVA's EMS Procedure (TVA-SPP-05.0) follows the written structure of the ISO 14001 model. The standard process and procedure (SPP) identifies roles within TVA, responsible for various aspects of the EMS.

TVA is working to ensure the following EMS components are firmly in place:

- Procedures are designed to remove inefficiencies, with the intent to establish appropriate benchmarks and perform effective cost/benefit analyses.
- Audit reports and risk reports are performed periodically per plan.
- Metrics are aligned to key business processes and performance goals.
- Management review is systematic, and demonstrates an ability to align with company risk mitigation.

Our EMS roadmap lays out a process-oriented, three-year action plan to drive further improvement throughout the company. The action plan includes addressing key sustainability processes as well as environmental corporate and site compliance oriented processes.

TVA's actions and activities, particularly our power generation activities, are subject to comprehensive regulation under environmental laws and regulations relating to air pollution, water pollution, management and disposal of solid and hazardous wastes, resource protection, among other issues.

## Environmental Reviews

TVA conducts environmental reviews in accordance with the National Environmental Policy Act (NEPA), which requires federal agencies to consider the effects of their proposed projects and programs on the human and natural environment before final decisions are made. Environmental reviews under NEPA typically also include assessments that facilitate compliance with other environmental review requirements, such as those under the National Historic Preservation Act and the Endangered Species Act.



At TVA, we maintain our Climate Change Resiliency and Adaptation Plan as a cohesive part of our major planning processes, which include integrated resource management, natural resource, and NEPA planning as well as Reservoir Management Plans and Shoreline Management Policy. It describes the climate adaptation and resiliency programs, policies, processes, and plans that TVA already has in place, as well as information about our progress on additional projects that help manage climate risks and build resilience in the short and long term. Climate change adaptation planning allows TVA to identify possible impacts to mission achievement, assess potential consequences and our ability to mitigate climate change, develop adaptation planning actions, ensure resources are invested wisely, and support the federal government's leadership role in sustainability.

TVA continues to ensure that climate change adaptation is consistent with the current National Climate Assessment and that it is integrated into both agency-wide and regional planning efforts in coordination with other federal agencies, state and local partners, tribal governments, and private stakeholders.

TVA is one of 18 electric utilities participating in DOE's Partnership for Energy Sector Climate Resiliency. This partnership is an initiative to enhance U.S. energy security by improving the resiliency of energy infrastructure to extreme weather and climate change impacts. TVA, as part of our participation, updated our existing High Level Vulnerability Assessment and Resiliency and Adaptation Plan to also meet DOE partnership industry guidance.

We are continuing our Sentinel Monitoring program, which collects biological, chemical, and physical data in each of the five predominant eco-regions in the Tennessee Valley. The goal of the program is to assess potential biological, ecological, and hydrological responses of aquatic ecosystems related to climate change.



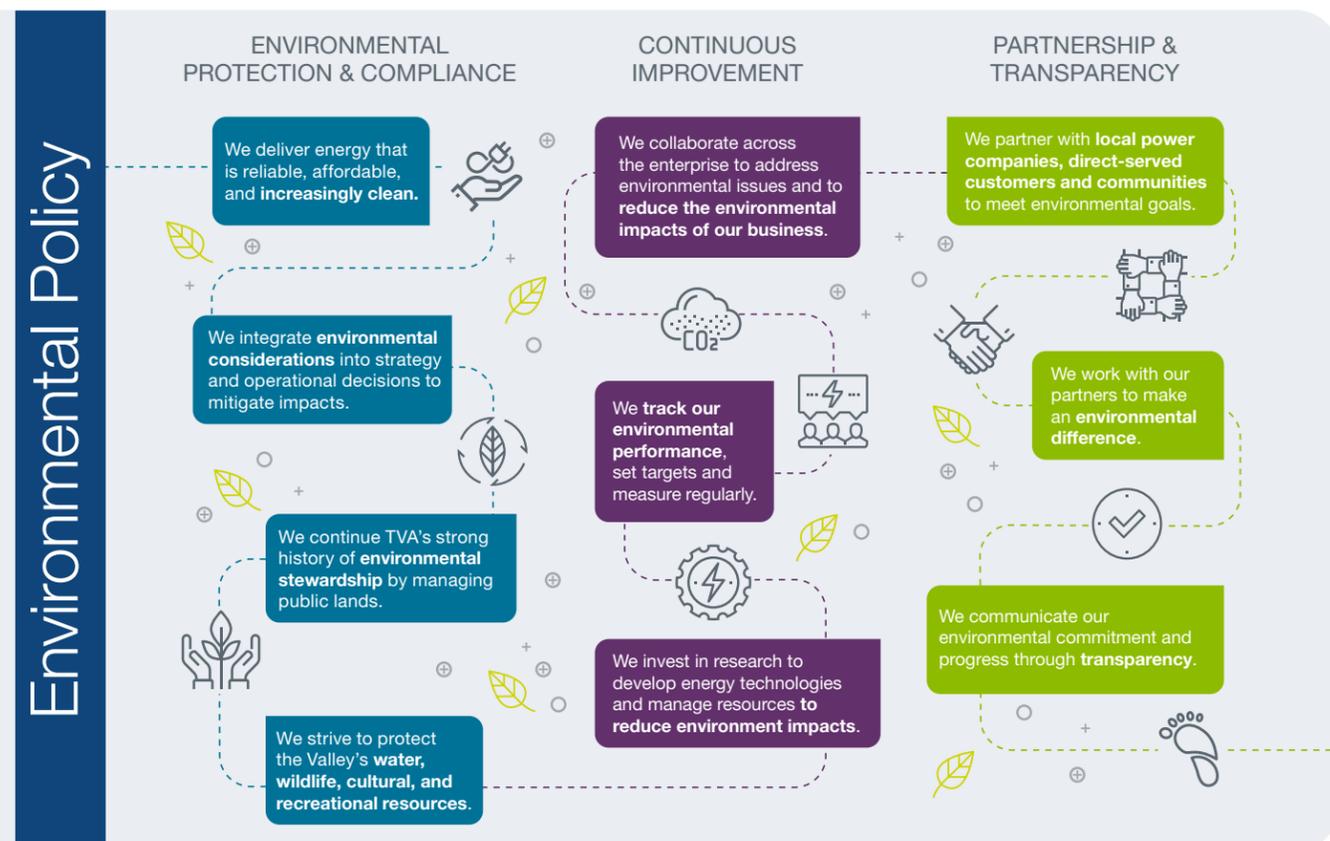
## Climate Resiliency

TVA is in the top quartile among regional peers for clean energy generation, and the proportion of clean sources to total generation is steadily increasing. In fiscal year 2019, 54 percent of TVA electricity was carbon-free. We have several key programs and initiatives that support our sustainability strategy, such as our Climate Change Resiliency and Adaptation Plan, which guides TVA's planning process to include a long-range view of climate impacts on TVA's system.

## Carbon Awards and Support

TVA currently offers two awards for both directly served customers and LPC-served businesses to commemorate their accomplishments on environmental excellence in the Valley: 1) Leadership Circle – for those achieving the lowest emission rates in a year; and 2) Most Improved – for those with the most year-over-year carbon emission improvement.

We also continue to expand our groundbreaking methodology on consumer carbon calculations. TVA currently calculates CO2 rates for certain consumers based on actual hourly electric consumption profiles. We calculate more than 700 specialized carbon rates.



### Air Emissions

TVA has one of the most aggressive clean air control programs in the country. Our activities, particularly our power-generation activities, are subject to comprehensive regulation under environmental laws and regulations. TVA improves regional air quality through emission controls on existing generation and through adopting cleaner energy options. We are:

- Employing air-emission reduction equipment at our coal-fired plants;
- Retiring some coal plants; and
- Considering air quality as a critical component in future capacity-planning decisions.



From 1970 to 2019, TVA spent approximately \$6.8 billion on controls to reduce emissions from our coal-fired power plants. In addition, TVA has reduced emissions by idling or retiring some coal-fired units and relying more on cleaner energy resources.

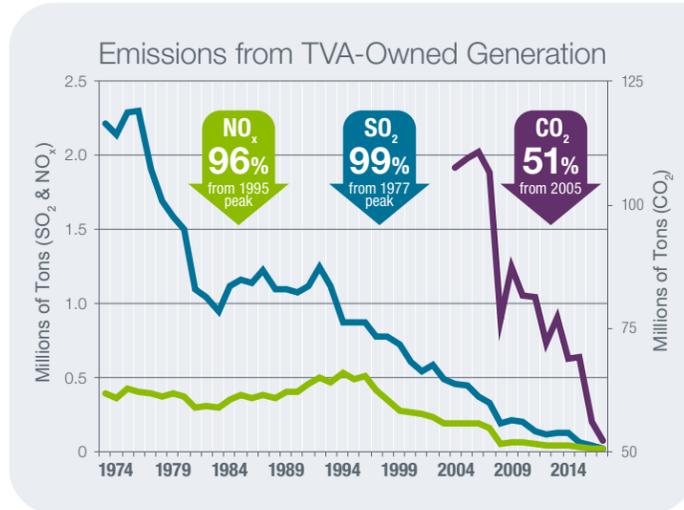
Emissions from all TVA-owned and operated units (including small combustion turbine units of less than 25 megawatts) have been reduced from historic peaks. Emissions of nitrogen oxide (NOx) have been reduced by 96 percent below peak CY 1995 levels and emissions of sulfur dioxide (SO2) have been reduced by 99 percent below CY 1977 levels through CY 2018.

For CY 2019, TVA's emission of carbon dioxide (CO2) from our sources was 47 million tons, a 55 percent reduction from 2005 levels. This amount includes 2,383 tons from units rated at less than 25 megawatts. To remain consistent and to align with the EPA's reporting requirements, TVA intends to continue reporting CO2 emissions on a calendar year basis. Read more about air quality at [tva.gov](http://tva.gov).

### Waste and Chemical Management

At TVA, we take social responsibility seriously. We are dedicated to ensuring safe, long-term storage and sustainable management of the waste produced by our operations. We are reducing our waste footprint at all TVA facilities by decreasing waste generation and improving recycling.

We are also recycling coal combustion waste. In 2009, TVA launched a coal ash management program to convert coal combustion residuals from wet impoundments to dry systems (lined landfills). This conversion program provides for closure of all TVA



wet coal ash handling units. This process of moving to dry coal combustion residuals (CCR) storage greatly reduces the possibility of impacts to groundwater. Many CCR impoundments have already been dried, closed, and capped, and TVA expects to see improving trends in groundwater quality at the sites where effects have been observed. Each site under the CCR Rule is also undergoing evaluation to choose the best method for closure.

In 2019, the EPA issued proposed rules to amend portions of the CCR Rule regarding beneficial use, temporary piles, and public access to information and revise portions of the CCR Rule requiring closure of unlined surface impoundments. TVA is committed to protecting human health, caring for the environment, and complying with all applicable environmental regulations while safely managing our operations.

TVA's nuclear operations produce various types of nuclear waste materials, including spent fuel. TVA has been storing the spent fuel in accordance with NRC regulations in anticipation that a final storage site for all such waste will be developed and put in operation by the U.S. government. If no such site is forthcoming or if no alternative disposal or reuse plan is developed, then TVA might be required to arrange for the safe and permanent disposal of the spent fuel itself.

TVA has dedicated staff that manage environmental operating permits for solid waste, landfills, and other waste management activities. Additionally, staff coordinates and supports the environmental compliance activities associated with hazardous and solid waste, PCBs, asbestos, and other waste for all operating facilities and sites in a manner that protects human health; supporting self-assessments and audits for operating facilities; and developing and maintaining compliance procedures.

### River Management

#### River Management Climate Change Impact Assessment:

TVA works to assess the possible climate impacts on the Tennessee River system, utilizing national climate data. For example, the National Climate Assessment (NCA5) will be sampled to adjust TVA's long-term temperature and precipitation records to appropriately reflect the potential future climate. These adjusted forcings will then be run through a long continuous simulation and series of short flood simulations. The river system inflows, river flows and reservoir operations will be modeled to create a realistic picture of the future river. Changes to TVA's key river management objectives will be tabulated for key sites. These objectives are flood risk reduction, river navigation, hydroelectric power production, water supply, water quality, and recreation.

**Water Reliability Assessment:** TVA is testing the resilience of our reservoir system in the face of extreme droughts. We are sponsoring the University of Tennessee to create an approximately 600-year reconstruction of rainfall within our watershed based on tree ring analysis. This historical reconstruction will test the resilience of our policies and intake equipment against the largest historical droughts that we can find. TVA will use this information to help us increase the resilience of both our reservoir operations and the operations of the water utilities and industries that rely on us for water.

Read more about Coal Combustion Residuals and about the Toxics Release Inventory online at:

[Coal Combustion Residuals and Toxics Release Inventory](#) and [The EPA: What is the Toxics Release Inventory?](#) (EPA website).

Testing the system against extended droughts will help TVA prepare appropriately should climate change lead to such a drought.

**Mega-Flood Study:** TVA is utilizing a state-of-the-art stochastic flood event model to create thousands of realistic extreme floods. These floods are routed through TVA's reservoir operation model to determine the effect they would have on TVA's infrastructure as well as other infrastructure built near the river. Statistical techniques built into the software allow us to understand the likelihood of these events, as well as the magnitude. This information is much richer than the information that TVA has utilized in the past, and is allowing TVA to improve decisions on where and how to invest to reduce flood risk the most. We are improving our flood resilience, which will be a valuable climate change adaptation, should floods increase in the future.

#### Preparing to Balance Intermittent Renewables:

TVA is beginning to study how the hydroelectric fleet mission must change in order to balance the influx of non-dispatchable renewables like wind and solar. The hydroelectric fleet is likely to be called on for quick ramping to balance the intermittent nature of these new asset types. The impact of this new hydroelectric fleet mission may be significant, and TVA is beginning to study the costs, benefits, and impacts of such a hydroelectric fleet mission change.

## Water Quality

Tennessee River watershed is one of the most biologically diverse watersheds in North America. It is home to over 240 fish species and over 75 species of mussels. TVA monitors conditions in Valley waterways and supports a broad range of initiatives to preserve these precious resources.

Each year, TVA collects, stores, and analyzes data about the ecological health of streams and tributaries from approximately 130 locations within the Tennessee Valley. TVA also monitors ecological conditions at 69 sites on 31 reservoirs on the Tennessee River system to provide information on the health or integrity of Tennessee Valley reservoirs. TVA also monitors water quality aquatic life around our dams and other facilities to ensure compliance with applicable laws and regulations. This data is used to monitor conditions that could affect the Valley's water resources and TVA's operations. The information accrued is crucial for decision-making by water resource managers throughout TVA and can be shared with stakeholders to facilitate increased awareness of water resource conditions.

Since the early 1990s, TVA has spent more than \$60 million to improve dissolved oxygen levels in tailwaters by pulsing releases from our dams and installing innovative technologies at release points. To ensure the required dissolved oxygen levels and river flows below the dams are maintained, TVA conducts annual water quality and aquatic life assessments below our dams and in the reservoirs. As with the stream monitoring, reservoir monitoring provides vital information for TVA operations and compliance needs. TVA's monitoring efforts integrate stewardship and compliance monitoring needs to support a variety of functions and issues related to environmental compliance, pollution prevention and control, economic development, and partnerships with our stakeholders.

To protect the water resources, water quantity must be managed effectively. That means balancing power production and navigational, industrial, agricultural, and basic human needs—all to ensure there is a sufficient water supply for every circumstance, including drought conditions.

TVA protects the region's drinking water by ensuring that reservoir levels stay above municipal and industrial intake structures along the river system and by monitoring river temperatures to prevent algae growth from causing problems with taste and odor. Special reservoir operations are conducted as necessary to assist local water suppliers in dealing with accidental releases of contaminants that sometimes take place. Read more about water quality at TVA.



## Biological Compliance

As a federal agency, TVA complies with laws, regulations, executive orders, and policies. Through our biological compliance efforts, TVA provides consultation, guidance, and oversight in the application of biological review requirements for proposed TVA actions. Biological Compliance supplies biological data and recommendations to help guide effective conservation and land planning activities and to ensure TVA's compliance with National Environmental Policy Act (NEPA), the Endangered Species Act (ESA), wetland regulations in the Clean Water Act, Executive Orders and other federal and state legislation.

As part of its compliance program, TVA monitors plant and animal species on its federal lands, and maintains and shares its data to support other agencies. Identifying these valuable resources throughout the Valley and providing for their protection supports TVA's Environmental Policy and helps ensure the Valley's resources will be preserved for future generations.

## Cultural Compliance

TVA is responsible for compliance with the National Historic Preservation Act (NHPA), the Archaeological Resources Protection Act, the Native American Graves Protection and Repatriation Act, and numerous other laws, regulations, and executive orders and memoranda. These laws require us to identify, manage, and protect archaeological and historic sites, historic buildings and structures, and Native American resources on TVA land

as well as those impacted by TVA actions. Any project, permit, license, or other TVA approval is reviewed for impacts to these resources and, when necessary, mitigated through a consultation process outlined in Section 106 of the NHPA.

We are responsible for protecting more than 11,500 archaeological sites on over 293,000 acres of land and 470,000 acres of inundated land. In addition, TVA manages a number of historically and architecturally significant buildings and structures, including our 29 hydroelectric dams. We consult with more than 20 federally recognized Indian tribes that have a religious and cultural interest in the Tennessee Valley. Cultural resource protection of Native American archaeological sites and traditional cultural properties on land that was once their native homelands is important. These tribes play an invaluable and active role in the management of these significant resources.

## Rights of Indigenous Peoples

TVA recognizes the unique legal relationship with federally recognized Indian tribes (Tribes) set forth in the Constitution of the United States, treaties, statutes, and court decisions. As a federal agency, TVA is committed to work with Tribes in a government-to-government relationship, respecting tribal sovereignty and self-determination. The government-to-government relationship requires consultation between appropriate Tribal Officials and TVA officials. TVA acknowledges that Tribes possess traditional knowledge and a special expertise in regards to both natural and cultural resources located in the Tennessee Valley. Tribal knowledge and expertise play a vital role in TVA's identification and

evaluation efforts, preservation and management of cultural resources.

More than 20 Tribes have identified an interest in the Tennessee Valley and TVA programs and undertakings as they pertain to the American Indian Religious Freedom Act, Archaeological Resources Protection Act, Native American Graves Protection and Repatriation Act, National Historic Preservation Act and other laws, executive orders and Presidential memos. TVA is devoted to maintaining relationships with sovereign tribal nations and maintains open communication with Tribes. In addition to the typical Section 106, NAGPRA and ARPA consultation letters and project meetings, TVA has established a recurring monthly call to provide a venue for Tribes to discuss projects together and provide feedback on TVA's program activities and undertakings. Annually, TVA holds a weeklong face-to-face Tribal Consultation Meeting.

As most Tribes who have an interest in the Tennessee Valley have been removed and no longer reside in this area, TVA works to provide opportunities for Tribes to come back to their ancestral homelands when possible. TVA utilizes Tribal speakers at outreach and public events in order for people of the Tennessee Valley to hear the Tribal perspective and learn about the people who once inhabited this area. TVA also brings Tribes to the Tennessee Valley to obtain feedback and guidance from them on sacred sites or potential traditional cultural properties. Field schools, conducted by TVA for tribal representatives in conjunction with surveys, provide opportunities for tribes to gain archaeological experience while visiting their ancestral homeland.



## Regulatory and Consumer Protection

TVA is unique in that not only do we set the wholesale rates (rates charged to LPCs and directly served customers), but we also regulate the retail rates most of our LPC partners charge their customers. TVA balances our regulatory responsibility and oversight with LPC local control. When an LPC's customer pays their electric bill, a portion of that charge is paid to TVA for generating and supplying the power to the LPC, and a portion of the bill goes to the LPC for distributing the power to them. Any changes that an LPC wishes to make to its retail rate or rate structure must be formally submitted to TVA for review and approval using the Local Rate Adjustment process.

TVA also ensures each LPC adheres to the agreed upon rates as well as their published service policies and procedures. TVA provides guidelines for handling over or under billings, classification of customers, and other policy issues. TVA seeks to verify that rates are as low as feasible and to ensure everyone is treated fairly.

One of the key areas of TVA's regulatory focus is designed to ensure electric system assets and funds are used for the benefit of the electric system and its customers. TVA's wholesale power contract prohibits the use of electric system funds or assets for non-electric purposes in order to protect customers from the risks associated with non-electric business ventures. In 2019, the TVA Board took an action to provide local power companies with options in financing investments to support their retail broadband. This work also supports LPC distribution grid modernization. TVA continues to maintain oversight to help ensure electric system operations do not subsidize other utility functions.

## Employee Experience

TVA employs about 10,000 people in the Tennessee Valley and is dedicated to keeping them inspired and empowered toward achieving our primary mission of service. Our employees share common core values and strategic objectives, whether they work in nuclear engineering, transmission, communication, river operations, information technology, hydroelectric power, or others. The TVA values are the fundamental beliefs that guide our actions, our behaviors and our decisions as a company. The competencies are the corresponding behaviors expected of all TVA employees. TVA's core competencies are accountability and driving for results, continuous improvement, leveraging diversity, adaptability, and effective communication.

TVA is committed to a culture of innovation, continuous improvement, and inclusion. TVA employee competencies are observable, measurable, and coachable behaviors

that are expected of all TVA employees. By exemplifying the competencies, in the spirit of our values, we can successfully meet our goals and strategic imperatives to achieve our mission of service.

## Powered By People You Know

TVA was founded on the belief that respect for the individual is the key to success, and we thrive on diversity—of people, talents, and ideas. Our “Powered By People You Know” series is a good way to meet TVA employees and learn about some of the fascinating ways they serve the Tennessee Valley through their work in energy, environmental stewardship, and economic development. Learn more from [TVA's Powered by People You Know](#).

## Non-discrimination

TVA provides equal opportunity in employment to all employees and applicants; and prohibits discrimination because of race, color, religion, sex (i.e. pregnancy, gender identity, or sexual orientation), national origin, age (40 and over), mental and/or physical disability, genetic information, and reprisal.

## Human Rights Assessment

In order to identify, prevent, and mitigate negative human rights impacts, TVA has in the past performed employee impact assessments of its operations. TVA has implemented specialized training that equips employees to address human rights in the course of their regular work.

## Child Labor and Forced or Compulsory Labor

TVA abides by federal laws and guidelines to address the topic of child labor. TVA abides by the expectation of an organization to prevent the use of child labor within its activities. TVA also abides by federal laws pertaining to forced or compulsory labor. TVA governs and passes these expectations through its relationships with others (e.g., suppliers, clients).

## Labor and Management Relations

All of TVA's collective bargaining agreements have specific terms for timeframes in which negotiations are to occur, notice periods to open/amend agreements, and Article of Agreement and Supplementary Schedules/Agreements that provide for direction regarding bargaining processes.



## Freedom of Association and Collection Bargaining

TVA's first Board of Directors established the Employee Relationship Policy dated August 28, 1935. Under this policy, employees have the right to organize, select their own labor organization, and bargain collectively. The Employee Relationship Policy established that rates of pay for laborers and mechanics, "...whether hourly or annual ...will be open for revision not more often than once each calendar year..." This policy has been recognized since its inception and remains in place today.

## Benefits

To care for the well-being of employees and their families, we offer quality healthcare, insurance and retirement benefits, along with a great quality of life. TVARS, our retirement system, has been recognized by PLAN SPONSOR Best-in-Class 401(k). Family benefits include flexible work schedule, reduced hours when needed, dependent care flex spending account, scholarships for dependents of employees, HealthCheck Wellness incentive, and confidential employee assistance. Other benefits include parking and public transportation reimbursement; discounts on name-brand computers, banking services and more; generous holiday and leave time; tuition reimbursement; and training and education opportunities.

## Learning and Development

As TVA continues to adapt to the evolving demands of the industry, it is imperative that we cultivate a work environment that fosters the attributes and capabilities of an interconnected workforce.

Individuals can do more than just work at TVA; they can start a career. We offer entry-level career opportunities with competitive compensation, and entry-level training programs to launch careers such as operator, technician, electrician, lineman, instrument mechanic, and more.

We also offer career opportunities and training for military veterans, college students, and recent graduates. Employee Development involves individual learning-ability, team learning, career pathing (including rotational development), and mentoring.

In 2018 and 2019, TVA was recognized by Chief Learning Officer magazine with the Learning Elite Silver Award for our learning and development programs.

## Diversity and Inclusion

At TVA, we are powered by people—and we are enriched by the diversity of a talented, highly skilled workforce made up of people from all backgrounds. We achieve this by ensuring that all qualified candidates receive consideration for open jobs at TVA and that all employees are encouraged, engaged, and empowered to contribute 100 percent of their talents, 100 percent of the time.

TVA has been recognized as a Top Military Friendly employer for the past five years by GI Jobs magazine. In 2019, TVA was a recipient of five awards by the Society of Asian Scientist and Engineers (SASE), including Government Organization of the Year. TVA was also recognized by the National Organization on Disability as a 2019 Leading Employer.

Each and every day, TVA is responsible for making life better in the Valley. We value diversity because it makes us stronger. We actively recruit employees of all races, colors, sexual orientations, ethnicities, genders, abilities, religions, and ages. TVA's Employee Resource Groups support and empower diverse internal cultures. The groups include TVA & Amigos, ABLED, ACTion, African American Voices, Women Empowered, New Employee Network, Ignite, TVA-Veterans Association, and Spectrum. For full descriptions of the Employee Resource Groups, please visit: [TVA's Employee Resource Groups](#).

# WE INVEST IN THE VALLEY

We invest in the Valley—through quality job creation; a competitive, diverse supplier base; and growing out investment in future technologies.

## Invest

This section provides details on the following:

- Economic Development
- Sustainable Supply Chain
- Advancing Technology and Innovation.

### Key Sustainability Issues

As expressed in our Key Sustainability Performance Measures Table, the following topic areas and their associated metrics are extremely important relating to the INVEST component:

- Assets and Operations,
- Climate Change,
- Electricity Affordability,
- Reliability and Resiliency,
- Supply Chain, and
- Transparency.

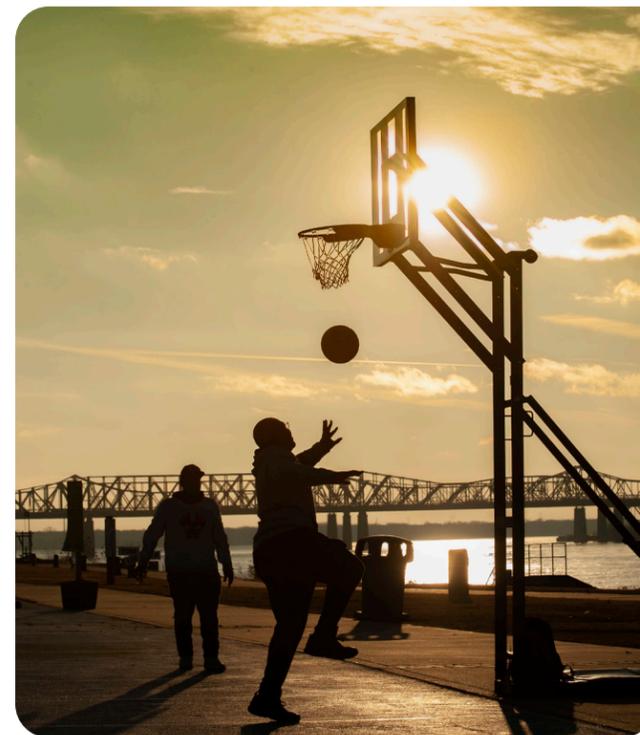
These topic areas impact our communities, our supply chain, our prospective customers, our investors, and our business success.

With the signing of the TVA Act in 1933, Congress charged TVA with ensuring the economic, environmental, and social well-being of the people of the Valley. Today, we continue to uphold those values as we work to attract and retain quality jobs for the people and businesses in the communities served by TVA.

The vitality and prosperity of Valley communities depends on job growth and financial strength. TVA's financial strength helps us continue to invest in the asset base, without undue reliance on new debt, which in turn keeps rates low and reduces risks to our local power companies



and to the people of the Valley. In addition to keeping rates as low as feasible, TVA ensures that the power we produce is distributed throughout the Tennessee Valley, helping to modernize rural communities by providing access to clean, reliable, affordable energy.



## Economic Development and Community

TVA's partnerships with customers and communities have helped create quality jobs and attract significant capital investments from new and existing companies.

Economic development is one of the three primary purposes of TVA, along with energy and environmental stewardship. TVA works with LPCs; regional, state, and local agencies; and communities to showcase the advantages available to businesses that locate or expand in the TVA service area. TVA's primary economic development goals are to recruit major business operations to the Tennessee Valley, encourage the location and expansion of companies that provide quality jobs, and prepare communities in the Tennessee Valley for economic growth. TVA seeks to meet these goals through a combination of initiatives and partnerships designed to provide program support, technical services, industry expertise, financial assistance, and site-selection assistance to new and existing businesses.

TVA's innovative economic development programs and services combine to create effective tools for sustainable economic development. These programs and services include, but are not limited to, the following:

- **Recruiting Services:** TVA works with LPCs and their customers and local, state, and regional economic development organizations to recruit companies through an integrated package of economic development resources.



- **Regional Development:** TVA assigns a regional development specialist with economic development expertise to serve counties in a specific area to help create and sustain job growth.
- **Community Preparedness:** TVA helps communities increase their competitiveness in attracting investment and creating jobs by delivering resources and training to local community leaders.
- **Rural Initiative Strategy:** TVA helps rural communities develop and better market their sites and buildings to prospective companies. TVA also offers leadership development, planning, and project assistance.
- **Research:** TVA provides economic and market research to help build the business case for the location and expansion of companies and prepare communities for future growth opportunities.
- **Business Development Support:** An array of products and services is designed to meet the needs of prospective or existing industries. These include financial support and industry consulting services. This work provides vision to businesses for locating and being successful in the Tennessee Valley.
- **Technical Services:** TVA offers general engineering design services to help industrial prospects make sound location decisions and to help communities market themselves for prospects and growth.

## Investment and Economic Development

Since 1941, TVA has paid more than \$14 billion in tax equivalent payments, with payments in the past 10 years totaling more than \$5 billion. In 2019, TVA provided over \$541 million in tax equivalent payments to state and local governments where it sells electricity or has power properties. TVA pays tax equivalent payments annually to the eight states where it sells electricity or owns generating plants, transmission lines, substations or other power assets, and directly to 147 county governments where TVA owns power properties that were previously privately owned and operated and subject to ad valorem taxes.

State and local governments distribute the funds according to their own formulas and discretion to support a variety of initiatives, including schools, fire departments and other emergency response agencies, tourism and recreation, and human service organizations.

**Local, Regional, and State Partnerships:** TVA conducts economic development efforts in partnership with private and public organizations, including local, regional, and state agencies. This serves the needs of TVA stakeholders through regional economic development, which contributes to a better quality of life for Tennessee Valley residents. TVA's innovative programs and services combine to create effective tools for sustainable economic development.

TVA Economic Development efforts also foster capital investment and job growth in the seven states that make up the TVA service area. Working in concert with our partners, we offer site selection services, incentives, research, and technical assistance to help companies

locate, stay, and expand existing operations in the Valley. Environmental sustainability continues to be one of the most important factors when a company chooses to invest in or relocate to a community. TVA's mission is to serve Valley communities

### For Investors

Investment in TVA supports electricity, environmental stewardship, and economic development in the Tennessee Valley.

<https://www.tva.gov/Investors>

by helping them showcase their strengths, including their sustainability efforts.

In 2019, TVA's economic development efforts helped recruit or expand 215 companies within the TVA service area. These companies announced capital investments of more than \$8.9 billion and the expected creation and/or retention of approximately 66,500 jobs.



Over the last few years, TVA in partnership with Valley businesses, communities, and municipalities have attracted leading-edge companies.

Google, an innovative global technology company with a mission to organize the world's information and make it universally accessible and useful, chose TVA's Widows Creek retired coal plant in Stevenson, Ala., to build a data center—the 14th across the globe. The company conducted a very competitive, multi-state site search and will invest approximately \$600 million to build its data center and bring in renewable power through the site's robust infrastructure system to power the facility. This is the company's first time to repurpose a coal plant as a data center location.

In 2019, Google also announced plans to locate a second data center site in Clarksville, Tenn. Located on one of TVA's Certified Megasites, this will be Google's 15th data center site worldwide, and the second in TVA's service territory. TVA is the only utility company in the world to serve two of the company's data center sites. This second data center creates 70 new jobs and will invest approximately \$600 million. The site plans to be powered 100 percent by renewable energy and will be a directly served customer of TVA.

Amazon, a global electronic commerce and cloud computing company, announced plans to locate an Operations Center of Excellence in Nashville, Tenn.

Plans for this project include a 5,000-person operations center for Amazon, Inc., including positions in information technology, customer interfacing, and research & development. The projected capital investment is approximately \$230 million and with plans to use up to five MW of power. The company is expected to locate in an existing real estate development in Nashville. This announcement represents the single largest initial jobs announcement in TVA Economic Development history. Economic development partners include Nashville Electric Service, Tennessee Department of Economic and Community Development, Nashville Area Chamber of Commerce, and Metropolitan Government of Nashville and Davidson County.

Site Selection magazine named TVA one of the top 10 utilities in economic development for the 14th straight year. TVA Economic Development recruits new companies and investments to the region in these targeted industry sectors: Transportation-Related Manufacturing, Consumer and Industrial Products, Aerospace and Defense, Advanced Manufacturing, and Power Intensive Industries.

The FY2019 announcements of jobs created and/or retained and capital investment generally reflect the following:

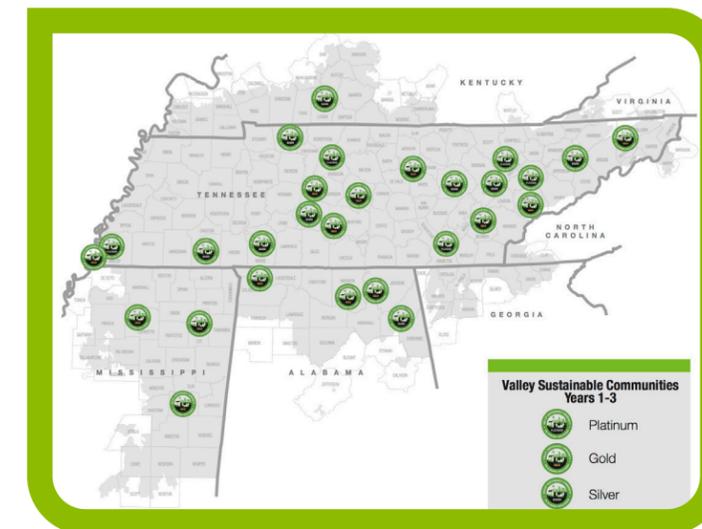
- **Alabama:** 12,300 jobs and \$1.7 billion
- **Kentucky:** 6,200 jobs and \$1.3 billion
- **Middle Tennessee:** 16,600 jobs and \$1.8 billion
- **Mississippi:** 6,800 jobs and \$1.1 billion
- **Northeast Tennessee and Virginia:** 8,500 jobs and \$598 million
- **Southeast Tennessee, Georgia and North Carolina:** 6,700 jobs and \$792 million
- **West Tennessee:** 9,400 jobs and \$1.5 billion.

**Valley Sustainable Communities:** TVA introduced the Valley Sustainable Communities program in 2013 as a way to recognize communities that link local sustainability efforts with economic development opportunities. Staff work closely with cities, towns, and counties throughout the region to successfully help them commit to long-term economic development. In 2019, 29 communities representing Alabama, Kentucky, Mississippi, and Tennessee are engaged.

Communities may participate on the Platinum, Gold or Silver level:

- A Valley Sustainable Platinum Community has made a significant and comprehensive commitment to sustainability and also has thoroughly integrated economic development into its sustainability efforts.

- A Valley Sustainable Gold Community is one that has taken a leadership role in implementing sustainable practices and has made a commitment to sustainability efforts focused on economic development.
- A Valley Sustainable Silver Community has community-wide sustainability initiatives in place, with some programs available to support the business community and economic development opportunities.



**Economic Incentives:** TVA offers a unique range of economic incentives (Valley Incentive Programs) that may benefit specific projects from start-up to long-term success in the Valley. Valley Incentive Programs consider both economic and power-system metrics to create a profile of a company's value to the region, and that in turn, determines appropriate funding levels.

**Engagement with Investors and other Financial Stakeholders:** The financial community is also increasingly focused on sustainability. TVA works to address the information needs of investors and other financial stakeholders on ESG related factors. ESG factors are not new to analysts that cover utilities or the major credit rating agencies (Moody's Investors Service, Standard & Poor's, and Fitch Ratings) that provide ratings on TVA bonds. ESG factors have traditionally been considered credit analysis for TVA and other utilities. Thus, Edison Electric Institute (EEI's) industry-wide effort to ensure that information on ESG issues is reported in a consistent format across companies is beneficial to the financial community. TVA's report using the EEI template was published in summer 2019.

## Sustainable Supply Chain

At TVA, we hold ourselves to a high standard and have the same expectation for our suppliers. TVA suppliers go through a set of specific criteria to qualify to become a potential supplier for TVA. The criteria, which include environment-oriented aspects, are established within a standard process. We maintain a competitive, diverse supplier base that is reflective of the Tennessee Valley region. TVA also practices sustainable acquisition, or buying “green” through our green procurement program. We are committed to buying products that fall under designations exemplifying commitment to sustainable practices including certified energy-efficient products and practices, water efficient products, and environmentally preferable products.

### Supplier Diversity

An important part of TVA’s mission of service is maintaining a competitive, diverse supplier base that is reflective of our region. We seek to do business with firms that offer exceptional products and services at competitive prices, and we welcome businesses of all types—small, minority-owned, woman-owned, veteran-owned, service-disabled veteran-owned and those located in historically underutilized business (HUB zones), among others. In 2019, TVA spent \$766 million in transactions with small businesses and \$395 million with diverse businesses.

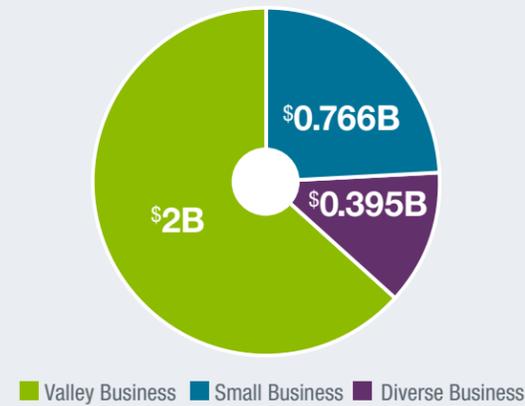
TVA is deeply committed to supplier diversity by engaging with suppliers through direct contracting, supplier mentoring, community partnerships, active outreach, and benchmarking supplier diversity goals and progress, among other efforts. With an emphasis on making life better for the people of the Valley, TVA pursues strong partnerships and meaningful economic development across the region.

TVA tracks Supplier Diversity Performance using key indicators detailing total small business spending, total diverse business spending (minority-owned, woman-owned, veteran-owned, etc.), and total Valley business spending, all measured in both dollar amount and percent of total spending. Supplier Diversity at TVA is a result of our commitment to improving life in the Tennessee Valley for every person in the community. Supporting a diverse supplier base makes us better at what we do.

**Supply Chain Security:** TVA’s Supplier Code of Conduct lays out expectations and protocol for security across our supply chain. TVA’s suppliers are expected to adhere to all applicable TVA security rules and processes, whether related to data, information, computer systems, personnel background investigations, drug testing, or



## Supplier Spend in FY19



physical locations and property. Suppliers may not take photographs or make any other recording or depiction of TVA property or facilities, or allow access by any third party to TVA property or facilities, without TVA’s express prior consent. Companies’ safety records and security standards are important considerations in choosing our suppliers. These measures help us to ensure protection for employees of TVA and our suppliers, as well as for the people of the Tennessee Valley.

## Advancing Technology and Innovation

Innovation has been part of TVA’s mission of service since 1933. We were created to be a leader in the generation of clean, low-cost power, and a conservator of our region’s precious natural resources.

TVA makes annual investments in science and technological innovations that help us meet future business and operational challenges. We are exploring ways to further reduce carbon emissions, embracing energy efficiency, and pursuing development of advanced nuclear generation options. Further, with the rise of electric transportation, we are working to evolve the electric transmission and distribution systems into a dynamic and interdependent network. We are accomplishing these goals in numerous ways.

### Advanced Energy Efficiency in Homes (Campbell Creek Homes)

TVA collaborated with Oak Ridge National Laboratory (ORNL) and Electric Power Research Institute (EPRI) to compare energy usage in a typical home, a retrofit home, and high performance home. The typical house, designated the Builder Home, served as the control for the project. The second home, also built as a typical home, was retrofitted with energy efficiency technologies that any existing homeowner could add. The third home was built using the latest construction technologies to make it as efficient as possible and still provide excellent curb appeal. It employed photovoltaic panels and solar water heating to help make it a near-zero energy house. Over the five-year study, the retrofit home used 40 percent less energy than the builder home, and the high performance home used 66 percent less. [Campbell Creek Homes](#).

### Electric Transportation

TVA is embracing electric transportation technologies and charting a course to encourage consumers to adopt electric options. Since 2011, TVA has conducted research in collaboration with EPRI, automotive manufacturers, and charging station infrastructure manufacturers to demonstrate and enhance underlying technologies associated with electric transportation. These are technologies such as battery development and re-use, vehicle demonstrations and development, and charging infrastructure standardization and development. In 2019, TVA’s research into the impacts of EVs continued with the creation of the Smart Charge Nashville project, following 200 real-world EV drivers in the greater Nashville area to understand their energy needs and potential impacts. TVA also continued to increase vehicle adoption within TVA’s own fleet of vehicles along with the charging infrastructure

to support charging at various TVA facilities across the southeast. Also in 2019, TVA collaborated with more than 30 stakeholder organizations from across the southeast to chart a course to encourage consumers in adopting EVs. This collaboration led to the publication of the first-ever Roadmap for Electric Vehicles in Tennessee. Focusing on the market barriers to EV adoption, the stakeholder team, now called Drive Electric Tennessee, identified four Opportunity Areas (market gaps) to drive consumer adoption of EVs:

- Charging infrastructure availability,
- Consumer awareness,
- Supportive policies and programs, and
- Vehicle availability and offerings.

TVA will continue to lead and support local stakeholders as the Drive Electric Tennessee collaborative evolves into a stand-alone, membership-funded group that will continue to work on closing the market gaps identified in the EV Roadmap.



### Energy Storage

Storage technologies such as pumped hydroelectric, compressed air storage, electrochemistry (batteries), and other options can act as a buffer between electricity supply and demand variations, increasing the flexibility of the grid and helping to enable use of variable resources such as solar, wind, and other forms of distributed generation. With recent technological advances, battery energy storage (BES) systems are becoming less costly, yet the practical use of these technologies remain challenging. TVA is engaging in industry research designed to make storage technologies more technically and economically practical in the future, whether owned and operated by utilities or by individuals.

### TVA Clinch River Small Modular Reactor (SMR) Project

SMRs are a variant of Advanced Reactors, which are defined as any light water or non-light water fission reactor with enhanced features and increased standardization as compared to the current generation of operational reactors. These features open up the benefits of nuclear energy to a wider variety of sites and applications, including locations with more limited electric power grids such as the proposed Clinch River Site in Oak Ridge, Tennessee.

The Advisory Committee on Reactor Safeguards (ACRS) began their safety evaluation reviews in May 2018 and completed their reviews in October 2018. The ACRS conducted these independent reviews of the early site permit application (ESPA) and the NRC’s advanced safety evaluation report (SER), and provided advice to the Commission about the potential hazards and the acceptability of the proposed site.

The NRC issued its final EIS in April 2019 and issued its final safety evaluation report in June 2019. The safety review included an evaluation of certain plant design parameters, site characteristics, siting requirements, quality assurance programs, physical security, and major features of emergency preparedness.

The NRC held a mandatory hearing in August 2019 on the ESPA and concluded that SMRs with design characteristics within the ESPA basis used by TVA, in developing its Clinch River Site ESPA, can be constructed and operated without undue risk to the health and safety of the public.

The permit was issued by the NRC in December 2019. The ESPA basis and terms are conservative, and would allow TVA to explore multiple, diverse emerging nuclear technologies, including light water SMRs, non-light water technologies, and micro reactor demonstrations, providing flexibility for future business options and decisions. The development of advanced reactor technologies is consistent with TVA’s technology innovation mission of service and could contribute to TVA’s vision to be among the nation’s leaders in cleaner, low-cost energy. In February 2020, the Advisory Committee on Reactor Safeguards recommended the issuance of an early site permit to the NRC. The final NRC ruling is pending.

### “Fresh Electric Farm” Celebrates Launch

Indoor agriculture is a unique example of electrification that could help lower overall carbon emissions to the atmosphere. In 2019, TVA and the UT Institute of Agriculture (UTIA), EPRI, and Knoxville Utilities Board (KUB) cut the ribbon on a new project seeking to reinvent



agriculture. The system relies on hydroponics—growing plants without soil in a nutrient solution. This all-electric container farm goes further than prior hydroponic systems by using new LED lighting and Controlled Environmental Agriculture (CEA), where a totally controlled and enclosed environment grows leafy vegetables such as kale and lettuce.

### Energy Management Circuit Breaker (EMCB)—EPRI Technology Transfer Award Winner

TVA joined forces with the EATON Co, EPRI, and other utilities to test and develop utility applications to create a new consumer device: the Energy Management Circuit Breaker (EMCB). The EMCB combines metering capability of a smart meter with the connectivity of a WiFi/Internet of Things (IoT) device, the control of load management switches, the flexible platform of a smart phone and other valuable capabilities into a required safety device that already governs all electrical circuits in the United States: the circuit breaker.

The EMCB will allow utilities and customers to obtain revenue grade power metering and remotely control electricity use. TVA participated in a project that installed more than 250 devices nationally. In phase II of the project, TVA and our partners continue to test the EMCB, re-develop weak data management links, and improve the system for consumer applications, while adding tests for low-cost, long-term visibility of grid edge power quality waveforms. It promises to become a strong component of the Behind the Meter IoT.

## Grid 2023

TVA manages one of the largest and most reliable transmission systems in North America.

TVA is developing the grid of the future, or Grid 2023. As older plants are retired and new ones come online, there will be a changing resource mix that will include solar, distributed energy resources and microgrids. TVA will need to adapt from more centralized generation locations to distributed locations while continuing to ensure reliable grid operations.

Sound investments in a modernized grid now will pay off for years to come. Grid 2023 will help ensure that we continue to deliver power at the lowest feasible rate and attract and retain jobs and investments in the Tennessee Valley.





# WE PARTNER WITH COMMUNITIES

We partner with communities and customers to improve quality of life in the Tennessee Valley.

## Partner

This section provides details on the following:

- Community Partnerships
  - River and Public Land Management
    - Flood Management
    - Reservoir Lands Planning, Land Use, and Ecotourism
    - Sustainable Land Use, Resource Stewardship, and Recreation
  - Public Engagement
    - Volunteerism and Charitable Giving
    - Stakeholder Engagement
- Customers as Partners
  - Directly Served Companies
  - Local Power Companies
  - Valley Partnerships
  - Customer Engagement
  - Complaint Resolution Process
  - Comprehensive Services Program
  - Community Engagement in Partnership with Customers
  - Rates
  - Carbon
  - Distributed Energy Resources for Customers

We carry out our mission through meaningful partnerships with communities, local power companies, and directly served customers throughout the Valley. We serve communities throughout the Valley with our work in land and river management, our charitable giving, and volunteerism. We engage with stakeholders to identify issues and opportunities that will help create a clean energy future and shared value for all.

## Key Sustainability Issues

As expressed in the Key Sustainable Performance Measures Table, the following topic areas are extremely important relating to the PARTNER component.

- Climate Change,
- Community Vitality,
- Electricity Affordability,
- Habitat and Biodiversity,
- Internal Energy Management Programs,
- Reliability and Resiliency,
- Transparency, and
- Water.

These issues impact our employees, our customers, and our stakeholders. Drivers of our sustainability efforts include consumers, many of whom have annual CO2 goals and reporting requirements that include Greenhouse Gas (GHG) emissions from their consumption of purchased electricity; utility-industry direction and competition; federal executive order directives; and regulatory requirements. TVA builds strong community partners to enhance the Valley's resources, such as water resource stewardship, reservoir lands planning,



and ecotourism, to ensure that these resources will be sustained for generations. TVA manages an integrated river system for multiple uses, including flood control, and provides clean water for Valley needs. TVA has developed public outreach programs to increase awareness and appreciation of the cultural and natural resources in the Tennessee Valley as well as to provide opportunities for community support, stakeholder engagement, environmental education, and collaborative partnerships.

TVA recognizes that the environment in which we do business continues to evolve. TVA's broad array of stakeholders, and their needs, are important to our future. TVA remains flexible in our planning and nimble in our execution and is also working to respond more quickly than ever to continually changing market conditions and stakeholder needs.

## Community Partnerships

TVA is committed to partnerships that help improve our communities. Just as TVA supported the progress of regional communities into the mainstream of 20th century American prosperity, our activities today continue to play important roles in improving our region's quality of life. As a responsible corporate citizen, we are committed to strengthening the quality of life everywhere we serve.

TVA has developed public outreach programs to increase awareness and appreciation of the cultural and natural resources in the Tennessee Valley as well as to provide

opportunities for community support, stakeholder engagement, environmental education, and collaborative partnerships.

Environmental education programs provide a platform for TVA to share information and our passion for natural and cultural resources and public lands with children and adults. Through our environmental education efforts, TVA works with educators to bring hands-on learning experiences to the classroom or provide opportunities in outdoor settings on TVA public lands. Environmental education helps build and foster interest in science, technology, engineering, art, and mathematics (STEAM) learning and career opportunities. Approximately 10,000 children in the Tennessee Valley participate in TVA environmental education programs annually.

We contribute to our local youth through educational programs and competitions focused on energy-related subjects (STEM) and robotics in both primary and secondary schools. By narrowing our scope to STEM and robotics for school-related assistance, we are helping educate the future workforce and building a pipeline of future employees for TVA and other businesses in the Valley.

We also connect with communities by sharing our interests in local wildlife and aquatic habitats, native plants, river management, public lands, and recreational opportunities through public events and communications tools such as our "River Neighbors" e-newsletters, social media, interactive web sites, and other publications. TVA

also works collaboratively to support communities in their stewardship efforts across the region; examples include support for Kids in the Creek programs to encourage children to learn about aquatic species in local streams, Trash to Treasure events to promote recycling and reuse of materials, and 4-H club activities to promote environmental stewardship.

## River and Public Land Management

Under the TVA Act, TVA is tasked with managing the Tennessee River for multiple benefits and the highest public good. Approximately 42,000 miles of rivers, streams, and tributaries, including the 652-mile-long Tennessee River, 650,000 surface areas of reservoirs, and 49 dams and 14 navigation locks constitute the Tennessee River System. The U.S. Army Corps of Engineers operates and maintains these locks for navigation. It is a vital part of the nation's inland waterway system, transporting more than 50 million tons of cargo annually. In addition to supporting commercial navigation, TVA's integrated management of the river system supports recreation, public and industrial water supply needs, aquatic habitat protection, flood risk reduction, hydroelectric power production, and cooling water for TVA's generation units. The watersheds of the Tennessee River and its 16 tributaries encompass more than 41,000 square miles across 125 counties in portions of seven states.

TVA's broad mandate enables a holistic approach to resource management, balancing competing demands on the river system in a way that maximizes benefits while minimizing risks.

TVA manages an integrated river system for multiple uses and provides clean water for Valley needs. We are:

- Lessening impact on aquatic systems while balancing thermal cooling needs;
- Reducing consumption of water at TVA's metered facilities; and
- Managing water quality and quantity impacts through permitting activities on and around TVA reservoirs; collection, maintenance and distribution of water quality information; and strategies to manage increased water demand.

A unique aspect of TVA's integrated river management is that through the process laid out within Section 26a of the TVA Act, we permit what development may occur within the floodplain and promote flood-resilient decisions. Section 26a permits are also required for all water intake structures, allowing TVA to use the information to perform water supply and water use studies in the Tennessee River watershed every five years, which supports regional, state and local water supply planning. These studies have

shown that, although water withdrawals in the Tennessee River watershed are some of the highest in the nation, the consumptive use is among the lowest. In 2019, TVA continued our support of a joint research study to construct a 600-year time series of river inflows by tree ring sampling to ensure that our water supply is resilient to extreme drought. Learn more about water supply online at: [Managing Water Supply](#).

## Exciting Young Scientists

TVA facilitators annually deliver the TVA Science Kids World Water Monitoring program to about 10,000 children at 1,500 locations. The young students learn to perform experiments on water quality, record data, and apply the findings in their daily lives.

The facilitators use water from a local pond or stream as well as a "lab in a box" to teach children about conducting experiments, testing water quality, recording data, and safely handling scientific equipment.

Part of TVA's mission is to protect the Valley's natural resources for future generations. In partnership with EarthEcho International, this program helps create young citizen scientists who discover that their behavior can help keep the Valley's waterways clean and its wildlife healthy.



In addition to the integrated management of the Tennessee River system, TVA is entrusted with approximately 11,000 miles of shoreline and 293,000 acres of reservoir lands for cultural and natural resource protection, recreation, and other purposes. TVA's Natural Resources stewardship strategy and Natural Resource Plan guide TVA's stewardship efforts.

Through the stewardship strategy, we strive to remain agile, balance competing demands, and be a catalyst for collaboration that protects and enhances biological, cultural, and water resources, while also creating and sustaining destinations for recreation and tourism, and opportunities for learning and research. TVA also states in the strategy that we will assist water-based community development with technical and planning support, Section 26a permitting and land use agreements, clear regulations and meaningful guidelines, and consistent enforcement.

TVA's Natural Resource Plan (NRP), aligned with TVA's Environmental Policy and Stewardship strategy, provides a sound framework for balancing land use, human



## Restoring Fish Population

TVA is working with other federal and state agencies to reintroduce the North American lake sturgeon, a giant bony-plated fish that dates back to the time of the dinosaurs, into the Tennessee and Cumberland rivers.

Decades ago, TVA dams impacted the ability of these fish to thrive. But with careful study, changes in TVA river management practices, and introduction of TVA oxygenation systems, TVA is helping restore the population.

Federal and state partner hatcheries in six southern states incubate eggs collected from another area of the country, then the agencies tag and release the fish when they reach 6 to 8 inches. The fish are tracked and monitored for years to come.

To date, more than 255,000 juvenile lake sturgeon have been released into the two rivers. Specialists report that the fish population appears to be healthy and expanding.



activity, and conservation to achieve the greatest public benefit from our natural resources. The NRP is a strategic document that steers TVA's resource stewardship work over the next 15 to 20 years.

TVA's NRP is designed to:

- Integrate the objectives of 10 focus areas (Reservoir Lands Planning, Section 26a Permitting and Land Use Agreements, Public Land Protection, Land and Habitat Stewardship, Nuisance and Invasive Species Management, Cultural Resource Management, Water Resources Stewardship, Recreation, Ecotourism, and Public Outreach and Information);
- Provide optimum public use benefit;
- Balance competing and sometimes conflicting resource uses; and
- Coordinate and collaborate with partners and stakeholders to meet near- and long-term resource needs.

## Flood Management

Flood control is an important objective of TVA's mission of sustainability and another example of how we work to support Valley communities. TVA has a sophisticated system of 49 dams and ancillary structures to control flooding along the Tennessee River watershed. As of September 30, 2019, TVA had spent \$153 million on modifications and improvements related to extreme flooding preparedness and expects to spend up to an additional \$27 million to complete the modifications. TVA continues our flood resilience and dam safety initiatives, including remediation efforts at Boone Dam.

Each year, TVA prevents an average of about \$280

million in flood damage in the TVA region and along the Ohio and Mississippi Rivers. To date, the operation of this system has prevented more than \$7.9 billion in flood losses across the Tennessee Valley, including about \$7.2 billion in damage averted at Chattanooga—the Valley's most flood-prone city. TVA spills or releases excess water through our dams in order to reduce flood damage to the Tennessee Valley. TVA typically spills only when all available hydroelectric generating turbines are operating at full capacity and additional water still needs to be moved downstream.

In February 2019, significant flooding occurred in portions of the Tennessee Valley. During this time, the Tennessee Valley received 11.6 inches of rainfall, which was 269 percent of normal for that time period. Although many locations along the Tennessee River reached or exceeded flood stage, TVA's efforts, including storing water in large tributary reservoirs, accounted for approximately \$1.6 billion in avoided damages in areas such as Chattanooga.

## Reservoir Lands Planning, Land Use, and Ecotourism

TVA's Reservoir Land Management Plans direct how TVA manages the 293,000 acres of public land in our care on a reservoir-by-reservoir basis and help TVA make decisions on the uses of public land under TVA's stewardship. The land planning process is a systematic method of identifying and evaluating suitable land uses and assigns land use allocation categories, or zones, to parcels of public land. TVA's land management and property administration decisions can support regional development, while enhancing the protection of resources, including threatened and endangered species,



cultural resources, wetlands, natural areas, water quality, and the visual character of the reservoirs.

Additionally, the lands planning process provides guidance for TVA to respond to new issues and changes in conditions and circumstances, and provides a mechanism for public involvement that allows local, state, and federal entities as well as individual members of the public to participate. These important land-use decisions are key to helping TVA strike a balance for the overall health, economic development, and recreation opportunities of our reservoir land.

TVA's public lands and shoreline have long provided a platform in support of the tourism industry. Partnerships on TVA shorelines and land have been used for facility development, festivals and events that attract and hold area visitors. In recent years, nature-based, outdoor adventure and sustainable tourism have been labeled and defined using the term Ecotourism. TVA helps local communities with ecotourism community development planning, with implementation focused on facility and amenity investments that support nature-based, sustainable recreation attractions, events, and festivals. TVA also works with partners to create or expand public recreational facilities and promote existing recreational and tourism opportunities that result in local, regional, and state positive economic impacts. The Tennessee River system and adjacent public lands generate about \$12 billion a year to the regional economy and create or retain about 130,000 jobs each year.



### Sustainable Land Use, Resource Stewardship, and Recreation

TVA is unique among power generators in that it was created to not only empower the economic aspects of Southeast society but also to protect and improve the cultural and natural resources of the Tennessee Valley region. This includes the sustainable management of 293,000 acres of public lands, 11,000 miles of shoreline, and 650,000 surface areas of reservoir waters.

TVA invests funding and resources and builds strong community partners to enhance the Valley's resources to ensure that these resources and opportunities will be sustained for generations. Our work includes managing these public lands; improving reservoir shoreline conditions through collaborative partnership initiatives; providing well-managed, eco-friendly land for recreation while also protecting cultural heritage resources; and promoting ecological diversity and wildlife habitats on TVA lands and waterways. These stewardship projects support TVA's mission to help make the Valley a great place to live and work. The results of TVA's efforts are apparent in the abundant resources in the region and the opportunities they afford.

Being good stewards of cultural resources includes complying with applicable requirements and taking additional steps to protect and manage the cultural resources in the Valley. This year, TVA participated in several tribal partnership initiatives, including the Native American Graves Protection and Repatriation Act

(NAGPRA) inventory for multiple sites excavated at the former Hartsville Nuclear construction site and a NAGPRA Consultation meeting with federally recognized Indian Tribes in May 2019. TVA also is collaborating on a Trail of Tears research project to document the locations and routes for the Trail of Tears on TVA land, waterways, and within the power service area. This project will help the agency manage a very sensitive resource that is considered a Traditional Cultural Property by federally recognized tribes.

TVA also restored the Muscle Shoals Animal House, a historic structure on TVA's Muscle Shoals Reservation, and stabilized archaeological sites along Watts Bar, Chickamauga, and Wheeler Reservoirs. TVA collaborates with partners, including tribal representatives, to increase awareness and protect the Valley's cultural resources. The tribal voice is instrumental in promoting the protection of Native American resources, and they partner with TVA in outreach and education efforts across the Tennessee Valley to reduce the vandalism and looting of archaeological sites on TVA land.

TVA has a long history of natural resource stewardship, including wildlife habitat management, forestry, and sensitive resource management. In 2019, we worked with partners to study native plants and research imperiled forest dwelling bats considered to support land and habitat management. TVA also conducted surveys to learn more about bats, amphibians, reptiles, and small mammals and their habitat needs. We preserved the natural state of public lands with restoration of the shortleaf pine through prescribed burns, invasive plant removal, and creation of a pine savanna habitat with native plants and warm season grasses.

Water resources stewardship is a key part of TVA's resource management. The Tennessee River watershed is frequently noted as one of the most biologically diverse regions in North America. However, aquatic species in the region face numerous threats – from habitat loss and degradation to pollution, climate change, and the spread of invasive species.

TVA partnered with local, state, and federal agencies and non-government organizations this year to improve water quality and protect aquatic habitat by implementing projects including stream bank stabilization, buffer establishment, in-stream habitat improvements, mussel propagation, and reintroduction and

outreach activities. Our areas of focus this year included working with the U.S. Fish and Wildlife Service to monitor the snail darter; expanding the Shade Your Streams program from North Carolina to the Tennessee River in Georgia and Tennessee, establishing over 150 acres of riparian buffers in the Elk River; and working with the Little Tennessee River Native Fish Conservation Partnership on mussel and fish population and reintroduction.

Recreation is an important part of life in the Valley. Throughout the Valley on our dam reservations and other public lands, TVA manages over 170 agreements with private entities for commercial recreation (such as commercial campgrounds and marinas), manages 130 agreements with public agencies for public recreation (such as public parks, day use areas, boat launches, and swimming areas), and is directly responsible for more than 80 public recreation areas throughout the Tennessee Valley. TVA's public lands also provide opportunities for hiking, biking, hunting, and access to some of the best fishing around.

TVA works with other agencies, municipalities, and organizations to expand recreation opportunities and access to public lands and waters in the region. In 2019, TVA improved recreation amenities on dam reservations in 17 counties across the Valley. This included building or refurbishing Americans With Disabilities Act (ADA) compliant fishing piers, picnic areas, and playgrounds, new courtesy docks, upgraded boat ramps, enhanced campground amenities, and new interpretive signs. We also expanded recreational opportunities throughout 30 counties on TVA public land and public land owned by other agencies and communities. Examples include improvements and additions to trails, wildlife observation areas, stream access sites, informal campgrounds, courtesy piers, and boat ramps.



## Public Engagement

### Volunteerism and Charitable Giving

TVA and our employees believe strongly in working together to support safe, vibrant communities. Our Team TVA volunteer program connects employees' passion for volunteering with tangible public and community service efforts. Our employees logged more than 5,000 volunteer hours participating in programs of their choice and those that TVA plans, organizes, and sanctions. For example, TVA helps match interested employees with volunteer positions in school robotics programs throughout the Tennessee Valley region. These programs need support, particularly from adults with skills in



machining, programming, and engineering, and TVA employees are eager to help. Employees also look for opportunities to serve communities in partnership with LPCs, such as volunteering in local food banks, local schools, or other activities. TVA sponsorships, grants, and donations can also help our community partners. In 2019, TVA sponsored more than 80 robotics competitions and provided over \$1 million in grants for STEM and robotics programs. Additionally, TVA donated nearly \$3 million to organizations across the Valley and helped distribute 1.3 million meals through the Feeding America Partnership.

TVA also offers volunteer opportunities for community members through our Volunteer programs. For example, TVA developed a project called A Thousand Eyes, which works with local groups and communities to protect archaeological sites and preserve them for future generations. Staff members conduct cultural resources presentations and field trips in which community members have the opportunity to learn more about the

protection of sites on TVA land and are encouraged to take action when they see suspicious activity such as digging or unpermitted dredging. Community members can also participate in TVA's Volunteer program to learn about nature and be part of a collective effort to protect public lands. Through this program, volunteers can join TVA to help maintain trails, monitor wildlife, and help keep public lands looking their best.

### Stakeholder Engagement

TVA stakeholders want a voice in determining the future of the energy they consume. These stakeholders include our employees, our customers, our investors, our neighbors, and the residents and businesses in the communities where we provide energy. We also engage with industry groups, policymakers, consumer advocates, professional associations, universities, non-governmental organizations, and thought leaders. On our most-recent stakeholder survey, TVA received 81 percent in stakeholder engagement, which means that a majority of public influencers, elected officials, and others who were surveyed responded favorably about TVA's work or rated TVA positively for engaging public stakeholders.

Our stakeholders want to know how TVA is keeping power rates low and the environment clean. They ask us about our environmental stewardship, power generation sources, advanced technologies that enable energy efficiency, distributed resources, and regulations and public policies that could affect future operations or investments. Stakeholders also want to provide input on TVA's plan for smart, modern infrastructure that informs and empowers customers and creates a more resilient and robust system. Gaining stakeholder input helps TVA make more informed decisions and leads to better outcomes.

TVA engages a variety of stakeholders through partnership projects, public meetings, open houses, public comment periods, listening sessions, and federal advisory councils. TVA also forms issue-specific working groups and information exchanges to facilitate dialogue and gain input from stakeholders on key issues such as the Integrated Resource Plan, energy efficiency programs for low-income residents, and renewable energy programs. Providing opportunities for engagement and ensuring information is available for stakeholders support TVA's continued efforts to be transparent in our operations, planning and decision making.

Learn more about opportunities for stakeholder engagement online at [Get Involved Stay Involved](#).

## How to build trust and relationships

Group or Forum	Methods of engagement and feedback systems	Examples from 2019
<b>OPEN HOUSES</b>	Gather public input on environmental issues such as coal ash storage, transmission line construction and public policies regarding land use planning.	Multiple open houses have been held for coal plant sites to share information about the plant, coal ash handling and storage.
<b>COMMUNITY ACTION GROUPS</b>	Gather public input on environmental issues such as coal ash storage, transmission line construction and public policies regarding land use planning.	Community Action Groups have been formed at plant sites dealing with disposal of coal ash disposal at Kingston and Bull Run.
<b>FEDERAL ADVISORY BOARDS - RRSC AND RERC</b>	Structured engagement opportunities, comprised of people from local and state governments, agencies, academics, business owners, local power companies, large industries, activists and tribal representatives. Meetings are open to the public and provide time for people to address their concerns to the groups.	These groups meet at least twice a year. At the Regional Energy Resource Council meeting in December 2019, TVA's approach to managing coal ash was discussed. The Regional Resource Stewardship Council met in September in western Tennessee to discuss dam safety projects, flooding impacts and a shoreline erosion study. The group went and visited projects at Pickwick Dam, campground repair efforts and the site of the erosion study along the Tennessee River. The April 2019 meeting focused on invasive species, including Asian carp migration and joint government projects to halt and abate spread of Asian Carp in the Tennessee River watershed. In September 2019, local farmers attended and thanked the group for visiting their area and listening to concerns regarding flooding and erosion. Local officials also spoke during the public comment session and provided an award to local TVA employees who assisted in flood recovery.
<b>INDUSTRIAL CUSTOMERS</b>	TVA's website, traditional and social media and special online apps are used to help keep residents aware of TVA actions, studies underway, and emergency situations.	Participated in the group's annual May forum.
<b>INDUSTRY ASSOCIATIONS</b>	Attending industry working groups, webcasts and other events	A 21/2-day Utility Marketplace Forum was co-hosted by TVA and the Tennessee Valley Public Power Association in November to discuss evolving technology, customer communications techniques and renewable energy options and more. TVA presented the September annual meeting of TenneSEIA, a solar industry group to learn about its members' concerns and share information on new programs. TVA CEO Jeff Lyash was the keynote speaker.
<b>INFORMATION EXCHANGES</b>	Comprised of community members, subject matter experts and industry representatives	Met with the Energy Efficiency Information Exchange in September 2019 to discuss progress in low income energy efficiency work. This group has been meeting since 2016 to help form a joint effort to address low income energy efficiency needs in the Valley. Also, finalized meetings with the Floating Cabins citizen group to report out status of legislative actions and implementation of Phase 2. The Integrated Resource Plan Working Group met almost monthly from February 2018 to June 2019 to provide guidance and raise issues for clarity and further modeling on this 20-year energy resource guidance plan ( <a href="http://www.tva.gov/irp">www.tva.gov/irp</a> ).
<b>LOCAL POWER COMPANY PARTNERS</b>	TVA's website, traditional and social media and special on-line apps are used to help keep residents aware of TVA actions, studies underway, and emergency situations.	Held meetings with LPCs to discuss rates and to announce and explain a new 20-year contract proposal for energy production and supply and determine issues for joint resolution. TVA also hosts an all-customer meeting in early August that includes industrial customers to work through issues and build strong relationships.
<b>LOCAL, STATE AND FEDERAL OFFICIALS</b>	TVA's website, traditional and social media and special online apps are used to help keep residents aware of TVA actions, studies underway, and emergency situations.	Local and state officials are represented on our Federal Advisory Boards. Additionally, these officials meet with and are briefed by members of TVA's Government Affairs staff on issues such as long-term planning, executive compensation, flood control, emergency preparedness and environmental compliance.

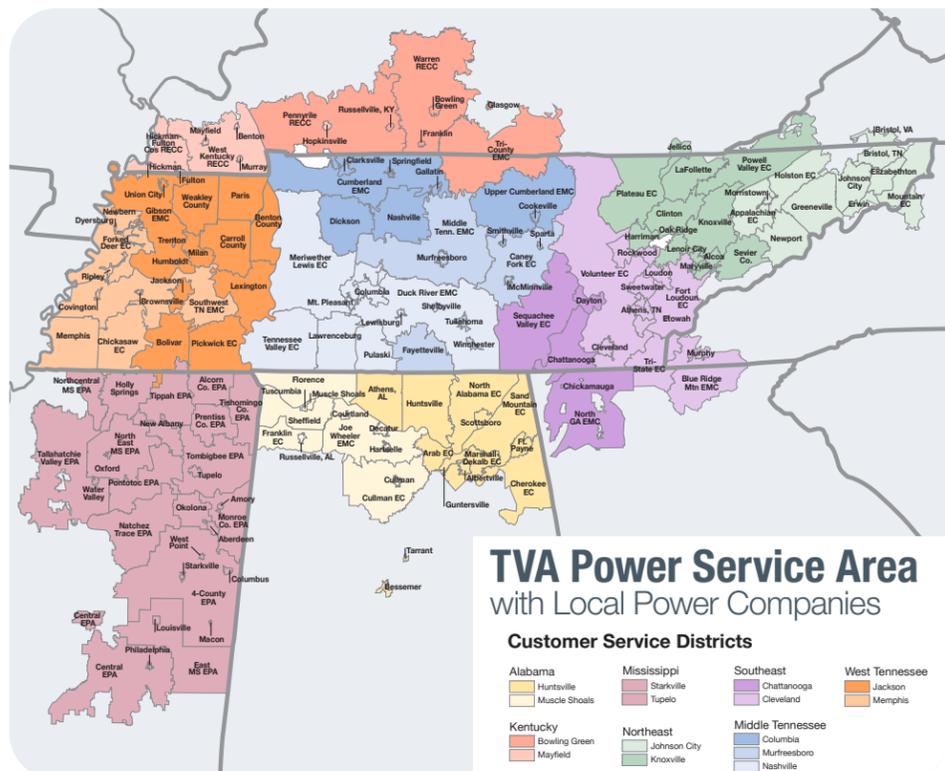


## Customers As Partners

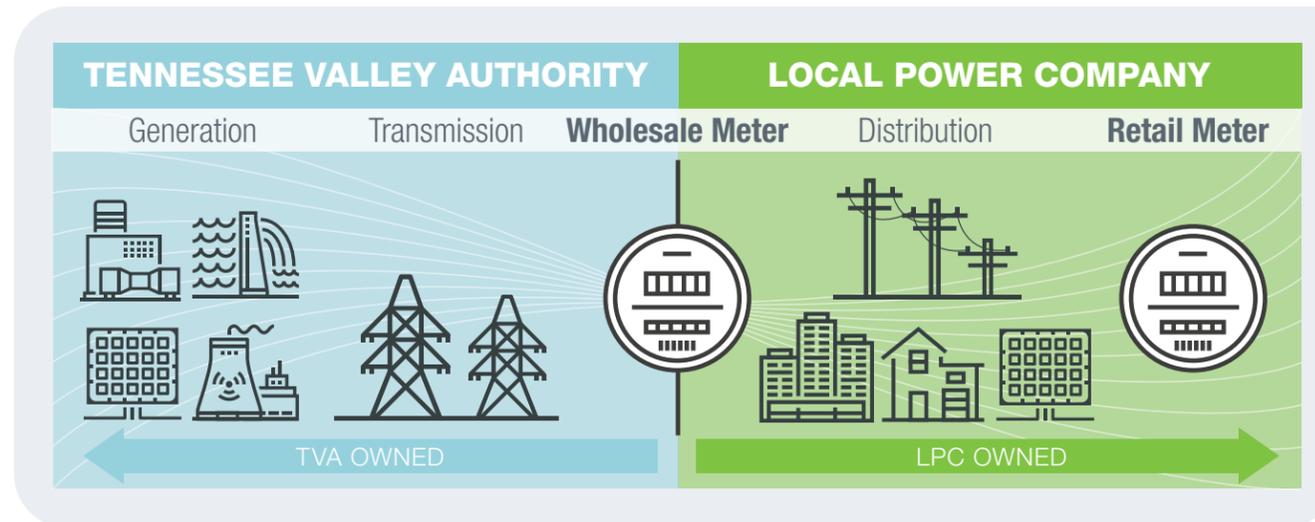
One of the most important ways that TVA fulfills its mission is by providing reliable, affordable electric power to our partners. TVA works in partnership with local power companies and directly served customers to benefit the people of the Valley – our actions are guided by what’s best for the Valley as a whole. Throughout our 87-year history, we have built strong, long-term relationships with both local power companies and directly served customers that help make communities more sustainable and resilient.

## Directly Served Companies

A total of 57 large, energy-intensive industrial customers count on TVA for a reliable stream of affordable power. These directly served customers include producers of primary metals, chemicals, industrial gases, forest products, and rolled aluminum products. TVA also serves seven federal customers, including U.S. Department of Energy facilities and military installations, and exchange power customers (electric systems that border TVA’s service area).



Directly served customers employ over 100,000 workers and represent an estimated \$8 billion in annual economic impact to the Tennessee Valley. These directly served customers also require nearly 5,000 megawatts of TVA power and account for roughly 12 percent of TVA’s overall sales, totaling nearly \$900 million in annual revenues. TVA collaborates with the Tennessee Valley Industrial Committee, which is the organization that represents the interests of the Valley’s industrial customers.



## Local Power Companies

TVA also serves 154 local power companies (LPCs) that deliver power to all of the residential, commercial, and industrial consumers across the Valley that are not directly served by TVA. TVA works in partnership to deliver power and benefit the communities we serve, which includes 104 municipal systems and 50 cooperatives.

The LPCs throughout the Valley are all public power entities, either municipal utilities or electric cooperatives. Each of these entities is governed locally by either elected or appointed boards or councils. These municipalities and cooperatives operate public power electric systems with the primary purpose of supplying electricity to the public or the cooperative’s members, not making a profit. Many also provide additional utility services, including gas, water, waste and broadband

## Valley Partnerships

TVA recognizes that the environment in which TVA does business continues to evolve. We must be prepared to respond quickly to continually changing market conditions. At its August 22, 2019 meeting, the TVA Board approved a 20-year Partnership Agreement option that better aligns the length of LPC contracts with TVA’s long-term commitments and strengthens the Tennessee Valley public power model.

Under this long-term partnership proposal, LPCs that agree to contractual changes, which include a rolling 20-year term and a termination notice period of 20 years, will receive a long-term partner credit. That credit is currently

3.1 percent of wholesale standard service demand, non-fuel energy, and grid access charges. As part of the agreement, TVA has also committed to collaborating with LPCs that execute the long-term agreement to develop and provide enhanced power supply flexibility for up to 5 percent of LPC energy, by October 1, 2021, with pricing and planning considerations mutually agreeable between the LPC and TVA.

This LPC flexibility will enhance the Valley’s energy resource diversity and will be responsive to customer demand for renewable energy resources. The Valley benefits from a diverse power system. As the economics of renewables and distributed energy resources continue to improve, operational agility will be increasingly important to successful integration of these resources into the generation portfolio.

Under a flexibility proposal, Valley Partners will be allowed to provide generation services to their retail customers so as to remain their customers’ trusted energy advisor and comprehensive power supplier. The proposal will potentially reduce costs for customers seeking generation solutions and will address customer demands for reductions of their carbon footprints.

We collaborate with various LPC customer associations; Associated Valley Industries represents the LPC-served industrial customers; Tennessee Electric Cooperative Association represents the Valley’s cooperative LPCs; Tennessee Municipal Electric Power Association represents the Valley’s municipal LPCs. The Tennessee Valley Public Power Association (TVPPA) is a nonprofit





organization that represents the interests of local power companies operating within the TVA service area. TVPPA members include both municipal and electric cooperatives, and they serve nearly 10 million customers in Tennessee, Alabama, Georgia, Mississippi, Kentucky, North Carolina, and Virginia. TVPPA also provides TVA with suggestions and advice on existing and possible research and development projects, and in many cases provides venues for demonstration research projects

carried out in partnership with TVA. Learn more about Tennessee Valley Public Power Association online at: [tvppa.com](http://tvppa.com).

Recently, TVA had an opportunity to communicate our work in sustainability and Valley partnerships. TVA was asked by the Electric Power Research Institute (EPRI) to write a chapter in their book "Sustainable Electricity II: A Conversation on Tradeoffs." TVA's chapter is titled "Creating Success for TVA Through Sustainable Solutions and Customer Collaborations." This chapter discusses sustainability at TVA and the dynamics of three customer relationships (Steel Dynamics, Inc.; Naval Air Station Meridian and East Mississippi Electric Power; and Resolute Forest Products).

### Customer Engagement

We are continuously looking for ways to better serve our customers and make life better for the nearly 10 million people of the Valley. We conduct an annual Voice of the Customer survey with every customer, asking questions covering all aspects of customer interactions with TVA. We take that feedback and other insights to develop action plans to continually improve our service, programs, and products. Survey participation continues to be strong, with greater than 90 percent participation rate in five of the last six years. TVA customer service representatives consistently receive the highest Voice of the Customer scores. There is strong satisfaction with TVA programs, in part because we design programs in a collaborative way with customers.



## Helping Our Neighbors

TVA marked a milestone of serving 400 Knox County (Tenn.) families through the Home Uplift weatherization program. TVA partners on the program with local agencies, government, and utilities.



The weatherization assistance program is designed to address the root cause of high-energy bills for customers living in inefficient homes and without the resources required to weatherize them. By bettering each home's air quality, the Home Uplift program is improving quality of life and overall health of the families it serves.

"TVA recognizes the tremendous need and is strongly committed to energy efficiency solutions for income-limited customers," said TVA President and Chief Executive Officer Jeff Lyash. "The success in the Knoxville area with the Home Uplift pilot has helped us build a broader program so we can help more families."



TVA provides an online repository for information via its Online Connection platform.

Fifteen Customer Service Center offices are distributed among seven regional districts to provide convenient, personalized, face-to-face service by individuals familiar with each region's diverse and unique LPC needs and expectations. These local, single points of contacts simplify interactions for our customers and provide quick responses to customer issues. We also have transmission personnel in locations across the Valley familiar with transmission system conditions who can quickly respond to transmission issues, including service interruptions, changes in power quality, and other concerns.

### Complaint Resolution Process

Historically, TVA has handled consumer complaints through the office of the Ombudsman and through the TVA Information Hotline. In summer 2015, the TVPPA endorsed piloting an enhanced Complaint Resolution Process.



The goal of this process is to assist LPCs and their customers with resolving complaints. TVA's Complaint Resolution Process is comprised of two parts: the Informal Complaint Resolution Process and the Escalated Complaint Resolution Process. These processes are designed to only resolve complaints that have not been able to be resolved by a LPC. Complainants are required to first work with their LPC to try to reach a resolution before filing a complaint with TVA. TVA tracks complaints by type, volume of complaints by quarter, as well as billing complaints.

### Comprehensive Services Program

TVA's Customer Delivery group offers the Comprehensive Services Program—engineering services through the local power companies to their customers to help them optimize energy usage and proactively address potential equipment issues before they become larger issues, thereby helping to reduce operating expenses. Services include energy audits, ultrasonic surveys, infrared surveys, power quality audits, lighting recommendations, HVAC sizing and analysis, sub-metering, power factor analysis, demand side management, billing assistance, meter testing, and various other technical services. LPCs share the cost of the program. While primarily a service for LPCs' customers, the services are sometimes performed for directly served customers as the need arises.

### Community Engagement in Partnership with Customers

We partner with LPCs in the communities they serve to perform energy efficiency workshops, provide information on our renewable programs, and offer educational events reviewing effective energy use and electricity safety. TVA sponsors public Earth Day events, environmental education programs, dam anniversary celebrations, various customer organization meetings, as well as performing workshops at local power companies and supporting the LPC Power Play Scholarship Program and the Youth Education program.

## Rates

Living in the Tennessee Valley, we enjoy electric rates lower than 70 percent of the country. TVA provides much more than power through these low rates. TVA's rates provide a better life for all of the nearly 10 million residents we serve with our local power company partners. TVA's expert management of the river system continues to protect public health and safety 365 days a year. This includes flood control, recreation, electricity generation, and economic development activities the river provides.

When developing wholesale rates, TVA performs a cost of service study that assigns system costs to rate classes based on cost causation.

## Carbon Rates

While all consumers are rate sensitive, some businesses and industries compete on the carbon content of their specific products or calculate their overall carbon footprint. It is becoming more common for corporate buyers to select products, or investors to screen a stock or bond, based on carbon performance. Companies also commonly include carbon performance in capital expansion decisions.

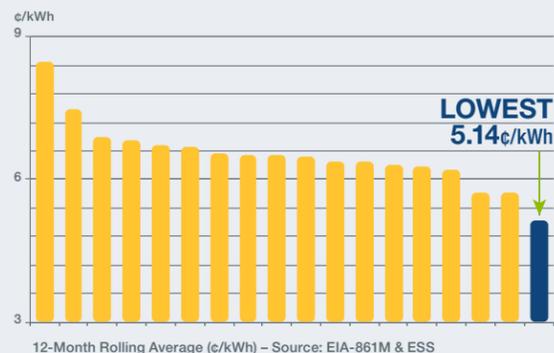
TVA is proud of the strides we have made in decreasing the carbon content of our power portfolio, and offer a very attractive carbon rate. TVA provides one of the most attractive combinations of price (\$/MWh) and CO2 content (lbs. /MWh) in the nation. TVA was first in the nation to make the carbon content of the power used available to each commercial and industrial consumer. TVA's carbon rate benefits to end-use consumers are as follows:

- Helps customer achieve their corporate CO2 performance goals
- Improves plant competitive position for production allocation
- Improves sustainability scores for customers
- Improves corporate performance scores for third-party entities such as CDP and Dow Jones Sustainability Index.

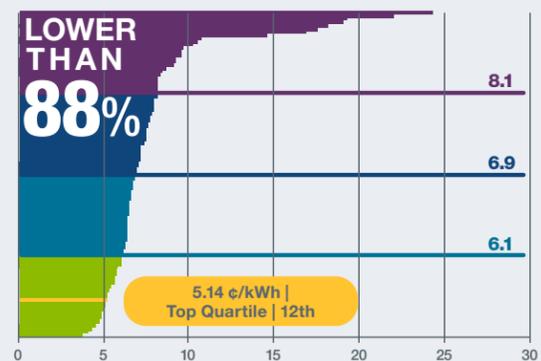
## Customer Carbon Awards and Support

In an effort to encourage energy behavior changes, TVA established annual carbon awards for the top performing and most-improved companies across the Valley. TVA currently offers two awards for both directly served customers and LPC-served businesses to commemorate their accomplishments on environmental excellence in the Valley: 1) Leadership Circle – for those achieving the lowest emission rates in a year; and 2) Most Improved – for those with the most year-over-year carbon emission improvement.

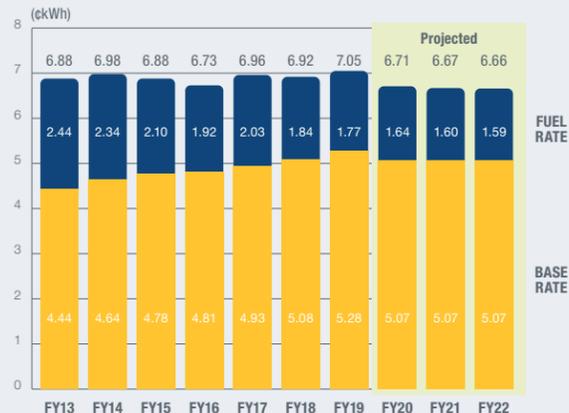
Industrial Rate Competitiveness  
Compared to Regional Peers – Dec 2019



Industrial Rate Competitiveness  
Among Top 100 U.S. Utilities – Dec 2019



Base and Fuel Rates



## Distributed Energy Resources for Customers

TVA has a rich history of helping people use energy wisely. TVA is working to adapt our products and services to answer consumer demands in a changing energy market and support the economic development mission by improving manufacturing productivity and quality. Consumers are increasingly more concerned with how products are made and want to make product decisions that support companies that are conscious of their footprint—from the sustainability of their materials to the environmental impact of the energy they use.

By offering EnergyRight® programs and services, local power companies can serve as trusted energy advisors to their customers. Many new technologies use electric powered equipment in place of equipment that burns fossil fuels like natural gas, propane, gasoline, and fuel oil. The solutions considered by TVA's EnergyRight® for Business + Industry team have been researched and proven to provide benefits to businesses, industry, and the Tennessee Valley as a whole. In fact, incorporating electric equipment or dual-fuel solutions into a business can improve its efficiency and even lower its overall energy bills in some cases.



## Conclusion

As you have read in this report, TVA's mission is to serve the people of the Tennessee Valley. Sustainability was woven into the fabric of the legislation that created TVA, and it has been a part of our business culture for generations.

Our commitment to sustainability improves our delivery of reliable, affordable, and increasingly cleaner energy; deepens our care of the Tennessee River system and public lands; and strengthens our investment in the Valley, in its businesses, and in its economic growth. We are proud of our strong relationships with our partners and communities, for these partnerships create a strong region that is better prepared to respond and adapt to future challenges.

As we have highlighted, in 2019, we achieved our 20th consecutive year of 99.999 percent transmission reliability. We also are on track to reduce our average carbon emission rate by 60 percent from 2005 levels by the end of 2020.

Our flood management efforts avoided \$1.6 billion in flood damage, and we continued to expand economic growth in the region with more than \$8.9 billion in investments and the creation or retention of approximately 66,500 jobs in FY 2019.

As we reflect on our accomplishments and challenges, so, too, are we continuing to look ahead. We are following a new Integrated Resource Plan that serves as a roadmap for how TVA can meet future demand for power in new and innovative ways. We are examining ways to positively impact the carbon footprint of the Valley, and we have made a conscious effort to partner with customers and stakeholders to improve their carbon footprints as well. To help guide our sustainability efforts, we will work with our customers and stakeholders to refine our sustainability objectives and provide meaningful progress updates.

We will continue to identify, invest, and encourage new technologies that support improved service and cleaner energy. And as we have done for the past 88 years, we will do everything in our power to maintain a wonderful, healthy region in which to live, work and play today...and for generations to come.

## Appendix A

### Disclosure Initiatives

As a federal agency, TVA is required to submit several Federal Energy and Sustainability reports annually in order to achieve goals in Executive Order 13834, Energy and Policy Act of 2005, National Energy Conservation Policy Act of 1978, and Energy Independence and Security Act of 2007.

TVA engages in the following Industry, federal, and customer-oriented disclosure initiatives that support the GRI framework.

- **CDP (formerly known as Carbon Disclosure Project)** - CDP is an international, not-for-profit organization providing a global reporting platform for companies and cities to measure, disclose, manage, and share vital environmental information to stakeholders and investors. TVA continues to monitor and evaluate CDP's annual scoring methodologies on its carbon, water, and supply chain questionnaires as a means to continuously improve and demonstrate sustainability performance.
- **Edison Electric Institute - Environmental, Social, and Governance (ESG) Reporting Pilot** - TVA participates in the Edison Electric Institute (EEI) and American Gas Association (AGA) environmental, social, and governance (ESG) reporting template initiative. This initiative includes a stakeholder working group composed of electric companies and financial industry specialists in asset management, sustainability, investment banking, and buy-side and sell-side analysts to develop industry-focused and investor-driven sustainability reporting practices. The effort encourages voluntary reporting of sustainability information in both quantitative and qualitative formats and is the first and only industry-focused and investor-driven ESG reporting framework.

The EEI ESG report template provides information in a measurable and consistent format for investors and customers to accurately assess long-term sustainability progress. Within the quantitative section, companies report sector-specific information, including data on a company's generation portfolio, emissions, capital expenditures, and resources. The use of these universal metrics provides comparable data. The qualitative section provides an opportunity for companies to share additional information and context about their sustainability governance and strategy.

TVA's 2019 EEI ESG report highlights the company's emission reductions and clean energy strategy, which is focused on modernizing the power grid, expanding renewable energy resources, and delivering cost-effective, reliable energy to our customers. [TVA Sustainability](#).

- **Electric Power Research Institute (EPRI)** - The electric power industry continues to evolve in its effort to integrate sustainability into strategic planning and operations. TVA actively participates in EPRI's sustainability metric assessment and benchmarking supplemental collaborative projects. 2019 marked the sixth year of EPRI's focused research on metrics to measure performance on priority sustainability issues for the electric power industry.
- **National Environmental Policy Act (NEPA)** - As a federal agency, TVA must also comply with the National Environmental Policy Act. NEPA establishes the process of identifying, considering, and disclosing environmental impacts of major federal actions. The NEPA process is intended to help agency officials make better decisions that protect, restore, and enhance the human environment. TVA's NEPA procedures outline how TVA conducts these environmental reviews. Read more about TVA's NEPA procedures online at: [NEPA Procedures](#).
- **Office of Management and Budget Scorecard** - Executive Order (EO) 13834, "Efficient Federal Operations," states that the Office of Management and Budget (OMB) and the Council on Environmental Quality will coordinate scorecard metrics and reporting instructions to measure agency progress. TVA's Federal Sustainability Report and Implementation Plan addresses key aspects of our federal objectives and targets. We integrate our federal goals into our existing business operations, align with specific federal goals and metrics, and report on our progress. The Executive Order does not include the parts of TVA that directly produce electricity for resale. The Sustainability Report and Implementation Plan (along with an Annual Energy Management Report) are updated annually to report progress on the EO 13834 goals. Learn more about TVA Annual Federal Sustainability Plans at [sustainability.gov/tva](#).
- **Task Force on Climate-Related Financial Disclosures** - The Task Force on Climate-Related Financial Disclosures (TCFD) is an organization formed by the Financial Stability Board (FSB) with the goal of developing a set of voluntary climate-related financial risk disclosures to inform investors, lenders, and insurance underwriters as well as other members of the public about the risk companies face related to climate change. TCFD's efforts are ongoing and TVA continues to monitor, evaluate, and incorporate TCFD recommendations into its public disclosure documents. Read more about TVA's Task Force on Climate-Related Financial Disclosures online at [Task Force on Climate-related Financial Disclosures](#).

## Appendix B

### Guidance Documents

In addition to the disclosures mentioned throughout the document, TVA also develops and updates on a periodic basis the following plans. The following disclosures support the GRI framework.

- Climate Change Adaptation Action Plan**– TVA maintains our Climate Change Adaptation Action Plan as a cohesive part of our major planning processes, which also include our Integrated Resource Plan (IRP) and Natural Resource Plan (NRP). Climate change adaptation planning allows TVA to identify possible impacts to mission achievement, assess potential consequences and ability to mitigate climate change, develop adaptation planning actions, ensure resources are invested wisely, and support the federal government’s leadership role in sustainability. TVA’s current Climate Change Adaptation Action Plan is available online at: [TVA Climate Change Adaptation and Resiliency Plan 2018 Update](#).
- Environmental Policy**– This synergistic and forward-thinking Board Policy lays forth TVA’s plan for environmental stewardship and compliance, technology innovation, and a growing renewable energy portfolio. The goal is to provide cleaner, reliable, and affordable energy to support sustainable growth in the Tennessee Valley and to engage in environmental stewardship in a balanced and ecologically sound manner. Read more about TVA’s Environmental Policy online at: [TVA’s Environmental Policy](#).
- Integrated Resource Plan (IRP)**– Building on TVA’s service commitment, the IRP provides a roadmap for making decisions about how TVA can meet future demand for power in new and innovative ways. Considering costs, environmental factors, reliability, regulations, and energy efficiency, the plan helps determine how TVA’s energy portfolio will look in the future. Read more about TVA’s Integrated Resource Plan online at: [TVA’s Integrated Resource Plan](#).
- Natural Resource Plan (NRP)**– TVA is unique among power generators in that it was created to enhance the economic aspects of its service region, and to fulfill the responsibilities associated with being a good steward of the lands and resources that are entrusted to TVA. The NRP is a strategic level document that, over the next 20 years, will guide the direction of TVA’s natural resource stewardship. The NRP creates a sound framework for balancing land use, human activity, and conservation. As always, the goal is to find the optimal public benefit of each action TVA takes. Read more about the Natural Resource Plan online at: [TVA’s Natural Resource Plan](#).

## Appendix C

### Global Reporting Initiative Metrics

In consideration of the four TVA sustainability focus areas, which support the GRI reporting principles, we have provided a detailed response to GRI indicators in the form of the following GRI Metric Alignment Matrix.

GLOBAL REPORTING INITIATIVE (GRI) ALIGNMENT TO TVA METRICS					
GRI Category Information			Year		
Category	Topic	Key Performance Metric Name	FY 2017	FY 2018	FY 2019
102	General Disclosures	Total number of Board of Director members	6	8	9
102	General Disclosures	Total number of Female Board of Director members	3	1	1
102	General Disclosures	Total number of Minority Board of Director members	2	1	1
102	General Disclosures	Total Number of Employees	10,092	10,023	10,009
102	General Disclosures	Military Share of Workforce (%)	17.47%	18.32%	18.10%
102	General Disclosures	Minority Share of Workforce (%)	11.17%	11.31%	11.80%
102	General Disclosures	Women Share of Workforce (%)	19.01%	20.12%	20.10%
102	General Disclosures	Winning Performance Payout (%)	103%	130%	116%
102	General Disclosures	Training for Career Advancement (hours/employee)	76.92	77.71	73.7
102	General Disclosures	Continuing Education Contributions (\$)	665,753	498,041	443,789
102	General Disclosures	Total Nuclear Generation (GWh)	58,742	64,194	63,433
102	General Disclosures	Total Natural Gas or Oil Fired Generation (GWh)	25,485	32,104	31,704
102	General Disclosures	Total Coal Generation (GWh)	39,019	31,471	27,934
102	General Disclosures	Total Hydro Generation (GWh)	10,967	13,736	16,058
102	General Disclosures	Total Purchased Renewable Generation (GWh)	7,127	7,245	7,840
102	General Disclosures	Federal Sustainability Report Disclosure	SR&IP and AEMR	SR&IP and AEMR	SR&IP and AEMR
102	General Disclosures	Investor Sustainability Report Disclosure	EEI-ESG Industry Working Group	EEI-ESG Industry Pilot	EEI-ESG Industry Template

Category	Topic	Key Performance Metric Name	FY 2017	FY 2018	FY 2019
102	General Disclosures	Customer Carbon Accounting Disclosure	Annual Customer Carbon Accounting	Annual Customer Carbon Accounting	Annual Customer Carbon Accounting
201	Economic Performance	Operating Revenues (\$M)	10,739	11,233	11,318
201	Economic Performance	O & M Expense (\$M)	2,604	2,598	3,090
201	Economic Performance	Non-Fuel Delivered Cost of Power (cents/kWh)	3.10	3.18	3.46
201	Economic Performance	Retail Rate (cents/KWh)	9.17	9.16	9.28
201	Economic Performance	Incremental Annual Electricity Savings from EE (MWh)(CY)	225,753	228,202	32,377
201	Economic Performance	Incremental Annual Investment in Electric EE programs \$(CY)	76,192,000	36,213,000	21,406,000
201	Economic Performance	Operating Cash Flow (\$M)	2,728	3,938	3,720
201	Economic Performance	Net Income (\$M)	685	1,119	1,417
201	Economic Performance	Total Spend (\$M)	4,917	4,353	4,467
201	Economic Performance	Total Financing Obligations (\$B)*	26.0*	24.3*	22.8*
201	Economic Performance	Combined Cycle Seasonal Equivalent Forced Outage Rate (SEFOR)	3.20%	1.60%	7.50%
201	Economic Performance	Coal Seasonal Equivalent Forced Outage Rate (SEFOR)	14.50%	12.50%	12.70%
201	Economic Performance	Nuclear Unit Capability Factor	90.70%	91.30%	89.80%
201	Economic Performance	Load Not Served (System Minutes)	4.3	3.3	3.7
201	Economic Performance	Reliability Rating (Transmission System) (%)	99.999%	99.999%	99.999%
201	Economic Performance	Inventory Value—Materials and Supplies Inventory (\$M)	734	725	742
201	Economic Performance	External Nuclear Performance Indicators	90.7%	91.3%	89.8% (UCF)
201	Economic Performance	Total Annual Capital Expenditures (\$M)	\$2,153	\$1,759	\$1,700
201	Economic Performance	Coal Equivalent Availability Factor	64.5%	61.9%	65.2%
201	Economic Performance	Combined Cycle Equivalent Availability Factor	82.4%	80.1%	84.6%
201	Economic Performance	Economic Development - Capital Investment in the Valley (\$B)	8.3	11.3	8.9
203	Indirect Economic Impacts	Jobs Created or Retained (#)	70,076	65,423	66,572
203	Indirect Economic Impacts	Flood Management: Avoided Flood Damage (\$M)	\$260	\$260	\$1,600
203	Indirect Economic Impacts	Total Acres of Habitat Protected (# acres)	247,706	247,706	247,706
204	Procurement Practices	Supplier Diversity: Total Diverse Business Spend (\$M)	390	445	395
204	Procurement Practices	Supplier Diversity: Diverse Business Utilization (%)	12.00%	15.10%	13.70%
204	Procurement Practices	Supplier Diversity: Total Small Business Spend (\$M)	1,000	822	766
204	Procurement Practices	Supplier Diversity: Small Business Utilization (%)	29.00%	27.80%	26.60%
204	Procurement Practices	Supplier Diversity: Total Valley Business Spend (\$B)	2.7	2.2	2.0
204	Procurement Practices	Valley Spend Utilization (%)	80%	74.30%	68.80%
301	Materials	Waste: Coal Combustion Products Beneficially Used (%) (CY)	41%	38%	45% *****
302	Energy	Performance Contracting - Investment Value (\$M)	\$3.98	\$5.40	\$4.91
302	Energy	Sustainable Buildings Progress (% reduction from baseline: GSF)	4.80%	5.10%	22.00%
302	Energy	Building Energy Intensity Progress (% reduction from FY2003: Btu/GSF) (EO 13834)	36.90%	62.60%	64.30%
302	Energy	Building Renewable Energy Use (% renewable sources) (EO 13834)	13.10%	18.00%	18.30%
303	Water and Effluents	Building Potable Water Intensity Progress (% reduction from FY2007: Gal/GSF) (EO 13834)	28.20%	31.60%	36.90%
303	Water and Effluents	Water Supply: Freshwater Consumption Rate (All Generation) (Billions of Liters/Net MWh)(CY)	0.0000006	0.0000007	0.0000006
303	Water and Effluents	Water: Total Water Withdrawal-non consumptive (Billions of Liters/Net MWh) (CY))	0.0001001	0.0000978	0.0001116
305	Emissions	Clean Energy (Power from carbon-free sources delivered) (%)	50%	52%	54%
305	Emissions	Scope 1 and 2 GHG Emissions (% reduction from FY2008)	36.10%	41.00%	41.60%
305	Emissions	Scope 3 GHG Emissions (% reduction)	29.50%	29.60%	31.97%

\*Please see Appendix E for Regulation G Reconciliations.

\*\*\*\*\* The data was updated from 41% to 45% due to a calculation error discovered 8/2020.

Category	Topic	Key Performance Metric Name	FY 2017	FY 2018	FY 2019
305	Emissions	CLIMATE: TVA CO2 Tons from Owned Generation (metric tons) reported in CY	51,082,818	47,521,550	43,090,822
305	Emissions	CLIMATE: TVA Emissions (Owned CO2 Tons/GWh)	416	360	307
305	Emissions	CLIMATE: CO2 Emissions rate - System TVA Scope 2 CO2 Emissions Rate (Owned and Purchased lbs/MWh) reported in CY	850.91	825.09	741.66
305	Emissions	CLIMATE: TVA CO2e Scope 1 Emissions (metric tons) (CY)	56,473,166	47,720,320	43,696,845
305	Emissions	CLIMATE: TVA CO2e Scope 2 Emissions (metric tons) (CY)	227,277	208,159	200,153
305	Emissions	CLIMATE: TVA CO2e Scope 3 Emissions (metric tons) (CY)***	2,617,751	72,095.60	73,994.45
305	Emissions	Air: TVA SO2 Emissions (metric tons) (CY)	42,741	26,744	26,972
305	Emissions	Air: TVA NOx Emissions (metric tons) (CY)	27,443	21,451	19,430
305	Emissions	Air: TVA Mercury Emissions (kg) (CY)	79.4	67.7	50.1
306	Effluents and Waste	Non-hazardous Municipal Solid Waste Diversion (% diverted / recycled)**	7.00%	5.42%	4.53%
306	Effluents and Waste	Waste: Low-level radioactive waste disposal rate (ft3/MWh)	0.00172640	0.00252050	0.0033666
306	Effluents and Waste	Waste: Amount of Hazardous Waste Disposed (MT) (CY)	117.43	52.44	93.67
307	Environmental Compliance	Compliance: Notice of Violations (NOV)	3	1	4
403	Occupational Health and Safety	Safe Workplace (RIR)	0.39	0.34	0.44
403	Occupational Health and Safety	Lost Time Case Rate (OSHA)	0.08	0.12	0.00
403	Occupational Health and Safety	Days Away, Restricted, and Transfer (DART) rate (OSHA)	0.2	0.25	0.00
403	Occupational Health and Safety	Serious Injury Incident Rate (SIIR)	0.03	0.05	0.06
403	Occupational Health and Safety	Work-related Fatalities	0	0	0
413	Local Communities	Environmental & Community Engagement (# Group activities)	617	598	805
413	Local Communities	Environmental & Community Engagement (# Children participating)	9,207	11,650	10,325
413	Local Communities	Stakeholder Survey (%)****	81.8%	81.4%	80.0%
413	Local Communities	Customer Loyalty (VOC Survey Results)****	70.30%	72%	71.3
413	Local Communities	Media Tone (Positive and Neutral)****	90.00%	90.30%	89.3.%
414	Supplier Social Assessment	Sustainable Acquisition Progress – Obligations in Dollars containing Statutory Environmental Requirements (% of contract dollars with environmental clauses)	95.00%	68.50%	93.70%

\*\* Does not include construction and demolition waste.

\*\*\* These are partial scope 3 CO2e rates.

\*\*\*\* Three-year average, not annual value.

## Appendix D

### Acronyms List

**ABLED:** Awareness Benefitting Leader & Employees about Disabilities

**ACRS:** Advisory Committee on Reactor Safeguards

**ACTION:** Asian Collaboration Team

**AEMR:** Annual Energy Management Report (Federal)

**AGA:** American Gas Association

**ASLB:** Atomic Safety and Licensing Board

**BES:** Battery Energy Storage

**CCR:** Coal Combustion Residuals

**CDP:** Carbon Disclosure Project

**CEA:** Controlled Environmental Agriculture

**CEO:** Chief Executive Officer

**CERCLA:** Comprehensive Environmental Response, Compensation, and Liability Act

**CEQ:** Center for Environmental Quality

**CES:** Clean Energy Standard

**CIP:** Critical Infrastructure Protection

**CO<sub>2</sub>:** Carbon Dioxide

**CRO:** Chief Risk Officer

**CSO:** Chief Sustainability Officer

**CSR:** Corporate Social Responsibility

**CY:** Calendar Year

**DER:** Distributed Energy Resources

**DHS:** U.S. Department of Homeland Security

**DOE:** Department of Energy

**DSS:** Distributed Solar Solutions

**EI:** Edison Electric Institute

**EIS:** Environmental Impact Statement

**EMCB:** Energy Management Circuit Breaker

**EMP:** Electromagnetic Pulse

**EO:** Executive Order

**EPA:** Environmental Protection Agency

**EPRI:** Electric Power Research Institute

**ERC:** Enterprise Risk Council

**ERC:** Environmental Research Center

**ERG:** Employee Resource Group

**ERM:** Enterprise Risk Management

**ESA:** Endangered Species Act

**ESG:** Environmental, Social, and Governance

**ESP/ESPA:** Early Site Permit/Assessment

**EV:** Electric Vehicles

**FACA:** Federal Advisory Committee Act

**FBI:** Federal Bureau of Investigation

**FERC:** Federal Energy Regulatory Commission

**FESP:** Federal Energy Services Program

**FISMA:** Federal Information Security Management Act

**FPA:** Federal Power Act

**FPC:** Federal Power Commission

**FSB:** Financial Stability Board

**FY:** Fiscal Year

**GAAP:** Generally Accepted Accounting Principles

**GAC:** Grid Access Charge

**GAO:** Government Accountability Office

**GHG:** Greenhouse Gas

**GIC:** Geomagnetic Induced Current

**GRI:** Global Reporting Initiative

**HUB:** Historically Underutilized Businesses

**IoT:** Internet of Things

**IP:** Internet Protocol

**IRP:** Integrated Resource Plan

**KUB:** Knoxville Utilities Board

**kV:** Kilovolt

**kW:** Kilowatt

**kWh:** Kilowatt Hours

**LPC:** Local Power Company

**LRA:** Local Rate Adjustment

**MW:** Megawatt

**NEPA:** National Environmental Policy Act

**NERC:** North American Electric Reliability Corporation

**NGO:** Non-Governmental Organization

**NHPA:** National Historic Preservation Act

**NOX:** Nitrogen oxide

**NRC:** Nuclear Regulatory Commission

**NRP:** Natural Resource Plan

**O&M:** Operations and Maintenance

**OIG:** Office of the Inspector General

**OMB:** Office of Management and Budget

**ORNL:** Oak Ridge National Laboratory

**PPA:** Power Purchase Agreement

**RCRA:** Resource Conservation and Recovery Act

**REC:** Renewable Energy Certificate

**RFC:** River Forecast Center

**ROP:** Reservoir Operating Policy

**RTO:** Regional Transmission Organization

**SEC:** Securities and Exchange Commission

**SER:** Safety Evaluation Report

**SMR:** Small Modular Reactor

**SO<sub>2</sub>:** Sulfur dioxide

**SOC:** System Operations Center

**SOX:** Sarbanes-Oxley

**SR&IP:** Sustainability Report and Implementation Plan (Federal)

**STEAM:** Science, Technology, Engineering, Art, and Mathematics

**STEM:** Science, Technology, Engineering, and Mathematics

**TCFD:** Task Force on Climate-Related Financial Disclosures

**TEMA:** Tennessee Emergency Management Agency

**TVA:** Tennessee Valley Authority

**TVARS:** Tennessee Valley Authority Retirement System

**TVIC:** Tennessee Valley Industrial Committee

**TVPPA:** Tennessee Valley Public Power Association

**UESC:** Utility Energy Services Contracts

**US-CERT:** United States Computer Emergency Readiness Team

**USFWS:** United States Fish and Wildlife Service

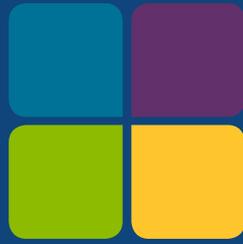
**UTIA:** University of Tennessee Institute of Agriculture

## Appendix E

### Regulation G Reconciliations

	September 30, 2019	September 30, 2018	September 30, 2017
Total outstanding debt	\$ 22,197	\$23,639	\$25,253
Exchange gain	191	147	125
Unamortized discounts, premiums, issue costs and other	139	154	163
Notes payable	(23)	(69)	(122)
Debt of variable interest entities	(1,137)	(1,175)	(1,211)
<b>Bonds and Notes, Gross</b>	<b>\$21,367</b>	<b>\$22,696</b>	<b>\$24,208</b>
Energy prepayment obligations		10	110
Notes payable	23	69	122
Leaseback obligations	263	301	339
Membership interests of variable interest entity subject to mandatory redemption	28	30	32
Debt of variable interest entities	1,137	1,175	1,211
<b>Total Debt and Other Financing Obligations, Gross ("TFO")</b>	<b>\$22,818</b>	<b>\$24,281</b>	<b>\$26,022</b>
Cash and Cash Equivalents	(299)	(299)	(300)
<b>Total Debt and Other Financing Obligations, Gross ("TFO"), net of Cash and Cash Equivalents</b>	<b>\$22,519</b>	<b>\$23,982</b>	<b>\$25,722</b>

Note numbers may be adjusted for rounding



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