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# Building TVA's Future Energy System

Rebecca Tolene

TVA Vice President of Environment  
and Chief Sustainability Officer

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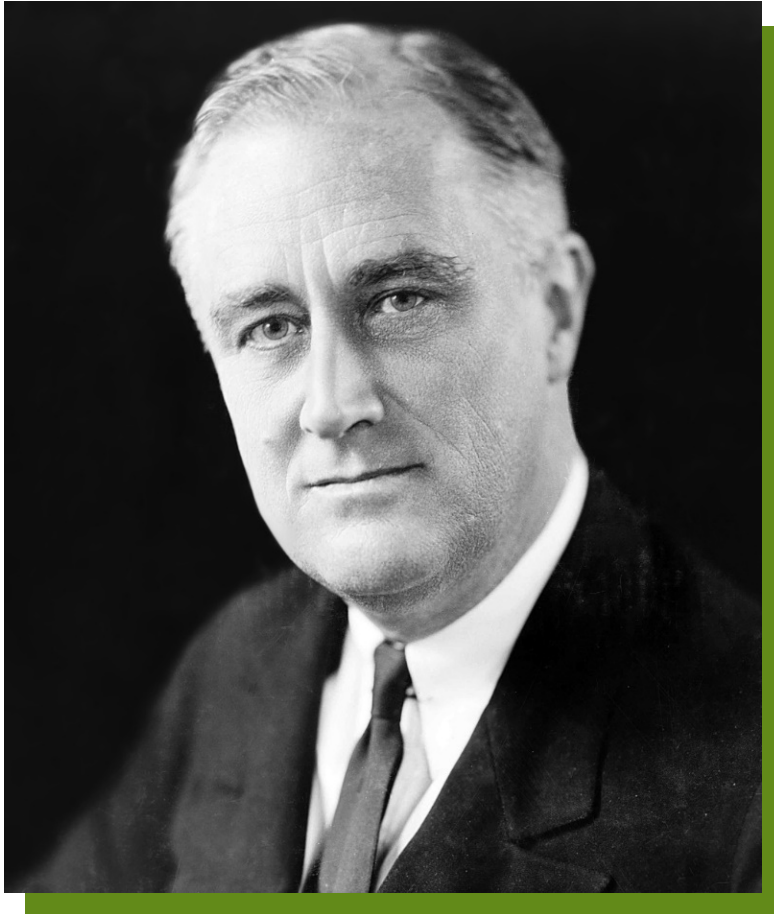
# TVA Overview

- Founded in 1933 as part of the New Deal
- Non-profit Federal Corporation, the nation's largest Public Power provider
- 10,000 + Employees, 18% Veteran
- Aspire to be Net Zero Carbon by 2050
- Manages 290k+ acres of public land
- Manages the Tennessee River System to minimize flood damage and for recreation, water quality and navigation
- In the Tennessee Valley, Economic Development with partners resulted in 341,000 jobs over \$45.4B in investment (last 5 years)



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## Improve Standards of Living



“ Power is really a secondary matter...TVA is primarily intended to **change** and to **improve** the standards of living of the people... ”

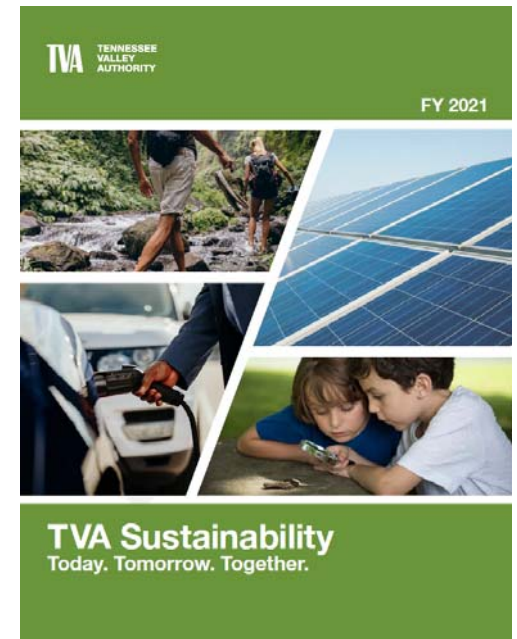
*-President Franklin D. Roosevelt*

# 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.*

- Our sustainability objectives align with the United Nations' [Sustainable Development Goals](#) and the [Global Reporting Initiative](#) standards.
- Focus areas:
  - **Aspiring to Achieve Net-Zero**
  - **Economic Impact:** Partnering to Build the Region's Clean Energy Economy
  - **Environment:** Stewarding the Region's Resources
  - **Social:** Serving People and Communities Across the Region
  - **Governance:** Driving Progress through Accountability and Transparency

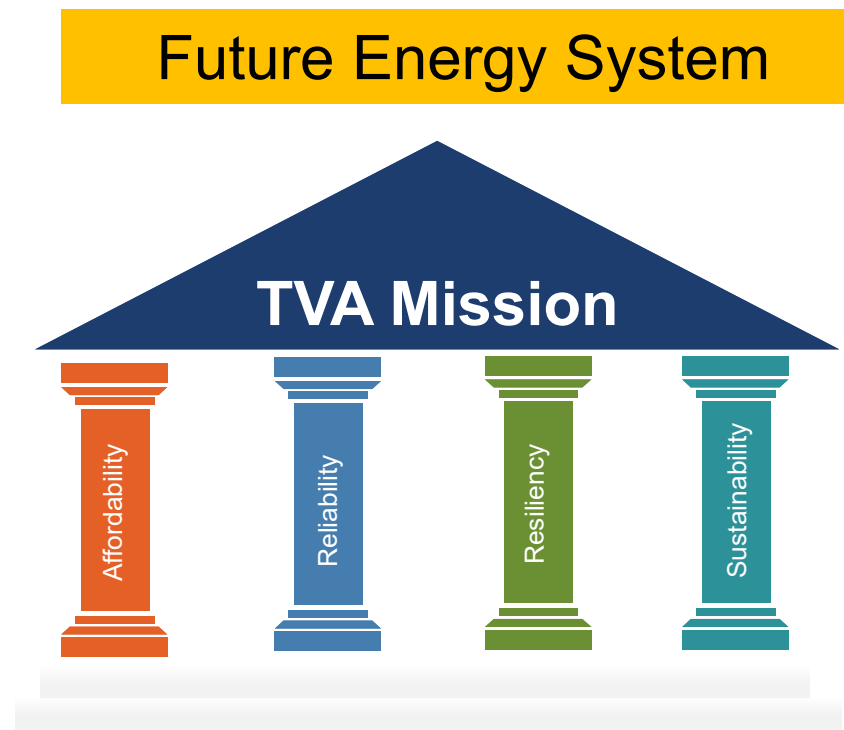


[tva.com/sustainability](https://www.tva.com/sustainability)

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# Meeting Electricity Demand

And The Four Pillars



# TVA Decarbonization Initiative

Carbon Reduction  
Leadership

**57%**  
by end of CY 2021

Our Plan  
**70%**  
by 2030

Our Path  
**~80%**  
by 2035

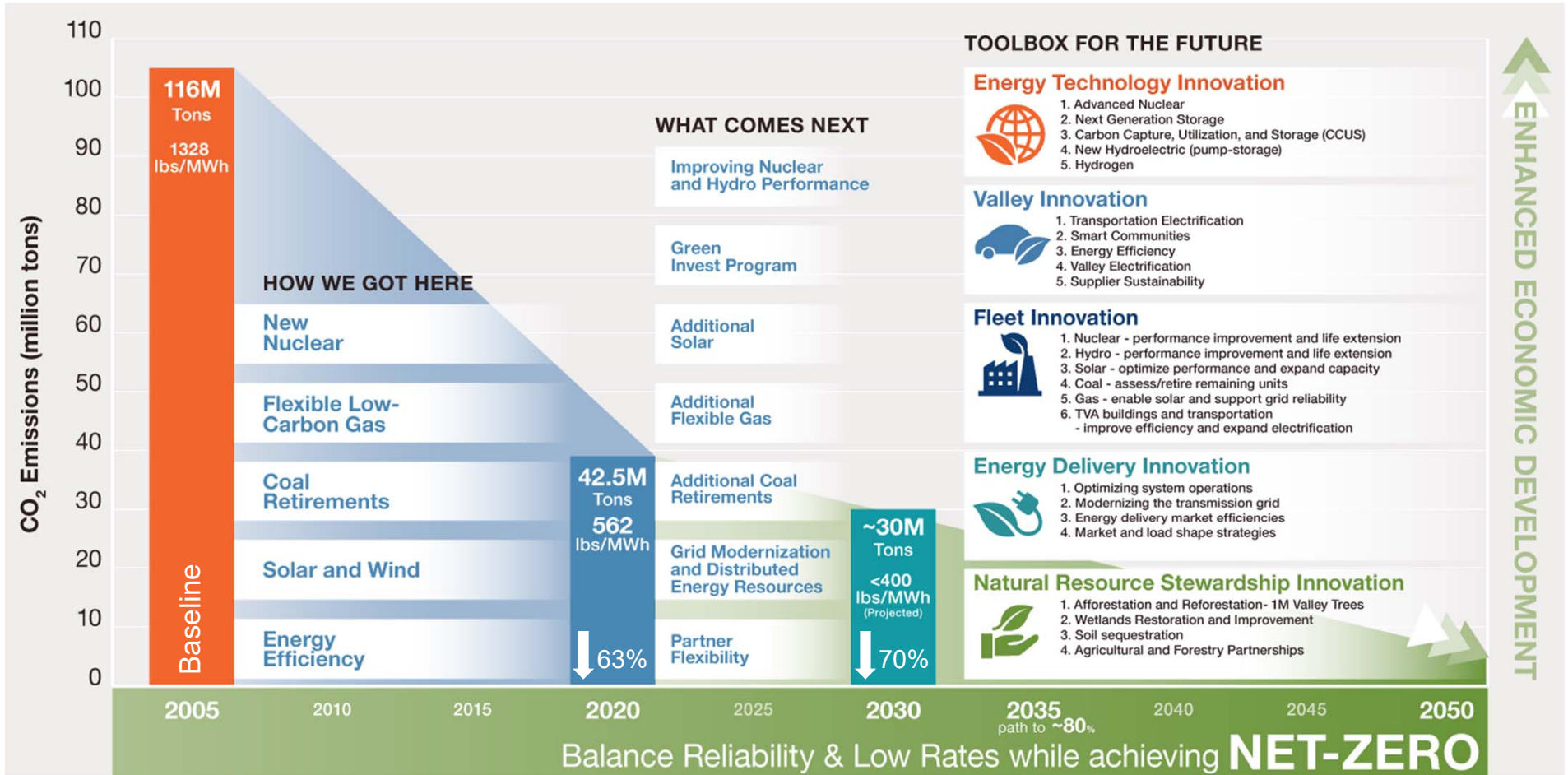
Our Aspiration  
**Net-Zero**  
by 2050

## 2021 Performance

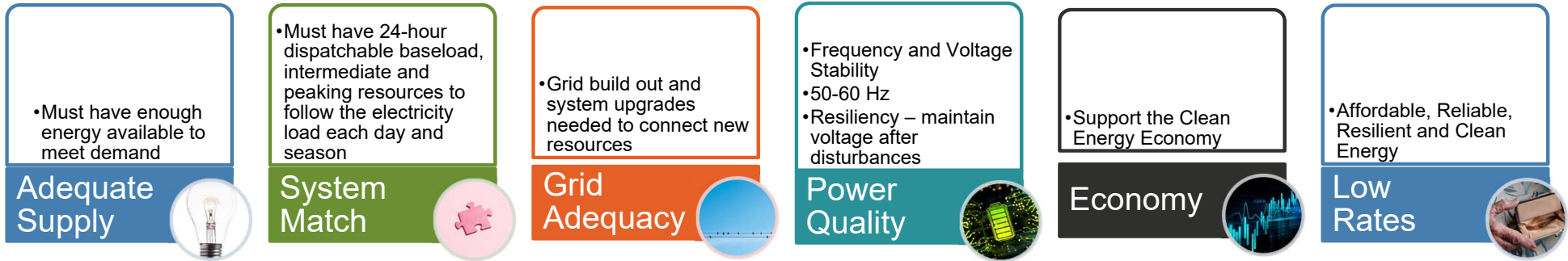
- **System Emissions Intensity was 638 lbs/MWh, 52% less than 2005**
- **Mass emissions were 57% less than 2005**
- **22 consecutive years of 99.999% reliability**
- **For comparison,**
  - **National average CO2 emission rate is 818 CO2 lbs/MWh\* (28% higher than TVA)**
  - **Regional average CO2 emission rate is 834 CO2 lbs/MWh\* (31% higher than TVA)**

eGrid emissions rates available on <https://www.epa.gov/egrid/egrid-2020-summary-tables>.

# TVA's Decarbonization Journey



# TVA Power System Challenges and Opportunities



- Load growth – current increasing load demand from demographic change – primarily in Tennessee
- Electrification
- Daily load peaks
- Transmission and energy inertia and voltage issues
- Battery technology and cost
- SMR / new-nuclear technology
- Gas – need for a bridge technology with less carbon emissions
- Carbon capture – what about storage or use
- Permitting new facilities
- Hydrogen at commercial scale
- Land use issues vs. solar or other new technologies
- New and existing **waste** streams and life cycle costs of new tech

# TVA Transformative Innovation Initiatives

Develop feasible technology pathways to achieve the next phases of carbon reductions and offsets



DECARBONIZATION  
OPTIONS

Expand smart technologies with communities to manage energy and services



CONNECTED  
COMMUNITIES

Develop a reliable, affordable, flexible, and clean generation option with cost and risk shared



ADVANCED  
NUCLEAR  
SOLUTIONS

Develop an interconnected, intelligent grid able to reliably deliver power as it evolves



REGIONAL GRID  
TRANSFORMATION

Implement a long-term strategy to integrate energy storage for system flexibility and maximizing renewables



STORAGE  
INTEGRATION

Enable adoption of electric vehicles in the Valley to create load growth and benefits for citizens



ELECTRIC  
VEHICLE  
EVOLUTION

**6**  
**Initiatives**

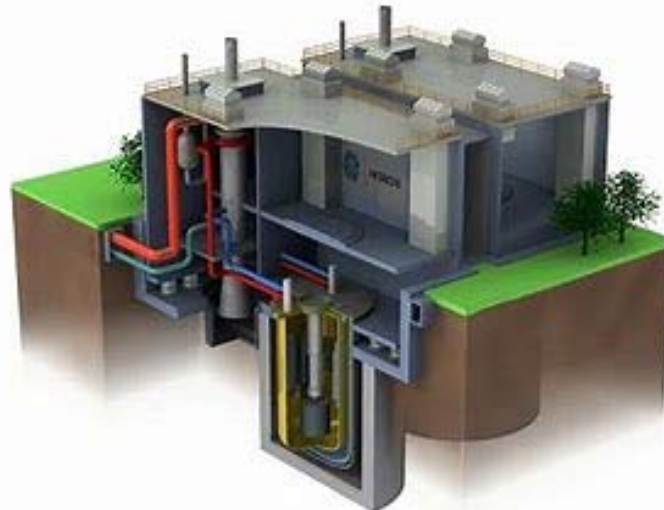
# Advanced Nuclear Solutions Initiative

Nuclear

## TVA Unveils Major New Nuclear Program, First SMR at Clinch River Site

The Tennessee Valley Authority (TVA) will invest in a major program that will explore the construction of multiple advanced nuclear reactors—starting with a GE-Hitachi BWRX-300 small modular reactor (SMR) at its Clinch River site in Tennessee.

TVA Board members during a meeting on Feb. 10 unanimously approved TVA's "New Nuclear Program," a broad new initiative that the utility describes as a "disciplined, systematic 'roadmap' for TVA's exploration of



### Small Modular Reactors

- Zero Carbon Emissions
- Benefits of nuclear with lower capital cost
- Operational Flexibility & Grid Stability
- Price Stability
- Little or no fuel cycle risk
- Smaller footprint and reduced emergency planning zone

# TVA's Storage Integration Initiative

Implement a long-term strategy to integrate energy storage for system flexibility and maximizing renewables



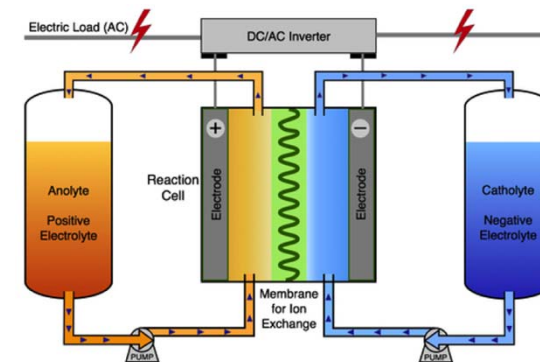
TVA's Vonore Battery Energy Storage System (BESS)



TVA's Raccoon Mountain Pump Storage Facility

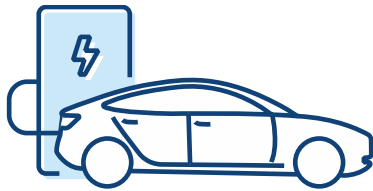


Gravity Storage



Flow Battery

# TVA Electric Vehicle Evolution Initiative [www.tva.gov/EV](http://www.tva.gov/EV)



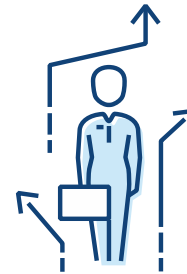
## Charging Infrastructure Availability

- Remove “range anxiety”
- Foundational EV charging network
- Partner with Local Power Companies (LPCs)



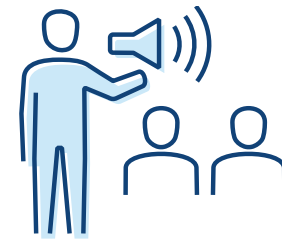
## EV Availability and Offerings

- Partner with automakers and fleets
- Support making a wide range of EVs available



## Innovative and Supportive Policies

- Remove utility policy or pricing barriers
- Craft policies and pricing that encourage investment and enable a market

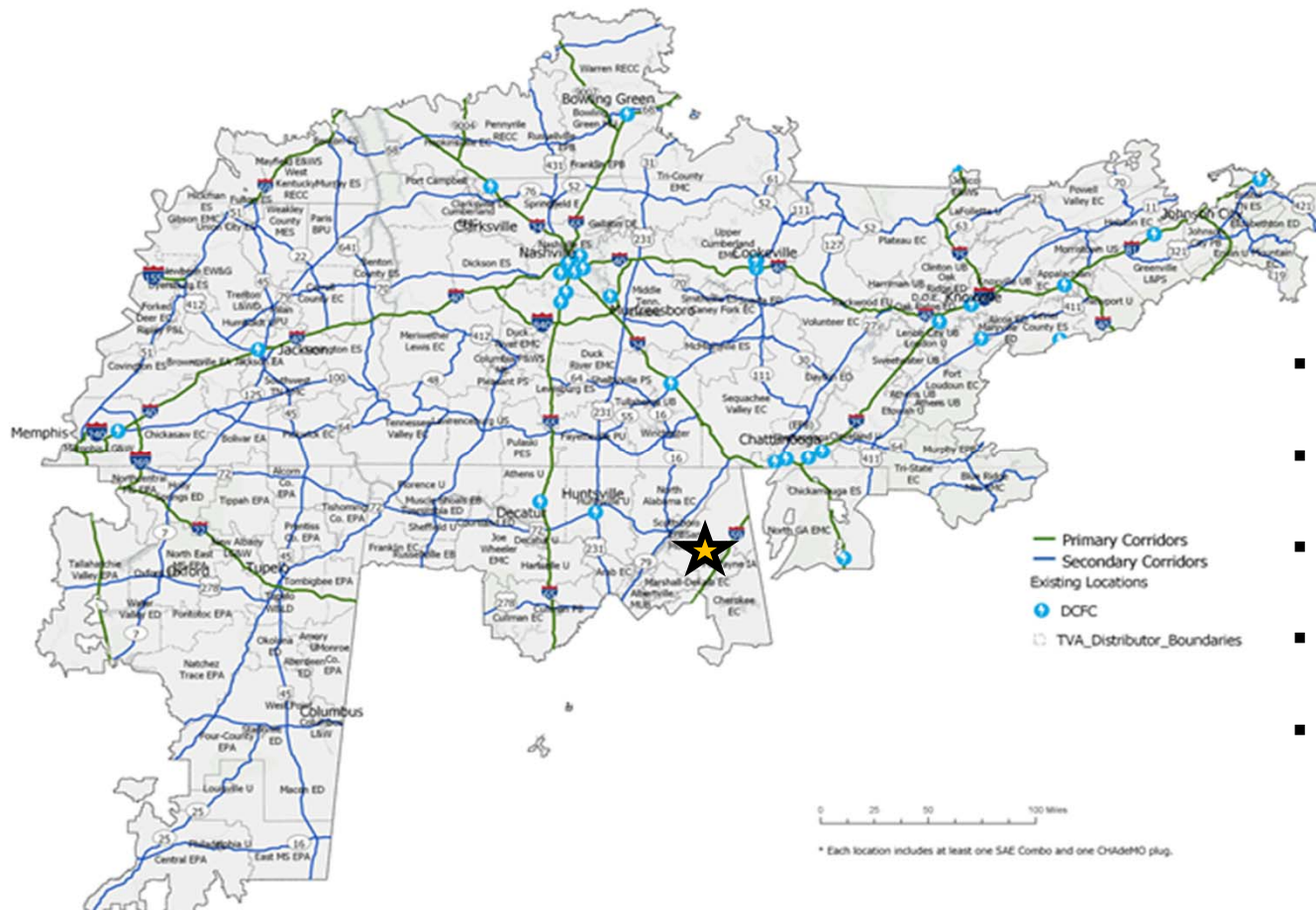


## Consumer Awareness

- Help consumers make sound choices
- Educate, inform, and promote while lifting TVA and LPC brands

Removing market barriers in key areas

# Fast Charge Network Program Rollout



- Reduce consumer range anxiety
- Fast chargers every 50 miles
- TDEC partnership launched
- Partnerships with local power companies
- Completing through 2025

# TVA Connected Communities Initiative

A Connected Community uses data and technology to offer new and improved services to its people and businesses.



**Faster and more accessible internet**

for all

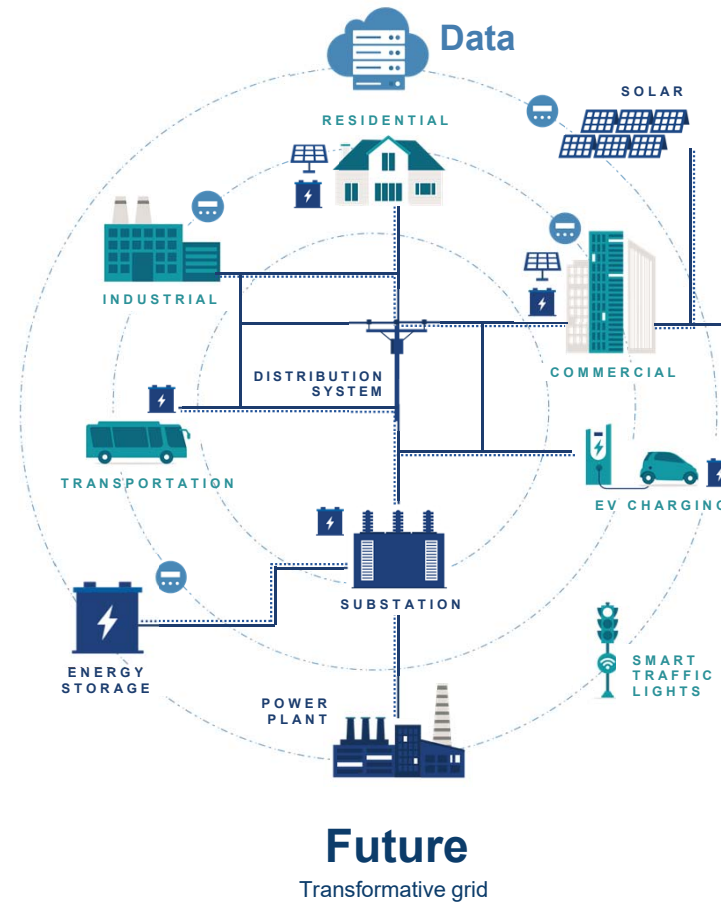
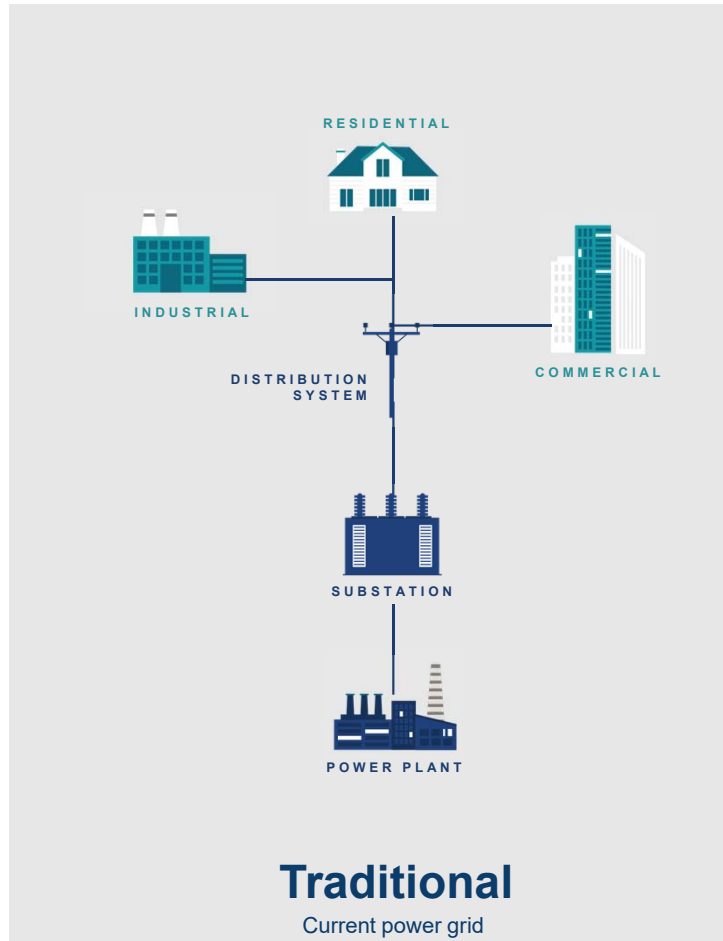
**More information**  
at your fingertips

**Access to education** and  
training programs

**Grid-interactive**  
buildings and  
resources

**Government modernization**  
through digitization

# Regional Grid Transformation Initiative



# Building the Integrated and Reliable Grid of Tomorrow

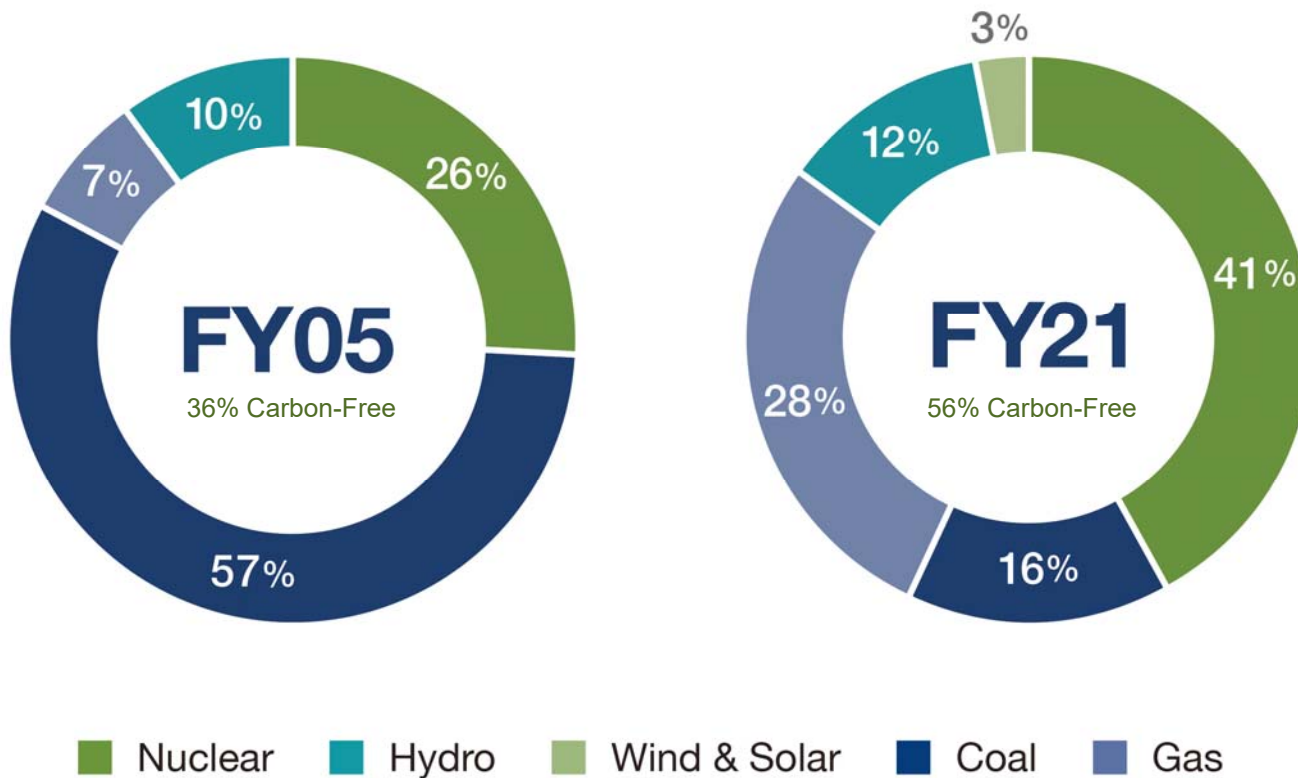
Enhanced reliability and resiliency with estimated capital investments of nearly \$1.5 billion in transmission improvements over the next three years.

This includes a \$289 million investment in a new System Operations Center, and

\$90 million in a new Energy Management System



# TVA Energy Portfolio



## INCREASE SOLAR

10,000 MW by 2035



## Electric Vehicles 200,000

on the road by 2028



## REDUCE CARBON

70% by 2030  
-80% by 2035

\*Chart depicts both generated and purchased power within respective resource types. In addition to power supply sources included here, TVA offers energy efficiency programs that effectively reduced FY 2021 energy needs by about 2,300 GWh or 1.4%. TVA sells the renewable energy certificates resulting from some of its purchased power to certain customers.



**TVA** TENNESSEE  
VALLEY  
AUTHORITY

Thank you