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# 2024 IRP Working Group

Meeting 11: June 24-25, 2024  
Nashville, TN

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# Welcome and Safety Moment

Jo Anne Lavender; IRP Facilitator

# Safety Moment

## EMERGENCY ACTIONS

### In case of Building Emergency

**Exit right out of the conference room doors, go down the hall and down the stairs to the lobby, and gather in the parking lot**

### In case of Severe Weather

**Exit right out of the conference room doors, go down the hall and down the stairs to the basement**



# Agenda – June 24, 2024

Topic	Time (CT)	Presenter(s)	Notes
Lunch	11:00-12:00		
Welcome	12:15-12:30	Jo Anne Lavender	
Opening Remarks	12:30-12:45	Hunter Reed; Althea Jones	General project updates
NEPA Overview and IRP EIS	12:45-1:45	Susan Jacks; Kelly Baxter	Overview of NEPA, TVA's implementation of NEPA, and NEPA EIS process for the IRP
Break	1:45-2:00		
Reference Case with GHG rule Scenario Forecasts	2:00-3:30	John Collins; Bob Roth; Nathan Mathis	Forecasts for new, sixth scenario: Reference Case with Greenhouse Gas Rule
Break	3:30-3:45		
Sensitivities Process Overview and Update	3:45-4:30	Daniel Woolley	Update on sensitivities, including initial list of select cases to be evaluated
Wrap-up	4:30-4:45	Jo Anne Lavender	
Off-site dinner	6:00-8:00		

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# Opening Remarks

Hunter Reed; IRP Project Manager

Althea Jones; Director, Public and Community Engagement

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# IRP On-going Efforts

Implementing modeling refinements to existing results.

Reviewed final EPA Greenhouse Gas Rule and created a new, sixth scenario: Reference Case with Greenhouse Gas Rule (scenario 6).

Finalizing updates with NREL for the greenhouse gas lifecycle analysis (SMR, CCS, and hydrogen emission factors).

Begun research and initial setup for select sensitivities, with the potential to include a small number in the Draft IRP.

# IRP Scenarios and Strategies

## SCENARIOS



### Reference Case

Represents TVA's current forecast that reflects moderate population, employment, and industrial growth, weather-normal trends, growing electric vehicle use, and increasing efficiencies



### Higher Growth Economy

Reflects a technology-driven increase in U.S. productivity growth that stimulates the national and regional economies, resulting in substantially higher demand for electricity



### Stagnant Economy

Reflects rising debt and inflation that stifle consumer demand and business investment, resulting in weaker than expected economic growth and essentially flat electricity demand



### Carbon Regulation

Reflects the impact of May 2023 proposed greenhouse gas rules that target significant reductions in electric utility CO<sub>2</sub> emissions beginning in 2030 and potential future regulations striving for net zero by 2050



### Carbon Regulation Plus Growth

Reflects impact of proposed and potential future regulations along with substantial advancements in clean energy technologies, spurring economic growth and extensive electrification



### Reference Case with Greenhouse Gas Rule

Reflects TVA's current forecast and incorporates the impact of greenhouse gas rules finalized in May 2024 that target significant reductions in electric utility CO<sub>2</sub> emissions beginning in 2030

## STRATEGIES



### Baseline Utility Planning

Represents TVA's current outlook based on least-cost planning, incorporating existing programs and a planning reserve margin target. This reserve margin target applies in all strategies



### Carbon-free Innovation Focus

Emphasizes and promotes emerging, firm and dispatchable carbon-free technologies through innovation, continued research and development, and strategic partnerships



### Carbon-free Commercial Ready Focus

Emphasizes proven carbon-free technologies like wind, solar, and storage, at both utility-scale and through customer partnerships, along with strategic transmission investment



### Distributed and Demand-side Focus

Emphasizes existing and potentially expanded customer partnerships and programmatic solutions to reduce reliance on central station generation and promote virtual power plants



### Resiliency Focus

Emphasizes smaller units and the promotion of storage, along with strategic transmission investment, to drive wider geographic resource distribution and additional resiliency across the system

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# IRP Next Steps

TVA will be presenting an IRP update at the July 16 Regional Energy Resource Council (RERC) meeting in Knoxville, TN (open to the public, including a live stream option); planned topics include:

- Scenario and Strategy Updates
- Expansion Resource Assumptions
- Stakeholder Engagement Updates
- Discussion and development of a formal advice statement

On July 18 at 6:00 pm CT TVA will host a virtual public webinar to review the same general topics as the RERC meeting.



# Regional Energy Resource Council (RERC)

Created by TVA in 2013 “to provide advice on its energy resources and the priorities among competing objectives and values” in compliance with the Federal Advisory Committee Act of 1972

RERC provides advice on TVA’s energy resources and the priorities among competing objectives and values.

Advice is reported to TVA Board’s External Stakeholders and Regulation Committee.

Term of the Council is two years, with two meetings per year typically.

Membership on the Council is diverse and balanced to ensure a broad range of views.



# RERC Term 6 Members

**Jan Berry**

Citizens Climate Education

**Marquita Bradshaw**

Sowing Justice

**Ron Bunch**

Bowling Green Chamber of Commerce

**Monte Cooper**

Jackson Energy Authority

**Erin Gill \***

Knoxville Utilities Board

**Rebecca Goodman**

Commonwealth of Kentucky

**Rodney Goodman**

Habitat for Humanity

**Chassen Haynes**

Ford Motor Company

**Chrissy Heard**

State of Mississippi

**Chelsea Jenkins**

Commonwealth of Virginia

**Candy Johnson**

Urban League of Greater  
Chattanooga

**Sen. Steve Livingston**

State of Alabama

**Pete Mattheis**

Tennessee Valley Industrial  
Committee

**Dan Miller**

Oak Ridge National Laboratory

**Doug Peters**

Tennessee Valley  
Public Power Association

**Boyd Pettit**

State of Georgia

**Erik Schmidt**

City of Chattanooga

**Patricia Sims**

Drake State Community &  
Technical College

**Alexa Voytek**

State of Tennessee

**Julie Woosley**

State of North Carolina

**\* RERC Council Chair**

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# NEPA Overview and IRP EIS

Susan Jacks; General Manager, Environmental Resource Compliance  
Kelly Baxter; IRP NEPA Project Manager

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# Overview of the National Environmental Policy Act (NEPA)

Susan Jacks; General Manager, Environmental Resource Compliance

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# What is the National Environmental Policy Act (NEPA)?



NEPA is a federal law that requires federal agencies to consider the potential environmental consequences of their proposals, to consult with other interested agencies, to document the analysis, and to engage stakeholders by sharing information and soliciting input.

A NEPA environmental review is intended to inform agency decision-making and must be completed prior to taking an action.

Signed into law on January 1, 1970, NEPA was the first major environmental law in the United States and is often called the "Magna Carta" of Federal environmental laws.

Congress also enacted NEPA to establish a national policy for the environment, and the Council on Environmental Quality (CEQ).

# When are NEPA reviews required?

NEPA requirements are involved with activities where a federal agency is funding, authorizing, or implementing a project including:

- Making decisions on permit applications
- Adopting federal land management actions
- Constructing highways and other facilities

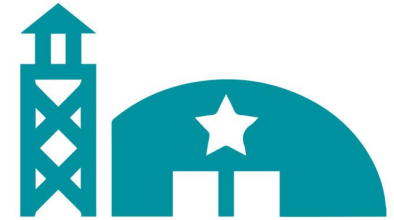
Policies developed by agencies



**Airports**



**Buildings**



**Military Complexes**



**Highways**



**Parkland Purchase**



**Other proposed federal activities**

NEPA does not apply to actions by a state or local government or private entity if those actions do not require federal review, approval, or money although many states have adopted similar state-level processes akin to NEPA.

# What is the intent of NEPA?



## Transparency

Disclose to the public plans to build or fund certain projects.



## Informed Decision Making

Conduct an evaluation of the project and relay the results to the public.



## Public Input

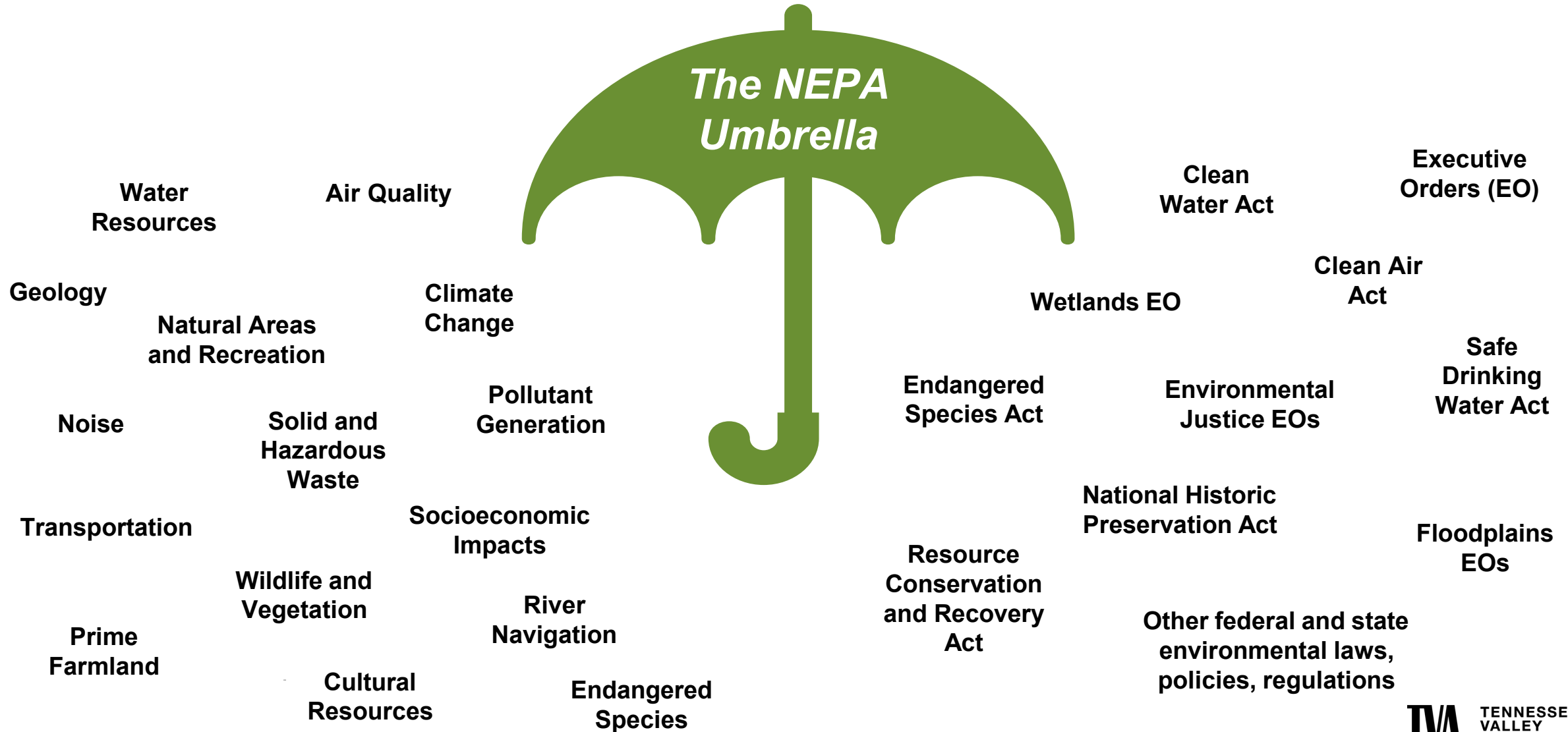
Elicit and consider public input.



## Accountability

Third parties utilize the courts to hold the government accountable for NEPA.

# What areas of study are in a typical NEPA review?





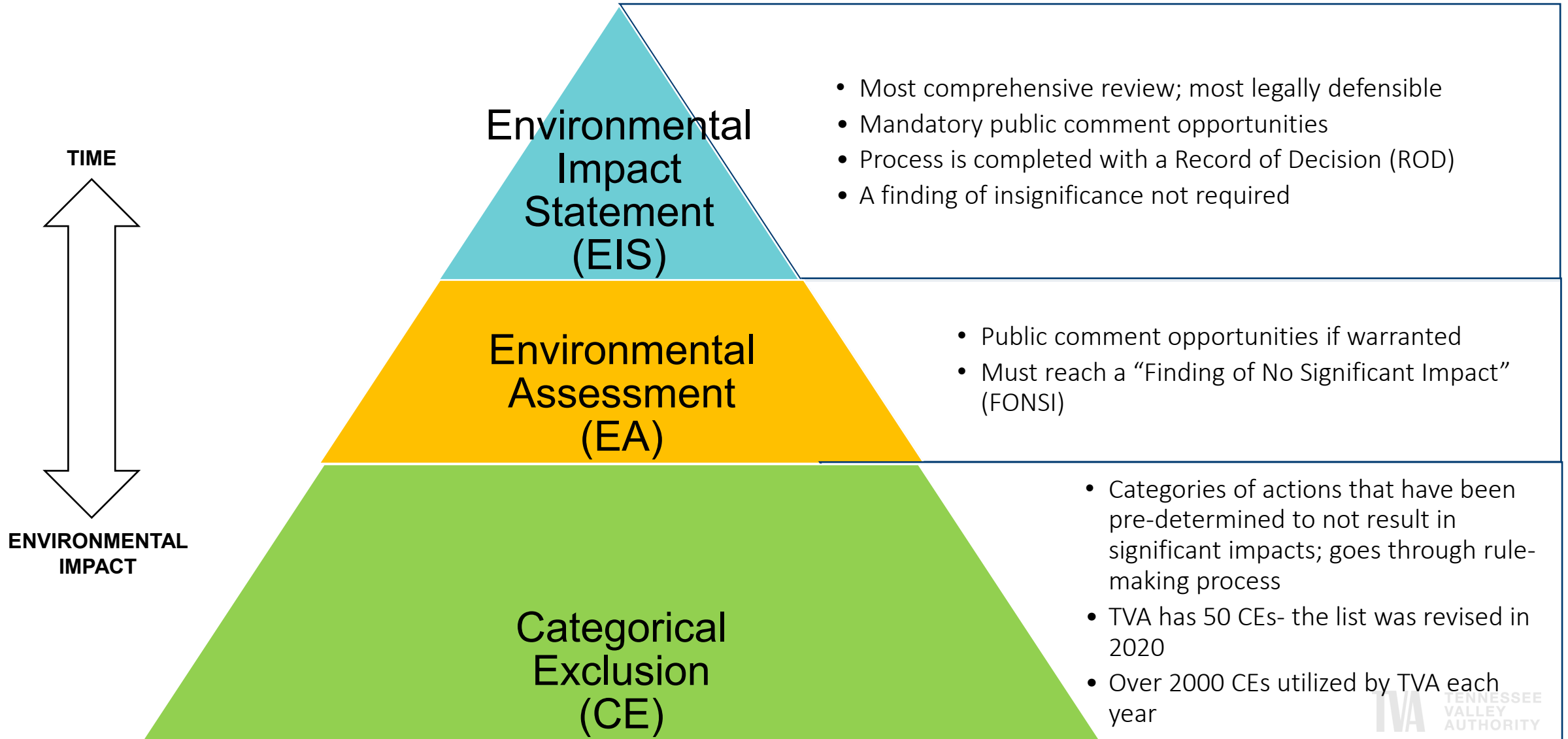
# Who is involved in a TVA NEPA review?

**The environmental review requires collaboration with multiple internal business partners.**

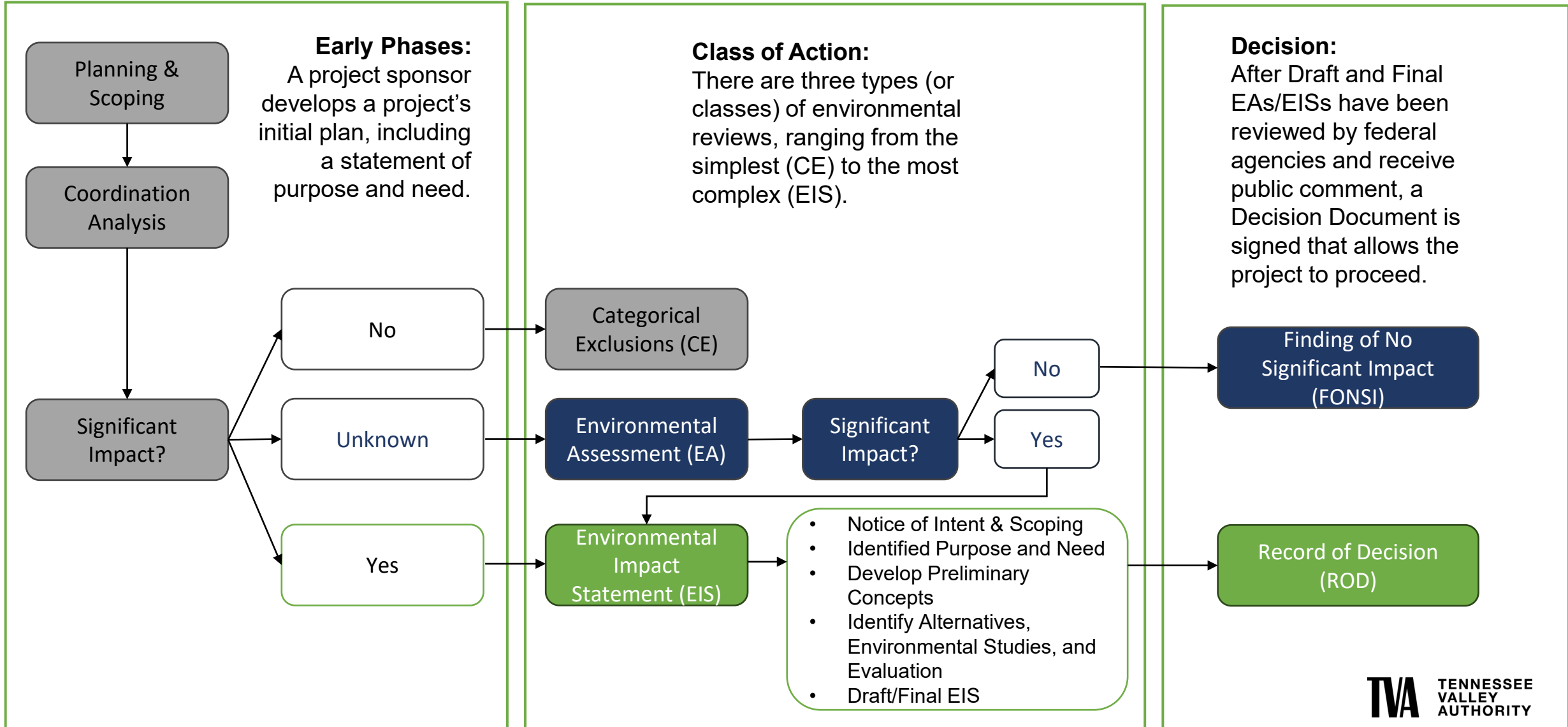
- **NEPA Specialist** – NEPA Process Manager, Technical Contract Manager. Primary interface between TVA staff and NEPA Contractor (TVA completes most EAs and EISs using external contractor)
- **Interdisciplinary Team (IDT)** – Subject matter experts in areas of potential impact perform analysis, provide technical reports, and/or review input.
- **Office of General Counsel (OGC)** - Provides guidance/legal interpretations, reviews EAs/EISs and defends NEPA Lawsuits
- **Environmental Program Managers** – Act as liaison between business unit and Environment. Work with air, water, and waste on permits. Initiate and complete CECs.
- **Operating/Planning/Stewardship Organizations** - Propose actions and feasible alternatives. Provide input to NEPA document. Provide responses to public comments where applicable.
- **Communications and External Relations** - Support external communications and engagement activities.
- **Other Business Partners**



# What are the three levels of NEPA review?



# What does the NEPA process look like?



# NEPA Takeaway Points

NEPA is part of the planning process for TVA projects

Considers the potential effects of proposed actions

Ensures compliance with federal and/or state laws and regulations

Provides opportunity for public involvement

Determines if actions would have significant effects

Informs decision-makers of potential effects of proposed actions



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# What does NEPA look like for the IRP?

Kelly Baxter; IRP NEPA Project Manager

# EIS Process and Milestones

The NEPA review of a proposed action must consider all aspects of the proposed action and all of the individual steps necessary to implement the proposed action.

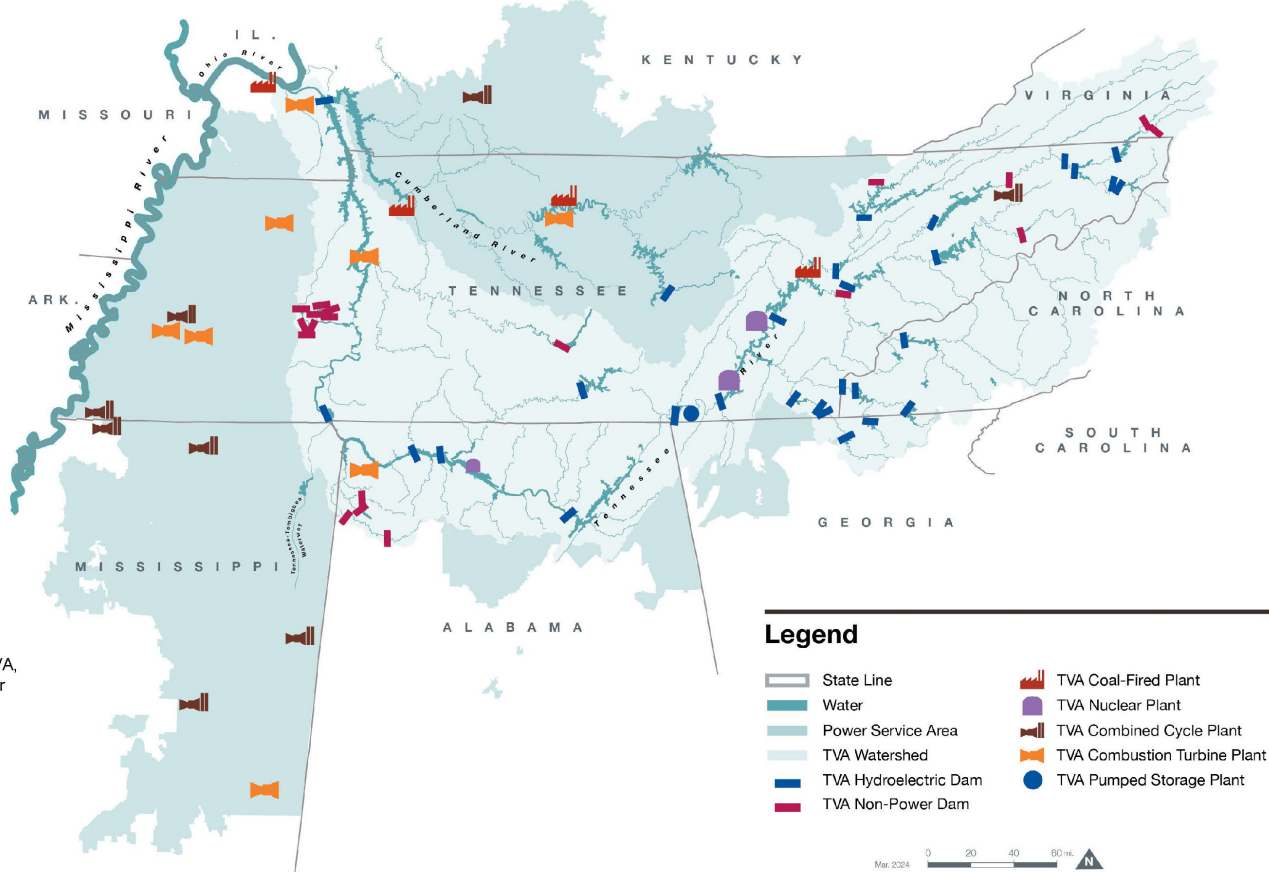


\*Opportunities for public feedback

# Valley-wide Scope of the IRP EIS

## TVA Power System

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



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# Water Resources Overview

Kelly Baxter; IRP NEPA Project Manager



# Break



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# Reference Case with Greenhouse Gas Rule Scenario Forecasts

John Collins; Sr. Program Manager, Resource Planning and Strategy  
Bob Roth; Sr. Specialist, Enterprise Forecasting  
Nathan Mathis; Manager, Load Forecasting

# EPA Final Rule Summary

EPA issued final rule setting limits on CO<sub>2</sub> emissions from new gas-fired combustion turbines and existing coal, oil, and gas-fired steam generating units

Main differences from proposed rule are:

- Removal of requirements on existing gas turbines
- Changes in compliance dates
- Temporary exemptions for reliability
- Less focus on hydrogen as a compliance pathway (the standards are now technology neutral)

Compliance pathways largely a function of capacity factors and retirement date, which are summarized in the table

Category	Compliance Pathway
New low load gas (<20% capacity factor)	Low emitting fuel (natural gas)
New intermediate load gas (<40%)	Efficient simple cycle/ combined cycle generation
New baseload gas (>40%)	Phase 1: combined cycle Phase 2: carbon capture
Existing coal retiring by 2032	Exempt
Existing coal retiring by 2039	Gas co-firing
Existing coal operating beyond 2039	Carbon capture

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# Reference Case with Greenhouse Gas Rule Scenario – Commodity Forecast

John Collins; Sr. Program Manager, Resource Planning and Strategy

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# Reference Case with Greenhouse Gas Rule Scenario – Economic Forecast

Bob Roth; Sr. Specialist, Enterprise Forecasting

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# Reference Case with Greenhouse Gas Rule Scenario – Load Forecast

Nathan Mathis; Manager, Load Forecasting

# Break



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# Sensitivities Process Overview and Update

Daniel Woolley; Sr. Specialist, Resource Strategy



# Analysis Tools within the IRP

## Scenarios

Describe potential outcomes due to a combination of factors outside TVA's control.

## Strategies

Test various business options within TVA's control.

## Stochastics

Evaluate risk of uncertainties around key planning assumptions within each portfolio.

## Sensitivities

Test a change in a key assumption for a particular portfolio to isolate its impact.

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# The Purpose of Sensitivity Analysis

Sensitivity analyses are performed to help answer questions meriting further evaluation

Suggested sensitivities can come from TVA Staff, IRP Working Group stakeholders, or Public Comments

Sensitivity analyses are run as variations from a core portfolio, typically Case 1A - the Reference Case scenario with Baseline Utility Planning strategy, to isolate the impact of a change in one key assumption

Sensitivities will be considered, along with the balance of portfolio results, when developing the IRP recommendation

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# Wrap-up

Jo Anne Lavender; IRP Facilitator

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# 2024 IRP Working Group

Meeting 11: June 24-25, 2024  
Nashville, TN

# Agenda – June 25, 2024

Topic	Time (CT)	Presenter(s)	Notes
Breakfast	8:00-9:00		
Agenda and welcome	9:00-9:15	Jo Anne Lavender	
IRP Resource Assumptions	9:15-10:15	Hunter Reed	Updates on resource costs and characteristics for IRP
Break	10:15-10:30		
Assessing Impacts of Managed EV Charging	10:30-11:30	Steven Coley; Ryan Stanton	Updates on research being performed on IRP EV Sensitivity
Wrap-up	11:30-11:45		
Lunch	11:45-1:00		

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# IRP Resource Assumptions

Hunter Reed; IRP Project Manager

# IRP Resource Options



- Advanced pressurized water reactor
- Light water small modular reactor
- Gen IV small modular reactor



- Hydro uprates



- Supercritical pulverized coal
- Supercritical pulverized coal w/carbon capture



- Combined cycle
- Combined cycle w/carbon capture
- Combustion turbine
- Aeroderivative
- Reciprocating engine
- Hydrogen blending
- Combined heat and power



- Utility scale solar
- Distributed solar
- Midwest wind
- Southeast high-hub wind
- High Voltage Direct Current wind



- Pumped storage
- Lithium-ion battery
- Advanced chemistry battery
- Distributed storage

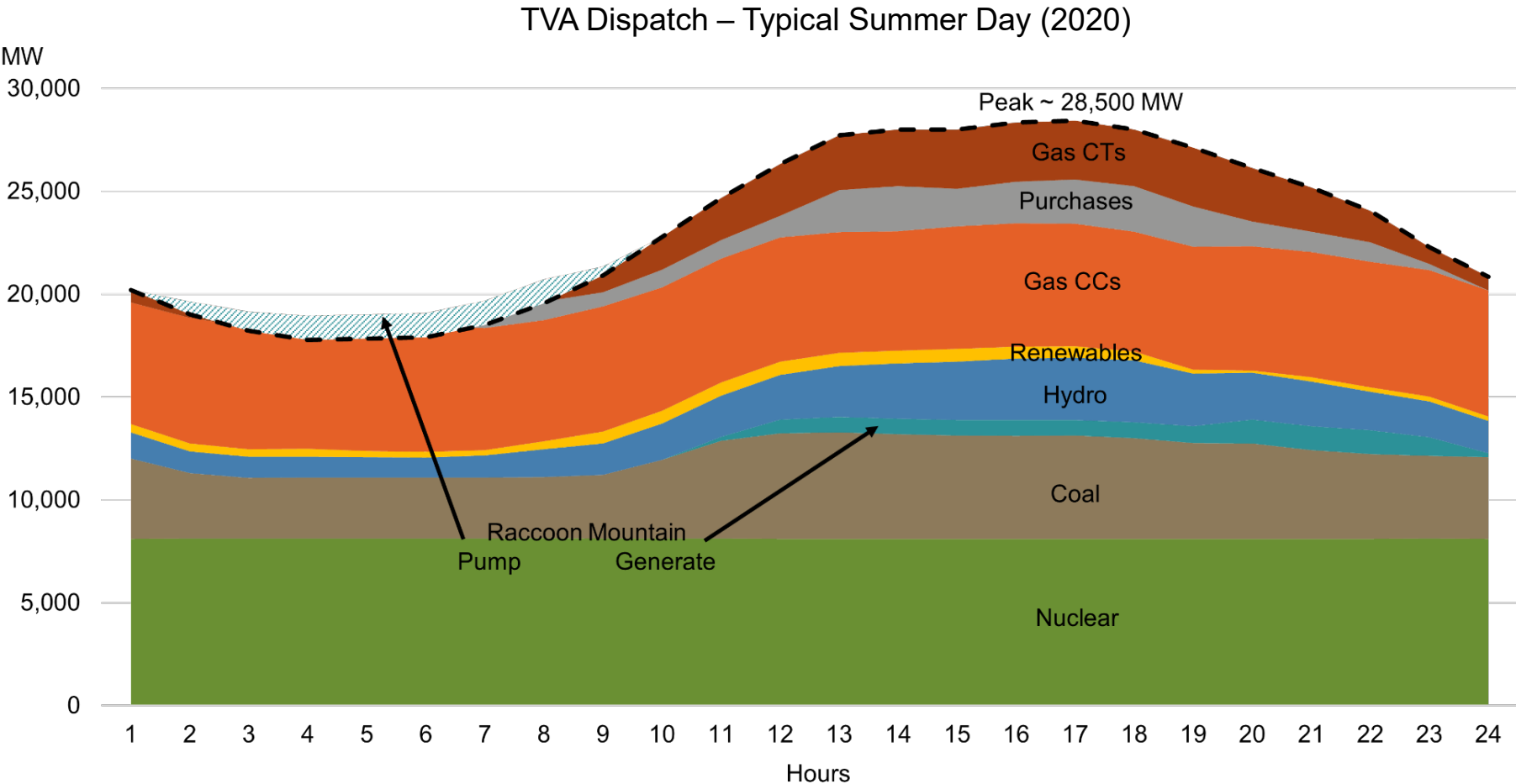


- Energy efficiency
- Demand response

# Resource Type Missions

Generating resources work together to reliably meet electricity demands at the lowest cost.

Most resources can be thought of in terms of their operational mission: baseload, variable, intermediate, or peaking





# Break



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# Assessing Impacts of Managed EV Charging

Ryan Stanton; Initiative Lead, EV Evolution  
Steven Coley; Manager, Grid R&D

# Managed Charging 101

Strategies to optimize charging at scale are emerging, but the industry is fragmented and nascent

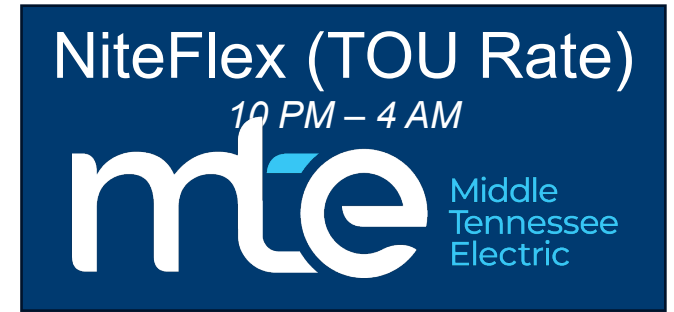
## **Passive: consumer behavior-driven**

- Consumer-driven "Set and forget"
- Available today, adoption gradually increasing
- Examples:
  - Public messaging campaigns
  - Time of use (TOU) rates
  - In-vehicle scheduled charging

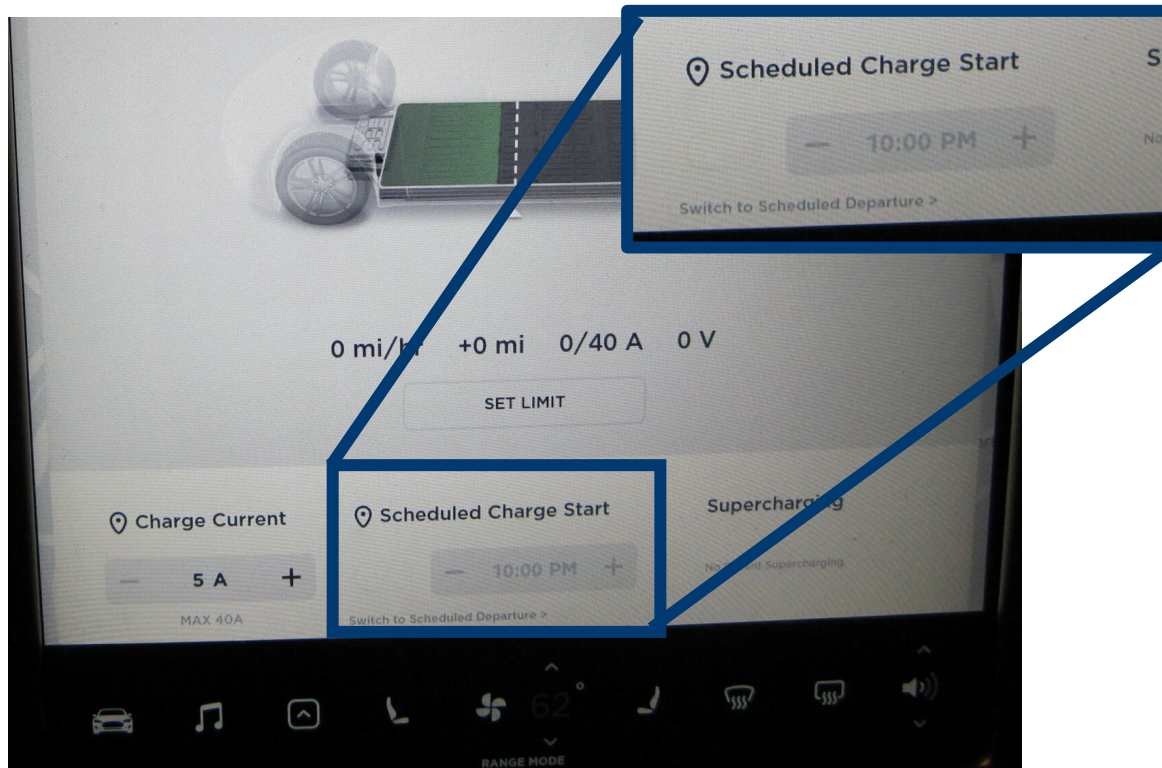
## **Active: technology-driven**

- Technology-driven dynamic control during peak events
- Nascent, emerging market
- Similar to residential thermostat Demand Response programs
- Examples:
  - Direct control of vehicle battery charging
  - Direct control of charging station

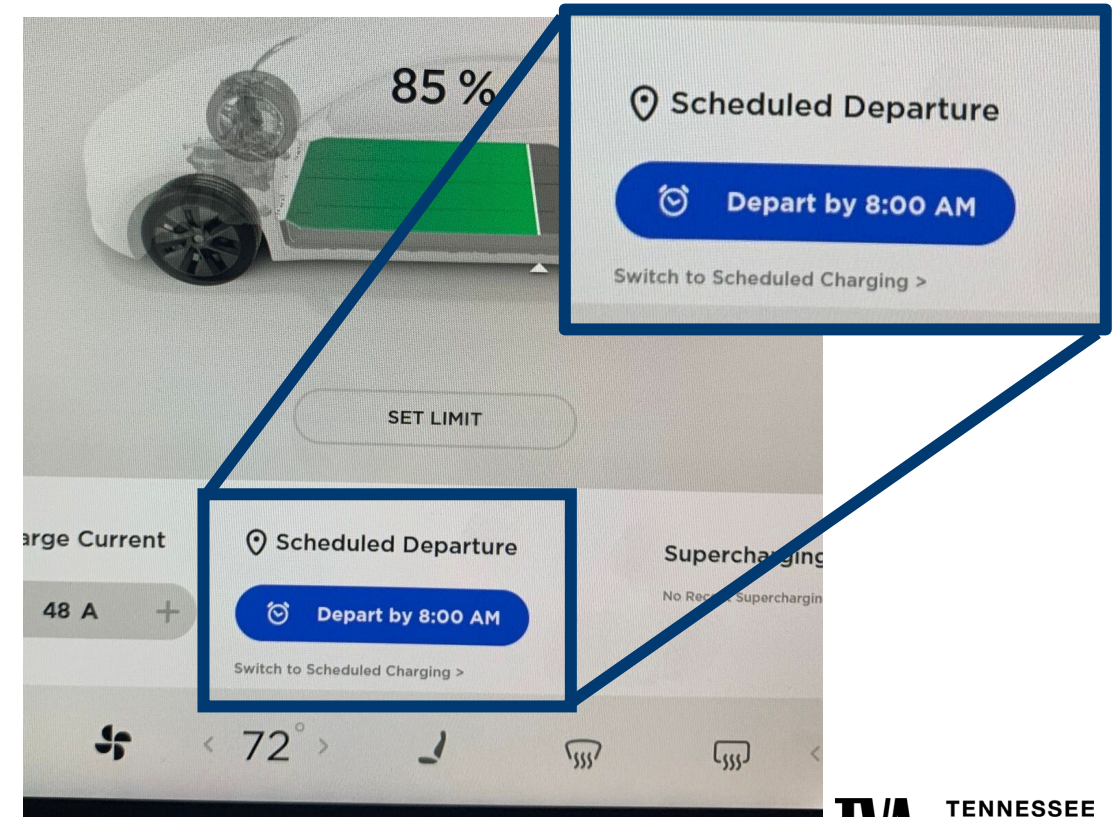
# Managed Charging Example: **Passive**



## Scheduled charging



## Scheduled departure

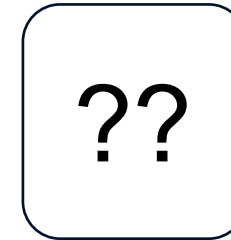


# Managed Charging Examples: Active

## Third party (mostly startups)



## Manufacturer-led



TESLA

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# Wrap-up and Lunch

Jo Anne Lavender; IRP Facilitator

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