2025 Integrated Resource Plan
Frequently Asked Questions
Winter 2025

Background: Below are frequently asked questions related to the draft Integrated Resource Plan (IRP) and draft Environmental Impact Statement (EIS). The draft documents were released on Sept. 23, 2024. That launched a 75-day public comment period, which ended on Dec. 11, 2024. Questions and answers from public webinars, starting with the July 2024 webinar, also are included. This document will be updated and expanded throughout the IRP process.

Sections:

General IRP information

What is the Integrated Resource Plan?
The Integrated Resource Plan, or IRP, is a comprehensive study that evaluates the region's future power needs, the resource options available for meeting that demand and the potential economic, environmental and operating impacts of these options. It serves as a compass, providing strategic direction for how TVA can continue to provide affordable, reliable, resilient and increasingly cleaner power for decades to come. Stakeholders play an important role in the IRP process. They work closely with TVA to review the planning information, and TVA shapes the analysis and outcomes based on their feedback.

What is the Environmental Impact Statement (EIS)?
The IRP study includes an environmental review called an Environmental Impact Statement (EIS), which evaluates the potential impacts associated with the IRP. The EIS assesses broad regionwide impacts on resources, including air quality, climate and greenhouse gases, water resources, land resources, and solid and hazardous waste. The EIS informs TVA's

decisionmakers and meets TVA's requirements under the National Environmental Policy Act (NEPA).

What is the status of the project?
TVA published the draft 2025 Integrated Resource Plan and the accompanying draft Environmental Impact Statement on Sept. 23, 2024. That launched a public comment period, which ended on Dec. 11, 2024. TVA is reviewing and evaluating stakeholder and public input and conducting further analysis to appropriately incorporate feedback into the final IRP. All public comments will be addressed in the final EIS. TVA plans to publish the final IRP and EIS in spring 2025.

Why is TVA doing the IRP now?
Since completion of the last IRP in 2019, TVA has monitored key planning signposts – or market signals – related to changing market conditions, evolving regulations and technological advancements. TVA initiated the 2025 IRP based on movement in the key signposts. The region's population and industry are growing and energy demand is increasing. Policies and regulations are changing. Industrial companies are electrifying their operations. And new, cleaner technologies are emerging, which could help TVA continue to provide affordable, reliable, resilient and increasingly cleaner power.

Why is the IRP important?
The planning direction established by the IRP will guide what power-generation resources and approximately how much of these resources will be needed to power homes and businesses across the Tennessee Valley region for years to come.

TVA initially announced plans to release the draft IRP and EIS in spring 2024. Why did TVA pause the release?
When TVA learned in spring 2024 that the Environmental Protection Agency was very close to releasing its final Greenhouse Gas Rule, TVA paused the IRP publication to allow for additional analysis that incorporates the finalized rule into the IRP. The draft IRP is more robust as a result. This timing change allowed for further review and continued engagement with the IRP Working Group, a diverse group of stakeholders who meet regularly to provide comprehensive feedback on the IRP.

How is the IRP process conducted?
TVA uses an integrated, least-cost planning framework that considers multiple scenarios for the future and alternative business strategies to analyze how potential generating resource portfolios would perform under different external conditions. Stakeholder input plays a vital role in the IRP process, which is conducted in a transparent, inclusive manner to provide numerous opportunities for public education and participation.

How does resource planning work?
Electric utility resource planning is a collaborative and iterative process designed to identify the appropriate mix of resources to continue providing affordable, reliable, resilient and

increasingly cleaner energy to customers. Key steps in the process include:

- Estimating future customer demand for electricity and capacity needs
- Comparing capacity needs to existing resources to determine gaps
- Identifying new resource options to be considered for filling the gaps
- Testing different resource combinations to evaluate performance
- Developing recommendations for the strategic portfolio direction.

Stakeholder and public involvement

How has TVA involved stakeholders in the IRP process?
TVA has involved stakeholders in the process since the very beginning. Before the IRP began, TVA led a Utility of the Future Information Exchange to provide a forum for a diverse set of stakeholders to discuss the IRP process and broad issues they believed should be considered in the upcoming IRP. TVA established and meets regularly with the IRP Working Group, a diverse group of stakeholders. The Regional Energy Resource Council (RERC), a federal advisory committee that provides formal advice to the TVA Board of Directors, also is engaged in the process.

How has TVA involved the general public in the IRP process?
Public participation is vital. In addition to public input during the scoping period and during the public comment period, TVA has received comments during quarterly TVA Board listening sessions, at RERC meetings and informational IRP webinars. After the draft IRP and EIS were published on Sept. 23, 2024, TVA held two webinars and 10 in-person meetings across the region during a 75-day comment period. Stakeholders and the public were encouraged to review the draft and provide feedback.

Did TVA receive much public input during the public comment period?
More people than ever participated in the process. A total of 594 participants asked a collective 376 questions about the IRP and EIS at the two virtual webinars and 10 in-person open houses *(Questions and answers from the two webinars are included below).* TVA received more than 2,200 official comments regarding the draft IRP and EIS.

How is TVA using stakeholder and public input?
TVA has reviewed and is evaluating public input and conducting further analysis to appropriately incorporate feedback into the final IRP. TVA is meeting with the IRP Working Group, a diverse group of stakeholders who meet regularly to provide comprehensive feedback on the IRP, to discuss and incorporate public considerations. Public comments help ensure TVA considers what is important to the public, and the input has prompted additional analysis.

Was it easy for people to submit comments?
TVA accepted public comments online via the TVA website, by email, on comment forms at the in-person open houses and by U.S. mail.

Where did TVA hold the open houses?

The in-person open houses were held across the seven-state region in Antioch, Tennessee; Oak Ridge, Tennessee; Hopkinsville, Kentucky; Huntsville, Alabama; Starkville, Mississippi; Memphis, Tennessee; Rossville, Georgia; Chattanooga, Tennessee; Murphy, North Carolina; and Bristol, Virginia.

When did the IRP process officially begin?
The IRP process began when TVA published a Notice of Intent in the Federal Register in May 2023. That initiated a 45-day public scoping comment period, during which time TVA gathered public input that helped frame the IRP effort.

Can you say more about the Utility of the Future Information Exchange?
Before the IRP began, TVA led the Utility of the Future Information Exchange to provide a forum for stakeholders to discuss the IRP process and broad issues they believed should be considered in the upcoming IRP. The effort was facilitated by Future 500, a non-profit third party, and included 20 members representing a diverse mix of stakeholder interests from across the region. They discussed opportunities to enhance TVA's IRP process and explored several topics in depth, including distributed energy resources and distribution, generation and transmission considerations in an evolving system, community impacts, and the IRP modeling approach. The report summarizing the group's findings can be found on TVA's IRP website.

Can you say more about the IRP Working Group?
The IRP Working Group is comprised of individuals from local power companies, directly served customers, customer associations, academia and research, state governments, environmental non-government organizations, community stakeholders and other special interest groups. The members represent the broad perspectives of those who live and work in the Tennessee Valley. The 2025 IRP Working Group members are:

- Dr. Kendra Abkowitz (TN) – City of Nashville
- Mike Butler (TN) – Tennessee Wildlife Federation
- Dr. Don Colliver (KY) – University of Kentucky
- Odell Frye (Valley) – Associated Valley Industries
- Lindsay Hanna (TN) – Nature Conservancy
- Shane Homan (MS) – Community Development Foundation
- Gil Hough (TN) – Tennessee Solar Energy Industries Association
- Mark Iverson (KY) – Bowling Green Municipal Utilities
- Wes Kelley (AL) – Huntsville Utilities
- Mike Knotts (TN) – Tennessee Electric Cooperative Association
- Dr. Teja Kuruganti (TN) – Oak Ridge National Laboratory
- Melissa Lapsa (TN) – Department of Energy – Energy Efficiency
- Kim Lewis (AL) – PROJECTXYZ, Inc.
- Pete Mattheis (Valley) – Tennessee Valley Industrial Committee
- Susan Hadley Maynor (TN) – Greater Memphis Chamber
- Doug Peters (Valley) – Tennessee Valley Public Power Association
- Cortney Piper (TN) – Tennessee Advanced Energy Business Council

- Jim Powell (National) – White House Climate Policy Office
- David Rogers (NC) – Sierra Club
- Tim Smith (MS) – Tippah Electric Power Association
- Brian Solsbee (TN) – Tennessee Municipal Electric Power Association
- Landon Stevens (National) – Clear Path
- Kenya Stump (KY) – State of Kentucky
- Dr. Jennifer Tribble (TN) – Tennessee Department of Environment and Conservation

Each organization also has the opportunity for an alternate to attend the Working Group meetings.

What is the Valley Pathways Study and how does it relate to the IRP?
TVA and the Baker School of Public Policy and Public Affairs at the University of Tennessee – Knoxville collaborated on a Valley Pathways Study, informed by stakeholder input. This study established a greenhouse gas (GHG) baseline for the region and looked across economic sectors such as transportation, industry, agriculture and building emissions to evaluate potential paths for achieving a competitive and clean economy by 2050. This study provides context on the role that electricity plays in achieving a net-zero economy. Insights from TVA's IRP will, in turn, inform future iterations of the Valley Pathways Study.

Details related to long-term planning

What guides TVA's approach to integrated resource planning?
TVA's integrated resource planning is grounded in fundamental least-cost principles: low cost, risk informed, environmentally responsible, reliable and resilient, diverse and flexible.

What does long-term planning entail?
Long-term planning entails considering future energy demand, evolving regulations, current power generation resources and new resource options, then determining what new power resources would work best to fill future capacity needs.

How does TVA identify the optimal mix of resources?
The IRP helps identify the optimal mix of resources to meet the region's future energy needs. As more renewable resources such as solar and wind are added to the system, firm resources that can generate power at any time also are needed to maintain system reliability and flexibility. For example, natural gas units can provide energy when renewable resources are not generating, and they can ramp up and down as solar and wind generation varies. Battery storage also can complement renewables and provide power when needed.

The IRP process

Can you describe some of the first steps in the IRP process?
TVA and the IRP Working Group spent months identifying IRP "scenarios" and "strategies" to

study. The IRP process evaluates scenarios that could arise over the next few decades and what strategies TVA could use to continue to provide affordable, reliable, resilient and cleaner energy in any future condition. Identifying scenarios and strategies is a critical step in the IRP process because they serve as the basis for modeling.

What scenarios have been used in the modeling?
TVA and the IRP Working Group aligned on six unique scenarios to evaluate in the IRP analysis, with results and metrics from all scenarios reflected in a balanced manner. The scenarios are:

- Reference (without Greenhouse Gas Rule)
- Higher Growth Economy
- Stagnant Economy
- Net-zero Regulation
- Net-zero Regulation Plus Growth
- Reference (with Greenhouse Gas Rule)

The reference cases represent TVA's current forecast for electricity demand with and without the impact of the Environmental Protection Agency's recently finalized Greenhouse Gas (GHG) Rule (May 2024).

How would you summarize the scenarios?
The scenarios cover a wide range of potential electricity demand forecasts – from the Stagnant Economy case that remains flat to the Net-zero Regulation Plus Growth case where electricity demand essentially doubles by 2050. Demand forecasts vary based on economic and demographic conditions, electrification of transportation and industrial processes, and other factors. The scenarios also explore the potential evolution of environmental regulations and power generation technologies that can influence demand.

What strategies have been used in the modeling?
The strategies are:

- Baseline Utility Planning, which represents TVA's current outlook for the power system
- Carbon-free Innovation Focus
- Carbon-free Commercial Ready Focus
- Distributed and Demand-side Focus
- Resiliency Focus

How would you summarize the strategies?
The strategies explore the impacts of an emphasis on carbon-free resources, distributed and demand-side resources, and system and local resiliency.

How are power generation resource options considered?
TVA and the Working Group developed a list of power generation resource options for the IRP. The list includes mature technology options, such as nuclear, hydro, coal, gas, renewables, storage, energy efficiency and demand response technologies. The IRP also considers emerging technologies such as small modular reactors, carbon capture and sequestration, hydrogen

blending and advanced chemistry batteries.

How does modeling work?
TVA uses an industry standard capacity expansion and production cost model. Based on a set of assumptions and constraints in the analysis, the model seeks to determine the lowest cost resource plan. The resource plan includes selected resources, selection year, expected energy output, and financial and operating data.

TVA modeled the five strategies in the six scenarios. The modeling generated 30 unique potential resource "portfolios" – the power supply mix that results from assessing a particular strategy in a particular scenario.

How has TVA evaluated the results?
Based on least-cost planning principles and with input from the IRP Working Group, TVA developed a set of metrics to assess the performance and key tradeoffs between the different strategies across the scenarios.

How are transmission investments addressed in the IRP?
As the IRP is not site-specific, transmission investments to support power generation are generally addressed as part of resource costs. In the near future, TVA will initiate development of an integrated transmission plan. Much like the integrated resource plan, the integrated transmission plan will incorporate input from stakeholders and the public.

Initial results from the draft IRP

What do the draft IRP results suggest?
The draft IRP results suggest that between now and 2035, TVA will need to add 9 to 26 gigawatts of new capacity to meet the region's energy demand. For reference, 1 gigawatt supplies roughly enough energy to power more than 585,000 average homes.
The IRP analyzes potential ways the resource portfolio might evolve between now and 2050, and insights gained from evaluating the entire planning horizon inform strategic portfolio direction between now and 2035.

Why will the capacity needs increase by that much?
There is a need for new capacity in all scenarios to replace retiring and expiring capacity, support economic growth, and enable further electrification of the economy. The power supply mix ranges vary based on energy demand, market conditions, policy and regulations, and technology advancements.

Does the initial modeling for the draft IRP offer specific ranges for power generation resources?
Yes. The ranges include:

- 3 to 20 gigawatts of solar nameplate additions

- 4 to 19 gigawatts of natural gas, hydrogen, and carbon capture and storage additions
- 1 to 4 gigawatts of energy efficiency and demand response additions
- Up to 6 gigawatts of storage nameplate additions
- Up to 4 gigawatts of wind nameplate additions
- Up to 1 gigawatt of nuclear additions

Do the draft IRP results indicate there would be a reduction in carbon emissions?
Yes. The results indicate that TVA would see a projected 75% to 90% reduction in carbon intensity by 2035 from its 2005 baseline.

Key themes based on draft IRP results

Are there key themes based on the initial IRP analysis?
Yes. Key themes include:

- New capacity is needed in all scenarios to replace retiring and expiring capacity, support economic growth, and enable further electrification of the economy.
- Firm, dispatchable technologies are needed to ensure system reliability throughout the year.
- Solar expansion plays an increasingly substantial role, providing economic, carbon-free energy.
- Gas expansion serves broad system needs, with the potential for emerging carbon capture and hydrogen options to enable deeper decarbonization.
- Energy efficiency deployment reduces energy needs, particularly between now and 2035, and demand response programs grow with the system and the use of smart technologies.
- Storage expansion accelerates, driven by evolving battery technologies and the potential for additional pumped storage.
- Wind additions have the potential to add more diversity and carbon-free energy to the resource mix.
- New nuclear technologies, with continued advancements, can also support load growth and deeper decarbonization.

Strategy performance

How did TVA evaluate the performance of the 30 portfolios?
Working with the IRP Working Group, TVA developed a set of metrics to assess the performance of the portfolios. The metrics, which reflect least-cost planning principles, are grouped into four categories – low cost, risk informed, environmentally responsible, and diverse, reliable, and flexible.

What were the key takeaways from evaluating strategy performance?
Key takeaways from that evaluation include:

- Strategy A that applies baseline utility planning is the lowest cost strategy overall,

but it has less reduction in CO_2 intensity than the alternative strategies.
- While Strategy B is the most expensive strategy, as it requires upfront investments in clean energy technology innovation, it achieves similar levels of decarbonization as Strategy C over the long term and reduces regulatory and financial risk.
- Strategy C that promotes carbon-free commercial ready technologies is second lowest in cost, achieves the fastest near-term reductions in CO_2 intensity, and reduces regulatory and financial risk.
- Strategies D and E, which promote distributed/demand-side options and options that enhance resiliency, generally rank in the middle across the metric categories.
- All strategies include timeline, technological, transmission, and/or market depth uncertainty and execution risks, which are amplified by load growth and regulatory impacts.
- Maintaining sufficient system flexibility to meet dynamic changes in load will require balancing renewable and dispatchable resource additions over time, especially in growth scenarios.

Observations in the draft EIS

Can you describe the purpose of the draft EIS?
The draft EIS broadly analyzes and identifies the relative impacts of the five strategies on the natural and human environment. The five strategies are the basis for the alternatives discussed in the EIS. Baseline Utility Planning is the No Action Alternative, and the remaining four strategies are the Action Alternatives. The EIS informs TVA's decisionmakers and meets the environmental review requirements of the National Environmental Policy Act (NEPA).

Were environmentally preferable alternatives identified, as required by NEPA?
Yes. The environmentally preferable alternatives are Strategies B and C, which emphasize carbon-free resources and achieve similar CO_2 emissions reductions over the planning horizon. These strategies have tradeoffs across other environmental metrics, with higher water consumption in Strategy B and higher land use in Strategy C.

What are the observations from the draft EIS?
Highlights of draft EIS observations include:
- **Air quality:** Long-term reductions in air emissions of all types with expected coal retirements
- **Climate and greenhouse gases:** Long-term reductions in carbon emissions and intensity
- **Water resources:** Reductions in water use from 2025 to 2050, except in Scenario 5, which has the most nuclear expansion
- **Land resources:** Increases in land use primarily driven by solar expansion
- **Solid and hazardous waste:** Coal combustion residuals production drops to zero by 2035

IRP considerations

Has the U.S. Environmental Protection Agency's final Greenhouse Gas (GHG) Rule been considered in the IRP analysis?
Yes. TVA worked with the IRP Working Group to develop a scenario that incorporates the recently finalized GHG rule to include in the IRP analysis. The Net-zero Regulation scenarios reflect the draft GHG rule, which also included regulations that may be adopted in the future related to existing gas plants, and consider potential future regulations designed to achieve net- zero emissions by 2050. TVA monitors and evaluates pending regulations, litigation and other factors that could affect planning assumptions, and it incorporates all applicable requirements into planning processes.

How is the Inflation Reduction Act being incorporated into the IRP?
The Inflation Reduction Act promotes investment in clean energy technologies. The impact of the incentives offered in the Inflation Reduction Act is reflected in the cost of the relevant resource technology options considered in the IRP. These apply in all IRP scenarios and strategies. TVA also evaluated costs of resource technologies without the incentives offered in the Inflation Reduction Act. TVA also plans to evaluate changes in the cost of key resource technologies in the final IRP, including the impacts from a removal of incentives offered in the Inflation Reduction Act.

Does the IRP set annual limits for each resource type?
Best practice in utility planning is to consider how much of each resource type can be built in a year or over the planning horizon, so the analysis will generate executable portfolio options. The IRP analysis includes annual limits for all resource types based on recent TVA and industry experience. For example, the market capability for solar has increased, and TVA has reflected this with solar limits that are more than double the limits used in the 2019 IRP. Gas builds also have annual limits to reflect the practical ability to build and bring new gas plants online. The draft IRP provides the complete set of assumptions on annual resource limits used in modeling.

Will the IRP support TVA's aspiration to achieve net-zero carbon emissions by 2050?
The IRP analysis, which is grounded in least cost planning, provides insight on how the various strategies evaluated drive continued reductions in carbon emissions. IRP metrics assess tradeoffs, such as between cost and environmental performance. Also, TVA plans to conduct a sensitivity analysis based on TVA's net-zero aspirations.

IRP enhancements

How does the current IRP build off the 2019 IRP?
The 2019 IRP recommended near-term actions, and the 2025 IRP speaks to the progress made to date on those recommendations. Also, the 2019 IRP highlighted key signposts – or market signals – to monitor. The 2025 IRP provides updates on those key signposts and how relevant impacts have been incorporated into current IRP planning processes.

How have weather risks been incorporated?
All scenarios incorporate weather trends and their impact on electricity demand. The IRP also includes a discussion of increasing winter risk and efforts TVA has undertaken to evaluate and address these risks. Also, TVA and the IRP Working Group will consider additional sensitivity analysis related to weather risks.

What information was used to develop demand-side management resource options?
In 2022, DNV (a global leader in energy program consulting) conducted a study for the TVA region to evaluate the achievable potential for energy efficiency programs that incentivize investment in making homes and businesses more energy efficient. The study also looked at the potential for demand response in the region. TVA is using insights from the study to inform current program development and energy program resource options in the IRP.

Did TVA conduct additional IRP benchmarking in this IRP?
In addition to benchmarking peer IRPs and resource costs and characteristics, TVA also engaged industry experts at the National Renewable Energy Laboratory (NREL) to develop a best-in-class approach for greenhouse gas life cycle analysis. Results are included in the Environmental Impact Statement.

How is TVA enhancing communication of the IRP to stakeholders and the public?
TVA has streamlined the IRP report and updated the IRP website to make information easier to find and consume. Materials such as these FAQs, fact sheets on specific IRP topics in Spanish as well as English, and social media posts are aimed at helping the public understand the complexities of the IRP. During the draft IRP and EIS public comment period, TVA conducted two webinars and 10 open houses across the region (up from one webinar and six open houses in 2019) to provide additional opportunities for education and engagement in the IRP.

How will TVA make detailed IRP information available to key stakeholders and the public?
In addition to energy and peak demand forecast charts, the IRP includes corresponding data tables. An expanded list of resource cost and characteristic assumptions also is included. To supplement the portfolio results included in the IRP report, TVA has provided corresponding data tables on the IRP website.

What happens next?

What happens now that the draft IRP and EIS have been released?
TVA is reviewing and evaluating public input and conducting further analysis to appropriately incorporate feedback provided during the public comment period. Public comments on the draft IRP and EIS will be addressed in the final EIS.

How will the final IRP and EIS differ from the draft IRP and EIS?

The final IRP will include power supply mix ranges, recommendations for strategic portfolio direction through 2035 and information on key signposts to monitor going forward that will provide insights into potential impacts to recommended actions. The final document also will incorporate changes made based on the evaluation of comments from stakeholders and the general public. The final EIS will evaluate the final IRP recommendations to determine the environmental impacts. TVA plans to publish the final IRP and EIS in spring 2025.

What are the last steps in the process?
Subject to the TVA Board's review and direction, the final IRP will serve as TVA's compass for power generation decisions as well as for long-term operational and financial planning.

Questions and answers from webinar on July 25, 2024

**Answers provided below may reflect adjustments for clarity or conciseness, compared to the answer provided during the live Q&A. Where more substantial additions have been made, these are noted in italics.*

JULY2024-Q1
How have energy efficiency programs in the Inflation Reduction Act (IRA) been incorporated into load forecasts? Are they present in all scenarios?
The impact of the incentives offered in the Inflation Reduction Act is reflected in the cost of the relevant resource technology options considered in the IRP. These apply in all IRP scenarios and strategies. One of the primary inputs into the load forecast are the projected changes to average appliance stock efficiencies through time. The average appliance stock efficiency is influenced by appliance efficiency standards, incentive or rebate programs (such as the IRA), technological advancement, and consumer adoption of above-code appliances. As the stock efficiency increases, these impacts will naturally lower demand. The rate of change in appliance efficiency is adjusted in each scenario based on the narrative, accounting for assumed consumer adoption and regulatory drivers. Additional impacts from TVA programs are factored into the supply side of the planning process.

JULY2024-Q2
Would you explain why the solar resource assumes tracker systems only, which have a higher operations and maintenance (O&M) cost, and not a mix of tracker and fixed-tilt?
For utility scale solar, the IRP is only including single-axis tracking. Although there is a higher O&M cost associated with that technology, these units have a higher capacity factor, or amount of expected generation. The vast majority of request for proposal responses reflect single-axis tracking as the more economical solution for utility scale solar. Also, in the IRP, TVA is including assumptions around adoption of distributed solar, which is assumed to be fixed-axis, since that is most typical for rooftop and smaller scale installations.

JULY2024-Q3
How does TVA intend to mitigate the risks associated with its decision-making process, which

some argue is increasingly insulated from public input?
TVA is executing a robust stakeholder engagement approach for the IRP. When specific actions are later evaluated to implement the IRP, TVA will follow a similarly robust process to understand the system-level and site-specific impacts and program considerations associated with those actions. For the IRP and for subsequent asset decisions, TVA follows the requirements of the National Environmental Policy Act (NEPA). For major generation projects, this includes issuing notices when project reviews begin, conducting public scoping, issuing draft NEPA documents for public review and comment, holding public meetings, appropriately incorporating input, and, ultimately responding to comments in the final NEPA document. This process creates an opportunity for significant public and stakeholder input into developing the strategic direction of the IRP, as well as specific asset decisions beyond the IRP.

JULY2024-Q4
How will TVA incorporate feedback during the public comment period?
Public comments and feedback received during the process help inform and improve TVA's IRP. We will review and respond to the comments that are provided during the public comment period on the draft IRP and Environmental Impact Statement (EIS). We will respond directly to comments in the final EIS.

TVA and the IRP Working Group considered public comments during scoping when framing the draft IRP analysis, particularly as scenarios and strategies and the set of resource options to consider were developed. Public comments received during the draft IRP and EIS comment period will be reviewed and considered as the IRP analysis is finalized. They will help inform the sensitivity analyses that will be performed to answer additional questions.

JULY2024-Q5
How will TVA ensure that the new IRP models environmental justice and addresses the concerns of communities burdened by emissions from its existing coal plants? Will TVA include environmental justice metrics as part of IRP?
All IRP scenarios in the IRP reflect that TVA intends to retire all of its remaining coal assets by 2035. Official retirement dates have been established for the Cumberland and Kingston plants, and the IRP scenarios assume the retirement of the Gallatin and Shawnee plants by 2035. Broadly speaking, environmental justice (EJ) factors most into site-specific asset decisions, given its locational aspects.

While the IRP is not site-specific, EJ considerations help guide TVA's public outreach strategies for the IRP. Additionally, the draft IRP and EIS will provide directional insight into potential impacts to communities with EJ concerns. For example, the average system cost metric is directionally indicative of overall trends in customer bills, and metrics related to emissions are directionally indicative of air and water quality trends in the region. Site-specific aspects of actions that are later proposed to implement the IRP will be addressed in tiered environmental reviews that will further explore EJ considerations.

JULY2024-Q6

What are some of the recommendations and/or changes to the IRP that have come out of the scoping comments or the IRP Working Group?
One recent change requested from the IRP Working Group was around the Inflation Reduction Act, the IRA. The initial approach modeled a phase-out for investment tax credits (ITCs) in the 2040s that were estimated at a more conservative level of about 30%. At the suggestion of the IRP Working Group to consider modeling it at 40%, TVA took another look and determined that it would be appropriate to model it at 40%. (Scenario 5 ITC level is 50%). Another significant change TVA made was based on a Regional Energy Resource Council (RERC) interaction related to the nomenclature of the reference case scenarios. There is now a reference case that denotes it is with the Environmental Protection Agency's final Greenhouse Gas Rule and a reference case that denotes it is without the Greenhouse Gas Rule.

TVA and the IRP Working Group also considered public comments during scoping when framing the draft IRP analysis, particularly as scenarios and strategies and the set of resource options to consider were developed. For example, the IRP includes strategies that emphasize carbon-free resources, distributed resources, and resiliency, which reflect some of the themes from scoping comments. Also, while all resource types have annual limits, the annual capability to add renewables has been increased in the current IRP, in part in response to public comments.

JULY2024-Q7
What percentage of solar is TVA?
TVA utilizes a diverse fleet of resources to meet the region's energy needs. At the end of FY 2023, we had about 4% of annual generation that was a combination of wind and solar. Today, TVA has about 1,000 megawatts of solar in operation. TVA has already signed contracts for the development of an additional nearly 3,000 megawatts of solar scheduled to come online over the next several years. We expect to expand that further over the coming decade. Currently, TVA generation is over 50% carbon-free, when also accounting for our hydro and nuclear assets.

JULY2024-Q8
What is the estimated release date for the draft IRP and what is the targeted timeline for the public review of the IRP?
We are hoping to release the draft IRP later this year, but no sooner than the fall. The timeline for public review would begin as soon as the draft is released. We would have at least 60 days of public review.
TVA is planning to release the draft 2025 IRP in late September.

JULY2024-Q9
Should TVA pause major generation projects outlined in the 2019 IRP until the new IRP reflecting current legislative changes is finalized?
TVA's IRP does not outline major asset decisions; rather it points us in a strategic portfolio direction. When a specific asset decision is evaluated, TVA conducts a robust review process, including collecting stakeholder input to equip TVA leadership and the Board to ultimately

make a decision. These evaluations will incorporate risks associated with potential pending or future regulation that are factored into decisions. The modeling and thought process that went into the 2019 IRP still serves TVA well with regard to strategic portfolio direction. Here are examples of strategic directions signaled from the 2019 IRP:

- Exiting coal by 2035,
- Adding solar and storage as it is economic to do so and as customer demand increases,
- Analyzing the future potential for energy efficiency and demand response through an energy programs potential study,
- Evaluating the role that emerging technologies can play in the system of the future – technologies such as SMRs, advanced nuclear, advanced storage, new pumped storage, advanced chemistry batteries, and new demand side programs and policies,
- Ensuring maintained reliability with dispatchable resources such as gas-fired assets and using that as an enabling technology to bring more solar and other intermittent resources onto the system.

All of that still holds, and the 2019 IRP study serves TVA well moving in that direction until the next IRP is finalized.

JULY2024-Q10
How will TVA incorporate public feedback, particularly from discussions like the People's Voice on TVA's Energy Plan hearing, into its upcoming Integrated Resource Plan?
TVA encourages everyone to participate in the open public comment period, where we will make sure that your feedback is considered. Responses to all comments will be included in the EIS. During that period, be sure to provide comments through that formal process.

TVA encourages public feedback throughout the development of the IRP, beginning with the public scoping period. TVA's Federal Advisory Committee, the Regional Energy Resource Council (RERC), has also met periodically throughout the process and has included a public listening session. Once the draft IRP is released, there will be 60-day public comment period during which TVA will host a series of open houses around the seven-state region and additional virtual engagements. Comments received during this period will all be reviewed and responded to and will ultimately help inform the final IRP.

JULY2024-Q11
Did you consider representing dispatchable customer-sited resources such as demand response and behind-the-meter batteries participating in a program as a selectable resource in the IRP modeling?
Yes. In IRP modeling, TVA is including both customer-sited batteries and demand response that are dispatchable at a system level. For demand response, there are a number of programs that are available for selection at residential, commercial, industrial and local power company levels. These programs are modeled in different tiers that offer increasing amounts of capacity at increasing costs. For distributed batteries and other distributed generation, TVA utilizes an NREL-based model that estimates adoption of a distributed resource, which varies in each scenario/strategy combination. The IRP looks at how distributed and demand-side resources

work together with the system as a whole and the relative benefits and tradeoffs. IRP results and recommendations will inform future program development.

JULY2024-Q12
Why are there no climate change scenarios in any of the IRP charts?
We intend to do a sensitivity that will look at the change in load due to more extreme weather and climate change adaptation.

In developing load forecasts for all the scenarios, TVA uses a weather normalization process that accounts for regional trends that show warming trends in summer and winter. Additionally, the planning reserve margin accounts for variations in weather and captures changes in weather volatility over time, such as during Winter Storm Elliott in December 2022.

JULY2024-Q13
Did you perform any scenarios in which local power companies are granted higher levels of load flexibility (self-generation)?
The IRP does not address specific program design, which comes later. The local power company flexibility option is part of the contract signed with local power companies and is also out of the scope of the IRP. The IRP explores strategies that provide incentives to increase distributed generation adoption, which is a proxy for TVA paying more to encourage individuals, businesses or local power companies to adopt more distributed generation. For example, Strategy D, Distributed and Demand-side Focus, incorporates the highest levels of distributed solar. This strategy helps identify the impacts to the overall portfolio if TVA were, in the future, to encourage more distributed solar through existing or new programs.

JULY2024-Q14
As part of least-cost planning, you emphasized that utilities can't prefer one resource over another. If it is necessary to assess the climate impacts of each strategy, how can a resource be neutral? Doesn't a commitment to a sustainable future compel us to not be neutral about fossil fuels?
Section 113 of the Energy Policy Act requires TVA to implement a least-cost planning program that considers the full range of existing and incremental supply-side and demand-side resources. The evaluation of resources must not give preference to one resource over another, and it considers all direct and quantifiable costs and operating characteristics. The IRP compares baseline utility planning with alternative strategies that emphasize certain resources to understand the tradeoffs across metrics that evaluate cost, environmental, and operational impacts. In the EIS, we will include a greenhouse gas life cycle analysis which captures upstream, ongoing operational, and downstream greenhouse gas emissions associated with each portfolio and will characterize those emissions through a social cost. The collective insights from the analysis will inform the strategic portfolio direction of the IRP.

TVA applies six least-cost planning principles in resource planning – low cost, risk informed, environmentally responsible, reliable and resilient, diverse, and flexible. Providing affordable, reliable, resilient, and increasingly cleaner energy over the long term requires a diverse mix of

resources.

JULY2024-Q15

Is battery cost assumption also based on the National Renewable Energy Lab (NREL) Annual Technology Baseline (ATB)? And is it for a degrading battery?

Yes. TVA's battery cost assumptions are based on NREL's ATB. We utilize the moderate case across most scenarios, with the exception of Scenario 5 (Carbon Regulation Plus Growth), which uses the advanced case. The NREL ATB does not include the impacts of tax credits or inflation, so those are incorporated on top of the NREL ATB base cost as well as estimated transmission costs typically associated with connecting battery resources. In IRP modeling, TVA assumes that degradation is addressed as part of annual fixed operations and maintenance (O&M) costs.

JULY2024-Q16

How will the 2025 IRP affect proposed projects such as New Caledonia, Allen and Cheatham? With regard to projects that have recently been approved or are proposed, only the Cumberland combined cycle project and the Kingston energy complex project are hard-wired in as existing resources (in the sense that the IRP starts with those assumptions in mind).

Proposed or potential actions such as Allen, New Caledonia and Cheatham County are competed against other resources in the IRP modeling. They are not hard-wired in as existing resources, since there is no official decision on them.

TVA has continued to take action to support the strategic portfolio direction from the 2019 IRP. Those actions include continuing to evaluate, and potentially execute on, projects within the bounds of the 2019 IRP that will ensure TVA continues to provide the Valley region with affordable, reliable, resilient and increasingly cleaner energy. Future asset evaluations, decisions and projects will be informed by the direction outlined in the 2025 IRP.

JULY2024-Q17

Are you incorporating the Energy Infrastructure Reinvestment program?

TVA is reflecting the impacts of the Inflation Reduction Act (IRA) in the cost of resources. The Energy Infrastructure Reinvestment program is a loan program. The IRP looks largely at resource types and timing, not necessarily the financing mechanism.

JULY2024-Q18

How do you incorporate the standing goal of TVA to install 10 gigawatts of solar by 2035 with the IRP?

We have an aspiration of adding the solar to our system and it is within our least-cost planning principles, so we are constantly monitoring the cost of solar assets and how we can add them to our portfolio within a least-cost manner.

Stemming from the strategic direction in the 2019 IRP, TVA developed a strategy to add approximately 10 gigawatts (GW) of solar to the system by 2035. Annually, TVA has contracted for additional solar capacity (about 3.6 GW to date) and is also pursuing TVA-

owned solar projects at two sites (about 0.3 GW to date). Draft results from the 2025 IRP are continuing to signal solar expansion, and the final results and recommendation will further inform TVA's solar strategy.

JULY2024-Q19

How does TVA justify potentially delaying the IRP until 2025, and what steps is it taking to ensure the delay is not politically motivated?

When TVA learned in spring 2024 that the Environmental Protection Agency was very close to releasing its final Greenhouse Gas Rule, TVA paused the IRP publication to allow for additional analysis that incorporates the finalized rule into the IRP. The draft IRP is more robust as a result. This timing change allowed for additional analysis, review and continued engagement with the IRP Working Group, a diverse group of stakeholders who meet regularly to provide comprehensive feedback on the IRP. *The draft IRP being released in late September 2024 includes the additional analysis.*

JULY2024-Q20

How are local power companies included in the IRP process?

There are local power company representatives on the IRP Working Group and on our federal advisory councils – the Regional Energy Resource Council and the Regional Resource Stewardship Council. TVA staff also attends local power company Board meetings. TVA has held informational webinars for local power companies. Throughout the whole process, we are directly engaging with local power companies in a variety of ways to ensure their input is received.

JULY2024-Q21

TVA prides itself on providing low rates to customers. Is the cost of electricity a factor in your modeling?

Yes, low cost is a key element in modeling, as it is one of TVA's least-cost planning principles. IRP modeling of the baseline utility planning strategy identifies a portfolio that meets the reliability and operational requirements of the power system at the lowest system cost. Each scenario/strategy combination introduces unique considerations for the model and optimizes for least cost, allowing TVA to evaluate alternative strategies against the six least-cost planning principles (low cost, risk informed, environmentally responsible, reliable and resilient, diverse, and flexible) to inform the strategic portfolio direction. We pride ourselves on our low rates, and the IRP modeling reflects that with a focus on low cost.

JULY2024-Q22

Is TVA assuming that hydrogen blending will be available for gas units and at what levels?

IRP modeling assumes that hydrogen blending is available. It is of particular importance in Scenario 4 (Carbon Regulation) and Scenario 5 (Carbon Regulation Plus Growth). In those scenarios, the modeling incorporated the EPA's proposed greenhouse gas rules, where hydrogen was identified as a proposed best system for emission reduction. Assuming a hydrogen market were to develop, TVA assumes that our gas units that are hydrogen capable have the ability to burn hydrogen at the level required in the years specified in those

regulations.

JULY2024-Q23

Will webinar comments be included in the official Environmental Impact Statement, or do we need to send them during the comment period?

While comments received during webinars are important to us, they are not official IRP comments. Please provide your comments during the formal comment period on the draft IRP and Environmental Impact Statement (EIS) to ensure that they are incorporated and addressed in the final EIS. The comment period will be publicized well in advance, and the open house times and locations will be publicized as well. That is the time period for you to submit your comments to ensure they are considered and addressed in the document.

JULY2024-Q24

If the draft IRP and EIS are released in November, does that mean the public meetings and comment period will likely be during the holidays in November and December?

At the July webinar, the exact timing of the draft IRP and EIS was still being refined, dependent upon completing the analysis of recently finalized rules. With the analysis now complete, the draft IRP and EIS are being released in late September, followed by a planned 60-day comment period which will end prior to the Thanksgiving holiday.

JULY2024-Q25

Is TVA using the Energy Information Administration's (EIA's) Capital Cost and Performance Characteristic Estimates for Utility -Scale Electric Power Generating Technologies report, or just the National Renewable Energy Lab (NREL) Annual Technology Baseline (ATB) data?

TVA is not using the EIA estimates. IRP modeling primarily uses NREL ATB estimates, with current experience with request for proposal responses influencing short-term forecasts and internal forecasts informing estimates for hydro and nuclear options where TVA has direct project knowledge and experience.

JULY2024-Q26

How are the members of the IRP Working Group selected? Is there any public involvement of selecting them, or are they appointed by TVA?

When selecting members of the IRP Working Group, the team began with the 2019 IRP Working Group list to ensure some continuity and existing expertise. Utilizing our new regional model, the team reached out to local, regional, and federal teams and requested recommendations from community groups and leaders. As discussed during the webinars, the groups represented are as follows:

- local power companies
- directly served customers
- industry groups
- environmental and energy advocacy groups
- academia
- research institutions
- community and sustainability representatives

- business and economic development professionals
- representatives of various state offices and the White House Climate Policy Office.

JULY2024-Q27
Who are the actual folks on the IRP working Group? I could not find this on the website. How were decisions at the IRP made?
A list of the IRP Working Group members is included in the draft IRP as well as in the Stakeholder and Public Involvement section of these FAQs.

JULY2024-Q28
How will increasing water demands, allocation and drought be considered into this process? And second, how can we make sure the Mississippi River does not have the same issues with growth as the Colorado River has?
The draft EIS contains information about water supply in the TVA region in Chapter 4 – "Affected Environment," and it includes discussions on water consumption and water use associated with TVA power generation in Chapter 5 – "Anticipated Environmental Impacts." TVA closely monitors the water supply and use of the Tennessee River system and its tributaries, and there is a water withdrawal permitting process to account for water withdrawals. The U.S. Army Corps of Engineers manages the Ohio and Mississippi river system. During periods of drought or flooding, TVA coordinates closely with the Army Corps on water releases from Kentucky Reservoir into the lower Ohio/Mississippi river system.

JULY2024-Q29
How does your modeling fully account for the climate impacts of upstream methane leakage and its 20-year role in triggering irreversible warming feedback loops?
As a part of the Environmental Impact Statement (EIS) analysis, TVA is performing a Greenhouse Gas Life Cycle Analysis (LCA) on each of the core portfolios. TVA is partnering with the National Renewable Energy Laboratory (NREL), which is providing technical support and guidance in the development of the LCA framework and process for the IRP. The LCA will include carbon dioxide, nitrous oxide, and methane emissions (including pipeline leakage) associated with upstream, ongoing combustion, ongoing non-combustion, and downstream emissions. Finally, these emissions will be contextualized using the latest social cost of greenhouse gases.

JULY2024-Q30
Solar generation varies significantly between different TVA distributors. Does TVA have a working group including both distributors & TVA staff working to implement best practices, and to potentially increase individual residences and businesses becoming part of community solar generation?
While there is not a formal working group that includes local power companies (LPCs) and TVA staff working to implement best practices, TVA Green Programs are offered in partnership with LPCs, which makes it easy for customers and communities to access renewable energy. TVA's Commercial Energy Solutions staff does consult with our LPCs on how to best implement the TVA Green Programs it has to offer in order to increase participation and meet

the various needs of end-use customers with business, residential, and community solutions. Some examples include Partner Flexibility Generation, programs for residential and small business, and a partnership with the states to implement Solar for All across the Valley.

JULY2024-Q31

Are environmental and public safety considerations included when making recommendations – especially considering recent lithium-ion battery fires in San Diego and at a battery plant in South Korea? And when will Vonore be opening?

Batteries installed in the TVA service region will have robust safety components based on best practices learned from other utilities. These safety measures currently include safe distances, advanced battery monitoring systems, automatic fire protection systems, and first responder training and first responder response plan development. TVA's Vonore Battery Energy Storage System is expected to begin commercial operations in late 2024. TVA has met with local fire departments regarding the lithium-ion batteries and will conduct walkdowns with the fire department before commissioning the Vonore site.

JULY2024-Q32

Gas seems to be a go-to dependable in the TVA dialogue during this webinar. Does this indicate TVA will hold tight with LNG and not outwardly increase the renewables option we have?

The IRP modeling will consider all available resource options, including existing renewable and non-renewable technologies, as well as emerging technologies that stand a reasonable chance of being deployable between now and 2050. This is consistent with TVA's obligations under Section 113 of the Energy Policy Act. TVA significantly increased the annual and cumulative potential for renewable resource additions in IRP modeling.

JULY2024-Q33

How do we ensure that we do not have the energy failures and problems seen in California and Texas, for example?

TVA utilizes a robust scenario and strategy modeling framework in creating the IRP. TVA also follows least-cost planning principles, which include consideration of reliability and resiliency needs. The IRP recommendation will include a strategic portfolio direction that will provide for low-cost, reliable, resilient, and increasingly cleaner power across a number of different ways that the future could unfold. With each specific asset decision that stems from the IRP, TVA will consider system reliability and resiliency needs as well.

JULY2024-Q34

Yes... the weather change scenarios need to be within this IRP. Look at the Tennessee River and its risk of floods and the TVA nuclear sites on this waterway. The risk of extreme temperatures needs to be in the plan. This extreme weather behavior is underway in 2024 and will continue.

Please see response above (JULY2024-Q12) where a similar question was answered during the webinar.

JULY2024-Q35

How much money did TVA spend on natural gas fuel last year? How does that compare to the amount spent on natural gas fuel in the past three years? How much did your gas costs increase due to winter storms? Are those extra costs for natural gas amortized? Over how many years?

Please refer to TVA's published SEC 10-K filing for information on historical fuel expenses.

JULY2024-Q36

What about the SMR companies that have gone bankrupt due to fraud? Are there any SMRs operating in the U.S.?

The decision to potentially build SMRs is an ongoing discussion as part of the asset strategy for TVA's future generation portfolio. TVA is following a structured, phased process for decision- making and incorporating lessons learned from other nuclear deployments. Partnerships, such as the technology collaboration with GE-Hitachi, Ontario Power Generation and Orlen Synthos Green Energy, help TVA share costs and reduce risk in development of innovative, advanced nuclear technology. While there are several SMR technologies and projects under development, there are not yet any SMRs under construction or operating in the U.S.

Questions and answers from webinar on October 30, 2024

**Answers provided below may reflect adjustments for clarity or conciseness, compared to the answer provided during the live Q&A. Where more substantial additions have been made, these are noted in italics.*

OCT2024-Q1

Do you have a timeline for upcoming Integrated Transmission Plan process?

We anticipate conducting a new and more comprehensive integrated transmission planning process that will result in an integrated transmission plan (ITP). We have done integrated resource plans for several decades, but with the changing utility landscape, it is imperative that we also expand and bring stakeholders into the transmission planning process. Our plan is to launch the ITP in 2025. We anticipate the process will take 18 to 24 months. We expect to have a website for the ITP similar to the one for the IRP. Please look for more information about the project in 2025.

OCT2024-Q2

Will the strategic portfolio direction choose one of the strategies for a clear path forward? Will TVA define a target energy mix?

The final IRP will include the set of IRP recommendations. We see the recommendations as likely having a few components. We expect the final IRP will include power supply mix ranges which illustrate the full bounds of what was studied. Then, the strategic portfolio direction may include certain near-term actions. Beyond that, we are exploring internally and with the Working Group ways to get a little more specific. We also will include key signposts to monitor. The signposts will influence future decisions within the power supply mix ranges, including when and why we may need to pivot as we move forward in the future.

OCT2024-Q3

When you say up to 1,000 megawatts of additional nuclear by 2035, would that be ready for commercial operation or under construction by 2035?

That would be up to 1,000 megawatts in commercial operation.

OCT2024-Q4

What does nameplate mean?

Capacity is typically provided in megawatts. Capacity refers to the maximum amount of generation in megawatts that a unit can produce. When we talk about capacity, there are different ways to talk about it. One is nameplate – that is the amount the unit is capable of producing. For renewables, like solar and storage, their nameplate is based off ideal conditions or maximum capability. When we talk about summer net dependable capacity or winter net dependable capacity, that is the amount of capacity we can rely on at the time of the highest demand in the summer or winter. For renewables and storage, based off unique characteristics, we have different net dependable capacity ratings that are lower than nameplate and based on what can be relied on at peak times. It is easier to talk in terms of nameplate when we talk about these assets, because these net dependable capacities decline over time and might be different from other utilities. It can be hard to compare our IRP with others if we don't talk about these in terms of nameplate.

OCT2024-Q5

Why isn't TVA taking advantage of the Inflation Reduction Act (IRA) incentives to build renewable energy now rather than later?

We are including all available incentives from the Inflation Reduction Act in our IRP modeling. All of our scenarios incorporate the IRA tax credits. In some of them, they have a little bit of a unique application, but it is important to know that every scenario incorporates potential IRA tax credits.

OCT2024-Q6

Will TVA drop modeling that did not include federal rules to cut greenhouse gases now that the Supreme Court has allowed them to move forward?

No. We will not drop scenarios that didn't include the final greenhouse gas rules or the draft rules. The Supreme Court elected not to stay the rule, but there is still litigation regarding the rules. We want to ensure we have a broad, robust set of scenarios that reflect the potential futures we might find ourselves in. None of these scenarios are probability weighted. We are looking at plausible futures. We are not making a call on one over another, but we do want to paint a broad range of what futures we might find ourselves in with regard to electricity demand and regulation or incentives that may exist.

OCT2024-Q7

What does TVA do with the comments on the IRP and EIS?

As typical for an environmental review that the public has a chance to comment on, we take those comments after the end of the public comment period, review each of them and in the final Environmental Impact Statement, we will provide written responses to each of those comments. To date, we have received over 1,000 comments. Many of them are expressing similar things, so in the final EIS, we will – for the sake of brevity – combine some of them and respond to them in that way. When folks ask questions or provide concerns about the scientific analysis we have done, we will go back to the analysis in the document, check it, talk to specialists and revise it if needed. In the previous IRP, we made revisions in the Environmental Impact Statement after the public comment period. We saw opportunities to improve the document that way. The public's input is a helpful and appreciated.

Additionally, TVA leverages public comments, in conjunction with the IRP Working Group, when determining which sensitivity cases should be analyzed for inclusion in the final IRP. These sensitivity cases test the impacts of changes in key assumptions, and they supplement the findings from the core cases when developing the IRP recommendations.

OCT2024-Q8

Why would TVA be building nuclear by 2035 when it could be deploying solar and batteries by now?

IRP modeling considers all resource types. We are interested in finding the best way to reliably meet electricity demands considering our least-cost planning principles. Just because we are looking at one resource type doesn't mean we are excluding another one. We are interested in what's the best total portfolio to meet all of the demands on our system. We are in the process of deploying solar and batteries today. We have a number of projects that have recently come online, and we have contracts for additional solar and battery facilities expected to come online over the next several years .

OCT2024-Q9

In today's dollars, how much will the rate increase be in 5, 10, 15 years?

The IRP does not project rate actions or rate design. It evaluates cost across a few measures. One is total system cost or the cost of the portfolio in today's dollars that resulted from the modeling in the IRP. The second is average system cost over the study period expressed on a dollar-per-megawatt-hour basis. This average system cost is directionally indicative of overall trends in customer bills. Lastly, total participant costs where we think about the cost of energy efficiency programs or other demand-side programs that may have a participant cost to them and add that to the total system cost. For example, if you had a high efficiency heat pump program where the individual homeowner pays $500 and the program pays the balance of the cost of the HVAC upgrade, the participant's costs need to be considered in the broader context of the analysis. You have those pieces of metric consideration in the IRP, but with regards to rates specifically, that is out of the scope of the IRP study itself.

OCT2024-Q10

How does the IRP address staying within TVA's debt limit?

That is outside the scope of the IRP. But when you think about what the IRP does: It sets a strong foundation for our asset strategy, for our commercial strategy (including evolving engagement with local power company customers and how we deploy resources in the most cost-effective way on the system) as well as our financial strategy. So, what will the trajectory of rates and what will the trajectory of TVA's debt level look like under these various portfolios? That depiction will be built off the foundation the IRP sets. This is not an explicit metric in the IRP metrics in regard to debt levels, but it is a consideration as we move past the IRP into asset strategy, commercial strategy and financial strategy implementation.

OCT2024-Q11

Are there opportunities with the IRP to partner with neighboring utilities or electric markets to procure or construct generation resources with firm transmission service to help reduce or spread costs among multiple partners?

The IRP is about what is the right mix of resources. It is not necessarily about the implementation itself; in the IRP, we are not making site-specific decisions. There are a few aspects of this question that could come into play with how we do our modeling. First, we have these various strategies that focus on certain types of resources, and we're promoting these types of resources with the assumption that perhaps the way these resources become the least-cost option is because we've engaged in public or private partnership that helps reduce costs through cost sharing or knowledge sharing. Ultimately,

though, the key thing is we are trying to find the right mix of resources. Beyond the IRP, once we take this to the Board for their consideration, then we would get into the execution phase and look for the lowest cost way to execute on the strategic direction identified in the IRP.

OCT2024-Q12

Why not target more storage?

The results that we shared are an output of the process. We took the scenario and strategy narratives that were defined by TVA and the Working Group; we created the modeling framework for that, and we allowed the model to select the best combination of resources. The model helps identify the optimal least-cost portfolio in a given scenario/strategy combination. The range of results we presented is what the model says produces that lowest cost optimal plan and storage was a part of that solution across the range of results.

OCT2024-Q13

When considering greenhouse gases, do you include methane leaks during development, extraction, transportation, storage and consumption?

Yes, the full lifecycle emissions of methane are included, including leakage, in the EIS. In this IRP, for the system-wide greenhouse gas lifecycle assessment (LCA), we partnered with the National Renewable Energy Laboratory (NREL), which is a Department of Energy laboratory that focuses on electricity and energy production. They have specific expertise in greenhouse gas lifecycle assessments. We felt they were the best source to go to for assumptions as well as for the best way to set this process up for something as big as the IRP. We use a set of emission factors provided by NREL based off a lot of academic study and consideration of peer-reviewed articles. They provide us with a set of emission factors that cover the full lifecycle – production, development of the power plant, the ongoing operation of the plant (combustion/direct emissions) and upstream emissions. That includes carbon dioxide, methane and nitrous oxide. We are including all of those as the plant is built, when the plant is expected to retire, during its years of operation and upstream fuel supply, leakage and other emission sources.

OCT2024-Q14

What storage systems have you explored?

In this IRP, we explored four different storage technology types. First, we allowed for adoption of distributed storage. This was based off economic modeling that we did unique to each scenario. Then, within each scenario based off the strategy we employed, we included financial incentives that we believe would increase adoption of this distributed generation, including distributed storage. We also look at utility scale options such as four-hour lithium batteries, which are shorter duration battery technologies, and long-duration advanced chemistry batteries. We are monitoring emerging technology options that could eventually come into play and meet the long-duration storage need. Finally, we are including long-duration pumped storage. We already have the Raccoon Mountain pumped storage facility, and we include an option for essentially another Raccoon Mountain – another 1,600-megawatt pumped storage facility.

OCT2024-Q15

TVA should evaluate MISO as a sensitivity.

This is more of a comment than a question. We encourage you to submit your official comments. You can go to the website and submit a comment there as well as learn about other ways to submit them during the official comment period. We are working with the Working Group now to identify which sensitivities to run, and we will run some specific to guidance provided in the comments. We will leverage them and review them with the Working Group.

OCT2024-Q16

TVA should evaluate joining MISO as a sensitivity.

Regarding sensitivity work, we are working with the IRP Working Group to identify which sensitivities to run. We will leverage official comments that are submitted during the public comment period and review them with the IRP Working Group to refine the expectations around what sensitivity work will be conducted and presented in the final IRP.

OCT2024-Q17

Can you explain the role of MISO wind in the portfolios? What is limiting additional MISO wind? How are you accounting for the cost of transmission for importing MISO wind?

We have three wind options. MISO delivered wind from the Midwest, high voltage direct current wind that is also assumed to be out of Valley, and in-Valley or near-Valley high hub option, which is a little more expensive but puts the wind turbines at a higher level to take advantage of lower wind speeds. In terms of the specific question, it is really going to come down to the transmission charge. As we look at the numbers, we include the cost to build assets and the fixed cost associated with operating these units on an annual basis. Those costs include traditional operations and maintenance, but in the case of wind, it also includes transmission wheeling and transmission capacity reservations. Regarding wind options, MISO wind versus in-Valley wind, the MISO wind has about three times the annual fixed costs associated with maintaining the unit and reserving the transmission compared to in-Valley option.

OCT2024-Q18

When you are evaluating strategy performance, how much difference is there in outcomes between good and best? Is it on the order of 10%? 200%? 1000%?

It is going to depend on the metric and the overall category, so we can't give a definite answer. Within the IRP, the last three appendices dive deep into the different metrics. Part of the problem with knowing the order of magnitude for these is that within each section area, there are a number of metrics. For example, the low-cost section includes three different metrics. Depending on which one you're looking at, it may be a little different. We try to look at the directional implications and show them at a high level on the slides. The full details of the actual numbers of the metrics are provided in the draft IRP document.

OCT2024-Q19

I see a lot of hydrogen carbon capture generation in a few scenarios. What are you assuming is the source of the hydrogen? Do you account for the cost of transportation and storage of the hydrogen?

Hydrogen shows up primarily in Scenarios 4 and 5. Within those scenarios, based off what we were seeing within the draft greenhouse gas rule, we made the assumption that a hydrogen economy would develop. If that develops, we would be able to procure hydrogen on a market basis and hook into a pipeline infrastructure that would be able to deliver the hydrogen. In terms of pricing, we looked at the price for green hydrogen today and looked at the Department of Energy (DOE) hydrogen shot targets. The DOE's targets were $1 per kilogram of hydrogen over a decade. For Scenario 4, we assumed the $1 a kilogram target was reached in 2050. In Scenario 5, we assumed that we were able as a nation to achieve the DOE hydrogen shot target within a decade.

OCT2024-Q20

Why didn't TVA evaluate incorporating fusion energy resources?

We looked at mature technologies that could be deployable today or emerging technologies that have a reasonable chance of becoming mature and deployable within the study horizon – by 2050. We worked

with the Working Group, with industry experts internally as well as with industry partners such as the Electric Power Research Institute (EPRI). We determined that we didn't feel comfortable on when or if nuclear fusion energy resources would become mature, so we did not include them. The draft IRP includes an assessment of both technology readiness and adoption readiness for the various resource options, and we used industry standard Department of Energy (DOE) tools when creating these assessment rankings.

OCT2024-Q21

Why didn't TVA evaluate incorporating space-based solar resources?

For its IRP, TVA looked at resources that are mature today or have a reasonable opportunity of being mature and available over the course of the study horizon.

OCT2024-Q22

Is it cost effective to produce excess solar and wind, then use the excess to produce hydrogen. In this way, hydrogen would become a form of energy storage.

Yes. It becomes a long-duration storage type option. If a green hydrogen economy were to develop, one would assume that there was excess renewable energy. We made the assumption that this green hydrogen is available via a market mechanism in our IRP, and that the market would find a way to produce that green hydrogen and then we would be able to purchase from this market.

OCT2024-Q23

Were goals set out in the 2019 IRP met and why or why not?

There were not goals outlined in the 2019 IRP; instead, TVA identified near-term actions that were outlined in the 2019 IRP. For example, we saw potential in the 2019 IRP for greater volumes of energy efficiency (EE) and demand response (DR) on the system. The near-term action was to conduct an energy programs study to understand what the market potential could look like and inform the pursuit of additional energy efficiency and demand response programs on the system. We completed that study and now are pursuing a $1.5 billion investment in EE and DR programs. Another example was to evaluate the end-of-life planning assumptions for the balance of TVA's coal fleet. We conducted that study and arrived at a plan to exit coal by 2035. That analysis is an underpinning assumption that exists in all of the modeling for this current IRP – that all existing coal plants on the system are retired in every portfolio by 2035. In this IRP, we have a section that speaks to actions that were outlined in the 2019 IRP and steps we have taken to fulfill those near-term actions that supported the strategic portfolio direction established in that IRP. We encourage folks to review that material. We have made significant strides on every one of the 2019 IRP's near-term action recommendations.

OCT2024-Q24

Solar and storage are being built in scenarios up to the build limits. What is the basis for the build limits? What is limiting higher solar and storage capacity?

All resources have some sort of limit. These annual limits are used within modeling to reflect the real-world limitations deploying these generating resources. For example, if it's a gas technology, we would work with our partners in TVA construction entities to understand the limits in terms of the pipeline of available resources from upstream vendors. And we looked at the results of our recent Request for Proposal (RFP) responses. What have we been able to transact on with the RFP processes? What can we interconnect in terms of new resources on the transmission system? Some resources are large amounts of megawatts at a single site, such as a large nuclear facility; whereas solar or battery storage might be at multiple sites across the Valley, and that can increase the complexity of integrating these resources.

We took all of this into account when setting annual limits within our modeling. Between the 2019 IRP and the 2025 IRP, we have taken feedback, we have seen what is available in the market and have doubled the annual limits for solar resources and storage resources. Some of our higher growth scenarios include even more potential for solar and storage deployment. We had a wide range of results. In the case of solar, we saw 3 to 20 gigawatts across the 30 core portfolios.

OCT2024-Q25

Why are there so little wind builds compared to solar builds? Is there a wind limit assumption in the model?

All resources have an annual limit. We have up to 1,000 megawatts of both the in-Valley high hub and MISO wind options available each year. That is not the limiting factor. It more comes down to cost. The model understands the cost to add solar and wind resources. Based on the typical profiles and the fact that solar resources can be procured in the TVA region which cuts down on transmission costs, solar is the preferred option over wind for the TVA system.

OCT2024-Q26

Do any of the nuclear scenarios assume advancement on the licensing side? Do the scenarios assume improvement of construction based on lessons learned from prior projects?

We include the spirit of both of these in our IRP modeling. Scenario 5 includes substantial advancements in carbon-free resource technologies, including nuclear. Because of that, within that scenario, the cost of nuclear resources and other carbon-free resources are much less than in other scenarios. That cost reduction could be due to a number of factors, including improvements in the licensing aspects and lessons learned. We want to understand, if the cost comes down, what does that mean? Regarding lessons learned, in the nearer term – the mid- to late-2030s – we have some assumptions around how fast the first few nuclear units could come online. By the time you get to the 2040s, we assume we could have a pipeline of projects coming on in back-to-back years. There are some limitations in the near-term, where you wouldn't have that ability.

OCT2024-Q27

Do any of the scenarios consider the need to harden the grid against terrorist actions?

No, not in the scenarios. For strategies, we have a Resiliency Focus strategy. There are multiple reasons why enhanced resiliency across the system may be valuable. That strategy, in conversation with the IRP Working Group, ultimately became one that emphasizes smaller, more geographically distributed resources that have a local resiliency element. If you were to see an attack on some portion of the electric grid, you would have less impact given the locational nature of the attack. Beyond the scope of the IRP, TVA has a robust cybersecurity program. We do rigorous work on resiliency, and mitigation strategies are a focus on a daily basis.

OCT2024-Q28

Will TVA consider setting requirements (such as solar or wind carveouts) to incentivize procurement of renewables and timely execution and buildout of these projects?

Could there be carveouts or specific requirements for resources? Potentially. The IRP is a compass that points us in the direction we need to go. In the strategy execution phase, that's when there is a discussion of the appropriate pace for adding resources, particularly ones we see larger volumes of, like solar between now and 2035. There are several factors to consider, such as customer demand for solar. We have some programs that allow for out-of-economic-order solar to be secured and sourced, with the premium paid for by specific customers that want the solar on the system. That's our Green Invest program. Another factor is adding solar as it is economic to do so, at a measured pace that optimizes the

potential value to the system from an energy price and reliability perspective and manages it through the transmission interconnection process as effectively as possible. When you think about how to get volumes of a resource, there has to be common sense, logical steps based on the world we are in.

OCT2024-Q29
Have you considered rail lift energy storage? In eastern Tennessee, we have a lot of hills. Would that be scalable?
TVA is monitoring rail lift and other forms of emerging energy storage options, although not necessarily in the IRP. We are using advanced chemistry battery storage options to help us understand and evaluate the need for long-duration storage in the IRP. We will continue to work with vendors and industry partners to keep a pulse on many emerging storage options. We will use whatever resource or combination of resources that provides the lowest cost option with the highest reliability when we get to actual deployment beyond the IRP.

OCT2024-Q30
How do nuclear cost reductions assumed in Scenario 5 interact with the promotion of nuclear via minimum quantities, reduced costs in Strategies B and E?
For our alternative strategy promotions, we introduce a moderate or high incentive. It could be a financial incentive that reduces the cost of that option for selection purposes, but we add that cost back in for metric purposes so we accurately account for it. This makes it more attractive to the model. The other way we do this is we define pilot projects and tell the model to select pilot projects for these resource options to get us started. In the cases of Strategies B and E, nuclear has either a high or moderate financial promotion across all scenarios except Scenario 5 that already models lower nuclear costs. Applying financial promotion means reducing the cost of nuclear down to some of the lower NREL projections, which are lower than our current internal assumptions. Beyond that, in Strategies B and E, we include some amount of pilot projects – either one or two plants worth of small modular reactor deployment.

Questions and answers from webinar on November 22, 2024

**Answers provided below may reflect adjustments for clarity or conciseness, compared to the answer provided during the live Q&A. Where more substantial additions have been made, these are noted in italics.*

NOV2024-Q1
How are the public comments included in the Integrated Resource Plan (IRP)?
TVA uses the comments to refine the analysis in the EIS and IRP and to develop the recommendation in the IRP. TVA will review and respond to each comment and the comment themes, and the final Environmental Impact Statement (EIS) will include a summary of all the comment themes. We will prepare comment responses that will be included in the final EIS, and the actual comments are included as an appendix in the final EIS.

NOV2024-Q2
Since your analysis is driven by cost, how did you model the highly regulated scenarios? Did you affix a cost for carbon emissions for this? If so, what was the cost?
In Scenarios 4 and 5 that include additional regulations, we looked at different ways to get the utility sector to net-zero emissions by 2050. First, we used the EPA's draft Greenhouse Gas Rule, which

included regulatory requirements for existing coal assets, existing gas resources and new gas resources. That resulted in substantial carbon reductions; however, it didn't get us to net-zero. So, within Scenarios 4 and 5, we also included a carbon tax. That carbon tax is different for Scenarios 4 and 5, as the clean energy technology advancements assumed in Scenario 5 would likely reduce the carbon tax needed to achieve net-zero by 2050. To develop the carbon tax assumptions, we looked at some published estimates for the social cost of carbon – from the White House in 2021 (Scenario 5) and from the Environmental Protection Agency (EPA) from 2023 (Scenario 4). We applied these social costs of carbon starting in the mid-2030s, and they escalate through time as proxies for potential future regulations. Ultimately, in both of those cases, the draft Greenhouse Gas Rule plus an escalating carbon tax through time is what gets us to a utility sector net-zero.

NOV2024-Q3

How did you include the cost of fossil fuels in your model? Since TVA is largely protected from fuel cost but your customers are not, do your models show your customers' risk for escalation in fuel costs among your strategies?

When it comes to costs, for every resource, we model several components. First, there is a cost to construct every resource – the capital cost to build the asset. And then there are a number of ongoing costs. One is the cost of fuel. In the case of a natural gas asset, every scenario has a forecast for how much that gas will cost in the future. Then, we have ongoing fixed costs – to staff the plant, do routine maintenance and other variable costs to maintain the plant. All of that is considered for every resource, including for natural gas and coal assets. Each scenario has a unique forecast for natural gas price through time that increases through time on a nominal basis. The goal of the model is to maintain reliability and produce a system at the lowest overall cost. The Present Value of Revenue Requirements (PVRR) metric captures all applicable costs to build, maintain, fuel and operate all power plants on the system. All of that is considered when producing a 25-year forecasted portfolio that optimizes for low cost.

I believe this question is really asking how do we look at potential volatility? We do that through stochastic analysis, which is a probability-type study that varies the forecast that we know will be different in the future. For example, the load forecast won't be a straight line; it will be choppy. The natural gas price forecast will be volatile. Stochastics analysis changes all of these unknown variables, and it varies them through time. We do over 120 iterations of this analysis so we understand the risk associated with any given portfolio. All 30 of our cases underwent stochastic analysis to develop the risk-informed metrics. We talk about strategy performance against pre-defined metrics. Related to being risk-informed, it was better for Strategies B and C, and a big part of that is because of a reduced reliance on natural gas-fueled assets, which results in slightly less volatility because of less exposure to natural gas prices.

NOV2024-Q4

Your least-cost models show little solar power under any strategy. What is different about the TVA service area compared to other areas of the country that makes solar power much more expensive for TVA compared to the U.S. regions?

I think we see significant volumes of solar playing a role on the system in the future. It was one of the largest or strongest signals of new capacity that would be coming onto the system. There is an important characterization between the concept of nameplate megawatts – how much capacity does a resource provide at an instantaneous point in time versus how much energy, or megawatt hours, does a

resource provide over a period of time? When you compare them, you have to look at the operating characteristics of a resource. Solar generates energy when the sun is up, so you are looking at a daily megawatt-hour capability that is cut in half relative to other resources that might be firm and dispatchable. When you look at the energy output of solar resources or the share of future system energy that solar resources or renewable resources in general provide, you also have to account for the intermittent nature of those resources. Every solar resource has a shape, and you have to think about how the shape can evolve when we get more solar, wind or intermittent resources on the system. That's where we factor in the effective load carrying capacity (ELCC) of intermittent non-firm, non-dispatchable resources. We see a strong signal for solar, and it will play a role that can provide economic energy across certain hours of the day and seasons ahead.

NOV2024-Q5

When it comes to meeting resource adequacy, how is TVA finding interconnection processes for new projects? Has the process become more expensive and longer for new resources? Does TVA have a preference for resource when it comes to interconnection?

Resource adequacy is about how capable a resource is of being reliable and how resources fit together to meet the needs of a total system. The interconnection process is separate from that. But we have seen challenges with the interconnection process with higher volumes of smaller and more distributed projects entering the interconnection queue. Utilities have traditionally used a serial process to evaluate those resources trying to interconnect to the system. As there is movement in the assumptions of the timing, locations and sizes of those resources, the serial process can be burdensome as different resources move around in the queue. We are excited that FERC Order 2023 is moving to more of a cluster study process, which we believe will alleviate some of the challenges we have seen in the interconnection queue process over the past few years. In regard to favoring one resource over another, we don't favor one resource type over the other. The process is designed to evaluate the resources as they come into the queue.

Transmission planning is a question we have gotten in most of our open house settings. We are planning in 2025 to launch a new initiative, the Integrated Transmission Planning effort. It will build upon and leverage the process we have used over many years now of building the Integrated Resource Plan, the IRP, which involves extensive stakeholder involvement and outreach. Our intent in 2025 is to launch an effort that looks at transmission planning. We will be building on and leveraging federal direction but also recognizing interest from customers and stakeholders who are interested in understanding how TVA develops its transmission plan to deliver power to end-users. Look for more to come on that in the new calendar year. Also, there is an Expression of Interest form on the TVA website. The form is included on a webpage that describes ways to engage with TVA, including by joining a Working Group or Federal Advisory Council.

NOV2024-Q6

Why didn't you model solar and storage together?

When we looked at modeling, we let all of the resources be added individually by the model. We let the model select the most optimized solution and to determine the best combination of resources to maintain reliability and deliver a portfolio that has the lowest overall system costs. Often, we see that renewables – solar or wind – are added in conjunction with storage. The model understands those beneficial relationships, it understands the unique shapes that vary throughout the days and the seasons, and it understands that there are certain times of year that get a lot of output from renewables but may not have high demand. Adding storage gives firm, dispatchable capacity and helps soak up

some of the energy that is coming onto the system that it may need later in the day. TVA felt it was best and most optimal to let the model make that evaluation.

NOV2024-Q7

It sounds like TVA is essentially doubling capacity by 2050. Is that an accurate statement?

It depends. In terms of our electric demand, that is going to depend on the scenario. We have anything from essentially flat electric demand in the lowest case to doubling electric demand by 2050 in the highest case. That demand creates the need for firm resources; those resources that provide reliable, dependable power at the time of the summer peak and the winter peak. We do have a wide range of demand.

When you think about the fact that renewables and storage may not provide 100% firm capacity, we are getting close to doubling the system due to large amounts of solar and storage resource additions. We talk about these in terms of nameplate, which is the maximum amount of energy an asset can produce. In terms of total installed nameplate capacity, it is roughly doubling or maybe even more in some of the larger growth scenarios.

NOV2024-Q8

Are the solar assumptions for TVA-owned solar or for purchase agreements? How are those two distinguished in the model?

How we actually procure a resource, whether it is a self-build or a contract with a third party, is a decision that will be made beyond the IRP. The goal of the IRP is to establish the types of resources we need to add and how many by what time. Within our modeling, we assume that solar resources – similar to recent past practices – would be through a purchase power agreement. However, the way we have modeled these costs, it really could be either. The dollar per megawatt-hour generated as modeled for a typical purchase power agreement can be translated into what it would cost to construct an asset and the fixed operations and maintenance costs over the lifetime of that asset. The model sees the cost the same, whether it is a self-build or a purchase power agreement. That way, we can make the best decision beyond the IRP on the lowest cost way to add solar.