Meeting the Energy Needs of Tennessee Today and Tomorrow

Presented to the

Tennessee House Government Operations Committee

February 27, 2023

Introduction

The Tennessee State Energy Policy Council (Council) has been requested to provide testimony to this committee and we are pleased to do so. Council was established in 2017 by Public Chapter 458 to serve as the central energy policy planning body for the state. Its mandate is to provide ongoing recommendations to the Governor and General Assembly on energy policy and a state energy plan. SEPC members represent a wide range of stakeholders and viewpoints to help bring the sharpest possible focus to energy policy discussions. These discussions are taking place amidst a rapidly changing market, technology, and policy environment. A list of Council members is included at the end of this testimony.

To date Council's work has included annual assessments of different facets of the state energy sector to help inform policy discussions. Council has also provided briefings to state government officials, public presentations, and most recently, a series of steps examining natural gas supply limitations across Tennessee. The natural gas challenge facing Tennessee and Council's response to this challenge will be discussed more fully below. Council's reports are available online at a website maintained by the Tennessee Comptroller of the Treasury. https://comptroller.tn.gov/boards/sepc.html

Today's testimony is motivated in part by concerns regarding the rolling blackouts in December 2022. While the blackouts have been and will continue to be addressed by TVA, they highlight an evolving energy system and the impact of a unique weather event on service delivery. Events like this heighten awareness of the importance of issues of energy resiliency and security, not just for electricity service but for all energy sources used by Tennesseans.

The focus today falls on ongoing pressures on both the supply and demand sides of energy markets that could affect energy availability, energy cost, energy sector resiliency and state economic development in the years ahead. Comments and questions are encouraged as Council's work on these subjects is ongoing. Council will issue a more comprehensive assessment in the months ahead.

Background

The energy consumed by residents and businesses in Tennessee come from many sources.[1] While the state holds some energy resources, notably hydropower, that are used for electricity generation, most energy supplies like nuclear fuel, natural gas, coal and petroleum are sourced from beyond the state's borders. As a result, Tennessee must react to global and national markets forces that impact energy supply and prices. Energy markets are also regulated by the federal government, including the Federal Energy Regulatory Commission (FERC). Together, these external forces sharply constrain the State government's ability to affect energy market supplies, energy distribution systems, and prices.

Electric Grid

The electric grid is the complex network that moves electricity from its source to end users. [2] Management of the grid is complicated by the diverse sources of energy used to meet consumer demand. Some sources, like nuclear and hydropower, provide ongoing energy to meet baseload demands throughout the day. Natural gas is used to meet baseload demand as well as peak demand. Power companies are accustomed to managing these energy sources. Renewable resources, like solar and wind, can be used as weather conditions allow. Managing the use of renewable energy resources and balancing their use along with traditional baseload energy sources represents an ongoing challenge. Consumers today also want other attributes of the power they purchase, like green or clean power, further complicating power resource management. Finally, the grid that links generation across regions and state borders creates complex security issues and system interdependencies.

Natural disasters, weather events, accidents, and terrorism (including breaches of cybersecurity) are among the many threats to the grid. (Note that the movement of natural gas and petroleum products through pipelines is subject to similar threats.) TVA follows best practice under the umbrella of federal regulations and oversight to ensure grid security.

In a separate report recently prepared by Council, recommendations were made regarding protecting the integrity of the grid.[3] Included on the list are diversification of energy supplies, promotion of large (utility) scale energy storage systems and increased energy efficiency that can reduce energy demand. Three additional recommendations are offered here:

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[1] For background, see *An Assessment of the Energy Sector in Tennessee*, November 24, 2020, prepared by the Howard H. Baker Center for Public Policy, on behalf of the State Energy Policy Council. https://comptroller.tn.gov/content/dam/cot/energy-policy-council/documents/SEPC_2020_Assessment_Final.pdf

[2] See *Energy Sector Disruptors in Tennessee: Framing Options*, Alec Apostoaei, Michaela Marincic, Matthew N. Murray, Lou Qualls, Tim Roberson, Charles Sims and Bruce Tonn. Prepared for the Tennessee State Energy Policy Council, December, 2021.

[3] *Statement Regarding Rolling Blackouts in December 2022*, prepared by the Tennessee State Energy Policy Council January 2023.

- Encourage TVA to work with research universities and other specialists to model the likelihood of events like blackouts that are subject to unique uncertainties and complexities and offer recommendations to promote system integrity.
- Engage the SEPC (potentially in partnership with state agencies) to organize a public conference that would gather experts to discuss cutting edge responses to rare events affecting electricity supply.
- Encourage the state to invest in a multidisciplinary, multi-institutional *Tennessee Energy Institute* to nurture in-state expertise on energy technologies, modeling, and policy.

Growing Energy Demand

Tennessee has seen strong population growth, particularly in recent years, that is a major contributor to the rising demand for energy. Since 2000, the state's population growth rate has exceeded the relative growth rate of the U.S. population. Moreover, the state's population is projected to grow an additional 14.4% between 2020 and 2040, which will further increase energy demand.[4] Many businesses in Tennessee, such as familiar retailers, are tied to a rising in-state consumer population. As the population grows, these businesses grow as well, further increasing the demand for energy. Steps to promote energy efficiency can temper this demand growth and reduce pressures on the energy delivery system.

Businesses in the state's agricultural and industrial sectors produce most of their commodities and goods for sale to consumers outside the state. These businesses must remain cost-competitive to be able to compete in the global and national marketplace. Ensuring their competitiveness, and thus their ability to employ Tennesseans and contribute to state and local tax bases, requires a diverse energy portfolio that can yield adequate, stable, and competitively-priced energy sources.

Tennessee has a relatively higher share of manufacturing jobs than the nation as a whole. The Tennessee Department of Economic and Community Development, along with communities across the state, is actively pursuing new industrial jobs to improve the wellbeing of state residents. Since 2019, the state received new job commitments totaling 81,438.[5] Projections indicate that the state will see stronger growth in manufacturing jobs relative to the nation between 2022 and 2033.[6] Ongoing population, business, and industry growth requires an increased and diverse energy portfolio to power automobiles, heat and cool buildings, and support heavy industry and agriculture. While the state must rely heavily on markets to meet these needs, it should look for opportunities to influence them to our advantage.

Electric Vehicles

Electric vehicles and plug-in hybrids represent a small share of the current transportation fleet in Tennessee today; less than one percent of vehicles on the road. Significant growth is expected as

[4] Projections developed by the Boyd Center for Business and Economic Research, https://experience.arcgis.com/experience/511cc776d42545afb2d3684ff90c2e8e

[5] See the Tennessee Department of Economic and Community Development's Business Development Project Activity Dashboard

[6] See the *An Economic Report to the Governor of the State of Tennessee*, *2023* https://haslam.utk.edu/publication/economic-report-to-the-governor-2023/

technologies improve, costs and charging times decrease and charging stations become more widely available.

Electric vehicles are especially important to Tennessee because of the state's large automotive sector. In 2022, 72,580 jobs in the state's transportation equipment sector accounted for one of every five manufacturing jobs in the state.[7] A significant number of jobs in other sectors of the state economy, both inside and outside the manufacturing sector, support the state's automotive sector. Vehicle assemblers and parts manufacturers are in the process of transforming production platforms to accommodate increased demand for electric vehicles.

The energy demanded by electric vehicles is modest today and can be accommodated by existing generation capacity and grid infrastructure. TVA anticipates 200,000 electric vehicles in its service area by 2028, representing only about 0.5% of load. Pressures on demand arising from a growing prevalence of electric vehicles are expected to be mitigated by home charging which will typically occur off-peak.

Small Modular Reactors (SMRs)

After many years of research and the pursuit of Nuclear Regulatory Commission approval, SMRs are now being designed for demonstration at select locations across the country, including a proposed demonstration project in east Tennessee.[8] SMRs are smaller than traditional nuclear power plants, with a capacity equal to or less than 300 MWe. Some designs propose to package multiple units within a common facility to produce up to 600 Mwe. SMRs offer clean, safe power that enhances power generation resiliency and reliability through supply diversity, and they can potentially be deployed in unique situations to meet niche market needs.

SMRs offer the potential to be a significant source of power generation for the state in the years to come, and with the possibility of producing new fuel forms in Tennessee, increasing in-state sourced power and reducing the need to import energy. They also offer potentially significant economic development benefits to the state through the design, manufacture, construction and deployment of factories, components, and reactors both inside and outside the state. The assets to support expanded SMR activity are already present in Tennessee, including Oak Ridge National Laboratory, TVA (which currently operates nuclear generation facilities) and colleges and universities across the state. It is noteworthy that three companies involved in SMR work are already present in Oak Ridge--Kairos, X-Energy and USNC. Increased economic activity centered on SMRs has already yielded benefits in terms of supporting jobs and occupations related to the nation's nuclear sector.

Coal Plant Closures

The Tennessee Valley Authority (TVA) has indicated that it plans to retire its fleet of coal-fired power plants by 2035. Between 2013 and 2022, four coal fired power plants in Tennessee were decommissioned, and the Bull Run plant will be retired by December of this year. In 2019, TVA generated approximately 17% of its electricity from coal; this is a sharp departure from 2004 when 57% of electricity came from coal. Reduced reliance on coal reflects many forces, including the aging of the

[7] Tables 1 and 6, *An Economic Report to the Governor of the State of Tennessee, 2023.*

[8] For background, see *Energy Sector Disruptors in Tennessee: Framing Options*, Alec Apostoaei, Michaela Marincic, Matthew N. Murray, Lou Qualls, Tim Roberson, Charles Sims and Bruce Tonn. Prepared for the Tennessee State Energy Policy Council, December 2021.

coal power plants and the associated costs of refurbishment, environmental concerns, the emergence of alternative energy sources (including solar and wind), and cheaper supplies of cleaner burning natural gas.

The power loss created by coal-plant closures is being met by a variety of sources including natural gas and solar power. Hopefully SMRs will contribute to meeting the state's baseload energy needs in the future as well.

Natural Gas Supplies

Natural gas use for electricity generation has been increasing, along with growing applications by other users, especially the state's manufacturers. Natural gas usage has been rising more rapidly relative to overall energy consumption in Tennessee. Most natural gas supplies are sourced outside the state and shipped across an increasingly constrained network of interstate and intrastate pipelines. Supply constraints could seriously impact economic development prospects for the state. There are already documented examples of natural gas capacity constraints across Tennessee today.

Council has conducted a preliminary needs assessment to identify the scope of these constraints, relying on direct interviews with over 30 experts and a survey of local natural gas distributors through the Tennessee Gas Association.[9] Findings include (i) current supply constraints in the eastern middle and eastern portions of the state, (ii) pervasive supply problems in rural communities across the state and (iii) serious concerns regarding future natural gas availability. Some communities today cannot meet expanded industrial natural gas requests, which means that industry and jobs must locate elsewhere; agricultural users, in particular poultry producers, also suffer from supply constraints that lead to higher costs because of the need for higher-priced substitutes. There are no current plans by major natural gas pipeline companies to expand capacity in Tennessee.[10] This is especially concerning because of the extended time it takes to deploy significant new pipeline capacity.

Based on Council's research findings, a proposal was submitted to the State in the current budget cycle to fund a comprehensive natural gas needs assessment. A one-time state appropriation of $400,000 was requested to support the study, but the funding is not included in the current State budget proposal. The proposed assessment would be undertaken by private sector specialists and managed and overseen by Council and UT's Baker Center. It would (i) examine current and future natural gas needs in Tennessee, (ii) evaluate the capacity to meet projected needs by natural gas suppliers and pipelines, (iii) consider prices and price disparities across the state, and (iv) review public-private financing options to help address identified problems.

Conclusion

The ongoing activities of Council are intended to assess the state's energy sector and make timely recommendations to the Governor and General Assembly. The presentation today is part of Council's

[9] See *Ensuring Natural Gas Capacity to Meet Tennessee's Energy Needs*, prepared by Matthew N. Murray for the State Energy Policy Council, March 29, 2022. https://comptroller.tn.gov/boards/sepc/reports-by-state-energy-policy-council.html

[10] Enbridge and Kinder-Morgan each have plans to increase natural gas capacity to support TVA power generation, but these proposals would not increase capacity to support other users. See https://www.enbridge.com/projects-and-infrastructure/projects/ridgeline-expansion-project) and Cumberland Project (kindermorgan.com)

ongoing efforts to fulfill this mandate. Council will continue to share its assessments and recommendations with you and others in state government as opportunities and needs arise.

Members of the State Energy Policy Council

Dr. Joe Hoagland, Chair, representing Tennessee Valley Authority

Dale Barnett, representing a commercial, industrial, or agricultural energy consumer

Molly Cripps, Governor's designee

Dr. Jasbir Singh Dhaliwal, representing an institution of higher education

Dr. H.M. Hashemian, representing the energy resource extraction or energy production industries

John Kenny, representing energy efficiency and conservation as it relates to the built environment

Jerry Kettles, representing the Tennessee Public Utility Commission

Dr. Lou Qualls, representing the energy research and development industry

Brian Solsbee, representing a local distribution utility

Steve Southerland, representing a residential energy user

Matt Stennett, representing industries that provide natural gas to consumers

Roy West, State Treasurer's designee

Vacant, representative of an environmental group

Vacant, representative of transportation-related industry

Vacant, representing a graduate student with expertise in energy issues