Testimony of David J. Tudor
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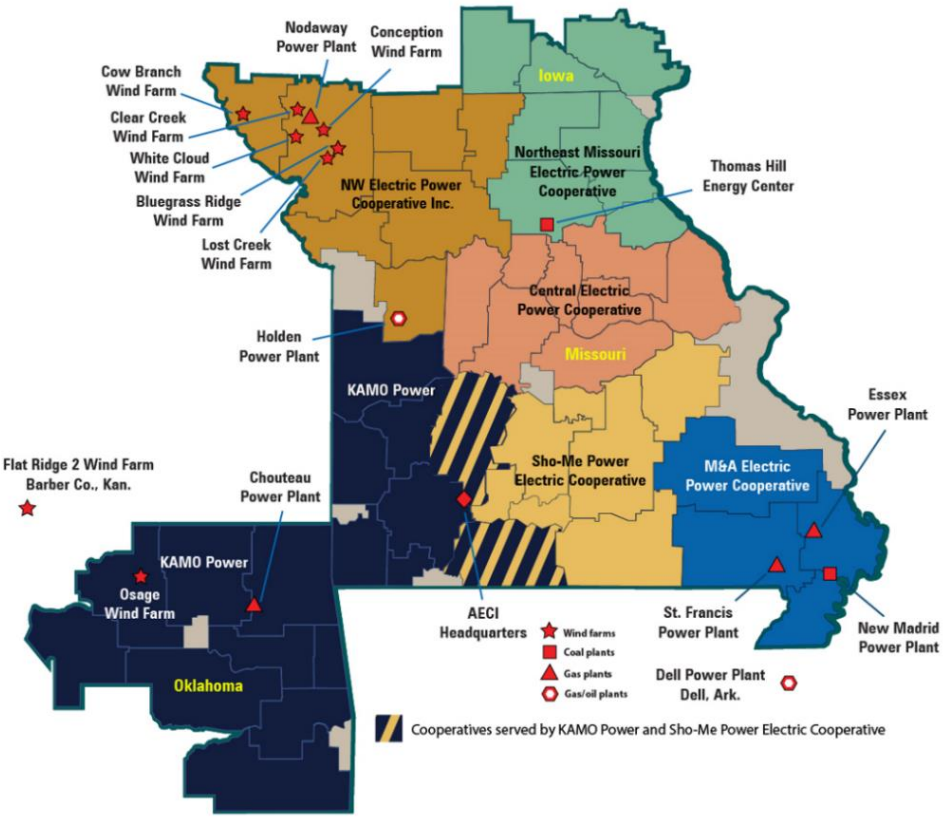
United States Senate Committee on Energy and Natural Resources
"Hearing to Examine the Reliability and Resiliency of Electric Services in the U.S. in Light of Recent Reliability Assessments and Alerts"

June 1, 2023

Chairman Manchin, Ranking Member Barrasso, and members of the Committee: thank you for the opportunity to testify here today.

Associated Electric Cooperative Overview

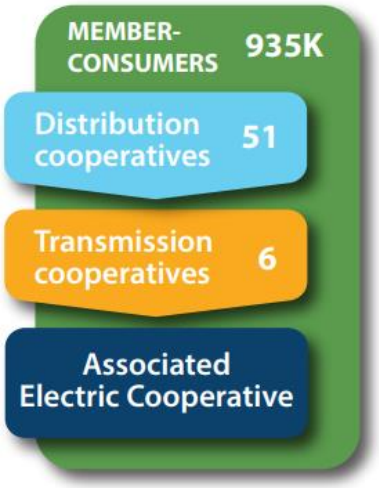
Associated Electric Cooperative (Associated) is a member-owned, member-led wholesale power generation and transmission cooperative created in 1961 by rural electric cooperatives to provide electricity reliably and affordably for rural areas of the Midwest. Today, this system delivers electricity to 935,000 meters (each meter equals one member-consumer), representing 2.1 million people across rural Missouri, northeast Oklahoma and southeast Iowa. Associated's member-consumers are primarily older, lower income electricity users who live in rural parts of the three-state system. More populous urban and suburban areas of these regions are served by municipal or investor-owned electric utilities.



map: AECI.org

Associated is a system comprised of three distinct tiers, each specializing in one critical area of the electric utility process and accountable for its performance through democratic control at every tier.

- Generation: In the first tier, Associated generates power for six regional transmission cooperatives who are member-owners of Associated.
- Transmission: In the second tier, the six regional transmission co-ops use an extensive network of substations and high-voltage power lines to deliver the power to 51 distribution co-ops who are their member-owners. Associated and its six transmission co-op owners own and operate 10,288 miles of transmission lines.
- Distribution: The third tier is made up of the 51 local power co-ops that deliver electricity to member-consumers at homes, farms and businesses in rural areas. 935,000 member-consumers served by this distribution tier own and are democratically represented at their local co-ops.



The system is independent of regional transmission organizations (RTOs) and makes decisions as a not-for-profit entity, but in the best interests of members who are also owners. Associated features more than 200 interconnections with Regional Transmission Organizations (RTOs) and others, which through its independence and focus on members, enables transactions to support reliability and keep members rates lower than they otherwise would be.

Member surveys of Associated's member-consumers reveal they are relatively: older, with 57% over the age of 57 and 33% over the age of 65; retired, with 34% retired and 54% employed full-time; and lower income, with 50% of household incomes less than $100,000 annually and 22% of less than $50,000. Escalating prices for electricity are regressive, impacting those most who are least able to afford to pay more. For many years, Associated's wholesale power rates to its member have been among the most affordable in the nation and continue to be today.

Associated's evolving resource portfolio

Associated has developed a balanced generation portfolio comprised of on-demand, dispatchable generation and intermittent renewable sources. Since 2005, Associated's generation portfolio has changed to include significant amounts of natural gas and contracted wind power, complementing coal, federal allocations of hydropower and purchases from the RTO markets.

This owned and contracted power provides a total generating capacity of 5,626 megawatts (MW). This includes over 2,300 MW of coal and has evolved over time to include nearly 2,800 MW of natural gas and significant wind resources. Associated contracts with eight wind farms totaling 1,240 MW of nameplate capacity. Because of its intermittent nature, wind energy is not included as capacity for planning purposes. Associated also receives nearly 500 MW of hydropower from the Southwestern Power Administration.

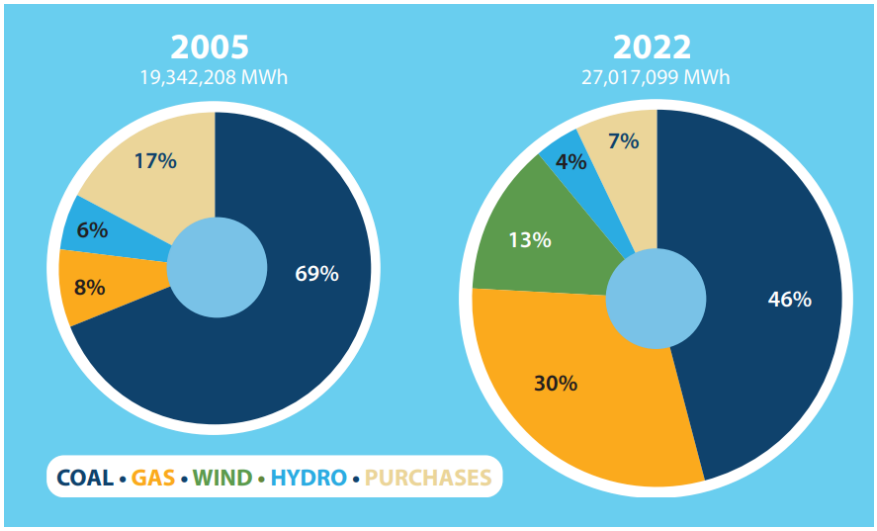


chart: AECI 2022 annual report

Technology, transmission and time necessary for an energy transition that preserves reliability

Associated believes that for a transition to a reliable energy industry future with lower emissions, all policies need to consider the maturity of technology and the time it takes to build new generation and transmission lines under the current regulatory and RTO paradigms. Three key areas must be addressed to make sure reliability is not a casualty of the transition:

- Technology: Potential solutions are being studied that may one day provide reliable, affordable, and zero-emission power for member-consumers. It is not a reality today or near-term. No commercially available technologies can replicate the reliability of a dispatchable coal, natural gas, or nuclear power plant.
- Transmission: Roadblocks can only be addressed with expensive and extensive upgrades to the existing transmission system. Those upgrades will take several years, and some may take over 10 years to complete under current regulatory paradigms and supply chain challenges.
- Time: Both new technology development and transmission system upgrades need time to mature and be implemented effectively. Natural gas units are the only viable bridge generating source available today.

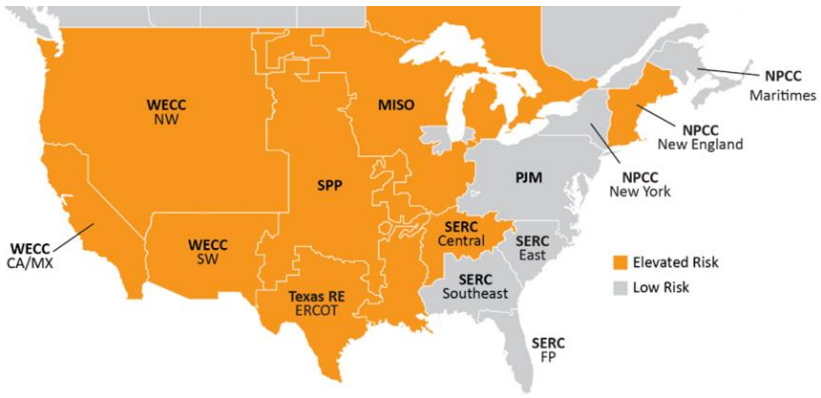
Overview of Reliability Assessments

As electric cooperatives work to meet the changing demands of our communities and our member-consumers, reliably keeping the lights on is vital for the health and wellbeing of those communities, the economy, and national security. Unfortunately, that obligation is becoming more and more challenging.

The 2023 Summer Reliability Assessment issued last month by the North American Electric Reliability Corporation (NERC) found that more regions of the U.S. than in 2022 face elevated risks of electricity supply shortfalls during periods of extreme summer weather. Although the 2023 Assessment did not identify any regions as high-risk, only under normal summer conditions is the entire country expected to have adequate power resources. The key findings by NERC on the reasons for these reliability challenges

this summer are consistent with its *2022 Long-Term Reliability Assessment* and other assessments and reports.

Summer Reliability Risk Area Summary

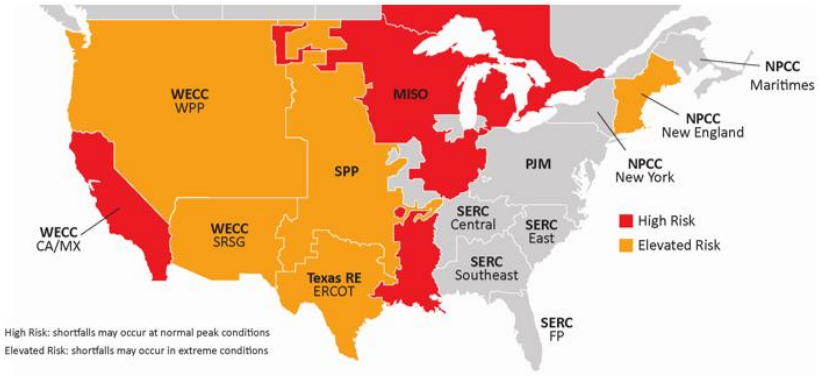


map: 2023 NERC Summer Reliability Assessment

Importantly, the 2023 NERC summer reliability assessment is just the latest in a series of alarming reminders about the new electric reliability challenges facing the nation. Earlier this month, Federal Energy Regulatory Commission (FERC) Commissioner Mark Christie warned this Committee of threats to reliable electricity, stating "I think the United States is heading for a very catastrophic situation in terms of reliability." In March, PJM Interconnection CEO Manu Asthana said that the RTO needed to slow the pace of generation retirements to avoid reliability problems by the end of the decade. "I think the math is pretty straightforward," Asthana said. And ISO New England has struggled to meet winter demand for over two decades. While the region has avoided blackouts to date, the grid operator "attributes that streak largely to luck."

Likewise, NERC's long-term assessment for the next decade shows Associated's service area surrounded by areas of high and elevated risk for reliability problems.

Risk Area Summary 2023–2027



map: 2022 NERC Long-Term Reliability Assessment

Recent Associated history: real-world proof diverse generation sources deliver reliable electricity

2021 Winter Storm Uri: A balanced generation mix kept power flowing to the rural Midwest

Settling in the weekend of February 13, 2021, winter storm Uri impacted a large part of the country, bringing into question the reliability of the bulk electric system. In its service area, Associated experienced temperatures as low as –20 F, with wind chill readings of –40 F at its northernmost plant. The RTOs of ERCOT, MISO and SPP implemented rolling blackouts. Millions of customers lost power, and over 700 lives were lost due to the severe cold and blackouts in Texas. The storm taxed transmission facilities, natural gas processing facilities and gas supply. Natural gas and energy prices skyrocketed. Gas in Oklahoma, for example, settled at a historic high February 18 at $1,193/MMBtu. Although the Associated system set its three highest all-time peaks at that time, a balanced generation mix kept power flowing throughout the storm with no rolling blackouts.

The key: Associated relies on a balanced generation mix, with proven and reliable coal and natural gas generating plants as a valuable foundation for reliability and dispatched its units to full capacity in advance of the cold temperatures. Despite significant outside pressure in recent years to move to other options, these fossil-fuel generating stations were the major factor in keeping the lights on for the 2.1 million people we serve. Hydropower allocated by the Southwestern Power Administration was a reliable energy source. Wind generation in Associated's mix played a minor role during the storm.

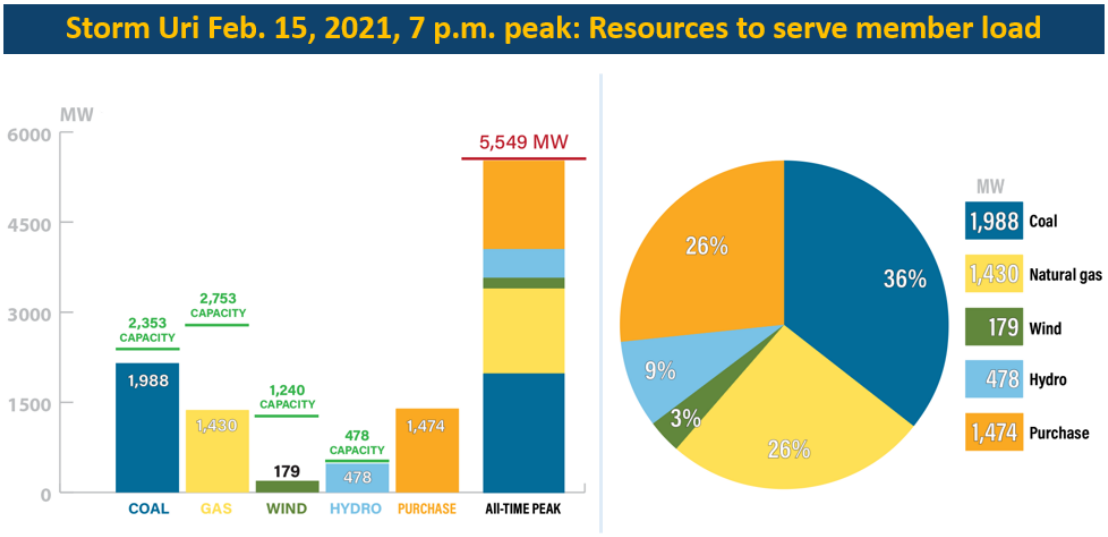


chart: AECI

2022 Winter Storm Elliott: New all-time peak, balanced generation mix maintain reliability

From December 22 to 23, 2022, the Associated system faced the brunt of winter storm Elliott that brought brutal cold, wind and snow to the Midwest. Across much of Associated's service territory, wind chills reached –35 degrees with 50-plus mile per hour wind and snow. Associated kept the power on as a new all-time peak was set, then set again in less than 24 hours. On December 22, the previous record was bested with a 5,809 megawatt peak for the hour ending at 8 p.m., only to be surpassed December 23 by a new all-time 5,899 MW peak for the hour ending at 9 a.m.

The key: Associated's ability to ensure reliability during the historic cold snap was the generation fleet's balanced and diverse portfolio. During the 9 a.m. peak hour December 23, Associated met most member load with its resources, generating 2,323 MW from coal plants; 2,103 MW from gas plants; 552 MW from contracted wind energy and 478 MW from hydropower. The remaining load was met by purchases across firm transmission line pathways. Associated's wind resources provided a moderate, but important, amount of power during the peak. Again, coal and natural gas generation carried the day, preserving reliability for Associated's members when they needed power the most.

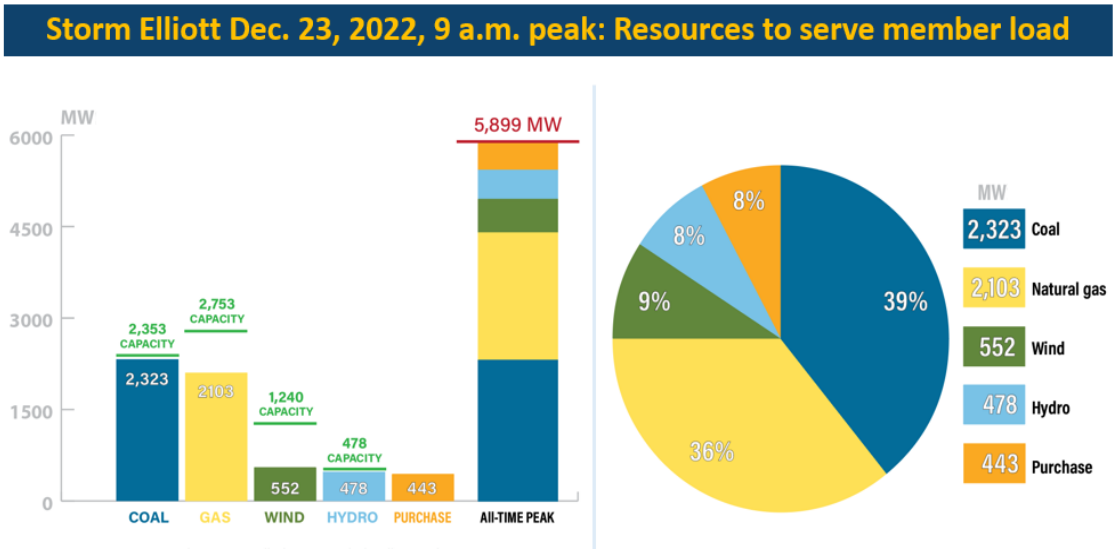


chart: AECI

<u>Five Issues Impacting Reliability and Affordability</u>

Today's energy decisions will determine if there are enough resources to meet tomorrow's energy needs. As noted earlier, policymakers must recognize the need for time, technology development, and new transmission infrastructure before taking our nation down an energy path that prioritizes speed over successfully keeping the lights on. And lawmakers must support policies that are inclusive of all energy sources to maintain reliability and affordability. Rolling blackouts cannot become the new normal in America.

The National Rural Electric Cooperative Association (NRECA) has identified five of the greatest issues impacting energy reliability and affordability, which is supported by findings from NERC's reliability assessments and by Associated's own experience.

<u>"Disorderly" Retirement and Insufficient Replacement of Always Available Generation</u>

The disorderly retirement of existing generating assets, and insufficient supply of readily dispatchable replacement generation, has directly jeopardized reliability. Many generating assets taken off-line in recent years have been replaced with sources providing less capacity, no capacity, or capacity that is intermittent and not always available. NERC has warned that for many regions of the country, the additional retirements of baseload thermal power plants – if not replaced by dispatchable, flexible

resources – will increase risk of rolling blackouts.[1] As NERC correctly points out, "merely having available generation capacity does not equate to having the necessary reliability services or ramping capability to balance generation and load."[2] NERC recommends that policymakers and industry manage the pace of generator retirements until solutions are in place to meet energy needs and ensure reliability.[3]

The accelerated pace of retirements of on-demand, dispatchable coal generation in particular will put reliability in serious jeopardy, with 86,000 MW retired since 2011 and another 73,000 MW in announced retirements projected by 2040. Of those retirements, MISO and SPP, the RTOs contiguous with Associated, have retired 23,000 MW of coal generation and announced another 26,000 MW of retirements by 2040, with most retiring by 2028. Non-dispatchable, intermittent wind and solar generation comprise the majority of the MISO and SPP generation additions projected for the future. In MISO, the future generation interconnection requests are mostly solar and wind comprising 64% of new generator requests; natural gas only 3%. In SPP, solar and wind comprise 68% of new generator requests; natural gas only 4%. Trading on-demand dispatchable generation resources for intermittent, non-dispatchable resources will only exacerbate the reliability problem for years to come. Until a reliable source of new generation—a technological breakthrough—becomes available and financeable on a wide scale, the degradation of electric reliability will continue to worsen, putting our nation at risk.

Unfortunately, the pace of reliable, baseload generation retirements will accelerate under overly aggressive and unworkable federal environmental regulations. NERC has identified the Environmental Protection Agency's (EPA) final ozone transport regulations, which would limit the operation of coal-fired generators in 22 states, as one of the key reliability issues for grid operators to watch this summer.[4] PJM warns that the combined effects of that ozone regulation, effluent limitation guidelines and coal combustion residuals regulations and state policies could result in a significant amount of generation retirements within a condensed time frame.[5] EPA's latest proposed rule to regulate new and existing power plant carbon dioxide emissions could further disrupt domestic energy security, force critical always available power plants into early retirement, and make new natural gas plants exceedingly difficult to permit, site, and build. Given the significant economic and operational implications of this proposed rule, EPA should extend the current 60-day comment period by at least an additional 60 days to ensure there is adequate time to fully evaluate and comment on this proposal. And we urge EPA to strongly consider the concerns that will be expressed in the submitted comments.

EPA has indicated that their goal is to issue all of these power sector regulations in a coordinated way to encourage the closure of coal and natural gas units. Yet it has not provided sufficient time to analyze and comment on these complex, compounding and interrelated regulations. Department of Energy (DOE) Secretary Granholm and EPA Administrator Regan in March of 2023 signed a Memorandum of Understanding on electric sector resource adequacy and reliability coordination, with a shared objective of supporting the continued delivery of "a high standard of reliable electric service." Achieving that

[1] North American Electric Reliability Corporation. *2022 Long-Term Reliability Assessment*. December 2022. https://www.nerc.com/pa/RAPA/ra/Reliability%20Assessments%20DL/NERC_LTRA_2022.pdf
[2] *Ibid*
[3] *Ibid at 7*.
[4] North American Electric Reliability Corporation. *2023 Summer Reliability Assessment*. May 2023. https://www.nerc.com/pa/RAPA/ra/Reliability%20Assessments%20DL/NERC_SRA_2023.pdf
[5] PJM Interconnection. *Energy Transition in PJM: Resource Retirements, Replacements & Risks.* February 24, 2023. https://www.pjm.com/-/media/library/reports-notices/special-reports/2023/energy-transition-in-pjm-resource-retirements-replacements-and-risks.ashx

objective is impossible, given the impractical timeframes for commenting on these regulations. It is imperative that NERC, RTOs/ISOs and other reliability entities, in coordination with DOE and power companies and relevant trade associations, have the opportunity to evaluate the collective impact on reliability of all EPA's so-called "suite of regulations" for coal and natural gas power plants.

Electrifying the Economy

As a nation, we are trending toward a future that depends on electricity to power more of the economy. The electric sector is poised to play a major role in transforming and reducing emissions in the transportation, industrial, agricultural, and other sectors through increased electrification. However, the increasing role of electrification will place even more demands on the electric grid and generation portfolio and will require measures to enhance grid reliability and to keep costs affordable. Electrifying other sectors of the economy will require a three-fold expansion of the transmission grid and up to 170% more electricity supply by 2050, according to the National Academies of Sciences.[6] And recent modeling by the Electric Power Research Institute finds that achieving net-zero economywide emissions by 2050 could require generation capacity to increase by as much as 480% compared to what is in place today.[7]

This movement toward greater economywide electrification will require tremendous planning, investment, and collaboration among all stakeholders. Electric co-ops and other utilities must be involved from the beginning, particularly with electric vehicle infrastructure buildout, to ensure they can continue to provide safe, affordable and reliable power. And as NERC emphasizes, industry and policymakers must consider and account for the impact increased electrification will have on future electricity demand and infrastructure as we plan to meet tomorrow's energy needs.[8]

Finally, in the context of economywide electrification and load management, it should be noted that co-ops have long been utilizing and encouraging energy efficiency programs in their service territories. Electric co-ops want to keep power as affordable as possible, which is more attainable with less energy demand. For example, Take Control & Save, a suite of energy efficiency services and rebates funded by Associated and its member systems, provides significant financial incentives for member-consumers to save energy. In a win-win for Associated and its member systems, Take Control & Save offers 15 rebates to improve energy efficiency across the system, helping families save money on heating and cooling equipment, smart thermometers, weatherization improvements, residential energy audits and more. Associated benefits by generating less energy than it otherwise would during periods of peak use and the program was recently extended through 2025. To help us expand the use of these load-management tools, we encourage Congress to support and maintain policies that enable our co-op members to take full advantage of energy efficiency upgrades and rebates.

[6] National Academies of Sciences, Engineering, and Medicine. 2021. *Accelerating Decarbonization of the U.S. Energy System.* Washington, DC: The National Academies Press. https://doi.org/10.17226/25932.
[7] Low-Carbon Resources Initiative. *Net-Zero 2050: U.S. Economy-Wide Deep Decarbonization Scenario Analysis* https://lcri-netzero.epri.com/
[8] North American Electric Reliability Corporation. *2022 Long-Term Reliability Assessment*. December 2022. https://www.nerc.com/pa/RAPA/ra/Reliability%20Assessments%20DL/NERC_LTRA_2022.pdf

Permitting Challenges

As we strive to meet the nation's growing energy demands and our member-consumers' expectations for reliable and affordable electric service, co-ops will need to build significant amounts of new electric transmission and generation capacity of all types. The current environmental review and permitting process required to build, site, and maintain electric infrastructure is outdated and a significant impediment to meeting tomorrow's energy needs.

For example, the timeframe for permitting new natural gas plants has been lengthened significantly. From start to finish, including permitting, the previous generation of Associated's natural gas peaking units were online in about three years. Today, permitting alone for new units will likely take about three years, extending the completion of the units to six to seven years. Many of the projects electric co-ops will undertake will need to navigate federal, state, and local environmental permitting processes. For major generation and transmission projects, this will likely include a National Environmental Policy Act (NEPA) Environmental Impact Statement (EIS). Unfortunately, as just one indicator of the headwinds we currently face, it takes an average of 4.5 years to complete an EIS and issue a permitting decision. One quarter of EISs take more than 6 years. Those timelines do not include any litigation that may further prolong the process.[9] This is simply too long.

We applaud Congress's inclusion of critical NEPA modernization provisions in the bipartisan debt ceiling agreement being considered this week. These reforms, including firm time limits for environmental reviews, greater applicant involvement in the process, and more efficient reviews for recurring small projects we already know have minimal environmental impacts, will allow co-ops to build new generation and transmission infrastructure in a timely and cost-effective way.

The electric grid needs more transmission capacity to meet expected growth in the coming decades.[10] While Associated and its six transmission cooperative-owners are making significant near- and long-term investments in its transmission system, the timeframe to add new lines capable of supporting reliability in an era of increasing intermittent energy will be measured in decades, not years. However, the costs of building out the grid must not be placed on the backs of communities, including marginalized rural communities, that will not receive commensurate benefits. Policymakers should ensure transmission projects and permitting proposals adhere to three key principles: they must not expand FERC authority over electric co-ops; they must allocate the costs of building new transmission or modifying existing facilities only to those who receive tangible and quantifiable benefits; and they must ultimately serve the national interest of maintaining the reliability and affordability of the electric grid.

Supply Chain

Electric utilities are facing unprecedented challenges procuring basic equipment needed to keep the lights on. Supply chain delays are already contributing to an unprecedented shortage of the basic

[9] Executive Office of the President Council on Environmental Quality, EIS Timelines (2010-2018) (June 12, 2020), https://ceq.doe.gov/docs/nepa-practice/CEQ_EIS_Timeline_Report_2020-6-12.pdf. *See also* National Association of Environmental Professionals, 2021 Annual NEPA Report 8 (2022), https://naep.memberclicks.net/assets/annual-report/NEPA_Annual_Report_2021.pdf.

[10] National Academies of Sciences, Engineering, and Medicine. 2021. *Accelerating Decarbonization of the U.S. Energy System.* Washington, DC: The National Academies Press. https://doi.org/10.17226/25932.

machinery and grid components essential to ensuring continued reliability of the electric system. For example, the recommissioning of Associated's Unionville Power Plant, a 44 MW fuel oil unit needed to support reliability, experienced significant delays when critical parts for its new control system were unavailable. When needs cannot be met, projects are delayed or cancelled. NERC in its 2022 Long-Term Reliability Assessment highlights that along with planning uncertainty, substantial supply chain processes must be addressed for future generation resources to materialize.

One of the most serious supply chain threats to electric reliability is the availability of electric transformers. Electric cooperatives are waiting a year, on average, to receive distribution transformers – a fivefold increase since 2021. Additionally, lead times for large power transformers have grown to more than three years. As a result, new projects are being deferred or canceled, and electric co-ops and other utilities are concerned about their ability to respond to major storms due to depleted stockpiles. NERC calls attention to this issue, noting that for this summer, "low inventories of replacement distribution transformers could slow restoration efforts following hurricanes and severe storms."[11]

Last year, the Electricity Subsector Coordinating Council, a partnership between the electric sector and the federal government, established a supply chain "Tiger Team" and made short and long-term recommendations based on their findings. In keeping with those findings, we urge Congress to:

- Utilize Defense Production Act authorities to finance a labor incentive program to hire and retain more workers and boost output at existing facilities;
- Establish a purchase guarantee by which the federal government can serve as a backstop or "purchaser of last resort" to give manufacturers confidence to invest in long-term capacity growth; and
- Urge DOE to reconsider a recent proposal to mandate new efficiency standards for distribution transformers, which is already hindering efforts to increase the number of transformers available. NERC has highlighted that "new efficiency standards for distribution transformers proposed by [DOE] could further exacerbate the transformer supply shortages" this summer.[12]

Availability of natural gas

The U.S. is increasingly reliant on natural gas for baseload power and as a backstop for intermittent generation sources. The ongoing robust capacity and resilience of the natural gas production and delivery system will be critical to maintain reliability for Associated's system. The availability of natural gas, however, has been challenged by several recent extreme weather events. During winter storm Uri, the natural gas delivery system was unable to deliver fuel to Associated's Holden Power Plant. As a result, the plant was required to use its back-up system, requiring the delivery of millions of gallons fuel oil to the plant for use during the height of the event. During winter storm Elliot, Associated's Dell Power Plant experienced periods where gas was unavailable due to pipeline compression issues.

Although NERC's assessment is that stored supplies of natural gas are at high levels for this summer, it emphasizes that "fuel supply and delivery infrastructure must be capable of meeting the ramp rates of

[11] North American Electric Reliability Corporation. *2023 Summer Reliability Assessment*. May 2023. https://www.nerc.com/pa/RAPA/ra/Reliability%20Assessments%20DL/NERC_SRA_2023.pdf
[12] *Ibid.*

natural-gas-fired generators as they balance the system when solar generation output declines."[13] In particular, NERC notes that in the long-term, severe weather events and limited natural gas infrastructure in various regions of the country could pose a risk to natural gas fuel supplies.

Pipeline companies are also experiencing challenges on new projects that are being slowed by permitting, environmental and supply chain issues. We agree with NERC's recommendations[14] that there must be greater coordination and collaboration between regulators and industry to address the reliability needs of and risks associated with interdependent electricity and natural gas infrastructures as well as the need for additional pipeline infrastructure to ensure reliability.

Conclusion

The growing risk of rolling blackouts across the nation is unacceptable. Providing reliable, affordable, and responsible electricity remains the shared commitment of Associated and all electric cooperatives across the country. We look forward to working with this Committee and others in Congress as we work to fulfill that mission.

[13] *Ibid.*

[14] North American Electric Reliability Corporation. *2022 Long-Term Reliability Assessment*. December 2022. https://www.nerc.com/pa/RAPA/ra/Reliability%20Assessments%20DL/NERC_LTRA_2022.pdf