

**UNITED STATES OF AMERICA
BEFORE THE
FEDERAL ENERGY REGULATORY COMMISSION**

Reliability Technical Conference

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Docket No. AD26-8-000

**WRITTEN TESTIMONY OF
BOBBY OLSEN
ON BEHALF OF SALT RIVER PROJECT, AMERICAN PUBLIC POWER
ASSOCIATION, AND LARGE PUBLIC POWER COUNCIL**

October 8, 2026

On behalf of Salt River Project Agricultural Improvement and Power District (SRP), the American Public Power Association (APPA), and the Large Public Power Council (LPPC), Bobby Olsen, Associate General Manager and Chief Power System Executive, is participating on Panel 1 “*The State of Reliability in a Changing Energy Landscape - Operational Challenges of Integrating Large Loads in Evolving System Dynamics*” and submits the following written testimony for the Federal Energy Regulatory Commission’s (Commission) annual Commissioner-led Reliability Technical Conference. SRP serves more than 1.2 million electric customers in central Arizona, operating a growing system of approximately 12,878 MW (including approximately 688 MW of wind generation, 1,600 MW of utility-scale solar, and 1,600 MW of energy storage capacity).¹ SRP also owns or operates approximately 3,400 miles of transmission lines and 22,700 miles of distribution lines.

The electric industry is experiencing a significant transformation driven by two concurrent trends: the rapid growth of large inverter-based loads, including data centers and artificial intelligence computing facilities, and the rapid deployment of inverter-based resources, including solar generation, wind generation, and battery energy storage systems. Together, these developments are reshaping traditional planning and operational assumptions and creating new reliability, resilience, cybersecurity, and physical security considerations for the Bulk-Power System. Utilities throughout the industry have proactively adapted planning processes, operational practices, and reliability frameworks to address these emerging challenges while maintaining reliable electric service.

Public power utilities are well positioned to respond quickly to changing circumstances because local governance structures facilitate close coordination among utility leadership, customers, communities, and policymakers. This flexibility allows public power utilities to adapt planning assumptions and invest in reliability solutions that reflect local system needs and operating conditions. As the Commission continues to evaluate these emerging challenges, it is important to recognize that reliability risks and system characteristics vary considerably across regions. While reliability objectives should be consistent, the strategies used to achieve those objectives should remain sufficiently flexible to accommodate regional differences in resource mix, load characteristics, market structures, and transmission topology.

¹ See generally Salt River Project, SRP Power Generation Resources (2026), <https://www.srpnet.com/grid-water-management/grid-management/power-generation-stations>.

1. Modeling, Planning, and Operating Practices for Emerging Large Loads

As Arizona flourishes as a hub for industries like semiconductor manufacturing and AI-driven data centers, SRP is experiencing record energy demand spurred by increased electrification of homes, vehicles, advanced manufacturing, data centers, and the businesses driving our region's growth. Recently, SRP set a multi-day record for energy demand amid extreme summer heat, delivering an all-time high peak load of 9,072 MW on July 24, 2026.² SRP is meeting this demand with a balanced strategy that promotes economic development and treats all customers fairly.

Although large data centers are still a relatively small part of SRP's overall customer base (contributing 7% to SRP's summer 2026 peak demand record), data centers are projected to be SRP's fastest growing customer segment. To meet growing electric system demand, SRP relies on large load customer forecasts and economic forecasts, paired with SRP's internal expertise and industry best practices, to size infrastructure correctly and plan for future demand. Data center load growth is also incorporated through SRP's Integrated System Plan (ISP), which aligns generation, transmission, and distribution strategy planning through 2035.³ SRP has taken additional steps to protect residential customers from cost shifts associated with adding new large customers through its Large Customer Integration Process (LCIP) and its updated E-67 Price Plan.⁴

At SRP, large customer loads are treated as a distinct category from traditional retail demand because they are variable and may exhibit materially different operating characteristics. SRP incorporates these loads into probabilistic resource adequacy studies using a range of load-growth scenarios and forecast-error assumptions. As the number and scale of these projects increase, SRP's experience and industry best practices indicate that resource adequacy frameworks should rely more heavily on stochastic methods that evaluate the timing, magnitude, and operational characteristics of large loads across thousands of potential system conditions.

The quality of the forecast also depends on the quality and timeliness of project information. Improved visibility into development milestones, commissioning schedules, and actual operating behavior can enhance forecasts and support more reliable long-term planning. As recognized in SRP's ISP, greater coordination among interconnection, transmission, and resource planning processes also improve visibility into localized impacts associated with concentrated load growth and the infrastructure needed to serve it.

² SRP delivered a record amount of energy to customers on Friday, July 24, delivering an all-time high peak load of 9,072 megawatts (MW) between 5 and 6 p.m. This surpasses the previous record peak of 8,542 MW set on August 7, 2025. Salt River Project, *SRP Sets Multi-Day Record for Energy Demand Amid Extreme Heat* (July 27, 2026), <https://media.srpnet.com/srp-sets-multi-day-record-for-energy-demand-amid-extreme-heat/>; see also Arizona Corporation Commission, SRP 2026 Summer Preparedness, 2026 Summer Preparedness Workshop Special Open Meeting, 62 (April 14, 2026), <https://docket.images.azcc.gov/E000050758.pdf?i=1790705608005>.

³ SRP is one of the first U.S. utilities to shift from an Integrated Resource Plan (IRP) to an Integrated System Plan (ISP). While an IRP focuses solely on generation resources, an ISP plans for the entire power system in one process and integrates a variety of community stakeholder and customer perspectives. This first ISP serves as a holistic roadmap for the power system of the future. It considers evolving customer needs for reliability, affordability and sustainability while also achieving SRP's 2025 Sustainability Goals. See Integrated System Plan, Salt River Project Agricultural Improvement and Power District (2023), <https://www.srpnet.com/grid-water-management/future-planning/integrated-system-plan>.

⁴ See Board Meeting Notice and Agenda, Salt River Project Agricultural Improvement and Power District, 47 (October 6, 2025), https://www.srpnet.com/v3/assets/bltefc1fc708dcc94e7/blt6690e223995539e6/20251006_DB_packet.pdf; see also Standard Price Plan for Large Extra High Load Factor Substation Large General Service (E-67) (2026), <https://www.srpnet.com/price-plans/business-electric/large-general-service#6>.

From a transmission planning perspective, a single data center or AI compute campus may add hundreds or even thousands of megawatts at one location, potentially on a schedule that is substantially shorter than the time required to plan, permit, and construct major transmission facilities. Reliability must remain the controlling consideration. Planners therefore need detailed load characteristics early in the process, including dynamic behavior, variability, control-system performance, protection and control information, backup-power operating characteristics, and load-shedding behavior. SRP is supportive of NERC's development of new large load standards that provide additional frameworks for the reliable interconnection of these loads.⁵ Development of the first revision is fostering constructive dialogue that will support continuous improvement and strengthen the standard's clarity and specificity over time.⁶

Transmission architecture should be evaluated deliberately rather than assuming that every large load can be interconnected directly to the existing network. Different transmission architectures, such as dedicated load loops or similar configurations, may provide a more scalable and reliable approach by reducing impacts on the surrounding transmission system. The appropriate architecture will depend on the location, magnitude, configuration, and performance of the proposed load and on the characteristics of the host system.

Large loads should be treated as major grid-connected assets with defined performance obligations. Clear reactive-power requirements are particularly important. SRP has taken steps on both defining performance obligations and establishing reactive-power requirements. Requiring a facility to maintain a tight power-factor range, such as unity to 0.98 leading at the point of interconnection, can support local voltage performance and reduce reliance on the broader transmission system for reactive-power support. These requirements should be established transparently and incorporated into interconnection, commissioning, and operating expectations.

Experience also demonstrates that study quality depends on study data. Validated dynamic load models, protection and control information, backup-power characteristics, and load-shedding behavior are frequently unavailable or incomplete, even though each may materially affect system performance during a disturbance. Robust model validation, updated commissioning requirements, and disturbance monitoring at the point of interconnection should become standard expectations for large transmission-connected loads. Commissioning and ongoing monitoring should also confirm that actual facility performance remains consistent with the assumptions used in planning studies.

Further work is needed to understand load behavior on second and sub-second timescales. Hyperscale customers have indicated that more variable operating characteristics may emerge as AI and advanced computing facilities evolve, but widely accepted and validated models capable of representing that behavior are not yet established. Developing and validating such models will be important if planning and operational studies are to capture emerging load characteristics accurately. These technical needs must also be considered alongside realistic transmission-development timelines; major infrastructure cannot be developed overnight.

2. Advanced Grid Support Functions and Regional Flexibility

The reliability challenges driving ERCOT's proposal to require advanced grid-support functions for future battery energy storage systems (BESS), in response to reliability events and operational trends,

⁵ Project 2026-02 Computational Loads, NERC (2026), <https://www.nerc.com/standards/reliability-standards-under-development/2026-02-computational-loads>.

⁶ See Comment Report, 2026-02 Computational Loads, NERC, 49 (September 18, 2026), https://www.nerc.com/globalassets/standards/projects/2026-02/final-posting/raw-comments_clo-001_fac-001_fac-002_091826.pdf.

are not unique to Texas. Similar issues are emerging across other regions, although the severity and urgency vary depending on factors such as inverter-based resource (IBR) penetration, the growth of large computational loads, and underlying grid characteristics. As Arizona adds increasing amounts of IBRs, the baseline reliability objective should be to ensure the system retains sufficient capability to remain stable during and following disturbances. This includes resources that not only ride through disturbances, but can actively provide fast voltage, frequency, and damping support.

One of the key technologies for providing this capability is grid-forming (GFM) BESS. Unlike conventional grid-following inverters that synchronize to an existing grid voltage, GFM controls maintain an internal voltage magnitude and angle and can respond rapidly to changes in the power system. Because this response is electronically controlled rather than dependent on slower electromechanical controls, GFM BESS can provide certain voltage, frequency, and power responses on much faster timescales than traditional synchronous generation. Industry organizations such as NERC, ESIG, NREL, EPRI, and others have identified GFM as an important capability for maintaining stability as power systems transition toward higher levels of IBRs.

SRP's current penetration of IBRs and large computational loads is significantly lower than ERCOT's. Nevertheless, industry trends indicate that our system is moving in the same direction. Grid operators should therefore monitor developments within the United States and lessons from systems with more advanced inverter penetration and those that are responding with advanced inverter performance requirements.⁷

BESS are particularly well suited for GFM operation because the battery provides an energy buffer that can support rapid inverter response. Wind and solar resources can also provide GFM functionality, but may need to operate below maximum available production to create the necessary energy margin. Even when a BESS is operating at its maximum steady-state MW output, it can retain valuable fast GFM response within its inverter, current, and energy limits, although its ability to provide additional sustained MW is constrained. NERC's 2023 *Grid Forming Functional Specifications for BPS-Connected Battery Energy Storage Systems* specifically addresses operation at maximum active power and recommends that new BPS-connected BESS be designed, studied, and commissioned with GFM controls enabled.

The amount and location of GFM capability ultimately needed will be system-specific and should be informed by detailed reliability studies and operating experience. The important point is that the industry does not need to know the precise future requirement before beginning to deploy the capability, particularly for BESS where GFM functionality can be incorporated as new facilities are developed. That is essentially the approach SRP is taking: building GFM capability into new BESS and gaining real-world experience now, rather than waiting until the need becomes an immediate reliability constraint. SRP has established a GFM BESS specification and simulation test procedure closely aligned with NERC's framework and will soon have a large GFM BESS in operation, providing direct operational experience with the technology. Continued system studies and operating experience can then help determine how much additional GFM capability is needed and where it provides the greatest reliability value.

Accordingly, there is a strong case for establishing baseline expectations for advanced grid-support capabilities, while allowing regional operators and individual systems the flexibility to determine the appropriate amount, location, and specific performance requirements based on local system conditions,

⁷ The Australian Energy Market Operator (AEMO)'s May 2023 guidance on grid-forming inverters serves an example of a country and region with substantial experience with IBRs and provides further context on the efforts its system operator has taken to translate that experience into specific expectations for advanced inverter performance. See generally Voluntary Specification for Grid-forming Inverters, Australian Energy Market Operator (AEMO) (May 2023), <https://www.aemo.com.au/-/media/files/initiatives/primary-frequency-response/2023/gfm-voluntary-spec.pdf>.

resource mixes, and reliability needs.

3. Managing Declining System Inertia and Frequency Response

Operators, particularly Balancing Authorities, should evaluate the reliability impacts of declining inertia by monitoring system frequency characteristics following disturbances. Particularly, operators should evaluate how quickly frequency changes and the low (generation loss) or high (load loss) frequency points the system reaches. As IBRs replace conventional generation and large computational loads continue to grow, maintaining acceptable frequency performance becomes more challenging.

When evaluating this issue across regions, it is understood that system impacts will vary based on resource mix, types of loads, and system characteristics. ERCOT's experience shows that systems with higher levels of IBRs and computational loads can experience more rapid frequency excursions following disturbances. Other regions should assess whether similar trends are developing as their resource portfolios and loads evolve. It is also important to consider the capabilities of available resources. Some regions may have significant BESS deployment, while others may have little or none. In those cases, operators should determine whether additional BESS is necessary or whether alternatives such as quick-start gas generation, synchronous condensers, or other dispatchable resources can adequately provide the required response to correct frequency.

The industry has relied on inertia from synchronous generation for decades, and it remains a proven source of frequency support. BESS can provide comparable, and in some cases superior, performance due to their extremely fast response capabilities. However, these capabilities must be properly configured, tested, and validated to ensure they perform as expected during actual system events.

4. Cybersecurity and Physical Security Considerations

As cybersecurity and physical security threats and policies continue to evolve, SRP and other public power utilities are committed to developing a response that allows energy infrastructure owners the ability to protect their assets and ensure reliability across the Bulk-Power System. The principal cybersecurity risks associated with large-load integration include malicious control of load demand and loss of critical communications between the facility and the utility. A threat actor that obtained control of a sufficiently large site could trip or rapidly ramp demand, with potential effects on Bulk-Power System reliability. Loss of utility visibility or communications could also adversely affect operations, balancing, and stability.

The above-mentioned cyber risks are not necessarily unique to a particular class of large load. The type and scale of the facility, however, can influence the consequences if a threat is realized. The relevant concern is the combination of concentrated demand, controllability, operating behavior, and dependence on communications. Risk evaluation should therefore focus on the facility's actual grid impact and control architecture rather than relying solely on industry labels such as data centers, crypto-mining facilities, or industrial loads.

From a physical security perspective, continued large-load growth can concentrate significant electric demand in a relatively small number of high-impact facilities. The underlying threats are familiar and include theft, sabotage, insider threats, surveillance, and drone activity, but the operational significance of a large facility may make it a more consequential target. A malicious event that causes sudden loss of a significant block of load is one example of a risk that should be considered in operating and resilience plans.

Industry response should remain grounded in threat assessment, intelligence sharing, coordination with government and law-enforcement partners, security exercises, and resilience planning designed to

maintain reliable operations. SRP participates in Electric Power Research Institute (EPRI) research concerning large-load impacts and risk and monitors threat-intelligence sources relevant to power and water utilities. Unauthorized drone activity presents an additional challenge because operators are increasingly expected to monitor and respond to potential threats while often possessing limited legal authority to mitigate the aircraft directly.

5. Gas-Electric Coordination and Behind-the-Meter Generation

Coordinated planning and operations between the electric and natural gas sectors are becoming increasingly important as large-load growth accelerates and as non-utility resources seek access to natural gas infrastructure. The electric generation sector continues to be the largest consumer of natural gas within the United States and as large load customers look to add behind-the-meter gas resources, the need for gas and electric scheduling coordination is higher than ever. Pipelines are often operating near maximum capacity and the need for additional supplies often pushes the pipelines into a low- or high-pressure situation which can result in significant financial penalties or worse, the inability to flow additional gas supplies. The Western Energy Imbalance Market - combined with the changing resource mix - has resulted in significant pipeline pressure fluctuations due to system wide generator variability and uncertainty, driven by weather and IBRs. Alongside these considerations, the simple cycle nature of facilities being installed behind the meter, the need for pipeline expansion, and SRP's general belief that most behind-the-meter gas installations will not retain firm fuel shipping rights, the risks to broader electric grid reliability are greater than ever before. These concerns for grid reliability are exacerbated as large customers run the risk of compounding significant fluctuations in pipeline operating pressures, leading to ripple effects on the broader generating fleet.

Currently, SRP does not have customers with behind the meter gas-fired generation, however, should a customer wish to interconnect with behind-the-meter gas-fired generation, gas-electric coordination would allow for more aligned scheduling and intraday adjustments to maintain pipeline pressures. Alongside efforts to expand pipeline infrastructure, this level of coordination will ensure safe operations of pipeline infrastructure and reliable operating conditions for the broader fleet.

6. Resource Adequacy, Fuel Assurance, and Long-Term Planning

SRP addresses the capacity needs associated with future load growth through its Integrated System Plan, which evaluates resource portfolios across multiple load-growth, economic, and reliability scenarios. SRP's analysis has shown that firm generation resources remain necessary to maintain reliability, particularly under high-growth scenarios that include data-center development.

SRP is also deploying energy storage to improve the capacity contribution of variable resources such as solar and wind. Longer-duration storage can further enhance the ability to use these fuel-free, variable resources to meet the needs of higher load factor customers. Storage does not eliminate the need for firm resources, but it can strengthen the contribution of a diversified portfolio and improve the alignment between variable production and customer demand.

SRP complements its planning process by securing long-term fuel supplies and firm interstate pipeline transportation rights for dispatchable generation resources. This includes participation in the Desert Southwest Expansion Project, which will help maintain year-round regional energy reliability as Arizona's energy needs continue to drastically increase.⁸ Together, scenario-based portfolio planning,

⁸ See Salt River Project, *Arizona Utilities Work to Lock in Critical Natural Gas Delivery to Power Growth* (August 6, 2025), <https://media.srpnet.com/arizona-utilities-work-to-lock-in-critical-natural-gas-delivery-to-power-growth/>.

firm generation, storage deployment, long-term fuel arrangements, and firm transportation rights support fuel availability and resource adequacy as the load-duration curve becomes flatter.

7. Conclusion

The rapid growth of inverter-based loads, together with the expanding deployment of IBRs, is creating new reliability and security challenges for the Bulk-Power System. Public power utilities, like SRP, have proactively adapted their planning processes, operating practices, and reliability frameworks to address these challenges and are particularly well positioned to rapidly adapt to changing circumstances due to their unique governance model.

SRP continues to advance this work and respond to the evolving challenges through its Integrated System Plan, Large Customer Integration Process, E-67 Price Plan, energy-storage deployment, long-term fuel and pipeline arrangements, and participation in industry research and threat-intelligence efforts. Because reliability risks and effective mitigation strategies vary by region based on system conditions, resource mixes, load characteristics, market structures, and transmission topology, the Commission should avoid one-size-fits-all national mandates. Instead, national requirements should establish essential reliability objectives while preserving sufficient regional flexibility to develop solutions suited to local needs. SRP appreciates the Commission's attention to these issues and respectfully submits this written testimony for the record.