NPCC

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NPCC Reliability Forums: 2026 In Review

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Overview

The Northeast Power Coordinating Council's (NPCC) Reliability Forums convene industry experts and encourage information sharing and collaboration among attendees, drawing speakers and participants across industry professions and throughout NPCC's footprint. The forums focus on themes related to the reliable integration of increasing levels of Distributed Energy Resources (DER) and Variable Energy Resources (VER).

NPCC representatives facilitate all forums, which follow a structured cadence that balances planned, recurring themes with timely, issue-driven programming. Each annual series of Reliability Forums seeks to:

- educate stakeholders on current and emerging Bulk Power System (BPS) impacts
- facilitate peer-to-peer knowledge exchange between utilities, generators, and regulators
- surface reliability resources, assessments, studies, and operational insights that inform standards development, compliance priorities, and policy decisions
- utilize NPCC's role as a trusted educator and provide guidance on best practices
- foster a well-rounded perspective of industry realities and regulatory requirements

In 2026, NPCC hosted three Reliability Forums, featuring 14 speakers from 12 organizations. Forum speakers addressed 36 attendee questions across all events.

This detailed summary describes key takeaways, major themes, and challenges identified during the 2026 forums, while providing insights and references for both participants and industry members who were unable to attend the live events.

2026 Reliability Forums - At A Glance

Date	Title	Speaker Organizations	Format
Mar. 26	Large Loads, Data Center, and Artificial Intelligence	North American Electric Reliability Corporation (NERC), Dominion Energy Virginia, PJM Interconnection, Office of Energy Market Regulation, Federal Energy Regulatory Commission (FERC)	Individual presentations
May 7	Transmission Enhancements & Reliability Standards Development	NERC, Hydro One, ISO New England, Hydro-Québec Energy Services	Individual presentations
Oct. 8	NPCC and Texas Reliability Entity (Texas RE) Operational Technology Forum	EPRI Europe, Consolidated Edison of New York, New York Power Authority (NYPA), California ISO (CAISO), NERC, New York Independent System Operator (NYISO), Texas RE	Moderated panels

2026 Forum Summaries

Forum 1: Large Loads, Data Center, and Artificial Intelligence (March 26)

The first forum offered a balanced and engineering-informed perspective on how the proliferation of large loads, particularly data centers, has resulted in planning and operational reliability challenges across the industry. Presentations covered technical, operational, and regulatory perspectives from the standards, planning, operations, and regulatory communities.

Speaker	Organization	Presentation
Latrice Harkness, Director of Engineering	NERC	NERC's Plan to Address Reliability Risks from Emerging Large Loads
Katelynn Vance, Ph.D., Manager, Electric Transmission Planning & Strategic Initiatives	Dominion Energy Virginia	Dynamic Data Center Performance, Monitoring, & Interconnection Updates
Chris Pilong, Sr. Director, Operations Planning	PJM Interconnection	Integrating Large Loads in Operations
Valerie Teeter, Acting Director, Office of Energy Market Regulation	FERC	Recent FERC Actions on Large Loads

Takeaways

- **NERC is analyzing risks to computational large loads and updating registration criteria.** The Large Loads Task Force produced a white paper recommending registration thresholds and standards applicability for data centers and crypto mining currency. Next steps include a glossary of definitions, a blanket reliability standard and a technical reference document. NERC is focusing on registering computational load entities rather than load-serving entities, and will share updates through workshops, webinars, white papers, and working group activities.
- **High-resolution data is essential to understand data center behavior.** Northern Virginia's "Data Center Alley," the largest data center load pocket in the U.S., has experienced voltage oscillations and four load transfer events since July 2024. Protection equipment performed as expected, but the events showed that individual facility behavior cannot be determined without high-resolution point-of-interconnection data, which should be built into interconnection standards early. Strong customer relationships were also described as integral to operations.
- **Forecast quality and speculative load are central planning risks.** Load forecasts in the PJM region have risen sharply since 2024 due to data center growth. Efforts are underway to separate real from speculative load to avoid overbuilding, alongside more than $20 billion in coordinated transmission upgrades, a Connect and Manage program for new loads that can be curtailed during peak conditions, and new transmission service products for co-located generation and load.

- **Regulators are reviewing a growing set of filings related to large loads.** FERC is reviewing utility filings on study agreements, cost sharing for network upgrades, and conditional transmission service. These proposals address the need for more data, accelerated upgrades, and ways to manage the risks of rapid large load integration. FERC has 60 days to respond to proposals.

Challenges

- **Unpredictable large load behavior.** Sudden load transfers and voltage oscillations can affect system frequency and voltage and may require new protection approaches such as Remedial Action Schemes (RAS) and specialized operator training.
- **Speculative and fast-changing forecasts.** Distinguishing firm demand from speculative requests is difficult, and over- or under-building carries reliability and cost consequences.
- **Uncertainty around registration and standards.** Registration criteria and standards for computational loads are still in development, with stakeholders searching for clarity on timing and compliance requirements.
- **Data and modeling fidelity.** Higher levels of granularity are needed in both data and dynamic modeling to represent how interconnected systems actually behave.

Q&A Highlights: Audience questions centered on the scope and timing of NERC registration criteria and standards, the causes of recent load transfer events, customer engagement, evolving modeling techniques, forecast accuracy, operator preparedness, and regulatory timelines. Speakers noted that recent seasonal forecasts have proven accurate, that investment in operator training and tools is continuing, and that FERC's response timeline depends on the type of filing.

Forum 2: Transmission Enhancements & Reliability Standards Development (May 7)

Hosted by Utility Services of Vermont at its Waterbury, Vermont office, the second forum examined recent developments in reliability standards and regional transmission in response to a Bulk Power System that is evolving faster than at any other point in its history. The program combined a NERC standards update with three regional perspectives across Ontario, New England, and Québec.

Speaker	Organization	Presentation
Howard Gugel, Senior Vice President of Regulatory Oversight	NERC	Standards Development – New and Improved
Alessia Dawes, Senior Manager of Transmission System Planning, North	Hydro One	Transmission Reinforcement in Ontario: Energizing the Future
Zach Bell, Operations Shift Supervisor	ISO New England	New England Clean Energy Connect (NECEC) Overview
Kyle Collins, Director of Business Development	Hydro-Québec Energy Services	Hydro-Québec Grid Operations and Interregional Transmission Briefing

Takeaways

- **NERC is modernizing its standards, registration, and certification processes.** In response to new reliability challenges such as large loads, wildfires, inverter-based resources (IBRs), batteries, and offshore wind, and following extensive industry outreach, NERC proposed a twice-yearly standards initiation workshop model. The model includes a fast-track option for urgent FERC directives, a pre-vetted subject matter expert pool, and an in-house AI tool with the capability to generate a draft for expert review. Balloting is open to anyone who comments during the designated period, and committee roles have been consolidated. NERC is targeting board approval of procedural changes by February 2027 and expanding the NERC Registry to include small inverter-based resources.
- **Ontario is planning for sustained demand growth.** Hydro One serves 21 planning regions across urban and rural areas, off-grid communities and ISO. The IESO 2026 Annual Planning Outlook forecasts 65% demand growth until 2050, driven by economic development, population growth, and electrification. Data centers are expected to make up 8 to 9% of Ontario's demand by 2050, about 60% more than previous forecasts, and remain the largest driver of demand. As of April 2026, 20 major transmission projects are underway, with new lines built in a 50/50 partnership with First Nations and corridors being identified and set aside for future electricity use.
- **NECEC adds meaningful transfer capability, with limits.** The ±320 kV HVDC tie began commercial operation on Jan. 16, 2026, and increases import transfer capability into New England by roughly 22%. The project's Presidential permit does not allow exports from New England to Québec, and operating limits protect against unit and

area instability, insufficiently damp system response, and unacceptable transient low voltage conditions.

- **Hydro-Québec sees a growing role in interregional supply.** NECEC and the Champlain Hudson Power Express (CHIPPY), a fully underground and underwater HVDC line delivering renewable energy directly into New York City under a 25-year agreement, will supply roughly 20% of the city's annual electricity. Future bi-directional transmission and storage in Québec could defer investments the U.S. would otherwise need in large volumes of new renewable generation and short-duration battery storage to achieve greater reliability and emissions reductions.

Challenges

- **Keeping standards current with fast-moving risks.** NERC's reforms aim to streamline standards initiation, drafting, and balloting while remaining entity-driven; procedural changes are still moving through public comment and approval.
- **Affordability and consistency amid demand growth.** Ontario highlighted regulation and affordability questions, including consistent treatment of data centers and the allocation of costs and economic development benefits. The discussion emphasized sustaining safety, reliability, and resilience as top priorities.
- **Reliance on imports during extreme weather.** During Winter Storm Fern (Jan. 23–27, 2026) and the prolonged cold that followed, rising demand in Québec meant NECEC flows could not be supported and temporarily dropped to zero, showing the limits of interregional imports when both regions are navigating extreme weather conditions.
- **Market and policy frameworks for future interregional projects.** Realizing the benefits of bi-directional transmission will require supporting market and policy frameworks, in addition to continued commissioning and operation of existing projects.

Q&A Highlights: Audience questions covered voting eligibility, quorums, and sector-based balloting under the new standards process; the AI drafting tool and progress on computational load standards; Ontario's conversion from its 25 Hertz system and how transmission planning is coordinated across Ontario's planning entities; NECEC capabilities, funding, and preparedness; growing industrial interconnection in Québec; and the benefits and capabilities of CHIPPY.

Forum 3: NPCC and Texas RE Operational Technology Forum (Oct. 8)

The third forum was an inaugural crossover event with the Texas Reliability Entity (Texas RE), hosted by Ontario Power Generation. NPCC shifted from individual presentations to two moderated panels exploring current operational technology (OT) challenges and opportunities tied to the ERO's 2025 reliability risk priorities of grid transformation and resilience to extreme events.

Speaker	Organization	Session
Mark Henry, Director of Reliability Outreach and Chief Engineer	Texas RE	Opening Remarks; Panel 2 Moderator
Gerry Dunbar, Director, Communications and Stakeholder Outreach	NPCC	Panel 1 Moderator
Adrian Kelly, Area Manager, Transmission Control Center of the Future	EPRI Europe	Panel 1
Dan Taft, Chief Engineer, Control Systems Engineering	Consolidated Edison of New York	Panel 1
William Vesely, Program Manager	New York Power Authority (NYPA)	Panel 1
Clyde Loutan, Principal, Renewable Energy Integration	California ISO (CAISO)	Panel 2
Larry Collier, Electricity Sector OT Cybersecurity Specialist	NERC	Panel 2
Udayan Nair, Director of Grid Transitions	NYISO	Panel 2

Opening Remarks

Reliance on public hydrometeorological systems is growing as droughts, floods, hurricanes, and tornadoes intensify. In Texas, Winter Storm Uri (2021) showed why these tools and their communications networks must remain operational. Early links between SCADA and public-facing systems drew little cybersecurity concern; today, networks must be both reliable and secure. Growth in dispersed generation, load, electric vehicles, and charging stations is also shifting operations.

Panel 1 Key Takeaways: *Building Operational Resilience Against Extreme Weather Events*

- **Upgrade and iterate to protect reliability during extreme weather events.** OT tools, open-source mapping and weather data can help detect environmental risks such as wildfires and identify assets at risk. The industry needs to shift from pinpointing issues in progress to predicting them. Fiberoptic communications and phasor measurement units enable clean, redundant, high-speed data, and replacing electromechanical relays with numerical devices that combine synchro phasor and digital fault recording can reduce capital cost. Resilience should be assessed end-to-end, including supply chain and procedures, as relay obsolescence and loss of experienced staff remain ongoing pressures. NERC is working to establish a reliability guideline on wildfires by early 2027.

- **Cybersecurity and operational innovation are converging.** Panelists agreed cybersecurity is a cost of doing business, while cautioning that Critical Infrastructure Protection (CIP) restrictions can keep analytics and high-performance computing out of the operator decision loop. Better technology exists, but cyber-attacks are themselves a reliability risk, and NERC standards count communications redundancy but not diversity of pathways. OT focuses on adjusting the physical environment with safety, availability, and timing as priorities, while IT focuses on information, privacy, and data.
- **AI offers defensive and analytical value.** Panelists advised against AI agents opening or closing breakers but encouraged frontier labs to test and limit models; including controlled tests of an agent's ability to hack grid systems as it has defensive and database-navigation uses.

Panel 2: *Integrating Inverter-Based Resources and Distributed Energy Resources*

Takeaways

- **Visibility is the central operational challenge.** As the grid shifts from large, centralized generators to one with millions of DERs and IBRs, operators no longer have nearly 100% visibility, immediate demand calculation and proactive control. Observability is needed to forecast net load, including DER, and coordinate responses.
- **Legacy systems and unclear roles complicate DER integration.** Legacy SCADA/EMS cannot manage DER at scale and there is a greater reliance on cellular and cloud-hosted communications. This introduces new cybersecurity challenges, and it is unclear who operates DER with TSO-DSO coordination (ISO, utility, aggregator, or customer). Coordination between transmission and distribution operators remains largely manual, and automation is being explored.
- **Forecasting is harder with dynamic customer behavior and weather.** Behind-the-meter storage, temperature extremes, weather events like wildfires, and weekend low-load conditions all complicate forecasts. Operators are responding with new tools, such as a flexible ramping product, a balancing intermittent construct that procures additional reserves based on combined load, solar, and wind forecast uncertainty, and layered architectures focused on maintaining visibility rather than controlling millions of devices.
- **Security and standards must be built in by design.** Many IBR projects are turnkey installations where security is minimal or added after the fact, creating retrofit and interoperability issues. Participants called for standards updates, new market products, and changes to how automatic generation control functions as operations still follow a 2004 standard. Trust in authenticated, encrypted data is critical, and industry members are encouraged to engage in standards development.

Challenges

- **Communications latency and aging equipment.** Fiber and communications upgrades add capital cost and require outages, relays are reaching obsolescence in about 12 years despite being physically sound, and experienced staff are leaving the industry.
- **Cyber requirements versus operational speed.** CIP restrictions can slow how quickly and accurately event information reaches operators and limit the use of advanced analytics and open-source data in decision-making.
- **Weak grid conditions and inconsistent data standards.** High-IBR areas face voltage coordination and control interaction challenges, and manufacturers and interconnections apply differing data standards and operating statuses.
- **Predicting the next five minutes.** With millions of devices, the challenge has moved beyond N-1/N-2 contingencies to maintaining enough situational awareness and forecast accuracy to predict system behavior even under normal operating conditions. U.S. standards are some of the strictest in the world, and require NERC's involvement to integrate more IBRs and DERs, which affect frequency.

Q&A Highlights: Panel 1 addressed audience questions on protecting operations against misuse of AI agents, along with an audience comment distinguishing IT from OT. Time ran out before Panel 2 could take questions; attendees were directed to email questions to information@texasre.org for written responses from subject matter experts.

Key Successes

The 2026 event series built upon the success of previous Reliability Forums with interactive programming that addressed industry risks, trends, and system impacts to support informed decision-making and reliability planning. This approach yielded:

- **Timely, relevant content.** The forums addressed active industry priorities, from large loads and standards modernization to transmission expansion and operational technology, giving stakeholders both regulatory context and operational detail.
- **A range of perspectives.** Pairing NERC and FERC with transmission owners, system operators, and utilities supported a well-rounded view of industry realities and regulatory requirements.
- **Stronger industry partnerships.** NPCC took the May forum to Vermont, hosted by Utility Services of Vermont, and partnered with Texas RE and Ontario Power Generation (host) in an inaugural crossover event in October.
- **Practical lessons shared openly.** Real-world operating experience, including NECEC's first months in service and recent load transfer events, gave attendees concrete examples to apply in their own planning and operations.
- **Format experimentation.** While the March and May forums featured presentations that drew a highly engaged Q&A, the October panel format enabled candid, multi-perspective discussions on the reliable and secure integration of emerging technologies.

Key Challenges

Speakers across all three forums described a consistent set of challenges facing the reliable and secure integration of emerging technologies and resources:

- **Planning amid rapid and uncertain load growth.** Data center and large load growth is driving sharp forecast increases, sudden load behavior, resource adequacy concerns, and questions about cost allocation, while speculative requests make it difficult to know what to build.
- **Limited visibility and modeling fidelity.** Operators and planners need higher-resolution data from large load interconnections, rooftop solar, behind-the-meter storage, and distribution-level DER to forecast net load and respond effectively.
- **Updating standards, registration, and regulation to meet changing conditions.** NERC's large load and IBR registration efforts, standards process reform, and evolving CIP and operating requirements all seek to keep pace with new technologies, while providing stakeholders with clarity on timing and compliance.
- **Dependence on interregional resources and exposure to extreme weather.** Winter storms, wildfires, and hurricanes showed both the critical value and the limits of imports in addition to the importance of resilient, functioning communications and control systems.
- **Aging infrastructure, workforce, and cybersecurity.** Relay obsolescence, costly communications upgrades, loss of experienced staff, security added after turnkey installations, and emerging AI risks all compete for limited time and capital.

Emerging Themes

Several themes surfaced across all three forums as a combined result of strategic topic selection, presenter insights, and audience input. These themes will continue to shape industry conversations and NPCC's future programming:

- **Load growth is outpacing planning tools.** Data center and large load growth, along with broader electrification, surfaced throughout the series, with consistent concerns about speculative forecasts, interconnection data, and cost allocation.
- **Stakeholders need clarity on standards and registration updates.** NERC presented on large load registration, standards process reform, IBR registration, and other regulatory updates.
- **Visibility is a common and critical operational gap.** Whether the subject was data center load transfers, rooftop PV, or distribution-level DER, speakers emphasized that operators and planners need higher-fidelity data and infrastructure.
- **Interregional dependence is rising.** NECEC, CHIPPY, and Winter Storm Fern showed both the value and the limits of imports during extreme weather conditions.
- **Extreme weather is a defining stress test.** Winter Storm Fern, Winter Storm Uri, wildfires, and flooding underscored the need for resilient communications, predictive tools, and well-planned recovery.

- **Cyber, OT, and AI are converging with reliability.** AI appeared in every forum: a driver of large load growth, in-house tool for drafting standards, and as both an opportunity and a risk for control rooms, while CIP requirements and communications infrastructure affect operator decisions and abilities.

A Look Ahead

The 2026 Reliability Forums underscored the pace and scale of change across the Bulk Power System. These discussions addressed associated risks, trends, and system impacts to support informed decision-making and reliability planning. NPCC remains committed to serving as a trusted educator and advisor on these matters and will carry the insights gained into 2027 programming, building on the partnerships and formats that proved most effective for all audiences.

NPCC encourages industry stakeholders to remain engaged in these events. To receive announcements of upcoming Reliability Forums and other reliability resources, please subscribe to NPCC updates at www.npcc.org.