

**i2X Webinar 5 Debrief**  
**“DER Interconnection Solutions for a Reliable and Secure Grid”**  
**December 16, 2025**

**Key Takeaways**

This webinar explored technical and regulatory solutions to maintain a reliable and secure grid with distributed energy resource (DER) deployment. Speakers discussed performance of inverter-based DERs, interconnection models and tools, approaches to adopting technical standards such as IEEE 1547-2018, advanced protection schemes and equipment, and the role of technical studies to accurately screen interconnecting DER projects. Panelists included Jennah Denney and David Farmer, National Rural Electric Cooperative Association (NRECA); John Kaduk, Georgia Public Service Commission (GPSC); Daniel Aguirre and Taylor Mullenix, Puget Sound Energy (PSE); and Nathan Walsh, National Grid (NGRID).

Stakeholder questions and audience discussion focused on standards and equipment safety, protection schemes and redundancy, microgrids for islanding, hosting capacity and screening, and the impact of DERs on reliability.

**Presentation Summaries**

- [Jennah Denney and David Farmer](#), NRECA

NRECA supports electric cooperative utilities (coops) to maintain or improve reliability as customer deployment of DERs increases. While coop electricity systems vary, they “share common characteristics, such as long radial feeders, lower load diversity and density, smaller engineering and general staff.” NRECA assists coops with adopting IEEE standards as they evolve towards active grid support. Resources for members include the [DG Toolkit](#) and the Rural Electric Workflow Improvements for Rapid Electric Vehicle Supply Equipment ([REWired project](#)), as well as guidelines on DER installation and interconnection and utility workflow for interconnection of electric vehicle supply equipment.

- [John Kaduk](#), GPSC

Georgia is integrating more DERs while maintaining reliability. The GPSC recently approved a plan and budget for Georgia Power's Distributed Energy Resource Management System (DERMS) for better forecasting, visibility, and real-time control of DERs in coordination with existing real-time control systems for grid operations. The utility will require Automatic Generation Control to facilitate DER flexibility. Georgia Power's Hosting Capacity Tool and multi-tiered interconnection “guidance requests” for technical studies help developers identify ideal project sites based on available distribution capacity and upgrade needs. The Hosting Capacity Tool, a map updated twice a year, helps steer project developers away from areas where DERs cannot interconnect without distribution system upgrades. The GPSC outlined security protocols and protection equipment requirements, such as the use of direct transfer trip (DTT) and requirements for inverter-based resources in compliance with the company's DER policy.

- [Daniel Aguirre and Taylor Mullenix](#), PSE

PSE's framework for integrating DERs into the electrical grid incorporates protection requirements to address inadvertent export, unintentional islanding, and new technologies like vehicle-to-grid systems. The utility categorizes interconnections into three tiers to determine protection requirements such as protective inverters, protective relays, and advanced safety protocols like DTT schemes. Emerging methods to prevent unintentional islanding include voltage total harmonic distortion analysis and synchrophasor-based schemes. PSE is also conducting vehicle-to-grid pilots and developing technical specifications and testing procedures for these technologies.

- [Nathan Walsh](#), NGRID

NGRID attributes its success in interconnecting over 120,000 facilities in its Massachusetts service territory to robust impact study processes and adherence to IEEE 1547 standards to minimize technical failures. NGRID's tiered application system ranges from simplified residential connections to complex standard processes for large-scale projects. The utility manages specific engineering challenges through DER impact studies, such as thermal analysis/load flow, power quality analysis, managing voltage flicker, ensuring effective grounding, and implementing 3V0 protection to prevent DERs contributing to grid faults. NGRID uses group studies and Affected System Operator (ASO) studies to simultaneously screen multiple projects and potential grid impacts. Utility visibility and control for larger installations are integral to maintaining grid stability during emergencies.

## Major Themes

### 1. Evolution of Interconnection Standards (IEEE 1547)

Historically, interconnection standards required distributed generation to disconnect immediately during a grid disturbance. The IEEE 1547-2018 standard requires resources to ride through disturbances and actively regulate voltage, supporting grid stability. However, adoption is inconsistent. NRECA noted that smaller coops often lack the engineering staff to implement new standards, sometimes preferring simpler, older methods despite new DER capabilities.

Denney (NRECA) stated that interconnection standards are "practical mechanisms and levers that utilities that we serve rely on every day to manage the risk and maintain safety as we integrate DERs without compromising reliability." At the same time, Farmer (NRECA) explained some of the challenges for small rural coops: "The basic understanding of the standard was if there's any kind of disturbance on the system, we want to get it off the system as quickly as possible.... But as we got more experience... utilities said, well, maybe we want to be able to actively regulate voltage, and maybe we want to ride through some of these abnormal events, and also provide frequency response." He further noted widespread implementation challenges and described a "patchwork of adoption across the U.S, mainly because of these technical, operational challenges, too, the interoperability challenges, cybersecurity risk. Smaller utilities generally lack the expertise in infrastructure [...]. A lot of the coops we talk to say, look, we don't want to get into this, we're just going to have them set the power factor [...], we're not going to actively regulate the voltage, we'll adjust the ride-through settings, that's not too complicated."

### 2. Tiered Technical Reviews and Protection Schemes

A tiered technical review process based on DER size and grid impacts helps utilities manage workflow and improve technical studies. The use of protection equipment also is critical to ensuring continued reliability in parallel to rising deployment of DER.

For example, Mullenix (PSE) stated that Washington Administrative Code requires that “there can't be a single point of failure for the size of interconnection, so as a result, we do require redundant microprocessor relays.” He also pointed toward DTT schemes that “send a signal to the customer to tell their protective equipment to disconnect from our system. ...[W]e would require a system like this ... if the DER generation exceeds 50% of the minimum distribution circuit load.” Walsh (NGRID) added, “The expense really lies with the communication line. If you want a secure transfer trip... you need a really robust communication path.”

### **3. Managing High Application Volumes via Group Studies and Hosting Capacity Analysis**

As interconnection queues increase, solutions to manage high queue volumes and impacts on reliability include the use of group studies and hosting capacity tools.

Faced with high volume queues (over 115,000 residential projects totaling almost 800 MW, and 456 larger DER projects >1 MW totaling 1.1 GW), NGRID used group (including ASO) studies to evaluate a geographic cluster of projects together and share the cost of necessary substation upgrades among them. According to Kaduk (GPSC), “The time and cost of those studies and upgrades is so great, most of these projects would not be able to make it...” He stressed the importance of a “hosting capacity tool [so] that developers can know, okay, this is not a good site for me.”

### **4. DER Deployment and Cybersecurity**

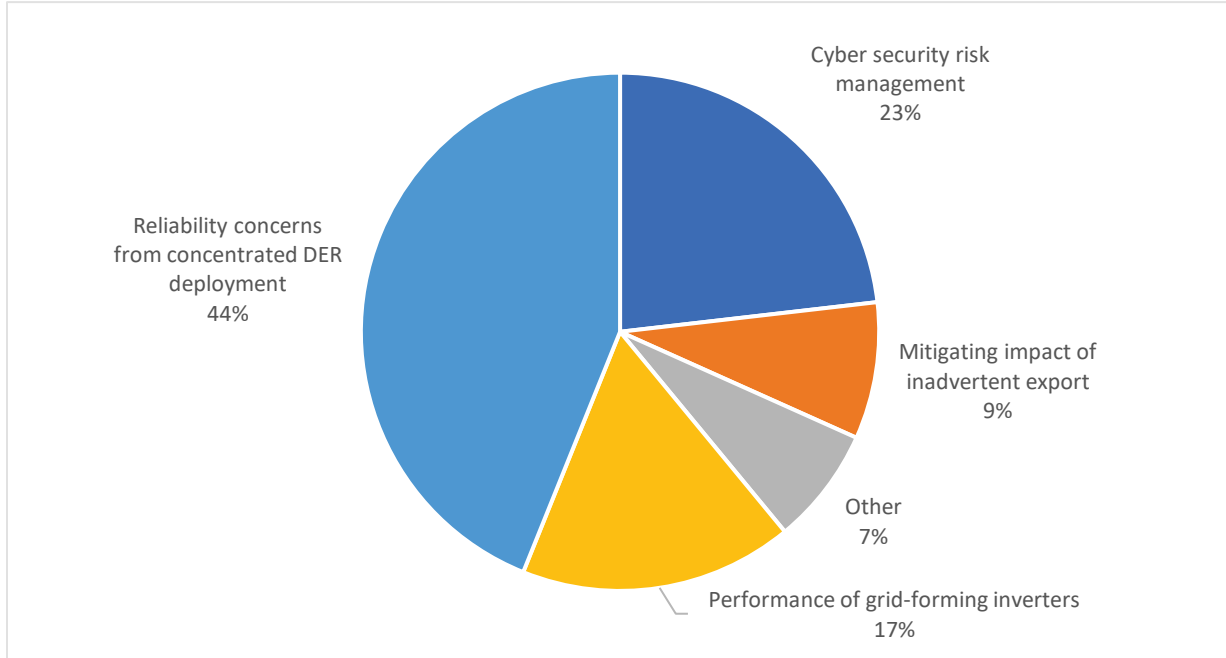
Adding more devices to the grid increases the “attack surface” for cyber threats and operational complexity. DERs must be deliberately integrated and managed. Denney (NRECA) stated, “Cybersecurity cannot be bolted on after interconnection.... [A]s more of these DER devices are integrated into our grid ..., this is something that coops are embedding into their processes.”

### **5. Emerging Technologies**

Emerging DER technologies like vehicle-to-grid for electric school buses and grid-forming inverters introduce new challenges and opportunities for grid reliability. Grid modernization applications like DERMS can provide visibility and control over these distributed grid assets. Aguirre (PSE) stated, “We're starting small.... We're partnering with school districts to charge buses... and maybe use some of that potential energy in the electric buses to help power the grid. But that is not a current use case, it's kind of a concept.... We want to make sure that we have full control of them.”

## Audience Polls

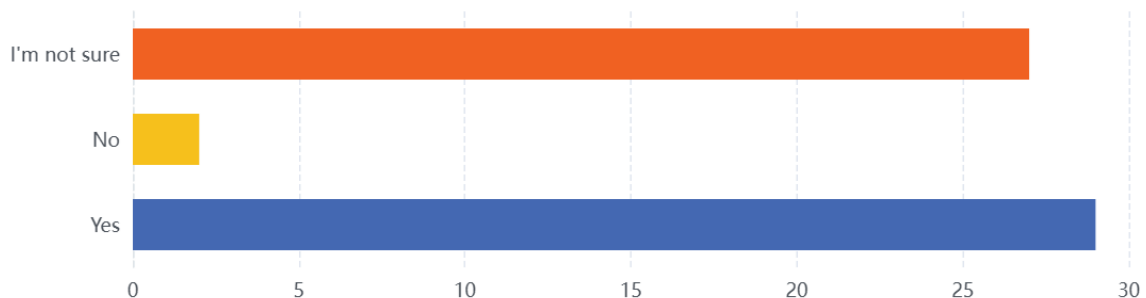
### 1) What are the biggest reliability and security challenges to DER integration in your jurisdiction?



The majority of respondents indicated that reliability concerns from concentrated DER deployment are the biggest challenge in their jurisdiction. Cybersecurity risk management was the second biggest challenge, followed by performance of grid-forming inverters. Other respondents selected mitigating impact of inadvertent export or other (limited existing grid capacity and rush to electrification).

### 2) Has your jurisdiction adopted IEEE 1547 standards?

58/59 (98%) answered · 1 skipped



Half of respondents indicated that their jurisdiction adopted IEEE 1547 standards (50%); about an equal number were not sure.

3) What other strategies have been advanced in your jurisdiction to improve grid reliability and security with DERs?



Respondents offered the following strategies:

- Well-defined standards combined with site-specific consultation
- Clear utility rules and requirements, subject to continuous improvement
- Adopting IEEE 2800-2022 Standard for Interconnection and Interoperability of Inverter-Based Resources or ERCOT's Nodal Operating Guide Revision Requests Standards
- Working groups for development and implementation of advanced inverter standards, cyber security and advanced inverter operationalization
- Deploying battery storage to increase hosting capacity and adding battery storage to solar PV projects
- Adopting IREC's recommendation on voltage screens for inadvertent export
- Deploying virtual power plants
- Data transparency and use of metrics to assess electric utility performance