AEIC GRID ADVANCEMENT PROGRAM · CHALLENGE BRIEF

Operationalizing DERs in a Two-Way Grid

Challenge 06. The operating problem, why it is hard, and what the cohort will work.

Working session	Tuesday, January 12, 2027, 2:00 p.m. ET
Cadence	Second Tuesday of every month, 2:00 p.m. ET
Eligibility	AEIC members and any electric utility
Join	https://aeicopscenter.org/grid-advancement
Program	AEIC Center for Operational Excellence

The problem

For more than a century the distribution system ran on one assumption: power flows one direction, from central generation down to customers who take it and do nothing back. The protection scheme, the voltage regulation, the planning models, and the training all inherit that assumption.

It is gone. Rooftop solar, behind-the-meter storage, EVs, and flexible load made distribution a two-way system without asking anyone's permission.

And the ask has changed again. It is no longer enough to safely absorb these resources. Utilities are being asked to *depend* on them, for capacity, for voltage support, for deferral of infrastructure they cannot get built in time. A nuisance is being promoted to an asset, and the operating model has not been promoted with it.

Why this challenge

Because the work here is easy to mistake for finished, from the outside and from upstairs.

Most utilities have an interconnection process, hosting capacity maps, a demand response program, and a virtual power plant pilot. Each of those is real, and each was hard to build. From an executive's chair, that looks like a solved problem, and the next ask is to lean on it.

But interconnection is a connection problem, and depending on a DER for capacity is a control problem. Doing the first well gets you almost no distance into the second. If you have been trying to explain that distinction inside your company and not getting traction, you are not imagining it, and you are not the only one. This challenge also sits underneath several of the others in this program. Flexible load, forecasting a nonlinear future, dynamic customers, security at the grid edge. Every one of them assumes a distribution system that can operate in two directions, and few utilities can say they are there yet.

Where utilities actually are

Three plays, run in some combination almost everywhere:

Screens and hosting capacity. Interconnection studies tell a developer where a resource can go without breaking anything. Genuinely hard work. But a hosting capacity map is a photograph of a moving system, refreshed about once a year, and it answers a permission question, not an operating question.

Autonomous smart inverters. Under IEEE 1547-2018 the capability is already on the wire: volt-VAR, volt-watt, and ride-through settings that hold voltage locally without anyone in the control room touching anything. Quietly powerful, and at most utilities those settings were commissioned once and have not been revisited since, because they land between planning and operations and the ownership was never assigned.

Programs on the side. Demand response, managed charging, and aggregation pilots, run out of the customer organization and measured in enrollments. They are real, and they sit next to operations rather than inside it, so the resource lives on a program dashboard and not in the plan for tomorrow's peak.

None of this is wrong. It is what you do when resources arrive faster than the operating model can absorb them.

The hard part

The technology is not the constraint. DER management, aggregation, state estimation, forecasting, and advanced inverter control are all real and deployed somewhere today. The hard part is these four things.

1. The connection half is built and the control half is not. Getting a resource safely onto the wire, and telling it what to do on a hot afternoon, are different problems with different owners. Interconnection lives in

planning. Control lives in operations. Most utilities built the first to a high standard, because it was mandated, staffed, and owned. The second has been none of those things, and the gap stays invisible until the day you need the megawatts.

2. You cannot see what you are being asked to depend on. The resources sit behind the meter and belong to customers. What a utility has is net load at fifteen-minute intervals arriving hours later, which is a billing artifact and not telemetry. The DER shows up as an unexplained subtraction. You are being asked to count a resource you cannot observe, dispatch, or verify in the moment, and closing that gap means moving customer-side data across the OT boundary, straight into NERC-CIP.

3. Protection was built for radial flow, and protection is the thing that cannot be wrong. Fuse and recloser coordination, sympathetic tripping, unintentional islanding, fault current from inverters that looks nothing like what the relay expects. Every one of those settings is a safety decision. Reopening them is career risk with no career reward, which is a structural problem and not a failure of nerve, and everybody knows what happens if one is wrong. This is the quietest and most serious blocker here, and it is engineering, not software.

4. The value is a deferral, and a deferral requires a promise. The business case for DERs as an asset is the substation you did not have to build. To make that count with a regulator, you have to guarantee the resource shows up in the hour you need it. But it is a portfolio of customer-owned devices whose owners can opt out, unplug, or not be home. Firm capacity out of nonfirm assets is genuinely unsolved, and until it is solved, "we will use DERs instead" is not a sentence that survives a rate case.

If you need one sentence to carry upstairs: **we can connect a DER. We cannot yet depend on one. Those are two different problems with two different owners, and we have only ever funded the first.**

None of those four barriers is local to you. In some form, all four show up in all ten challenges in this program: the data that cannot cross the OT boundary, the work that falls between planning and operations, the settings nobody is assigned to own, and the value that is an avoided build. If your list looks like this one, you are not behind. You are in the same room as everyone else.

And "we do not know what is behind our meters" is a legitimate answer here. Very few utilities can say otherwise with a straight face. It is a finding, not a failure.

What the cohort will work

Not "which DERMS should we buy." The room will work the questions that actually block deployment:

- What visibility do you truly need at the grid edge, at what resolution, and what have people actually gotten across the OT boundary?
- How are utilities revisiting protection coordination and inverter settings, and who signed off?
- What has anyone gotten a regulator to accept as firm capacity from a nonfirm, customer-owned resource?
- Where does DER dispatch live in the org, and who has moved it from a program into the operating plan?
- What was tried and did not work? That is the most valuable hour in this program, and it is the one you can only get from peers who have actually tried it.

What to bring

You do not need a solved problem. You need an honest one. Come with:

- One decision you are stuck on
- What you can and cannot see behind the meter, and how stale it is when you see it

- Whether anyone at your company owns inverter settings
- One thing you tried that did not work

If the honest answer to any of those is "we do not know," bring that. It is a finding, not a failure, and you will not be the only one saying it.

What you get

- This brief, and a short video briefing, before the session
- The Flight Plan, a working pilot scaffold, inside InnovationWorks
- The session itself, with the utilities living this problem
- A retrospective afterward: what the cohort tried and what happened

Join

Tuesday, January 12, 2027, 2:00 p.m. ET. Recruitment runs per challenge, so your DER and distribution operations people can come to this one without committing to all ten.

Open to AEIC members and to any electric utility. If you run a utility, you are welcome here.

https://aeicopscenter.org/grid-advancement
Knowledge of one is the knowledge of all.
Sources: this challenge was developed from research of public utility filings. The technology landscape for this challenge is maintained separately inside InnovationWorks.