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Engineering Impacts from Distributed Energy Resources Aggregation

BACKGROUND

- Indiana passed legislation to have the IURC (Indiana Utility Regulatory Commission) establish state rules and regulations regarding FERC (Federal Energy Regulatory Commission) Order 2222. The IURC is monitoring the filings from PJM/MISO (Midcontinent Independent System Operator) and realizes PJM is going first (est. implementation 2026+) and MISO is going to wait until much later (est. implementation 2030). The IURC wants to move forward effectively and established a series of meetings to examine various DER (Distributed Energy Resources) Aggregation topics in a round-table discussion format, which includes consideration of the IURC rules to be established, to ensure we maintain a reliable system.
 - EDCs (Electric Distribution Companies) are concerned about some issues that PJM/FERC perhaps does not see as a concern. For example, EDCs prefer limiting the scope of Energy Market Aggregations to single node, not multi-nodal (walk before you can run). EDCs also are concerned about FERC imposing a 60-day review/approval window on EDCs under RERRA (relevant electric retail regulatory authorities) jurisdiction to verify all DER unit information and review whether the DER aggregation will impact reliability.
- Evolution of the Grid
 - I&M (Indiana & Michigan), and the broader AEP (American Electric Power), are developing ADMS (Advanced Distribution Management System) and DERMS (Distributed Energy Resources Management System) systems to provide for future automation of the distribution and transmission grid.
 - As the volume of DERs expands, the visibility of DERs and DER Aggregations will become necessary to ensure the safety and reliability of the grid. Such challenges drive our need for an evolution of the distribution system.
 - The distribution system has been developed with radial feeds from Generation to Load; Under DER Aggregation, the power flows in this way, but also in reverse as DER injections feed energy into the distribution system and it reduces energy flow from the transmission grid.
 - As the changes to the distribution system are significant, it is even more important that safety and reliability be foremost as EDC employees work on the distribution system.
 - The EDC must retain the ability to override DERs to address reliability concerns or when operational limitations exist.

REGISTRATION

- Interconnection Agreement (IA)
 - Distribution Engineering Study, including on-site DER(s) if planning market participation.



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- Not all assets looking to participate in aggregation have existing IAs or have been screened/studied (e.g., DR and EV charging equipment). As a result, a new IA is required for market participation.
- DER Aggregation Registration by EDC
 - IAs are required for market participation.
 - A Distribution Engineering Study of each DER that make-up the aggregation must be conducted, with an analysis to assess the distribution system impacts, such as overloads or swings in voltage levels.
 - DER assets that require an IA are screened/studied at initial application. This process assumes diversity in DER operation (not all DERs operate at the same time). Aggregation has the potential to alter, if not remove, the existing natural diversity. As a result, assets need to be screened/studied as part of an aggregation separately from the initial interconnection process.
 - The FERC is limiting the study period, with other activities, to 60 days and specifying that the registration will be considered approved if not addressed within 60 days.
- Given the RERRA's jurisdiction over DERs, a DER registration process between the DER Aggregator and the IURC is suggested.
 - This process will be needed to ensure the safe sharing of customer data.
 - Given the acquisition and sharing of protected data, cybersecurity will need to be in use.
 - DER Aggregator must agree to immediately respond to PJM and EDC/DSO directives to override identified DERs or DER Aggregations.
 - DER Aggregator must demonstrate sufficient financial strength to effectively manage and render credits to DERs for their market participation.
 - DER Aggregator must be very responsive to the IURC as DER disputes arise.
 - Request that the IURC support the need for pre-registration process to review individual DER data and to not start the 60-window until the EDC has received and populated all DER data.
 - Oppose PJM's automatic approval of a DER aggregation if EDC does not act in 60 days. (FERC rejected this in March. EDCs should be able to provide a reasonable justification why more time is necessary.)
 - Oppose constant ability of DER Aggregator to update its list of DERs within an aggregation. (FERC rejected this in March. EDCs wanted a fixed review period, such as opportunity for annual updates. Every time a DER Aggregator modifies its aggregation, the EDC must verify DER unit information and review whether the modified DER aggregation will impact reliability.)
 - Real-time telemetry data delivery requirements are specified by capacity, energy, and ancillary markets.
 - PJM has defined metering requirements in its manuals.



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- P nodes need to be reasonable
 - Transmission to provide.

OPERATIONS

- Dispatch – IURC should consider the need for the accurate dispatch of DER Aggregations and the extensive experience of the EDC in this area.
- Foundational data (D-Nexus) and distribution Planning Modeling Capability and Automation improvements. Additional equipment and sensing on DWIREs to operate complex grid of future.
- Metering and Telemetry
 - We need unit data from PJM or DER Aggregators, not just aggregated information
 - We may need multiple meters – utility quality and production – on customer premises.
 - DERs provides metering & telemetry. The IURC may want to consider the importance of revenue quality metering and the long-term experience that the EDCs have in this area.
 - Telemetry is needed for real-time reliability. While PJM does not want it for units under 10 MW, EDCs will need it for distribution reliability.
 - AMI (Advanced Metering Infrastructure) deployment to all customers; planned completion expected in 2025
 - Deploy and receive recovery for communications and control technologies to allow AEP to remotely disconnect or directly curtail/adjust the output of the DERs for emergency/reliability reasons.
 - Installation of separate production metering for DERs would:
 - Address load masking;
 - Provide remote connect/disconnect capability for individual DER; and
 - Allows us to be more surgical and efficient if issues come up.
- AEP agrees with the IEEE (Institute of Electrical and Electronics Engineers) 1547-2018 standard and hopes that the IURC will also consider adopting it.

SETTLEMENTS

- We need meters for PJM settlements, state retail billing, and double counting. Meter data also reinforces telemetry data and power flow models.