Order No. 2222 – Preparing the Distribution Grid and Retail Programs to Maximize the Value of DERs for Customers

NREL DER Interconnection Workshop

December 15, 2022

About AEE

- Advanced Energy Economy (AEE) is a national association of businesses that are making the energy we use secure, clean, and affordable. We work to accelerate the move to 100% clean energy and electrified transportation in the U.S.
- Advanced energy encompasses a broad range of products and services that constitute the best available technologies for meeting energy needs today and tomorrow. These include energy efficiency, demand response, energy storage, solar, wind, hydro, nuclear, electric vehicles, biofuels and smart grid.
- AEE represents more than 100 companies in the $238 billion U.S. advanced energy industry, which employs 3.2 million U.S. workers.

Goals for today

- **Brief overview of FERC Order No. 2222 and Status Update**
- **Introduce AEE-GridLab Report and Summarize Recommendations**
  - "FERC Order 2222 Implementation: Preparing the Distribution System for DER Participation in Wholesale Markets" (January 2022)
- **Discuss Dual Participation in Retail and Wholesale Markets**

Note: "RERRA" = Relevant Electric Retail Regulatory Authority (i.e., states, municipalities, cooperative utility boards)

Overview of Order No. 2222, Issued Sept. 2020

- **Commission determination:** "we find that existing RTO/ISO market rules are unjust and unreasonable in light of barriers that they present to the participation of distributed energy resource aggregations in the RTO/ISO markets, which reduce competition and fail to ensure just and reasonable rates."
- **Commission directive:** that "each RTO/ISO… revise its tariff to ensure that its market rules facilitate the participation of distributed energy resource aggregations"
- **Definition of DER:** "any resource located on the distribution system, any subsystem thereof or behind a customer meter. These resources may include, but are not limited to, electric storage resources, distributed generation, demand response, energy efficiency, thermal storage, and electric vehicles and their supply equipment."

Order No. 2222 Overview: Key compliance requirements

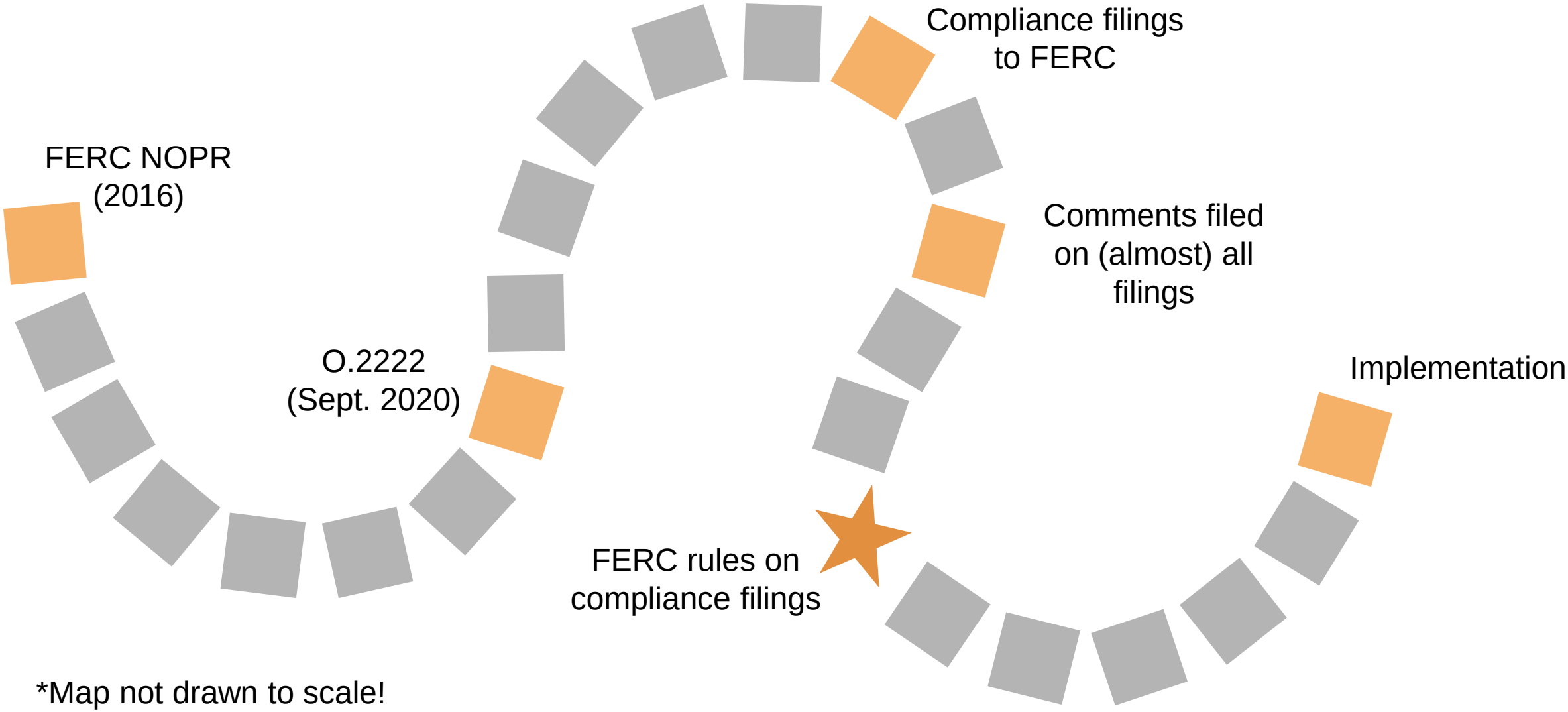
Parameter(s)	Key Requirement(s)
Eligibility of DER aggregators/DER types	DER aggregators must be an eligible market participant; RTOs/ISOs must allow all technology types and multi-technology combinations; rules must prevent "double counting" in retail and wholesale markets; no broad state "opt-out"
Geographic scope of aggregation	Encourages broad geographic scope of aggregation, but allows RTOs/ISOs to propose to limit aggregations to a single pricing node
Distribution factors and bidding parameters	Must account for physical and operational characteristics of DER aggregations and ensure they are able to fully offer their aggregations into RTO/ISO markets
Information and data requirements	RTOs/ISOs are required to transparently state the information and data that DER aggregators must provide them about the performance, physical parameters, and components of their aggregations
Metering and telemetry requirements	RTOs/ISOs have flexibility to set these requirements, including whether to require metering and telemetry of individual DERs; must justify why they are necessary and explain why they do not result in undue barriers to participation
Coordination	Requires RTOs/ISOs to establish procedures for coordination between RTOs/ISOs, DER aggregators, distribution utilities, and state and local regulators

AEE's Vision of Successful Order No. 2222 Implementation

Wholesale market participation/compensation *complements* other values and revenue streams that DERs currently access (e.g., customer benefits and retail programs). This means:

- **Customers can deploy DERs more affordably,** because DERs receive compensation for *all* the services they can provide
- **DERs already being deployed add more value to the grid** by offering all the services they are technically capable of providing
- **DERs are deployed more rapidly and more efficiently,** because they are responding to transparent market signals
- **Reliability improves,** because grid operators gain visibility and control as DERs participate in wholesale markets
- **Wholesale competition is enhanced** as DERs participate

You Are Here*



*Map not drawn to scale!

Status of RTO/ISO Compliance Filings

RTO/ISO	Date of filing	Implementation	Status
CAISO (ER21-2455)	7/19/21	2022	FERC Order issued XX
NYISO (ER21-2460)	7/19/21	2023 (2019 model), 2026 (O.2222 compliance)	FERC Order issued XX
PJM (ER22-962)	2/1/22	2026	Awaiting FERC Order
ISO-NE (ER22-983)	2/2/22	202? (capacity); 2026 (E&AS)	Awaiting FERC Order (requested by Nov. 1; 2022 capacity participation delayed)
MISO (ER22-1640)	4/14/22	2030	Awaiting FERC Order
SPP (ER22-1697)	4/28/22	Q3 2025 (targeted)	Awaiting FERC Order
ERCOT* (PUCT Project No. 51603)	N/A	2023 (applications accepted beginning Nov. 2022)	Pilot program approved by PUCT and ERCOT

*Not subject to O.2222

Introduction to AEE – GridLab Convening and Report

FERC Order 2222 Implementation: *Preparing the Distribution System for DER Participation in Wholesale Markets*

January 2022

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Background

- AEE and GridLab brought together utilities and AEE members to build consensus around key distribution system issues to facilitate DER participation in wholesale markets
- This summary lists key recommendations to help educate state commissions; inform FERC and RTO/ISO processes; and support state policies that increase DER value
- Four working groups formed to discuss: Interconnection and aggregation review; communications, controls, and coordination; dual participation; and investment recovery and cost causation

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CAMPAIGN PARTICIPANTS

Microsoft, DTE, greenlots (A Member of the Shell Group), CLEAResult, ecobee, Dominion Energy, Google, Xcel Energy, RECURVE, CPower, Portland General Electric, sip, uplight, enel x, ORACLE, Walmart, GridLAB, Advanced Energy Economy

Other participants include: APS, Exelon, PECO, ComEd, Pepco, and BGE

Vision of Success

DER aggregators, distribution utilities, RTOs/ISOs, and utility customers may benefit from increased DER participation in wholesale markets, for example:

- **DER Aggregators**: Order 2222 opens new opportunities to earn revenue from wholesale markets; alongside distribution level compensation, this brings DERs closer to providing and being compensated for their full suite of benefits
- **Distribution Utilities**: Order 2222 creates an opportunity to play a role in enabling DER participation in wholesale markets while potentially deriving value from DERs at the distribution level
- **RTOs/ISOs**: Aggregated DER participation gives system operators access to more resources that increase grid flexibility and maintain reliability, particularly in the context of increasing renewables
- **Customers**: Utilization of DERs in wholesale/retail markets has the potential to lower overall customer costs by avoiding otherwise needed energy and capacity investments across the grid

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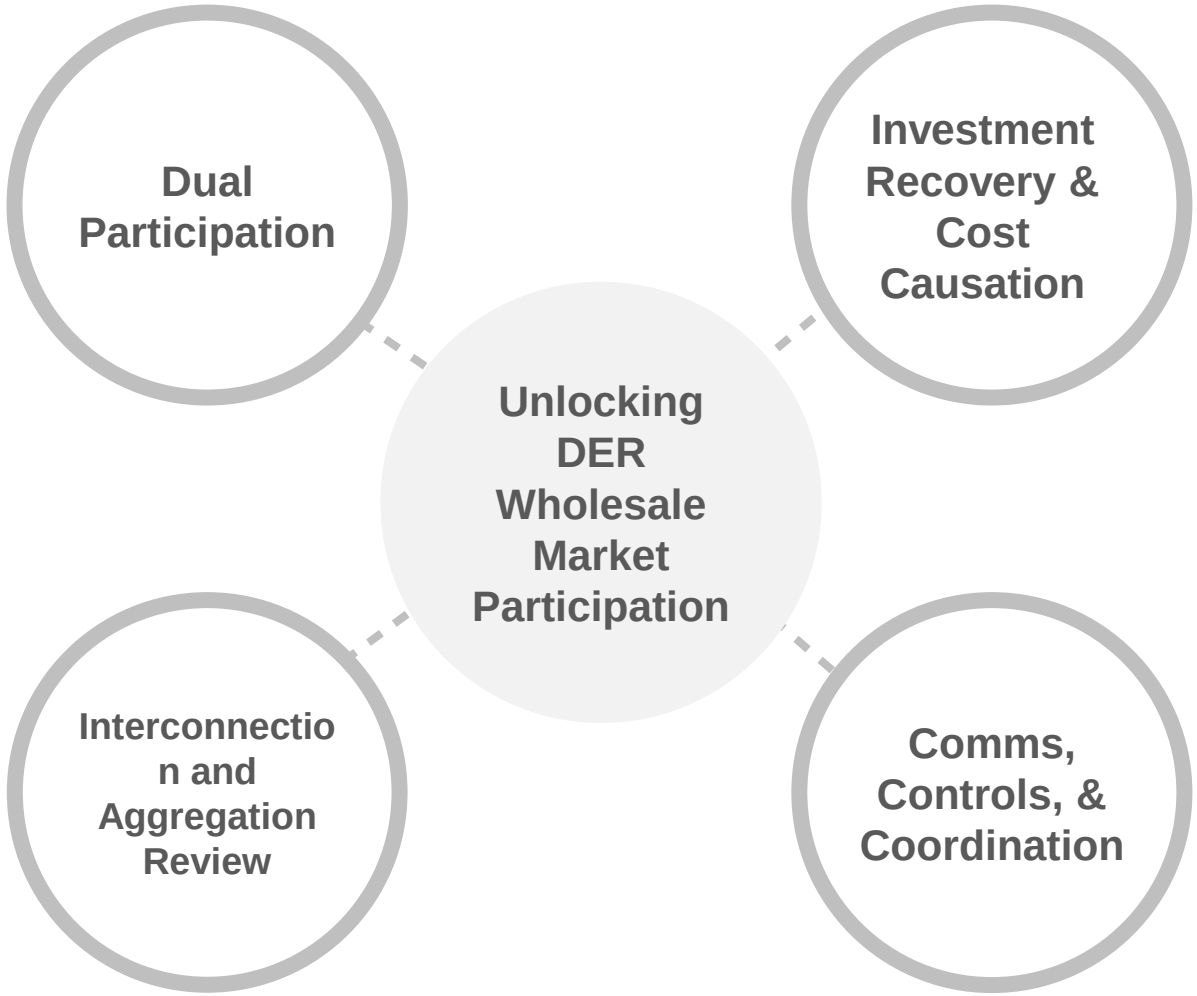
The collaborative prioritized four areas of focus and developed four Working Groups to address each



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Broad Conclusions

- DER aggregation in wholesale electricity markets under Order 2222 presents unique opportunities and challenges
- Order 2222 implementation will be most successful for customers and grid reliability with active engagement from state utility regulators
- Existing processes and tools developed by states, distribution utilities, and stakeholders to support DER integration should be built on to facilitate Order 2222 implementation
- In the future, processes and tools adopted by states and utilities related to DER adoption and integration should anticipate participation in wholesale aggregations
- New requirements and investments to support Order 2222 implementation should be aligned with the services provided and scaled as participation increases where possible
- Processes, tools, and policies enacted to support Order 2222 implementation must set clear expectations of all participants
- Equitably addressing the potential incremental distribution-level costs of Order 2222 implementation requires identification of a range of potential costs and benefits
- State regulators could consider establishing dedicated forums to examine and address the complex distribution system issues identified in this report

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Zoom In:

Dual Participation in Retail and Wholesale Programs

What is “dual participation?”

- *Ability to participate in both wholesale and retail programs, so long as DER is not receiving compensation for the same services as part of another program*.
- **Order No. 2222**: FERC required RTOs and ISOs to "allow [DERs] that participate in one or more retail programs to participate in its wholesale markets,” while allowing “appropriate restrictions” that are “narrowly designed to avoid counting more than once the services provided by distributed energy resources in RTO/ISO markets.”
- **Why does it matter**?
  - Dual participation is key to unlocking value given the operational and economic realities of DER aggregations; most are adopted for retail purposes first, but additional wholesale revenue streams can improve utilization and reduce costs (for DER owner and broader system)
  - Broad restrictions on DER participation that do not recognize reasonable operational limitations will diminish value and increase costs

Challenges of Dual Participation Identified by Working Group

- **Double Counting:** To the extent that a DER's wholesale participation coincides with the LSE/EDC peak demand and that participation impacts the amount of capacity for an ISO or LSE/EDC to procure, the DER's wholesale activities will need to be separately metered or added back to the peak load to ensure the ISO or LSE/EDC can accurately plan for system peak demand
- **Double Compensation:** Absent mechanisms to prevent duplicate payments, DERs engaged in dual participation may inappropriately receive compensation for the same service within the same time interval at both wholesale and retail levels
- **Operational Compatibility:** There could be instances when wholesale participation and retail obligations conflict with one another

Dual Participation

Opportunity

- Some states and RTOs/ISOs already have retail and wholesale constructs for dual participation while others may need to implement new constructs.
- States will have a key role, as recognized by FERC, particularly as it relates to oversight and design of retail programs. A thorough understanding by all parties of best practices and considerations will facilitate the regulatory decision-making process and pave the way for DER dual participation in a way that appropriately balances the interests of DER owners and aggregators, distribution utilities, and retail customers

Recommendations

- Load forecasting reconstitution practices exist today for wholesale demand response in markets such as NYISO and ISO-NE; other grid operators can leverage these existing practices for DERs
- States should establish a process through which the utility can identify where duplicate compensation may occur and RERRAs should develop appropriate mechanisms to prevent duplicate compensation (e.g., eligibility criteria in the aggregation enrollment and review, including ways to operationalize those criteria)
- Consideration of, and accounting for, instances of dual participation where a DER's capability may be split to provide more than one distinct wholesale or retail service in a given interval

Dual Participation Recommendations
(Continued)

- ISO/RTO participation models for joint ownership may be an example of how dual participation could be structured
- New York utilities' CSRP and DLRP tariffs provide useful models for preventing double compensation of energy
- DER Aggregators should update the DERA's operational status to the ISO/RTO to appropriately reflect any retail activities and/or obligations of DERs that comprise the DERA that impact resource availability for wholesale services and potential dual participation
- Retail tariffs and contracts should have guidelines for governing DER dual participation (such as identifying incompatible wholesale market services), with consideration for both normal and emergency operations at the bulk- and distribution-system levels
- States should proactively collaborate with utilities, DERs, Aggregators, and RTOs/ISOs to develop dual participation rules that are transparent and accommodate DER capabilities while preventing those issues outlined earlier in this document
- States should recognize that on-site metering will be necessary to facilitate wholesale participation and/or participation in retail programs

Thank you!

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Appendix: Summary of AEE-GridLab Working Group Recommendations:

Interconnection and Aggregation Review;

Communications, Controls, and Coordination;

Investment Recovery and Cost Causation

Interconnection and Aggregation Review

Problem Statement

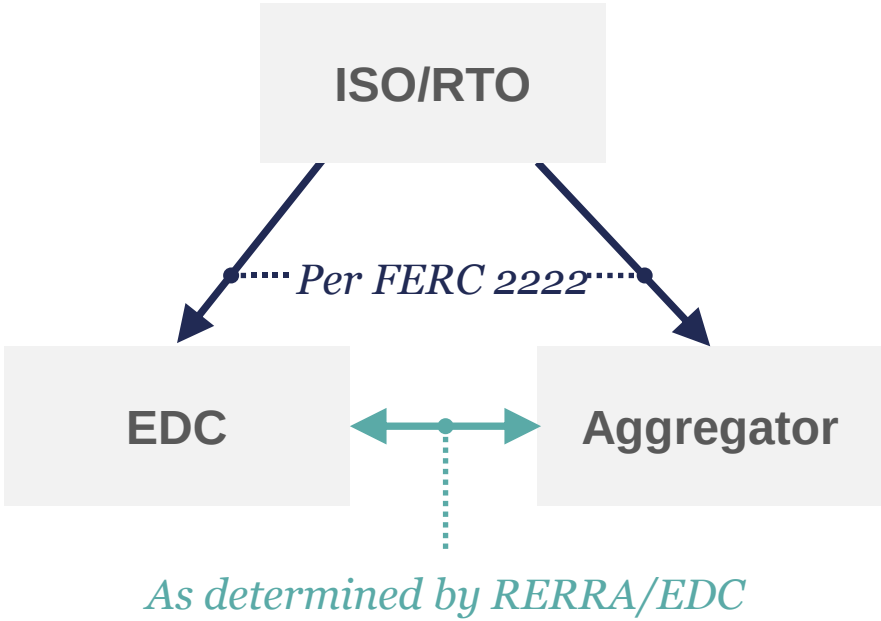
There appears to be a need for clarity around what an Aggregation Review process might be (and what, if any relationship it has to other processes)

Recommendations

- As EDCs establish an aggregation review process, they should utilize existing data from interconnection or ISO aggregation registration processes where possible to minimize the impact on all parties
- EDCs should work with RERRAs to modify existing distribution interconnection processes to include an option to indicate if a DER is intended to be included in an aggregation
- EDCs should distinguish aggregation review processes for different use cases and penetration levels
- DER aggregators should share ISO/RTO aggregation registration data with EDCs wherever possible and make best efforts to share any updates that take place on a regular basis
- ISO/RTOs should maintain up-to-date records accessible to EDCs on aggregations
- RERRA have an important role to play in approving tariffs, aggregation review processes, relevant cost recovery, adjustments to distribution interconnection, and potentially resolving any disputes that may arise

Interconnection and Aggregation Review Recommendations
(Continued)

- Requirements in the aggregation review process and any necessary impact studies should align with expected dispatch of the aggregation and any restrictions should be transparent for all parties
- Any new/modified processes need to be feasible for EDCs of varying degrees of sophistication
- All parties should expect that these processes will evolve as DER penetrations increase and/or EDC operations become more complex



Communications, Controls, and Coordination

Problem Statement

FERC order 2222 requires unprecedented coordination between the RTO/ISO, aggregator, and EDC. Existing tools and processes do not provide the functionality needed to enable the required coordination

Recommendations

- Do not assume a complete solution will be implemented immediately; follow a “crawl, walk, run” approach. Start with least regrets deployments
- At the early stage, scrutinize whether additional investments in communications, monitoring and controls above what the RTO/ISO and the interconnection procedures will require are necessary
- Consider if there are simple and lower cost approaches for fostering coordination, controls and visibility between EDCs and aggregators
- The functions of controls and monitoring are distinct, and these terms should not be used synonymously; distinct requirements should be developed.
- Requirements on controls, coordination, and monitoring for various types of DERs can be very different

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Communications, Controls, and Coordination Recommendations
(Continued)

- DER installations should leverage autonomous control features that have been adopted as standards, such as IEEE 1547.
- For distribution overrides, there may be two levels of overrides:
  - Soft override where aggregator can act based on early notice from EDC
  - Hard override where EDC directly curtails or interrupts DER for safety and/or reliability purposes
- The need for hard vs. soft overrides will depend on circumstances and degree of coordination between EDC and aggregator
  - Soft overrides will be the preferred option in non-real time applications and demand response
  - Hard overrides will be a last resort where system reliability or safety is at risk
- Level of automation (i.e., machine-to-machine) vs. manual communication will depend on level of complexity, existing tools at the EDC/aggregator, DER penetrations, and/or grid topology
- Setting clear expectations and open communications between EDCs and aggregators on drivers and likely conditions that lead to distribution overrides will benefit all parties

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Communications, Controls, and Coordination Recommendations
(Continued)

- EDCs alerting aggregators prior to bidding windows and aggregators adapting bidding behavior to expected conditions from EDC could help to alleviate the need for hard overrides
- Support foundational EDC actions that bring greater visibility into the distribution system (such as linking AMI with SCADA and/or ADMS); these can be part of broader grid modernization efforts
- The EDC functions of planning and operations are distinct. Any proposed hardware/software investment should be understood in the context of how they support these distinct functions, and how the EDC plans to institutionalize these new procedures and the feasibility of doing so vis-à-vis current planning and operations
- For small DER applications (especially residential demand response), access to AMI data has been a barrier; consider frameworks that reduce friction for aggregators to access AMI data and/or create systems that don't require aggregators to access AMI data by coordinating the data exchange between the EDC and ISO/RTO
- Low friction aggregator access to relevant meter data for settlement purposes and low friction utility access to relevant metering and controls data for planning, operation and settlement purposes need to be specified and mandated by applicable RTO/ISO tariffs and/or state jurisdictional tariffs in order to scale DERs in wholesale markets

Investment Recovery and Cost Causation

Problem Statement

Implementation of Order No. 2222 will result in incremental distribution level costs

Recommendations

Consider the following potential cost categories when evaluating utility investments that relate to Order No. 2222

1. **Interconnection Studies & Upgrade Costs**
2. **Utility Review of DERA Registration Requests**
3. **Day-to-Day Utility Management of DERs**
4. **Investments to Increase or Maintain Hosting Capacity**
5. **Wholesale Market Access Charge**

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Recommended Considerations by Which to Evaluate Proposed Investments[1]

1. Identify costs required to enable DERs sited on the distribution system to participate in wholesale markets
2. Identify relevant benefits of enabling DER penetration in wholesale markets
3. Avoid duplication of DER benefits in benefit cost analysis
4. Establish an objectively quantifiable basis for measuring, quantifying, and allocating relevant identified benefits and costs
5. Equitably allocate costs between retail customers, DERs, and aggregators, taking into consideration of applicable benefits and consideration of implications of any cost shifts to retail customers

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[1] These principles are focused on costs incurred at the distribution level; costs incurred by RTOs/ISOs are expected to be recovered through existing RTO/ISO cost recovery mechanisms.