

## Maximizing Demand Flexibility with Buildings and FERC 2222

In 2020, the Federal Energy Regulatory Commission (FERC) approved a rule,<sup>1</sup> Order 2222, that requires market operators to create pathways enabling distributed energy resource aggregators (DERAs) to compete in all regional organized wholesale electric markets. The goal is to encourage various forms of distributed energy resources (DERs) to participate in electricity markets in a way that would enhance competition, encourage innovation, and drive down costs for consumers. In this document, we briefly discuss how FERC Order 2222 affects the opportunities for participation in electricity markets for building owners and operators, the role of aggregators, and the involvement of buildings in the electricity market.

### What is FERC Order 2222?

Order 2222<sup>2</sup> is designed to enable DERs to participate in organized capacity, energy, and ancillary services markets managed by Regional Transmission Organizations (RTOs) or independent system operators (ISOs).<sup>3</sup> DERs include a range of energy generation and storage technologies and demand flexibility capabilities, such as buildings' ability

to operate with flexibility by shedding and shifting energy loads across the day.<sup>4</sup> The recent amendment to Order 2222, 2222-A,<sup>5</sup> ensures that RTOs and ISOs cannot opt out from market offers/bids provided by aggregating DERs.

FERC 2222-A has expanded opportunities for DERs by allowing them to participate in wholesale energy markets, whereas previously they were often limited to utility-managed programs. By creating additional pathways for market participation (shown in Figure 2), this regulatory order enables DERs to better integrate into the grid, supporting grid stability and providing customers with more options for reducing energy costs. Traditional utility programs have typically offered load flexibility services only during certain peak demand periods, but FERC 2222-A enables participation in wholesale markets year-round through aggregation. RTOs and ISOs must establish market rules to facilitate DER aggregation, allowing even small-capacity DERs. The order establishes that the minimum capacity of participation for DER aggregation may not be set higher than 100 kW. The new rule applies to the regions regulated by FERC, shown in Figure 1.

1 <https://www.ferc.gov/news-events/news/ferc-opens-wholesale-markets-distributed-resources-landmark-action-breaks-down>

2 <https://www.ferc.gov/media/ferc-order-no-2222-fact-sheet>

3 Zhou, Ella, Hurlbut, David, & Xu, Kaifeng. A Primer on FERC Order No. 2222: Insights for International Power Systems. United States. <https://doi.org/10.2172/1823766>

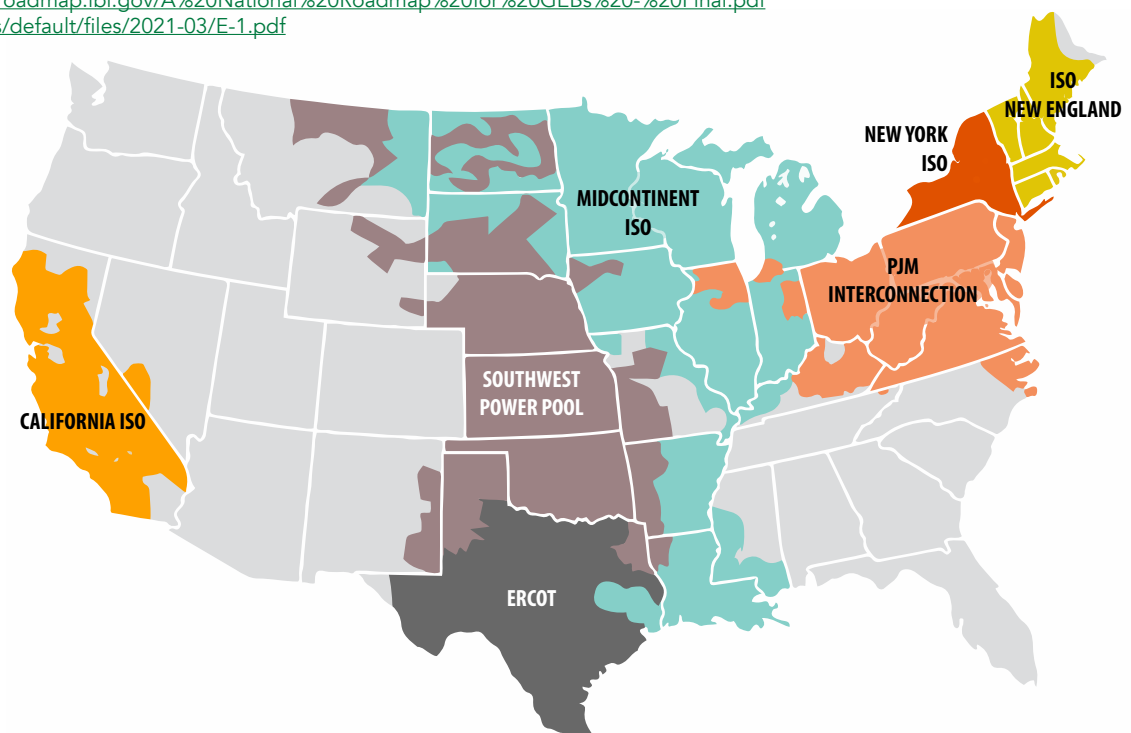
4 Satchwell, Andrew, et al. A national roadmap for grid-interactive efficient buildings. Lawrence Berkeley National Lab.(LBNL), Berkeley, CA (United States), 2021. <https://gebroadmap.lbl.gov/A%20National%20Roadmap%20for%20GEBs%20-%20Final.pdf>

5 <https://www.ferc.gov/sites/default/files/2021-03/E-1.pdf>

**Figure 1. Map of ISO/RTO regions in the U.S.**

Note that FERC 2222 does not apply to ERCOT, which is not regulated by FERC.

Credit: <https://www.ferc.gov/ferc-order-no-2222-explainer-facilitating-participation-electricity-markets-distributed-energy>



## Aggregation Is Key

The management and monitoring of multiple small-scale DERs, as well as minor load changes below 0.5–1 MW, pose unique challenges for both grid operators and wholesale markets software due to their small scale. One solution to address these challenges is to aggregate load flexibility across several buildings, presenting them to the wholesale market as a larger energy resource. By combining multiple DERs into a single resource to form what is often referred to as a virtual power plant, DERAs can offer a similar level of service with these resources that could be provided by large central power plants or industrial consumers.

The bidding process offered by DERAs enhances competitiveness among ISO/RTO service-providing entities including utilities, competitive power providers, and electricity marketers, creating a competitive marketplace. DERAs must ensure that their offers comply with ISO/RTO performance requirements, such as providing the aggregation in geographic boundaries served by transmission nodes that are connected without grid congestion.

While FERC 2222 permits DER resources to participate in various programs, such as utility DR programs, double counting is not allowed. RTOs and ISOs are responsible for implementing mechanisms that ensure each service is only counted and compensated once.

A potential pathway to access the wholesale energy market for building managers and DER owners is to utilize DERAs, which will aggregate the capabilities of individual buildings and other DER systems and bid them on the market (Figure 2). DERAs are accountable to both DER system owners, who seek to maximize revenue from their DER systems, and grid operators, who are responsible for providing a safe and reliable electricity service at the lowest cost.

DERAs require time to fine-tune their program offerings to best meet the needs of both DER owners and wholesale markets, and different DERAs may emerge with a range of business models. If you are in a FERC regulated ISO/RTO region, keep an eye out for more information about participating with DERAs in your area!

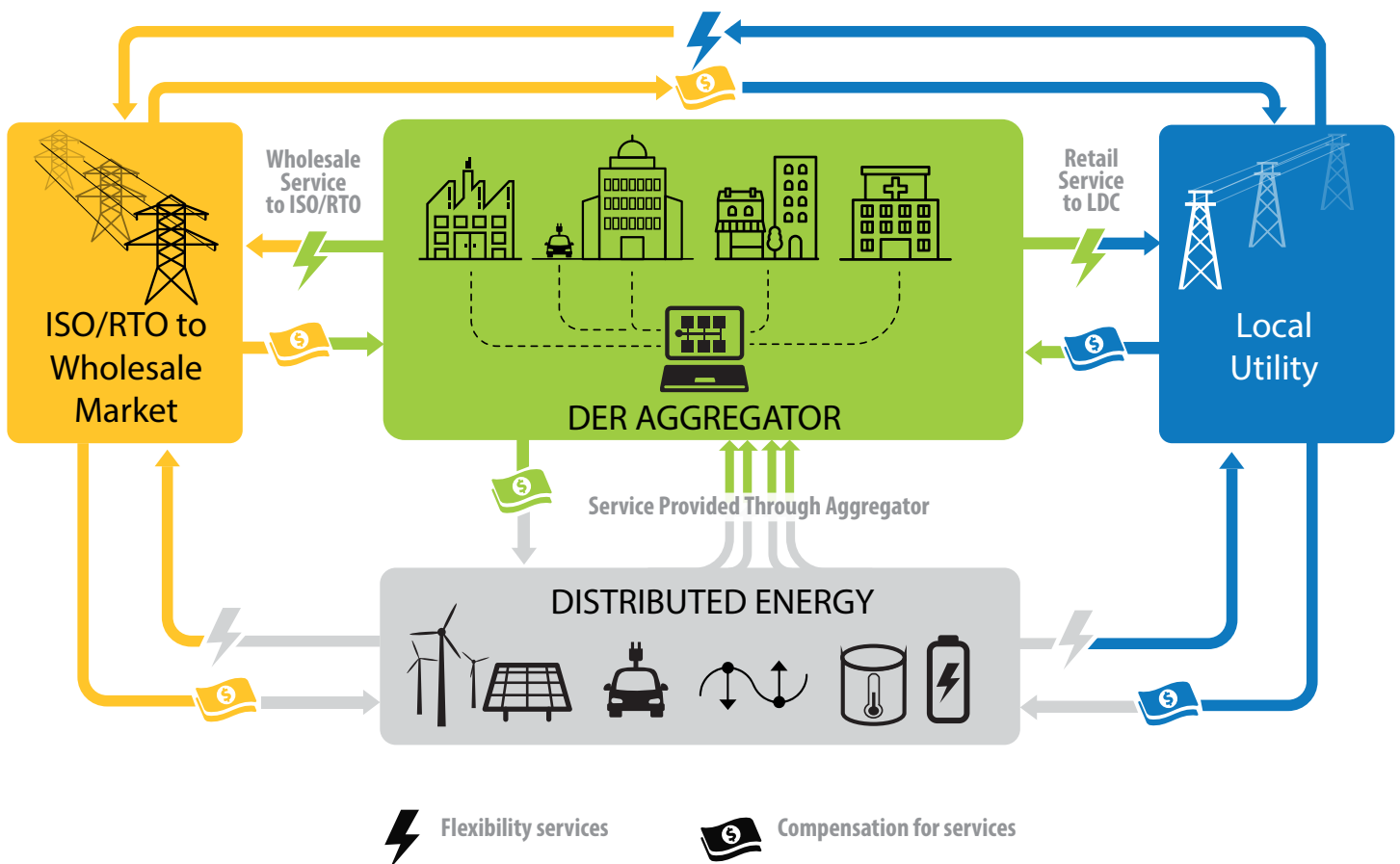


Figure 2. Pathways to participate in wholesale electricity market for DERs

## Related Background Resources

- ▶ **IRENA:**  
[https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2019/Feb/IRENA\\_Innovation\\_Aggregators\\_2019.PDF](https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2019/Feb/IRENA_Innovation_Aggregators_2019.PDF)
- ▶ **CA DER Participation Models:**  
[https://www.cpuc.ca.gov/-/media/cpuc-website/files/uploadedfiles/cpuc\\_public\\_website/content/utilities\\_and\\_industries/energy/energy\\_programs/electric\\_power\\_procurement\\_and\\_generation/procurement\\_and\\_ra/ra/official-btm-workshop-slides.pdf](https://www.cpuc.ca.gov/-/media/cpuc-website/files/uploadedfiles/cpuc_public_website/content/utilities_and_industries/energy/energy_programs/electric_power_procurement_and_generation/procurement_and_ra/ra/official-btm-workshop-slides.pdf)
- ▶ **CAISO DER Participation Matrix:**  
<http://www.caiso.com/Documents/ParticipationComparison-ProxyDemand-DistributedEnergy-Storage.pdf>
- ▶ **IEEE 2030.11-2021 - IEEE Guide for Distributed Energy Resources Management Systems (DERMS) Functional Specification**  
[https://standards.ieee.org/standard/2030\\_11-2021.html](https://standards.ieee.org/standard/2030_11-2021.html)
  - Provides a functional specification for a DERMS and a description of the grid services that aggregated DER can provide the distribution and transmission systems.
  - Addresses implementation issues and the interoperability requirements of a DERMS with its environment, including the transmission and distribution systems, and the communication and information infrastructure of modern grids.
- ▶ **PJM's roadmap for future of the grid and inclusion of non-wholesale aggregated DERs.**  
<https://pjm.com/-/media/library/reports-notice/special-reports/2022/20220510-grid-of-the-future-pjms-regional-planning-perspective.ashx>

## What Has Changed for Buildings?

Traditional demand response (DR) programs have been used by some jurisdictions to decrease energy loads in large commercial and industrial buildings during specific hours. Typically, these DR events are short in duration, infrequent, and announced an hour or a day ahead. Some participants are free to opt out without penalty and may receive bill credits or direct payments for participating.

Demand flexibility (DF), a more modern version of DR, is gaining popularity and can be implemented by smaller commercial buildings. DF requires flexible loads to adjust, reduce, and shift, providing a more continuous response to energy system needs for generation, capacity, and grid services, enabling smoother and more robust peak load reductions, which improves grid stability and reliability. The terms DF and DR are now interchangeable, and FERC 2222 allows market participation in all areas under ISO/RTO service territories.

New distributed energy resource management systems (DERMS) facilitate demand flexibility by receiving signals from utilities or aggregators and automating responses via controllers connected to building loads, such as Electric Vehicle (EV) chargers, HVAC systems, and lighting. DERMS also integrate distributed energy systems like solar photovoltaics and energy storage, providing better integration of renewables, and thus cleaner and more affordable power.<sup>6</sup> Buildings that implement these coordinated responses are called grid-interactive efficient buildings (GEBs).

FERC 2222 requires that minimum aggregation limits be established at 100 kW or less, which means that fewer building systems need to be aggregated to meet the required limit. Moreover, 1–20 EV chargers, depending on the charger level, can build the required capacity.<sup>7</sup>

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<sup>6</sup> [https://standards.ieee.org/standard/2030\\_11-2021.html](https://standards.ieee.org/standard/2030_11-2021.html)

<sup>7</sup> <https://betterbuildingssolutioncenter.energy.gov/sites/default/files/attachments/Connecting%20Electric%20Vehicle%20Charging%20Infrastructure%20to%20Commercial%20Buildings.pdf>