Getting Value and Opportunity Out of DERs in Wholesale Markets

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Overview of Order 2222

About Advanced Energy Economy (AEE)

- AEE is a national association of businesses that are making the energy we use secure, clean, and affordable.
- AEE is the only industry association in the United States that represents the full range of advanced energy technologies and services, both grid-scale and distributed. Advanced energy includes energy efficiency, demand response, energy storage, wind, solar, hydro, nuclear, electric vehicles, and more.
- AEE also supports the work of the Advanced Energy Buyers Group (”AEBG”), a coalition of large buyers of advanced energy technologies to meet sustainability goals.
- AEE pursues policy transformation in the states and in wholesale power markets that expand market opportunities for advanced energy technologies and lay the foundation for a 100 percent clean advanced energy future.

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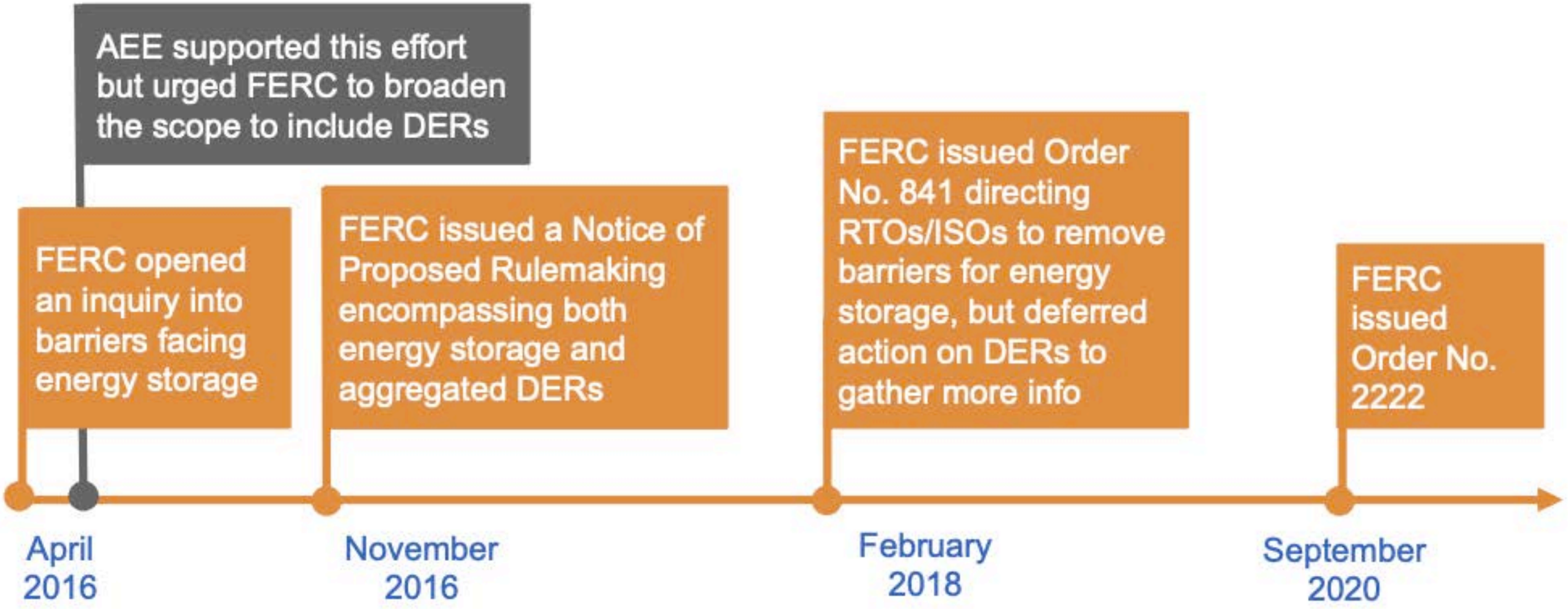
Years in the Making: The History of FERC Order No. 2222



Order No. 2222 Overview: Basic Framework

What it does: Order No. 2222 requires market operators to ensure that aggregations of distributed energy resources (DERs) have one or more pathways to provide all the wholesale services they are technically capable of providing.

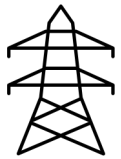
- FERC found this was necessary to improve competition and ensure "just and reasonable" rates.

Technologies covered: FERC defines DERs broadly to include "any resource located on the distribution system, any subsystem thereof or behind a customer meter," and says that such 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.

Who it applies to: All RTOs/ISOs under FERC jurisdiction must amend existing participation models or create new ones to enable participation by DER aggregations.

Benefits of Aggregated DER Participation

Benefits for All: If RTOs/ISOs, distribution utilities, DER aggregators, states, and other stakeholders work to remove barriers to participation, integration of DER use cases into wholesale markets will create benefits for all participants in the electricity sector:



Wholesale market operators gain the ability to utilize these assets to meet the needs of the larger grid

Distribution utilities gain local resilience on the distribution grid

DER aggregators are provided a new revenue stream, helping them make DERs and new services available to more customers

Consumers benefit from cost savings passed on by DER aggregators while also receiving a desired service

States can accelerate achievement of policy goals and empower their retail consumers

Looking Forward

- **Compliance Process:**
  - Remaining RTOs/ISOs must make compliance filings with FERC. Stakeholder processes to develop compliance plans are underway
  - MISO and SPP filings are due in April 2022; PJM is due in February 2022; CAISO and NYISO filed July 19, 2021
  - FERC will accept comments from all interested parties, then issue decisions on compliance plans, which may require RTOs/ISOs to make additional filings
- **Implementation:**
  - Implementation dates will likely vary by RTO/ISO, and will depend on a number of factors, including alignment with existing markets and needed software upgrades
- **Additional Proceedings:**
  - New rulemaking proceeding may impact existing “opt out” for demand response-only aggregations

Greg Geller
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Order 2222 in Action

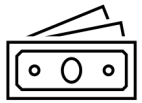
Order 2222 in Action: Frequently Dispatched DERs, e.g., Electric School Buses

- A growing number of school districts are replacing fossil fuel school buses with electric models which are rarely used at night or during the summer
- During these times, these resources can become a flexible resource that can provide many grid services
- There are currently **480,000** school buses serving more than **25 million** students
- Other examples of frequently dispatched DERs include residential EVSE, energy storage, and workplace charging

The Opportunity and Barriers: Frequently Dispatched DERs, e.g., Electric School Buses

Potential Retail Services:

- Transportation/Electric Vehicle Charging
- Demand Charge Management
- Peak Load Shaving
- Non-Wires Solutions Via Distribution Utility



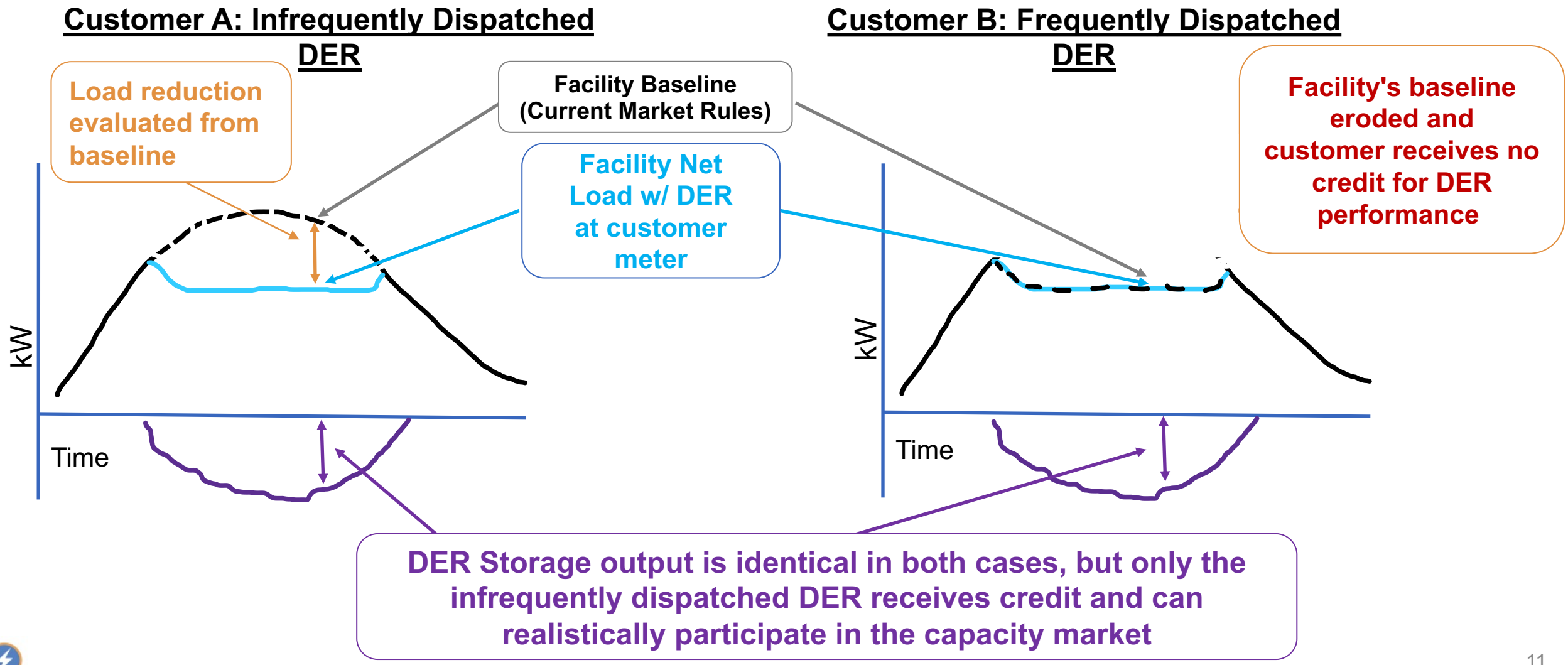
Potential Wholesale Services:

- Energy
- Capacity
- Ancillary Services

To enable wholesale market participation, grid operators will need to:

- Develop a continuous participation model that gives these resources credit for their full capacity value
- Allow these DERs to update energy offers in real-time to account for retail uses
- Create properly designed “baselines” to avoid baseline erosion due to frequent dispatch and provide fair compensation; recommend FERC-approved NYISO model

Baselines as a Barrier to Frequently Dispatched DERs



NYISO DER Baseline Approach Integrates Frequently Dispatched DERs

Example Unadjusted 5-minute ECBL Calculation

- Calculation of Unadjusted 5-minute ECBL for 11:05 interval on March 2, 2018 (weekday)

Day	Load at 11:05 interval
March 1	1.1 MW
February 28	1.0 MW
February 27	1.0 MW
February 26	3.1 MW
February 23 **Dispatch Day**	2.8 MW + 0.5 MW (add-back) = 3.3 MW
February 22	2.4 MW
February 21	2.5 MW
February 20	1.2 MW
February 19 **Dispatch Day**	1.3 MW + 0.5 MW (add-back) = 1.8 MW
February 16	1.2 MW

NEW YORK INDEPENDENT SYSTEM OPERATOR

NYISO Baseline includes last 10 days, regardless of whether there is dispatch, and includes addback for any "event" performance

FERC Approved Tariff Language: https://nyisoviewer.etariff.biz/ViewerDocLibrary//Filing/Filing1485/Attachments/Att%20XIV%20OATT%20marked%20eff%209998.pdf

NYISO DER Baseline Approach Integrates Frequently Dispatched DERs

Example Unadjusted 5-minute ECBL Calculation

- **Calculation of Unadjusted 5-minute ECBL for 11:05 on March 2, 2018 (weekday)**
  - Sorted highest to lowest
  - Unadjusted 5-minute ECBL = average of 5th and 6th values from descending list
  - Unadjusted 5-minute ECBL @ 11:05 March 2, 2018 = average (1.8, 1.2) = **1.5 MW**

Day	Load at 11:05 interval
February 23 **Dispatch Day**	2.8 MW + 0.5 MW (add-back) = 3.3 MW
February 26	3.1 MW
February 21	2.5 MW
February 22	2.4 MW
February 19 **Dispatch Day**	1.3 MW + 0.5 MW (add-back) = 1.8 MW
February 20	1.2 MW
February 16	1.2 MW
March 1	1.1 MW
February 28	1.0 MW
February 27	1.0 MW

Allison Bates-Wannop
Director of Legal and Regulatory Affairs
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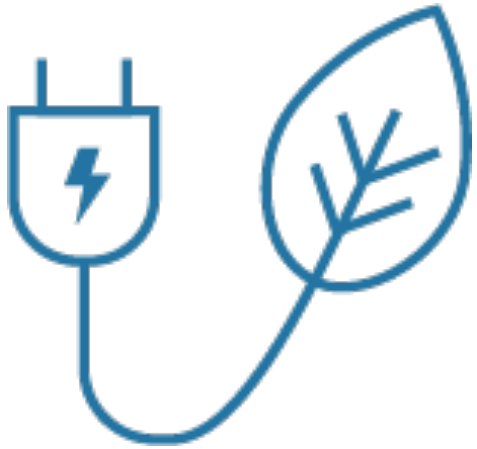
RTO/ISO Status Check: Key Compliance Requirements

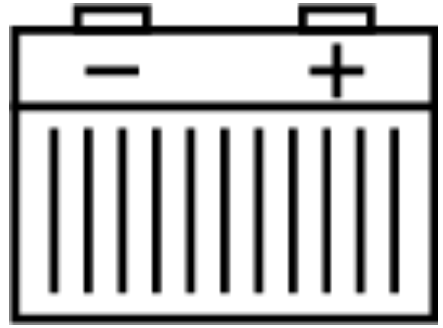
Four Horsemen of DER



Energy Efficiency

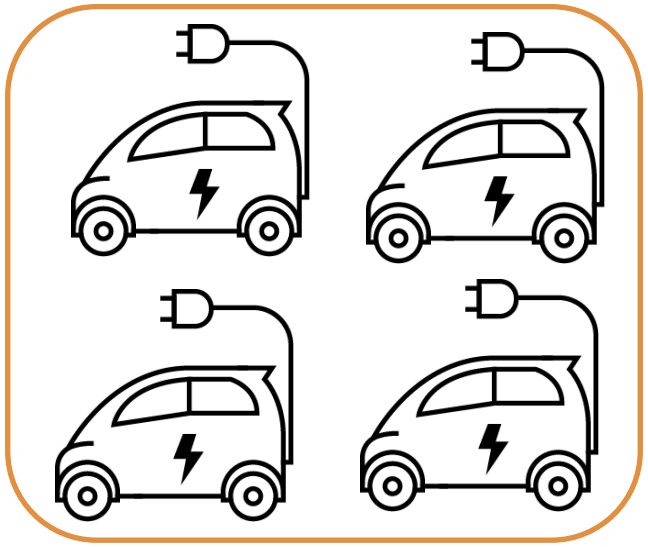
Distributed Generation

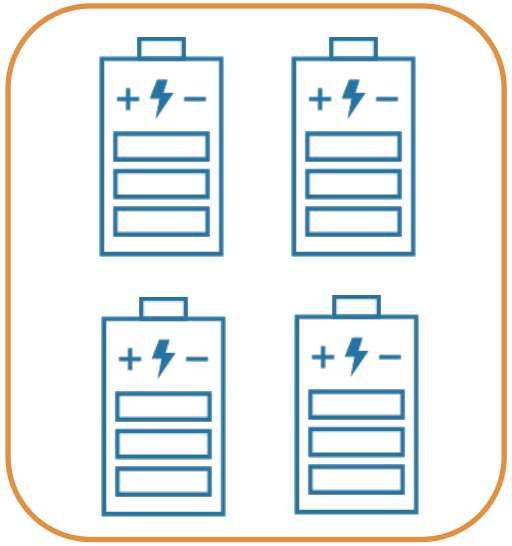
Demand Response

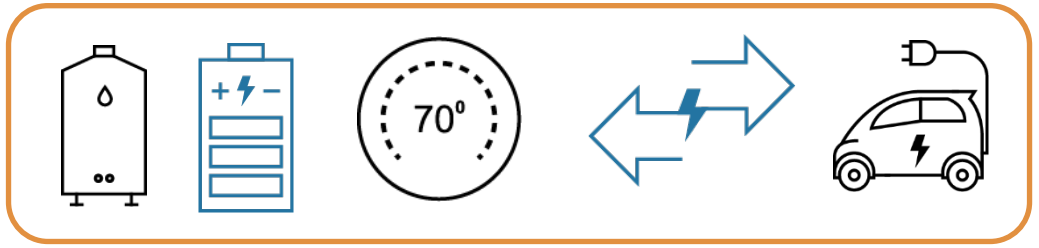


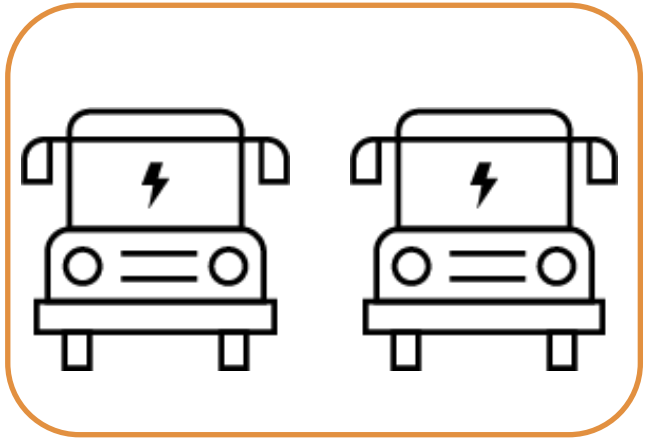
Energy Storage

Envisioned Use Cases









Locational Requirements

Each ISO/RTO must "establish locational requirements" for DERs "to participate in a distributed energy resource aggregation that are as geographically broad as technically feasible." ¶ 204

	CAISO	ISO-NE	MISO	NYISO	PJM	SPP
Capacity	N/A	Metering domain (often EDC territory)	Local Resource Zone (LRZ)	Transmission Node	Zone/ sub-zonal LDA	N/A
Energy	Single sub-lap	Metering Domain	Single EP Node	Transmission Node	Single Pnode	Interconnection Point
Ancillary Services	Single sub-lap	Metering Domain	Single EP Node	Transmission Node	EDC Territory	Interconnection Point

Very High Enrollment Rates Required to Meet Minimum Aggregation Size

0.5 kW Controllable Load / Thermostat or EV Charger				
Resi Peak kW/home	Enrollment Rates 5%	10%	15%	20%
1	100	200	300	400
2	50	100	150	200
3	33	67	100	133
4	25	50	75	100
5	20	40	60	80

- Typical controllable load for residential thermostat, EV Charger or hot water heater:
  - 0.5 – 2 kW per home
  - Typical size can enroll depends upon structure of program
- Need to enroll at least 5% of homes located at PNode to meet minimum 100 kW aggregation size where there are small (1 kW) homes
- Where there are large (5 kW) homes served by PNode, won't meet minimum aggregation threshold even with 20% enrollment
- Example assumes residential hot water heaters / EV chargers / smart thermostats are combined with an asset that injects and is therefore subject to the DERA participation model, not DR

Telemetry and Metering

Requirements must be "just and reasonable" and "not pose an unnecessary or undue barrier to individual distributed energy resources" joining a DERA (¶ 263)

CAISO	ISO-NE	MISO
Real-time DERA telemetry if: (1) Providing ancillary services or (2) DERA > 10 MW CAISO does not impose physical metering standards on DER	10 sec latency, 4 sec for regulation for 4 models (including storage) DRR & DRDERA has 5-min latency over 5 min of DER 1 min for reserves DRDERA Revenue Quality Meter for settlement	Real-time telemetry for the DER (2-4 sec) Revenue Quality metering for settlement Provide meter data for DER or "DER Group," allows Group-level-reporting for homogenous resources (e.g. water heaters)
NYISO	**PJM**	**SPP**
Real-time DERA telemetry (6 secs) Revenue Quality Meter data for DERA Homogenous DERAs have their own rules (e.g., ESRs)	DERA Telemetry 10 secs for Capacity Energy, Reserves, Reg A 2 secs for Reg D Sampling an option for DR	Real-time telemetry and settlement quality metering for DERA, subject to rules for DER type DR must also provide DER data

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Senior Director of Legal and Regulatory Affairs
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RTO/ISO Compliance Process Status

RTO/ISO Compliance Process Status

Stage	CAISO	ISO-NE	MISO	NYISO	PJM	SPP
Compliance Plan Development	Complete*	In progress – proposal largely complete, reviewing draft tariff language	In progress – design work still underway, tariff language under development	Complete*	In progress – proposal largely complete, targeting tariff language by Dec.	In progress – proposal largely complete, reviewing draft tariff language
Compliance Filing to FERC	July 19, 2021 (Docket #ER21-2455)	February 2, 2022	April 18, 2022	July 19, 2021 (Docket #ER21-2460)	February 1, 2022	April 28, 2022
Implementation	Tariffs effective upon FERC approval, except for heterogeneous DERAs expected Fall 2022 (Date TBD)	Energy & Ancillary Services market changes in Q4 2026; Capacity market changes by June 2027 (FCA #18)	TBD (2023+) – Market System Enhancements required	Expected Fall 2022 (Date TBD)	Possibly by 2023/24 DY	Possibly by 2023

* FERC issued letters on October 1st requesting CAISO and NYISO respond to questions concerning the compliance filings. Responses are due on October 31st. NYISO has filed an extension request to November 19th, however FERC has not yet responded.

Order 2222 Issues in RTO/ISO Stakeholder Processes

Issue	CAISO	ISO-NE	MISO	NYISO	PJM	SPP
Participation Models	DERP	7 different participation models (5 existing, 2 new)	New ESR-based participation model	New model for DR and heterogenous aggregations, existing models for other homogenous aggregations	Modified existing models – no option to accommodate switching between withdraw/demand reduction and injection	Modified existing participation models
Double Counting	Vague language for “other services”; 24/7 energy market participation creates barrier by forcing choice between wholesale/retail	Draft language applies only to sub-metered DERs behind customer meter (reported so DER output doesn’t impact retail load)	Work still underway	Prohibits DERs from providing a service to wholesale if providing “substantially similar services” at retail	Limit participation of DERs in DERA receiving comp for same services in another program	Largely leaves determination of double counting to RERRAs/utilities. Dispute resolution process lacks detail.

State-Level Issues

- Resource Adequacy
- Interconnection Requirements & Processes
- Data Access/Sharing between Utilities and Aggregators
- Aggregation Review Processes
- Dual Participation & Double-Counting
- Planning & Operational Coordination

Tricia DeBleeckere
Assistant Executive Secretary
Minnesota Public Utility Commission

Federal/State Interconnection: The role of the RERRA, potential regulatory actions, needs, and timelines

Disclaimer

The ideas expressed are the views of the presenter and are a collection of discussions and updates from the Organization of MISO States Distributed Energy Resources Work Group (OMS DER WG).

This presentation is not representative of the Minnesota Public Utilities Commission, the Organization of MISO States Board or the OMS DER WG generally.

This presentation is not intended to be prescriptive or be considered as a mandatory list of action items; each state, region, or RERRA will determine how to proceed based on individual circumstances.

Presentation Overview

Why does this matter to my state and local regulators (RERRAs)?

What does Order 2222 say about RERRAs and their involvement?

What could my RERRAs do about it now? And later?

Order 2222 Applicability and RERRA Oversight

- Within an RTO/ISO
- 4 Million MWh Distributed
- Could change: RERRA Approved ‘Opt-in’ or Changes in Distributed MWhs

FERC on RERRA Involvement

324. We further note that possible roles and responsibilities of relevant electric retail regulatory authorities in coordinating the participation of distributed energy resource aggregations in RTO/ISO markets may include, but are not limited to:

- developing interconnection agreements and rules;
- developing local rules to ensure distribution system safety and reliability,
- data sharing, and/or metering and telemetry requirements;
- overseeing distribution utility review of distributed energy resource participation in aggregations;
- establishing rules for multi-use applications; and
- resolving disputes between distributed energy resource aggregators and distribution utilities over issues such as access to individual distributed energy resource data.

We require that any such role for relevant electric retail regulatory authorities in coordinating the participation of distributed energy resource aggregations in RTO/ISO markets be included in the RTO/ISO tariffs and developed in consultation with the relevant electric retail regulatory authorities. {Emphasis Added}

Further, as noted in Section IV.G, to the extent that metering and telemetry data comes from or flows through distribution utilities, we require that RTOs/ISOs coordinate with distribution utilities and the relevant electric retail regulatory authorities to establish protocols for sharing metering and telemetry data that minimize costs and other burdens and address concerns raised with respect to customer privacy and cybersecurity.

-FERC Order 2222

Order 2222 Timeline – MISO Specific

FERC Order 2222 and RERRAs: Timing

	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
RTO/ISO Order 2222 Tariff Development										
Order 2222 Tariff	MISO DERA Filing Due April 2022, Tariff Development On-Going in DER Task Force, et.al.			Implementation Date/DER-A Market Access (*Years TBD*)						
MISO DERA BPM			DERA BPM Development (*Years TBD*)							
MISO Energy Storage Resource BPM	ESR BPM Development, ESR Implementation (June 2022)									
FERC Listed RERRA Actions										
	Near Term Actions			Medium Term Actions			Long-Term Actions			
RERRA Enabling Actions										
	Near Term Actions			Medium Term Actions			Long-Term Actions			
State/Regional Actions										
	Near Term Actions			Medium Term Actions			Long-Term Actions			

MISO Compliance Filing Due -->

DER-A Implementation Date - TBD
(When DERAs can Participate in MISO Markets)

FERC Order 2222 and RERRAs: Timing

	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
RTO/ISO Order 2222 Tariff Development										
Order 2222 Tariff	MISO DERA Filing Due April 2022 Development On-Going in DER Force, et.al.			mplementation D ess (*Years TB*						
MISO DERA BPM				ent (*Years*						
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RERRA Enabling Actions										
	Near Term Actions		Medium Term Actions				Long-Term Actions			
State/Regional Actions										
	Near Term Actions		Medium Term Actions				Long-Term Actions			

FERC Approved Tariff Late 2022 or 2023

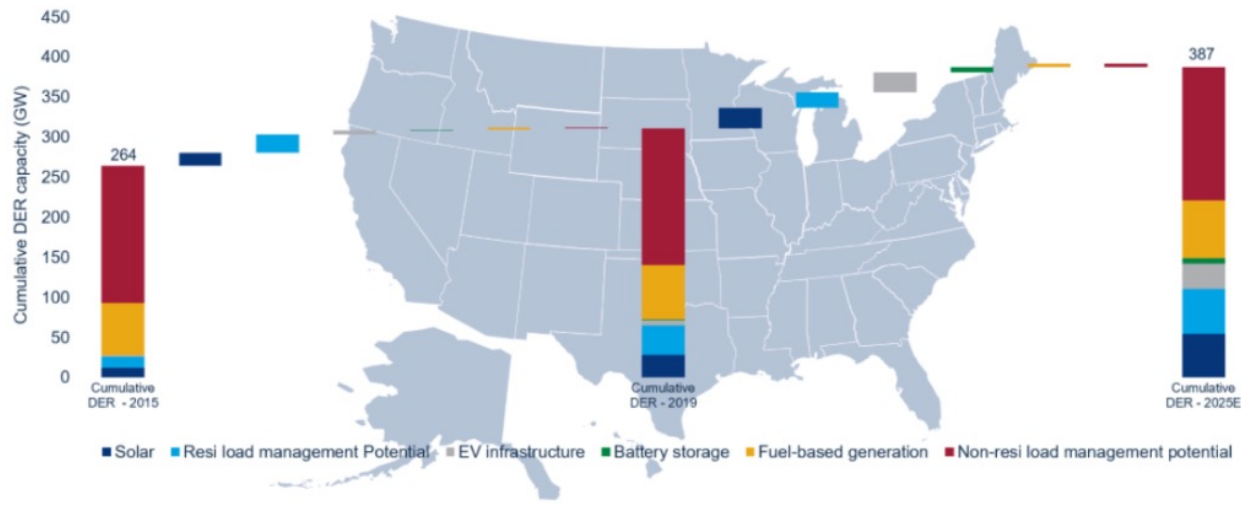
MISO Order 2222 Implementation Date TBD 2023-2026 (?)

MISO Compliance Filing Due -->

DER-A Implementation Date - TBD
(When DERAs can Participate in MISO Markets)

DER Growth in Region

Cumulative DER capacity additions by resource and customer type (2016-2025E)



Source: Wood Mackenzie Energy Storage, Grid Edge Service, U.S. Distributed Solar Service; U.S. Department of Energy
Note: Cumulative fuel-based generation capacity figures are the sum of Wood Mackenzie's comprehensive resource database accounting for projects commissioned after 2000 and the Department of Energy's tally of customer-sited CHP sites commissioned between 1980 and 2000.

Annual net DER capacity change by DER market segment

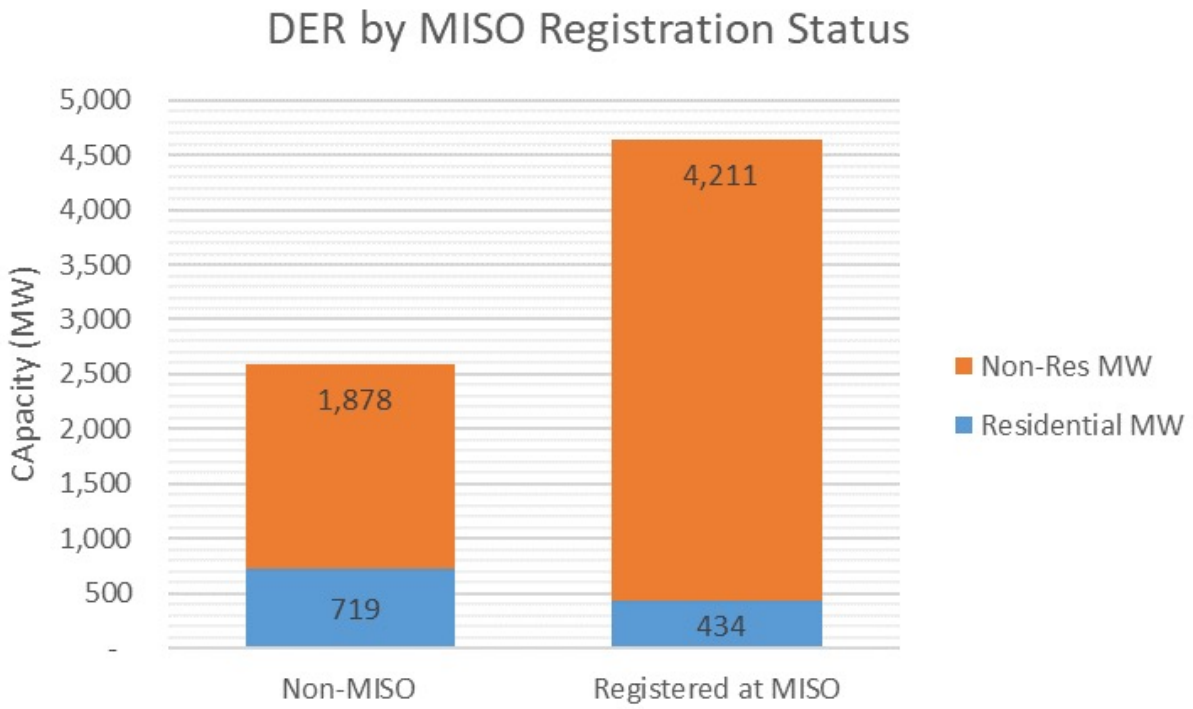
Source: Wood Mackenzie Energy Storage Service, Grid Edge Service, and US Distributed Solar Service
* - "Net" DER capacity additions includes the negative impact of falling non-residential load management DER capacity on the annual totals

Woods Mackenzie DER Outlook

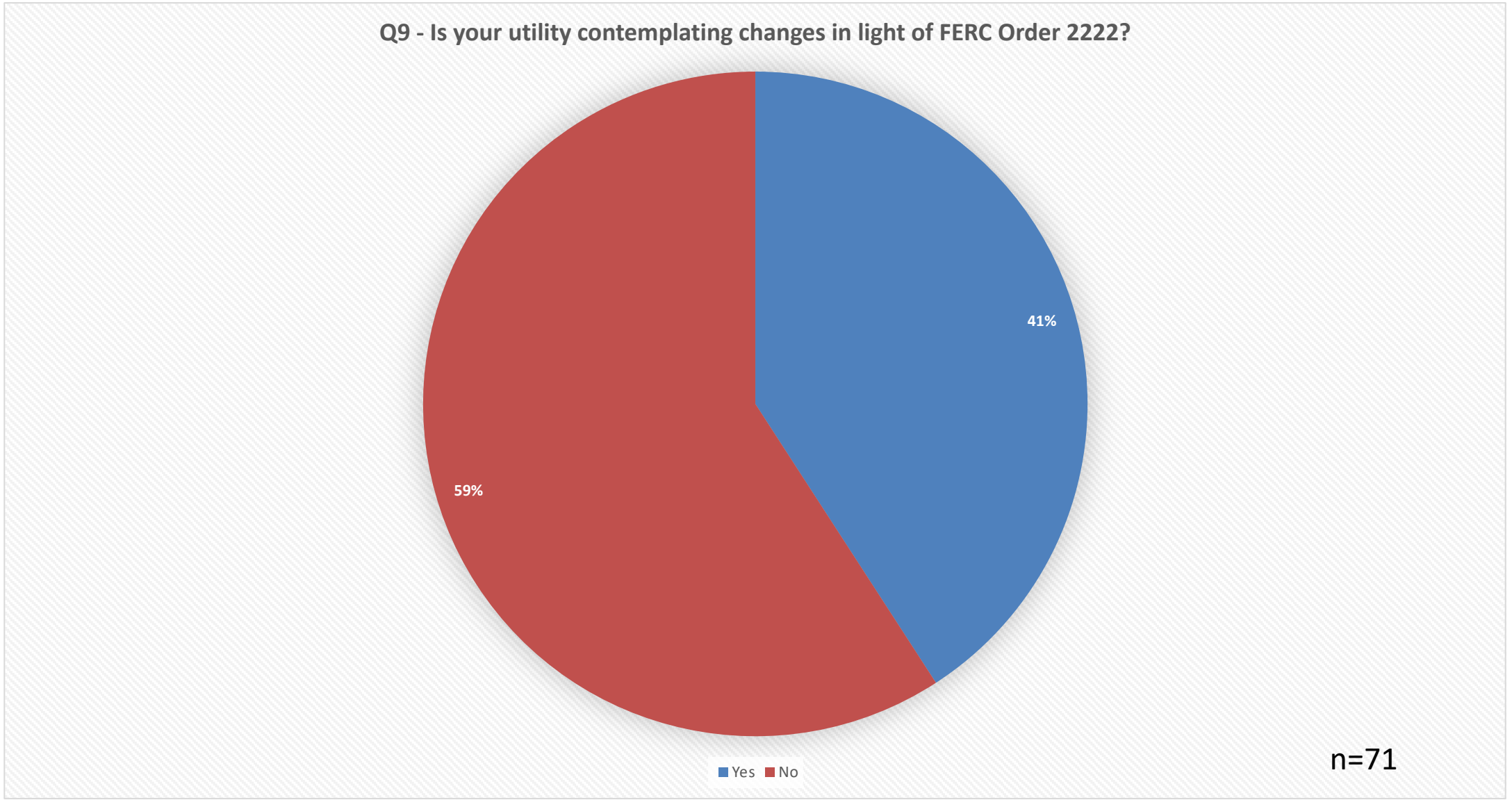
The next five years will see massive distributed energy resource growth | Wood Mackenzie

7.2 GW of Total DER Reported

- Over 60% of DER is registered with MISO
- Non-MISO registered DER has a larger portion that is residential
- Results indicate past results included DER that was registered with MISO



Customer Class	2018	2019	2020	2021 (NM)	2021 (RM)	2021 Total
Residential MW	456	411	528	719	434	1,154
Non-Res MW	2,124	3,387	3,845	1,878	4,211	6,090
Total MW	2,581	3,797	4,373	2,598	4,646	7,243



https://www.misostates.org/images/stories/Other_Projects/Item_7_2021_DER_Survey_Results.pdf

Four Areas of RERRA or State Involvement Regarding Order 2222

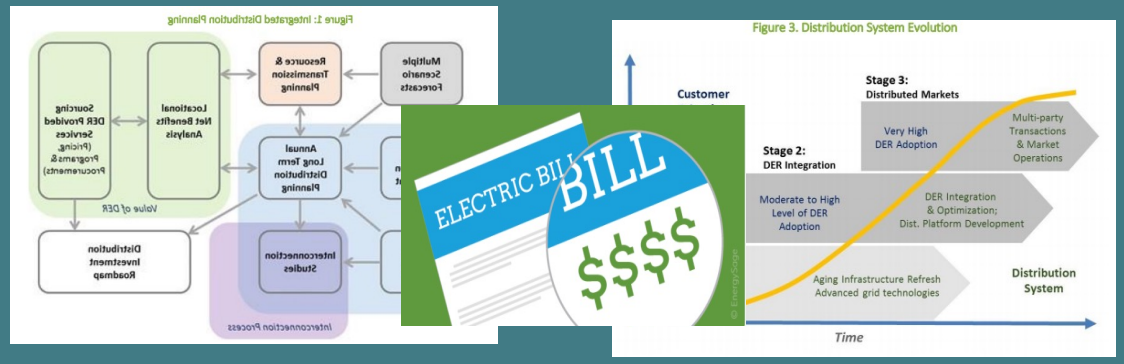
FERC Order 2222 and RERRAs: Areas of Interaction

RTO/ISO Tariff Development and Business Practices Manual (BPM) Input

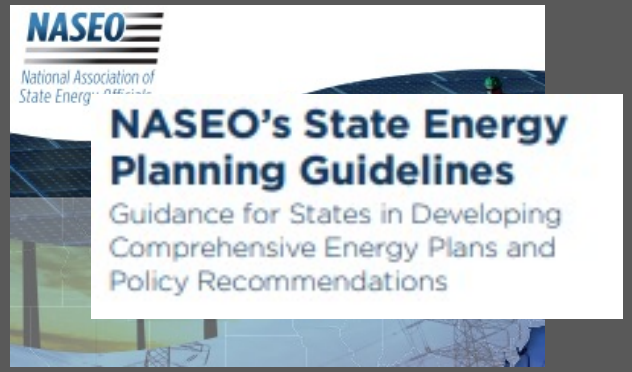
FERC Outlined RERRA Actions

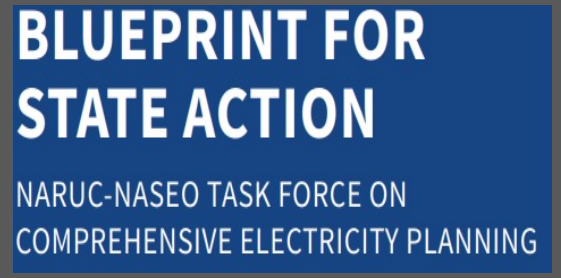
DER Interconnection; Local Distribution Rules for Reliability and Safety; Data Sharing; Metering and Telemetry Req'ts; Oversight of the Distribution Utility; 60-day DERA Review; Dispute Resolution; Multi-use Applications

RERRA Enabling Actions



State/Regional Actions





1. RERRA Involvement in RTO/ISO Order 2222 Tariff and BPM Development

MISO Order 2222: Tariff and BPM Development

	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
RTO/ISO Order 2222 Tariff Development										
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Coordination Framework

- Market participation registration
- Info sharing:
  - to ensure double counting isn't occurring between retail and wholesale (both financial and physical)
  - To validate utility pass through of wholesale charges
  - To ensure sufficient system planning by utilities

Tariff and BPM Design

- Communication, metering and telemetry requirements are as simple, sufficient, and low cost as possible
- Lessons learned from other states/jurisdictions with existing distribution-level market participants (Michigan, Illinois, Texas)
- Understanding of how design may affect how and what RERRAs regulate (i.e. EP-node aggregation level implications)
- Coordinated interconnection processes (between state and MISO, including affected system studies)

MISO Order 2222: Tariff and BPM Development

	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
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MISO DERA BPM			DERA BPM Development (*Years TBD*)							
MISO ESR BPM	ESR BPM Development, ESR Implementation (June 2022)									

Due to some similarities within the Order 841/Electric Storage Resources(ESR) requirements and its Business Practices Manual(BPM) development and future DERA BPM development, RERRA review and involvement within the ESR BPM development may assist in DERA/Order 2222 BPM development.

2. FERC Listed (Potential) RERRA Actions

FERC Listed (Potential) RERRA Actions

Part 1

FERC Identified Category	Potential RERRA Actions	
	Near Term (Actions Today)	**Medium Term (Actions Pre-MISO Product Launch)**
Interconnection	Establish or Update DER Interconnection Standards Adoption of IEEE1547-2018	Ensure transparency of interconnection processes (utility design standards, DER interconnection success rate by customer type, and transparency surround need for affected system studies – among others) Update interconnection standards for responsive/interactive DER (rate, wholesale market, etc.)
Local Rules for Distribution Safety and Reliability	Review of existing utility practices and design standards, work underway via EPRI, SPIDERWG, ESIG, others	Emerging area, more industry-wide work is needed
Data Sharing	Review of data practices and sharing (grid and customer data)	Establishment of customer data sharing protocols, procedures, and privacy requirements; establishment of grid data sharing protocols, procedures, and privacy requirements.
Metering and Telemetry	Review of existing utility programs and metering and telemetry requirements	Review how MISO requirements fit with existing meters, communications, etc.
Dsys Utility Review of DER participation in a DERA	Consideration of DERA-participation review process into interconnection standards or standalone	Review of utility proposal or options for streamlined review and enrollment of DERAs

FERC Listed (Potential) RERRA Actions
Part 2

FERC Identified Category	Potential RERRA Action	
	Near Term (Actions Today)	**Medium Term (Actions Pre-MISO Product Launch)**
Multi-Use Application	Evaluation of existing programs, service terms, or PPAs; what do existing programs or service agreements have in their contracts regarding assignment of grid services or attributes	Alignment or delineation of retail products to ensure no double counting of services and whether (or how) retail program prohibitions on wholesale market participation are valuing grid services
Dispute Resolution	Ensure dispute services division have clear lines of communication with rest of organization; streamlined or triage process for review	Scale up dispute services as needed

3. RERRA Enabling Actions

RERRA Enabling Actions

State Actions	Potential RERRA Action	
	Near Term Action (Action Today)	**Medium Term Action (Pre-MISO Product Launch)**
Order 2222 Workshops or Investigations; DER/DG Workgroups	Investigation-based or workgroup-based evaluation of Order 2222 implications on RERRA or state; education and discussion among utilities, Commission staff, and stakeholders	Identification of RERRA/regional specific needs: legislative, policy, case consistency, or other
Integrated Distribution System Planning, Hosting Capacity	Establishment of distribution system planning to ensure transparency and reduction of the info asymmetry between utilities and regulators (baseline, financial/investments, forecasting, system reliability/planning metrics)	Use of distribution system plans to ensure sufficient consideration of resource alternatives are conducted by utilities; ensure system reliability and planning
Customer Energy Data Access Standards	Ensure protocols and procedures around customer data sharing is established consistent with RERRA oversight and requirements; consideration of portals or other automated methods	Clear and sufficient standards
Grid Data Standards Development	Ensure protocols and procedures around grid data sharing is established consistent with RERRA oversight and requirements	Clear and sufficient standards
Grid Investment Review (Grid Modernization Proceedings)	Evaluation of utility grid investments - the order, speed, scope, or limitations on investments may be impacted (i.e. comm networks, advanced meters, planning or forecasting software, hardware, EV infrastructure, etc.	
Integrated Planning	Evaluation of how utilities are conducting resource planning in light of distribution system investments (Comprehensive Planning)	Improved integrated comprehensive electricity planning (forecasting, modeling, and D-T-G consideration)

4. State or Regional Enabling Actions

State or Regional Enabling Actions

Existing State Examples or Action	Potential State or Regional Action	
	Near Term Action (Action Today)	**Medium Term Action (Pre-MISO Product Launch)**
State or Regional Energy Action Plans	The implications of Order 2222 extend beyond many RERRAs and involve State Energy Offices, other state or federal agencies involved in electric vehicle infrastructure or clean fuels, or other policymakers. Broader state or regional input into goals or policies of a state may assist in informing utilities and RERRAs on comprehensive state or regional energy plans.	
Legal Review of State Laws and Rules	State laws and rules vary by region, state, and utility integration type (deregulated, vertically integrated, etc.); evaluation of state laws and rules to ensure consistency and alignment with Order 2222 regarding definition of utilities, utility service, aggregator registration, among others that may be necessary.	
FERC Notice of Inquiry on Order 719 Demand Response Opt-Outs	FERC is considering whether to retain state's ability to opt-out of the demand response aggregation by third parties; this decision will have affects on Order 2222 and how utilities plan and the procedures states require for DER integration.	

Current State Proceedings or Related Actions

Current State Actions

State/Action	Status/Docket ID	Relevant Links
Missouri	Order 2222 Specific Investigation; workshop held June 2021	https://psc.mo.gov/Electric/Workshop_FERC_Order_2222 https://psc.mo.gov/CMSInternetData/ConsumerInformation/FERC%20Workshop%20Sessions%201-9.pdf Docket EW-2021-0267
Arkansas	Docket on DER-Aggregation (16-028-U)	Facilitator Presentation on DER and Grid Mod for Docket: Arkansas Public Service Commission Workshop on Distributed Energy Resources and Grid Modernization Docket No. 16-028-U (apscservices.info) RAP Report: Enabling Third Party Aggregation of DERs (February 2018): https://www.raponline.org/wp-content/uploads/2018/04/enabling_third_party_aggregation_distributed_energy_resources2.pdf
Indiana	Legislatively Created: 21st Century Energy Policy Development Task Force	IURC Report: 2020 Report to the 21st Century Energy Policy Development Task Force: https://eta-publications.lbl.gov/sites/default/files/iurc_comprehensive_study_-_definitive_-_06-30-2020.pdf Meetings concluded November 2020; no additional meetings are scheduled: https://www.in.gov/oed/indianas-energy-policy/21st-century-energy-task-force/
Michigan	MI Power Grid stakeholder initiative, initiated by MI Governor	12 work groups/work streams intending to 'maximize the benefits of the transition to clean, distributed energy sources for Michigan….' MI PowerGrid Homepage: https://www.michigan.gov/mpsc/0,9535,7-395-93307_93312_93593---,00.html One-Year Status Report (Oct 2020) https://mi-psc.force.com/sfc/servlet.shepherd/version/download/068t000000EjZlEAAV Additional dockets numbers and link in Appendix.

Takeaways

Seven Key Categories of RERRA Actions

- RTO/ISO Tariff Development
- DER Interconnection Standards
- Wholesale/Retail Product Delineation
- Dispute Resolution Processes
- Integrated Planning
- Distribution System Reliability and Safety
- Cost Allocation (Distribution Cost Assignment)

Thank You!

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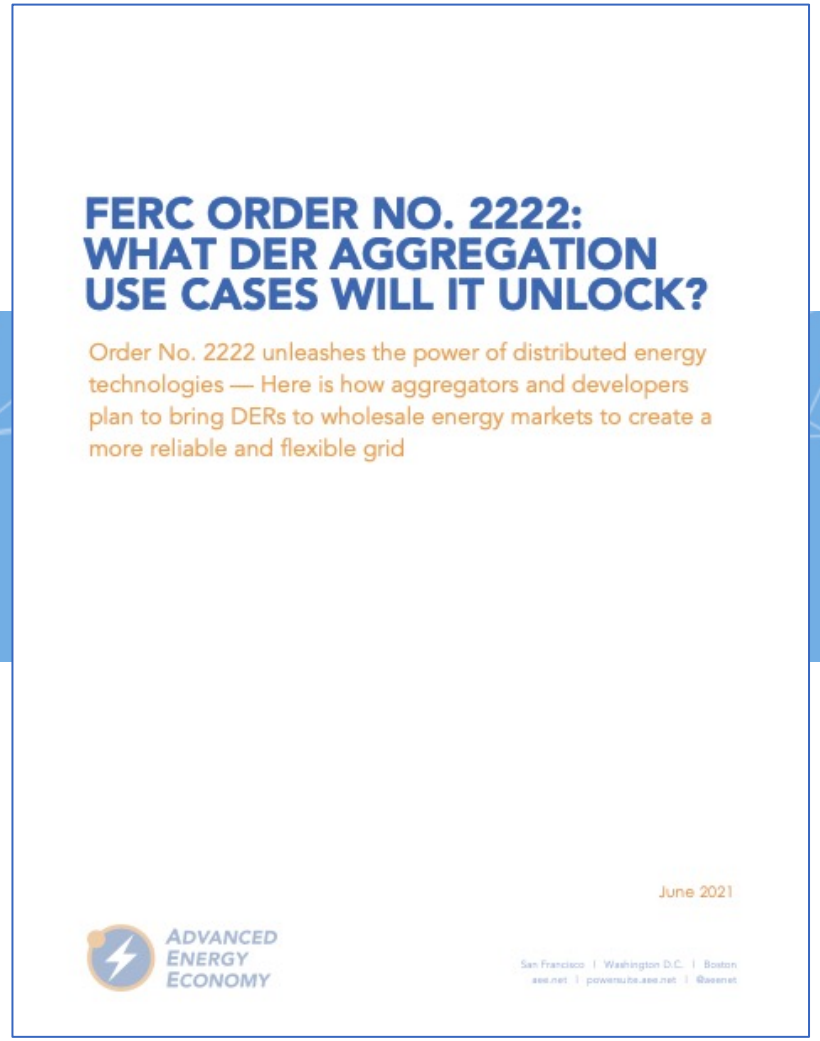
Questions

For More Details, Download the Reports at AEE.net



Thank you for attending this AEE webinar!

Related Links and Resources

Order 2222 and MISO Related Links

FERC

- Order 2222 (RM18-9-001): https://www.ferc.gov/news-events/news/ferc-opens-wholesale-markets-distributed-resources-landmark-action-breaks-down
- Order 2222-A (RM18-9-002) : https://www.ferc.gov/news-events/news/ferc-addresses-demand-response-opt-out-certain-der-aggregations
- Order 2222-B (RM18-9-003): https://cms.ferc.gov/news-events/news/ferc-sets-demand-response-opt-out-further-consideration
- Notice of Inquiry into Order 719 and State's 'opt-out' of Demand Response Aggregation (RM21-14-000): https://www.ferc.gov/media/e-2-rm21-14-000

MISO

- MISO Order 2222 Compliance, IR070: https://www.misoenergy.org/stakeholder-engagement/issue-tracking/distributed-energy-resources/
- MISO Distributed Energy Resources Task Force Homepage: https://www.misoenergy.org/stakeholder-engagement/committees/DERTF/
- MISO DER Task Force Charter: https://cdn.misoenergy.org/2021%20DERTF%20Charter516859.pdf
- MISO Order 2222 Compliance Framework Iteration 1: https://cdn.misoenergy.org/20210607%20DERTF%20Item%2003%20MISO%20Presentation%20of%20Compliance%20Framework%20-%20Iteration%201556792.pdf
- MISO Stakeholder Feedback on Compliance Framework Iteration 1: https://cdn.misoenergy.org/20210802%20DERTF%20Stakeholder%20Comments%20on%20Filing%20Framework%20Document%20-%20Iteration%201%20(IR070)567524.zip
- MISO Report on Use of EP-Node and Price Oscillation Issues: https://cdn.misoenergy.org/Future%20Resource%20Studies%20in%20the%20MISO%20System539337.pdf

Basics on DERs and DER Integration

MISO DER Training Series by Enerdynamix

- DER Basics: https://cdn.misoenergy.org/20210202%20DER%20Session%201%20Basics513192.pdf
- DER and Operations: https://cdn.misoenergy.org/20210216%20MISO%20Distributed%20Energy%20Resources%20(DER)%20Session%202%20Operational%20Impacts514893.pdf
- DER and Markets: https://cdn.misoenergy.org/20210219%20DER%20Workshop%20-%20Market%20Integration%20-_%20Session%203516310.pdf

NERC DERs video – NERC essentials: https://vimeopro.com/nerclearning/nerc-essentials/video/247990532

Interconnections Standards and Updates

NREL Guidance Materials for IEEE1547-2018 Educational Materials: IEEE 1547-2018 Standard Guidance | Grid Modernization | NREL
MISO Distribution Interconnection Coordination Homepage: IEEE 1547 (misoenergy.org)
MISO Guidelines for IEEE1547-2018 - https://cdn.misoenergy.org//MISO%20Guideline%20for%20IEEE%20Std%201547388042.pdf
Arkansas Interconnection Process Update Materials
FINAL Facilitator Report on Interconnection Working Group to the Arkansas Public Service Commission
Update from Arkansas Utilities on Interconnection Review
Presentation from Tom Key, EPRI

Minnesota Interconnection Process Update Materials
Interconnection / Minnesota.gov (mn.gov)
Minnesota MNDIP and MNDIA: https://mn.gov/puc/assets/MN DIP_tcm14-431769.pdf
Presentation of Michelle Rosier of Minnesota PUC on Minnesota interconnection update for ARPSC

Customer Energy Usage Data

Data Access Summary | ACEEE
Open Data Access Standard Approaches (raponline.org)
Aggregated and Anonymized Data: Similarities & Differences, Opportunities & Barriers (raponline.org)
A Utility Regulator's Guide to Data Access for Commercial Building Energy Performance Benchmarking

Comprehensive Electric and Distribution System Planning

- NARUC-NASEO Task Force on Comprehensive Electricity Planning: https://pubs.naruc.org/pub/14F19AC8-155D-0A36-311F-4002BC140969
- Department of Energy / ICF Consulting: Distribution System Planning in Minnesota: https://www.energy.gov/sites/prod/files/2016/09/f33/DOE%20MPUC%20Integrated%20Distribution%20Planning%208312016.pdf
- PNNL Summary of State Actions in Distribution System Planning: https://epe.pnnl.gov/pdfs/DSP_State_Examples-PNNL-27366.pdf
- Oregon Public Utility Commission Distribution System Planning Homepage: Public Utility Commission : Distribution System Planning : Utility Regulation : State of Oregon
- Webinar Archive: DSP-Archive.pdf (oregon.gov)
- Pacific Northwest National Laboratory. Grid Architecture for Electric Power Grids Homepage: PNNL: Grid Architecture;
- PNNL Grid Architecture Resource Library: PNNL: Grid Architecture - Library
- DOE/PNNL Modern Distribution Grid Report Volumes: PNNL: Grid Architecture - Modern Distribution Grid Project
- Grid Modernization Laboratory Consortium (GMLC). 2017a. *PUC Distribution Planning Practices*. Lisa Schwartz, Lawrence Berkeley National Laboratory and Juliet Homer, Pacific Northwest National Laboratory. https://eta-publications.lbl.gov/sites/default/files/4._schwartz-homer_necpuc_training_20170920.pdf
- NASEO State Energy Planning Guidelines: https://naseo.org/Data/Sites/1/sepguidelines_2018_final.pdf

Michigan MI Power Grid Dockets and Topics

- **MPSC dockets related to the MI Power Grid Initiative**
- U-20348 and U-20628 - Multi-year docket related to DR aggregation + MISO RAN initiative/PV 2019 learnings
- U-20959 - Customer Education/Participation, Data Access and Privacy. Implications for 3rd party access to utility data
- U-20645 Energy Programs and Technology Pilots
- U-20344 Interconnection rulemaking
- U-20898 New Technologies and Business Models (EVs, storage, other DERs, etc.) – evolved from pilots docket above
- U-20147 and U-20633 Integration of Resource/Distribution/Transmission planning
- U-20960 DER Rate Design (primarily for DG)
- **See also MI Power Grid's one year (Oct 2020) Status Report and news release**