



FERC Order No. 2222

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TECHNICAL MANAGER, SYSTEM OPERATIONS AND MARKET ADMINISTRATION



ORDER NO. 2222

Background and Order Requirements



Order No. 2222 Background

- [Order No. 2222](#), issued by the Federal Energy Regulatory Commission (FERC) on September 17, 2020, requires that ISOs/RTOs allow DERs to provide all wholesale services they are technically capable of providing through an aggregation of resources
 - The Order has 11 key compliance directives
- NEPOOL ultimately supported the proposal (over 71% voting in favor)
- ISO New England filed its [Compliance Proposal](#) on February 2, 2022
 - The ISO's Compliance Proposal created two new market participation models and amends several existing models to comply with Order No. 2222



Commission Orders and Further Compliance Filings

- On March 1, 2023, FERC issued a [Compliance Order](#) accepting in part and rejecting in part, subject to further compliance, the Compliance Proposal
 - The Compliance Order directed further compliance filings within 30, 60 and 180 days of the order (see [NEPOOL Counsel's Compliance Order summary](#))
- The ISO submitted the required compliance filings, and the ISO's Compliance Proposal (with some minor modifications) has largely been accepted by the FERC
 - The [ISO requested rehearing](#) of the Commission's rejection of the ISO's proposal that the Host Utility or its Assigned Meter Reader, rather than the DER Aggregator, to be responsible for providing metering data to the ISO for settlement purposes
 - [On October 6, 2023](#), the Commission sustained its directive to designate the DER Aggregator as the entity responsible for providing metering information to ISO-NE
 - [On January 31, 2024](#), the ISO submitted its final compliance filing, which designates the DER Aggregator as the entity responsible for providing metering information to the ISO
 - The ISO is still awaiting an order on its January 2024 filing
- All ISO-NE presentations, meeting agendas, memos, documents, stakeholder presentations, and other materials related to Order No. 2222 are available on the ISO's [Order No. 2222 Key Project Page](#)

Terminology

- A **DER** is “any resource located on the distribution system, any subsystem thereof or behind a customer meter... [that] may include, but are not limited to ... electric storage resources, intermittent generation, distributed generation, demand response, energy efficiency, thermal storage, and electric vehicles and their supply equipment...” (Order No. 2222 at P 114)
- A DER Aggregation or **DERA** is one or more DERs participating together in the wholesale markets, “which acts as a single resource” (*Id.* at P 180)
- A **DER Aggregator** is “the entity that aggregates one or more distributed energy resources for purposes of participation in the capacity, energy and/or ancillary service markets of the regional transmission organizations and/or independent system operators.” (*Id.* at P 118)



Key Compliance Directives of Order No. 2222

- Order No. 2222 has eleven key compliance directives:
 1. Allow DERAs to participate directly in RTO/ISO markets and establish DER aggregators as a type of market participant; DERAs may include more than one technology type, i.e. heterogeneous aggregations
 2. Allow DER aggregators to register DERAs under one or more participation models that accommodate the physical and operational characteristics of the DERA
 3. Address size requirements for DERAs and individual DERs
 4. Address locational requirements for DERAs
 5. Address distribution factors and bidding parameters for DERAs
 6. Address information and data requirements for DERAs



Key Compliance Directives of Order No. 2222 (cont.)

7. Address metering and telemetry requirements for DERAs
8. Establish market rules on coordination between the RTO/ISO, DER aggregator, distribution utility, and *Relevant Electric Retail Regulatory Authorities (RERRAs)*
9. Address modifications to the list of DERs in a DERA
10. Address market participation agreements for DER aggregators
11. Implement opt-in provision for distribution companies with ≤ 4 million MWh of annual sales



Effective Dates

- Order No. 2222 required each RTO/ISO to propose a reasonable implementation date that implements the final rule in a timely manner
- First set of Tariff changes – affecting Forward Capacity Market rules – are effective for FCA 19
 - Implementation was originally scheduled for FCA 18, but a delay in receiving a FERC order approving the ISO’s Compliance Proposal required implementation to be pushed back to FCA 19
 - Subsequently, FCA 19 has been delayed pending further capacity market design changes, and may be replaced with a prompt/seasonal capacity market design
- Second set of Tariff changes – affecting energy and ancillary service market rules – are effective on November 1, 2026
 - Distribution companies to develop processes to:
 - Review DER eligibility to participate in a DERA
 - Accommodate third-party (non-Host Utility) DER/DERA meter readers
 - Assess the safety and reliability impacts of DERAs and DERs on their systems
 - RERRAs to complete any processes addressing DER participation



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ISO New England's Compliance Approach

Participation Model Design

- Order No. 2222 requires that DERAs include a heterogeneous mix of technologies
 - All ISO-NE proposed models allow for mix of technologies
- To allow for heterogeneous aggregations, the ISO's approach focuses on capabilities, not on technologies
 - All DERs have at least one, and up to all four of these basic capabilities:
 - **Demand reduction**: the ability to respond to a dispatch signal to reduce demand as measured against a baseline (may also include injections incremental to the baseline)
 - **Energy injection**: the ability to inject energy to the grid
 - **Energy withdrawal**: the ability to withdraw energy from the grid
 - **Regulation**: the ability to respond to a dispatch to balance the grid every 4 seconds
- Single resource aggregations are allowed if they meet the definition of DER and meet DERA size requirements



Existing Models Can Be Used by Distributed Energy Resource Aggregations

- Generator Asset
- Binary Storage Facility (BSF) and Continuous Storage Facility (CSF)
 - The BSF/CSF models currently used by electric storage facilities, may be used by any DERA, accommodating any aggregation consisting of flexible loads and distributed generation, *even an aggregation that has no electric storage facilities*
 - An electric storage device like a battery, is sometimes a load, and sometimes a generator – an aggregation of DERs with flexible load and generation could, as an aggregation, be modeled and dispatched like a battery under the proposal
- Alternative Technology Regulation Resource
 - Minimum size limit reduced from 1,000 kW (1 MW) to 100 kW

New Models Were Proposed to Accommodate Other “Heterogeneous” Aggregations

- Settlement Only Distributed Energy Resource Aggregation
 - Allows non-dispatchable resources that could otherwise be Settlement Only Resources to participate together along with flexible loads, which furthers the Commission’s objective of allowing heterogeneous mixes of technologies to participate in a single aggregation
 - Are allowed to take day-ahead positions, which is not currently a feature of the Settlement Only Resource model
- Demand Response Distributed Energy Resource Aggregation (DRDERA)
 - The ISO proposed a DRDERA model for an aggregation comprised of demand response DERs *and other types of DERs*
 - Such an aggregation may have demand reduction capability as well as energy injection and/or withdrawal capability
 - DRDERA model allows energy injection and/or withdrawal outside of a dispatch to be compensated and/or billed at the LMP

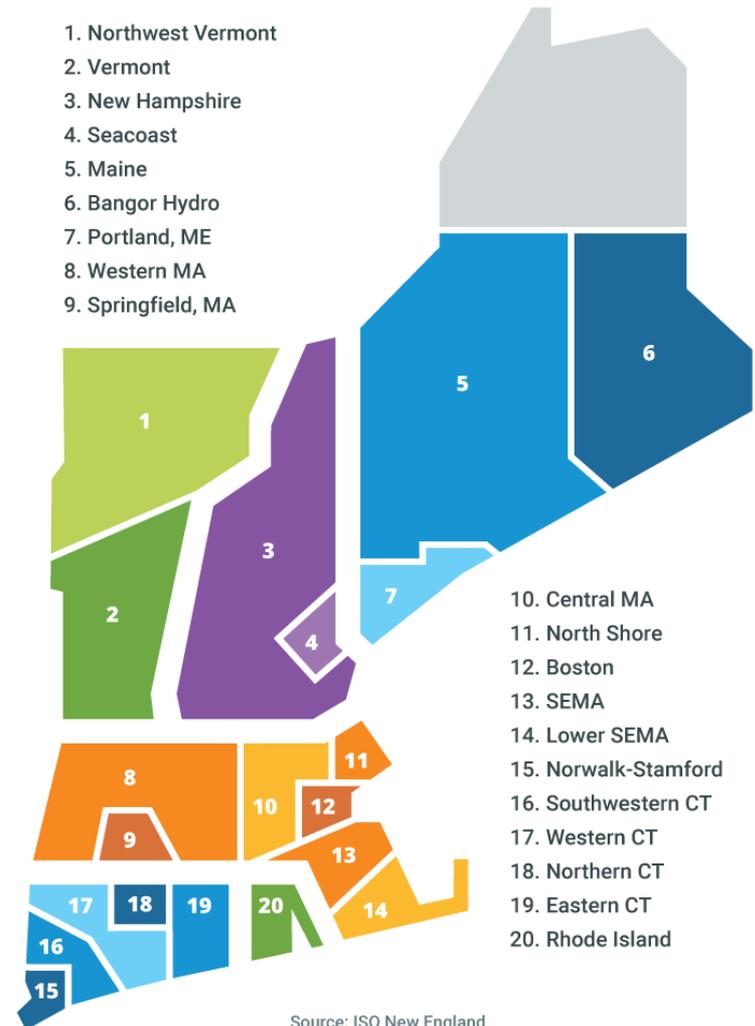
Size Limits and Metering Requirements

- Adopted the 100 kW minimum size limit for DERAs
- Proposed that larger DERs (> 5 MW) participate individually or in more geographically limited aggregations in certain situations
 - Individual DERs with a capability of 5 MW or more at a single node;
 - Aggregations of DERs with a capability of 5 MW or greater located at a single node
- Metering of DERAs is required to comply with OP-18
 - Meters of behind-the-meter DERs must be located at the Retail Delivery Point
 - DER sub-metering is allowed, but only if the Host Utility is able to accommodate metering configurations that address double-counting
 - The DER Aggregator can designate itself, an agent acting its behalf, or the Host Participant to be the Assigned Meter Reader of a DERA containing Generator Assets or Load Assets
 - Manual M-28 – Market Rule 1 Accounting – requirements would apply
 - The DER Aggregator must enter into applicable meter data coordination agreements with the relevant Host Participant subject to any RERRA requirements

Locational Requirements

- Multi-Node Approach Using DRR Aggregations Zones
 - All of the DERs in a DERA must be in the same DRR Aggregation Zone and the same metering domain
 - The DRR Aggregation Zone is modeled as a single pNode
 - Since all DERs in a DERA are in the same pNode location, DER Aggregators do not need to submit distribution factors

New England Aggregation Zones



Coordination With Distribution Companies and Relevant Electric Retail Regulatory Authorities

- **Registration:** The registration process allows distribution companies to assess the eligibility, and the safety and reliability impacts of DERs participating in wholesale markets through a DERA
- **Operations:** Distribution companies have the authority to override the ISO's dispatch of a DERA, or of the specific DERs comprising the DERA, to address distribution safety or reliability concerns
- **Relevant Electric Retail Regulatory Authorities ("RERRAs")**
 - RERRAs will be able to receive information about aggregations registering in their states if they want that information
 - RERRAs can have a role in settling disputes between distribution companies and DER aggregators
 - RERRAs will likely need to conduct their own processes on whether and how to address DER participation

Q&A AND DISCUSSION



APPENDIX

Additional Information Concerning DERA Registration Coordination, DER Aggregator Metering Responsibilities, and Operational Coordination

DERA REGISTRATION COORDINATION



The four stages of registration

- Initial Notification of Intent to Register a DERA
- Eligibility Confirmation
- Registration and Activation
- Updates to an Existing DERA Registration



Registration

Stage 1 - Initial notification

- DER Aggregator simultaneously notifies ISO and Distribution Utility (“DU”) of intent to register a DERA
 - Include contact info and general DERA description – location(s), size(s), technologies, planned markets, intended participation model, desired target date
 - Prior to submitting the Initial Notification, each DER must have an executed interconnection agreement where state rules require the DER to have an interconnection agreement
 - If an interconnection agreement is not required, additional DU studies may be necessary to identify distribution system impacts
- Initial notification establishes the 60-calendar day deadline for the distribution review, which includes:
 - DU review for safety, reliability and eligibility, in accordance with ISO-specified criteria
 - Plus any additional DU/state established criteria that may be put in place

Stage 1: Additional information required with initial notification to support ISO & DU review

- Electrical interconnection information for each DER that is part of a DERA is required by the ISO
 - Interconnection bus name
 - Interconnection voltage level
 - Name and number of the modeled PSS/E bus electrically closest to the interconnection point
 - Nameplate MW / Net Injection
 - Technology Type(s)
 - Inverter Limit
- This information should be part of a DER's interconnection agreement (if one is required), but should be provided to the ISO by the DU/DER Aggregator, even if an interconnection agreement is not required
- The DU may seek additional information, if based on what the DER Aggregator provides, it is not able to complete its review

Stage 2 – Eligibility Confirmation

- DU will have up to 60 calendar days, to confirm at least the following criteria:
 - Each constituent DER is capable of participating in a DERA
 - Net energy consumption/injection will not be included in another Load Asset
 - Not participating in a retail program that prohibits wholesale market participation
 - Safety and reliability
 - Overloads
 - Voltage
 - Stability
 - Short circuit interrupting capability
 - Distribution enhancements, if any, required through an IA or other applicable process, are completed or estimated to be completed by the participation target date
 - All DERs in the DERA are within the DU's service territory and metering domain, and electrically located in the appropriate zone
 - Each DER's net injection and consumption \leq capability stated in any relevant interconnection agreement

Stage 2: Outcomes of the Eligibility Review

- The DU provides its completed evaluation of the DERA and the constituent DERs against the specified criteria
- If determined to be eligible, ISO finalizes the registration:
 - DER Aggregator confirms with ISO & DU the finalized list of DERA's constituent DERs
 - This provides some flexibility to continue the process, even if a constituent DER that would not impact eligibility drops out while the DU review is underway or the DU only qualified a subset of DERs
 - DER Aggregator provides/confirms additional required details
 - DU confirms "location" information to the ISO
 - Metering domain
 - DRR Aggregation Zone, Load Zone, or substation pnode
- If determined to be ineligible by the DU
 - DU provides a written notice to the ISO and the DER Aggregator describing the criteria that were not met
 - The DER Aggregator may seek to resolve disputed findings through the relevant electric retail regulatory authority
- If determined eligible by the DU, but subsequent findings/decisions by the ISO determine that the DERA cannot be registered
 - These findings/decisions may be disputed by the DER Aggregator in accordance with Section I.6 of the ISO tariff

Stage 3 - Registration and Activation

- Summary of DER Aggregator Responsibilities:
 - Ensure all registration information is accurate
 - Ensure all constituent elements of the DERA complies with applicable location requirements
 - Provides the ISO & DU a desired implementation/activation date. Asset Activation follows existing schedules
 - Generator Asset, CSF, BSF, and ATRR activation occurs three times a year
 - DRR and DRDERA activation occurs monthly
 - SODERA activation occurs five business days after notification
 - Provide a complete list of all DER facilities comprising the DERA, including the incorporated technologies, service addresses, and retail account IDs (if applicable)
 - Provide the following aggregation information which includes the following:
 - Asset Name
 - DERA Participation Model
 - Metering domain and applicable location (DRR Aggregation Zone, Load Zone, or substation pnode)
 - Host Participant/Distribution Utility
 - Asset Ownership
 - Meter Reader and metering interval (hourly vs. 5 min)
 - Estimated Max Load/Maximum Consumption
 - Seasonal Max Net Output
 - Corresponding FCM Resource ID, if applicable

Stage 3: Registration and activation, cont.

- The DER Aggregator must provide an attestation, in a form prescribed by the ISO, stating that all constituent DERs are fully compliant with the tariffs and operating procedures of the distribution utilities and the rules and regulations of any relevant electric retail regulatory authority, including the terms of any state interconnection agreements
- The relationships between the DER Aggregator, DU, retail customers, owners of resources, and the ISO are addressed in the ISO Tariff. The DER Aggregator will be bound to all Tariff requirements once they execute the Market Participant Service Agreement (MPSA)
 - MPSA will be updated to include DER Aggregators

Stage 3: Registration and activation, cont.

- Additional information to be provided for Dispatchable DERAs
 - Designated Entity/Dispatch location
 - Seasonal Nominated Consumption Limit (if applicable)
 - Expected market capabilities
- For DERs that serve the load of end-use customers
 - The DER Aggregator must meet state requirements for serving load in states with retail choice
 - A DER Aggregator must enroll the end-use customers following applicable state/DU procedures and requirements

Stage 3: Registration and activation, cont.

- DER Aggregator notifies the ISO and DU once all eligibility criteria are met/resolved, and metering & telemetry is in place
- DU notifies the ISO to confirm that:
 - All metering, including interval Revenue Quality Metering (RQM) required by the DU/meter reader is in place
 - Mapping of RQM to the appropriate Load Asset and metering domain(s) has been completed through the state-approved process
- ISO coordinates market participation activation timing with the DU, DER Aggregator and Designated Entity (if applicable)

Stage 4 - Updates to an existing DER/DERA registration

- When a DER Aggregator adds or removes a constituent DER from an existing DERA, the DER Aggregator is not required to re-register the aggregation
- The DU will have up to 60 calendar days to review for any potential eligibility, safety or reliability impacts
 - This review follows the same process described earlier for the initial review of a new DERA, but focused on the additions/subtractions
- The DER Aggregator is required to update its registration information:
 - Coordinate changes with the DU/meter reader
 - Ensure real-time telemetry accurately reflects the re-configured DERA
 - Provide ISO with updated list of included DERA facilities and updated performance capabilities

DER AGGREGATOR METERING RESPONSIBILITIES



Compliance Approach – Metering Responsibility

- As required by the FERC, the ISO proposed Tariff changes that designate the DER Aggregator as the entity responsible for providing metering information for its Distributed Energy Resource Aggregations (DERAs)
- Metering responsibilities for Demand Response Resources and Alternative Technology Regulation Resources are unaffected
- The ISO proposes that the DER Aggregator could designate itself, a party acting on its behalf, or the Host Participant to be the Assigned Meter Reader for DERAs that include Generator Assets or Load Assets
 - The applicable metering requirements and meter data submission responsibilities are addressed in Operating Procedure 18 – Metering and Telemetry Criteria, and Manual M-28 – Market Rule 1 Accounting
 - The DER Aggregator would enter into applicable meter data coordination agreements with the relevant Host Participant subject to any relevant electric retail regulatory authority requirements (including those concerning privacy and cybersecurity)

Compliance Approach – Data Protocols and Cost

- If the DER Aggregator or its agent acts as the Assigned Meter Reader for its DERA, it would provide data for settlement to the relevant Host Participant using the protocols applicable to other Assigned Meter Readers as detailed in the ISO's Manual M-28, Market Rule 1 Accounting
 - Manual M-28 currently includes meter data reporting processes applicable to Assigned Meter Readers that are not the Host Participant
 - The process allows Host Participants to determine the amount of energy supplied to, and consumed in, its metering domain in each interval so that Energy Market payments and billings are accurate
 - The process of reporting meter data to the ISO may differ between Generator Assets and Load Assets and include adjustments for losses and residual unmetered load
 - To address privacy concerns, meter data submitted to the ISO would be subject to the ISO New England Information Policy

OPERATIONAL COORDINATION FRAMEWORK



Background on Operational Coordination

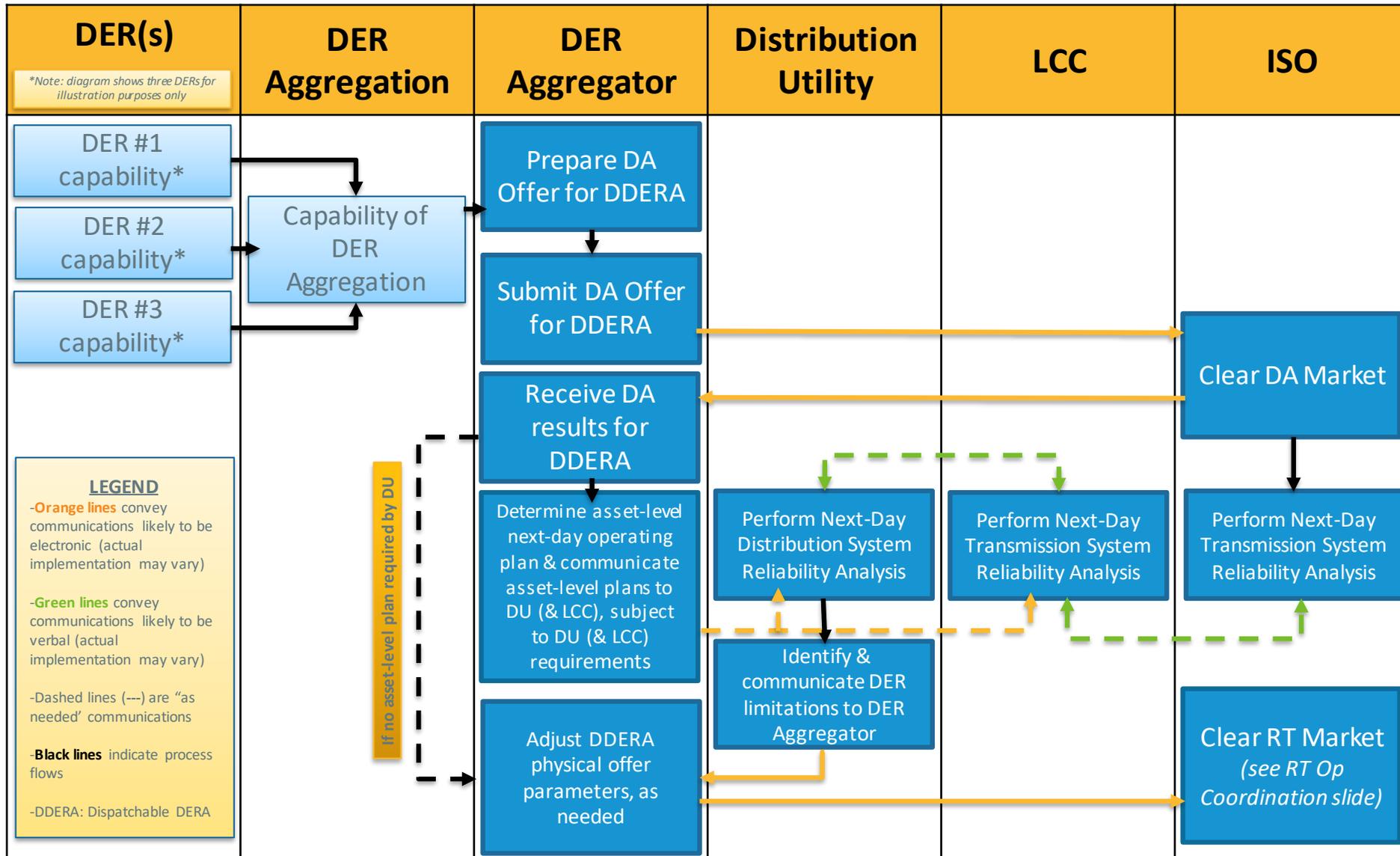
- With respect to operational coordination, Order No. 2222 requires that we:
 - Address data flows and communication between RTO/ISO, DER Aggregators, and the distribution utilities
 - Require DER Aggregators to report any changes to offered quantity and related distribution factors that result from distribution line faults or outages
 - Include coordination protocols and processes for the operating day that allow distribution utilities to override RTO/ISO dispatch of a DERA to maintain the reliable and safe operation of the distribution system



Background on Day-Ahead Operational Coordination Framework

- For dispatchable DERAs, DER Aggregators submit aggregation level Day-Ahead offers to the ISO, inclusive of restrictions due to distribution constraints as previously communicated by the DU to the DER Aggregator
- ISO clears Day-Ahead Market and provides aggregation level Day-Ahead awards to DER Aggregators
- DER Aggregators determine an asset-level operation plan to be provided to the DU for analysis, subject to the specific requirements of the DU (and LCC)
- Following receipt of the asset-level operation plan, the DU (and LCC) performs next-day distribution reliability analysis, if necessary
- DU informs the DER Aggregator of any operating constraints impacting either the asset or the aggregation based on any reliability analysis performed
- DER Aggregators modify their physical operating parameters or financial offers in order to reflect any constraints identified by the DU

Day-Ahead Operational Coordination



Background on Real-Time Operational Coordination Framework

- As necessary, DER Aggregators update aggregation level physical operating parameters or financial offers (to the ISO) inclusive of restrictions due to distribution constraints as previously communicated by the DU to the DER Aggregator
- The ISO clears the Real-Time Market and transmits aggregation level Dispatch Instructions to the DERA
- The DER Aggregator ensures the DERA follows ISO's Dispatch Instructions
- In the event that the DU detects actual or anticipated reliability or safety issues in the distribution system during real-time operation, the DU may override ISO's dispatch of a DERA by:
 - Informing the DER Aggregator of any operating constraints at either the individual DER or aggregation level, and the DER Aggregator immediately complying by adjusting the dispatch of the DERA as necessary, or
 - By directly adjusting the output of individual DERs without advance notice to the DER Aggregator to the extent that the DU has the capability
- The DER Aggregator declares (to the ISO) any change of physical parameters accordingly



Real-Time Operational Coordination

