California ISO

DOE's Electricity Advisory Committee (EAC)

Aggregated DER participation in ISO/RTO markets enabled by FERC Order 2222 – Panel

Jill Powers
Infrastructure and Regulatory Policy, Manager

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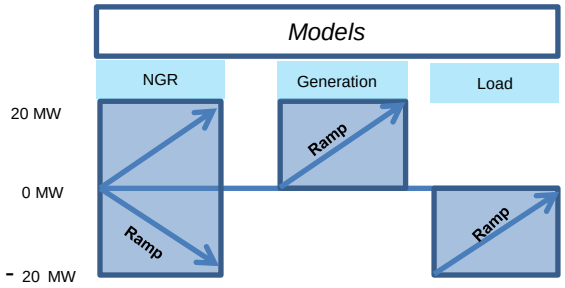
CAISO supply models are technology neutral and focus on resource capabilities to provide wholesale market services

- Three major categories:
  - Reduces load only (Demand Response)
    - Examples include: “traditional” load drop, various demand response programs, storage-backed demand response
  - Generates only (Participating Generator)
    - Examples include: generation connected at the transmission and distribution level
  - Reduces load and generates (Non-Generating Resource)
    - Examples include: storage resources, aggregation of distributed energy resources



Participation models and their attributes (EIM applicable)

Model	**Demand Response** (PDR, PDR_LSR,RDRR*) *dispatched only after system warning	**Non-Generating Resource (NGR)**	**Distributed Energy Resource Provider (DERP)**
Market Participation	• Day-Ahead & Real-Time energy • Spinning & Non-Spinning reserves • ***Non 24x7 participation*** • ***5, 15, or 60 minute dispatch option*** • Not subject to market power mitigation	• Day-Ahead & Real-Time energy • Spinning & Non-Spinning reserves • ***Regulation Up & Down*** • 24x7 participation • Not subject to market power mitigation*	• Day-Ahead & Real-Time energy • Spinning & Non-Spinning reserves • ***Regulation Up & Down*** • 24x7 participation • Not subject to market power mitigation
Capacity & Aggregation Requirements	• Aggregations within same SubLAP • Min 100 kW (for energy) • Min 500 kW (for ancillary services)	• ***No aggregations*** • Min 100 kW (for energy) • Min 100 kW (for ancillary services)	• Aggregations within same SubLAP • Min 500 kW • Max <20 MW if across P-Nodes • DERs within the aggregation <1 MW
RA Eligibility & must offer obligation	• RA eligible – Qualified Capacity methodology exists • By default, DR resources have a 24/7 MOO • *LRA must adopt terms and conditions for the DR program to modify the 24/7 MOO*	• RA eligible – requires deliverability study • 24/7 MOO	• ***RA eligible (no tariff rules) – Qualified Capacity methodology does not exist,*** *requires deliverability study* • ***MOO (no tariff rules)*** – CAISO standard rules may apply
Interconnection Requirements	• ***UDC rule 21 requirements*** • ***ISO registration process***	• ***Abide by UDC interconnection (WDAT) for CAISO wholesale participation*** • ISO new resource implementation process	• ***UDCs may prefer WDAT interconnection, but not required by CAISO/FERC*** • ISO new resource implementation process
Metering & Telemetry	• **Baseline (recognizes sub-meter for BTM Energy Storage & EVSE)** • ***BTM export of energy not accounted*** • Telemetry if >=10 MW, or providing A/S	• **Metered** • Telemetry if >=10 MW, or providing A/S	• ***Virtually metered - aggregate of metered DERs*** • Telemetry if >=10 MW, or providing A/S

Comprehensive Comparison Matrix available at: http://www.caiso.com/Documents/ParticipationComparison-ProxyDemand-DistributedEnergy-Storage.pdf

Additional DER aggregation participation requirements

- DERs participating in net energy metering or demand response program are ineligible to participate in a DERA
- Distribution companies get 30 days to review DERAs to ensure DERs are not also demand response participants, net energy metering resources, in other DERAs, conflict with their tariffs, or may pose a threat to safe reliable operation of the distribution system
  - concurrence letter from UDC is required before a DERA can enter the ISO new resource implementation process

FERC Order 2222 is largely modeled on the ISOs 2016 DERP filing

The CAISO is continuing its review of FERC Order 2222 against current DERP provisions in preparation for the July 19, 2021 compliance filing due date

- Reducing minimum DERA size requirement of 500 to 100 kW
- Evaluating the need to adjust current aggregation and metering requirements to accommodate baseline measured demand response in a DERA
- Identifying any settlement impact on broader definition of mixed aggregations (energy injections, energy withdrawals and demand reductions)

DERA challenges to wholesale market participation

- Retail programs are more attractive
  - NEM (No capacity limit)
- Stand-alone DER resource requirements are low
  - 500 kw for generators and 100 kW for storage
- Lack of an established methodology to determine an RA capacity value for DERAs
- Complexity DERAs introduce to distribution system operations and planning

Market participants have been surveyed to gain additional perspective on these challenges

The ISO and distribution utilities formed a working group to address DERA market participation

- Distribution Interconnection process did not study DERs impact to system in aggregate
  - established a detailed DERA review process, which included ISO NRI process integration
- ISO market systems see DER at T-D substations, have no visibility to distribution grid conditions or impacts;
  - developed DERA availability (red/green) – manual process
- Distribution utility is not aware of DER bids and dispatches
  - Identified availability to provide information using existing market reporting mechanisms

High DERA participation requires enhanced Transmission/Distribution Operations coordination