

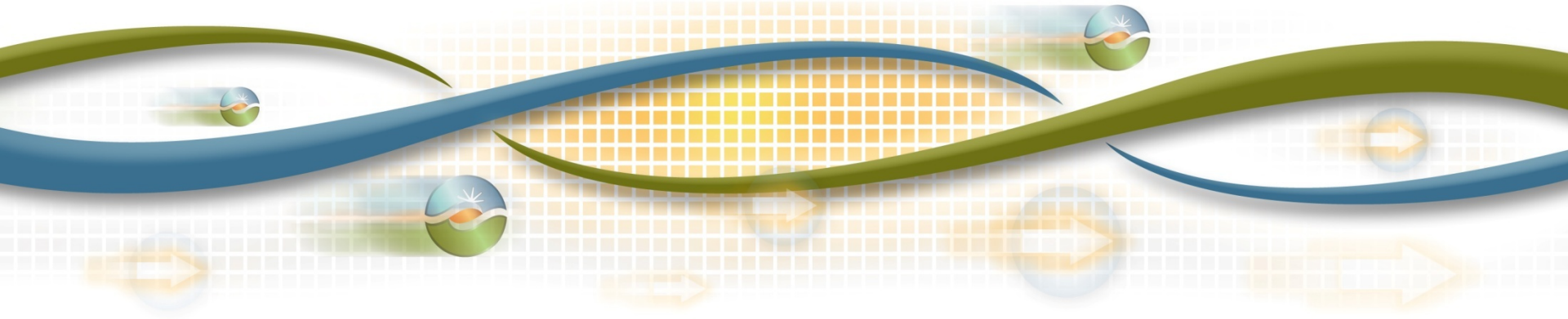


California ISO
Shaping a Renewed Future

Supply Resource Demand Response Integration Working Group
August 26, 2014

Implementation Overview for PDR

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CAISO has introduced two products both relying on the same technical functionality and infrastructure

| Design | Acronym | Services | Market dispatch | Description |
|--------------------------------------|---------|--|---|--|
| Proxy Demand Resource | PDR | Energy, non-spin, residual unit commitment (RUC) | Economic day-ahead and real-time | Bids into ISO markets as supply |
| Reliability Demand Response Resource | RDRR | Energy | Economic day-ahead, reliability real-time | Bids into ISO markets; used for reliability purposes |



Wholesale demand response participates in the CAISO comparable to a supply resource

Proxy Demand Resource (PDR) participation overview

PDR can bid economically into the following markets:

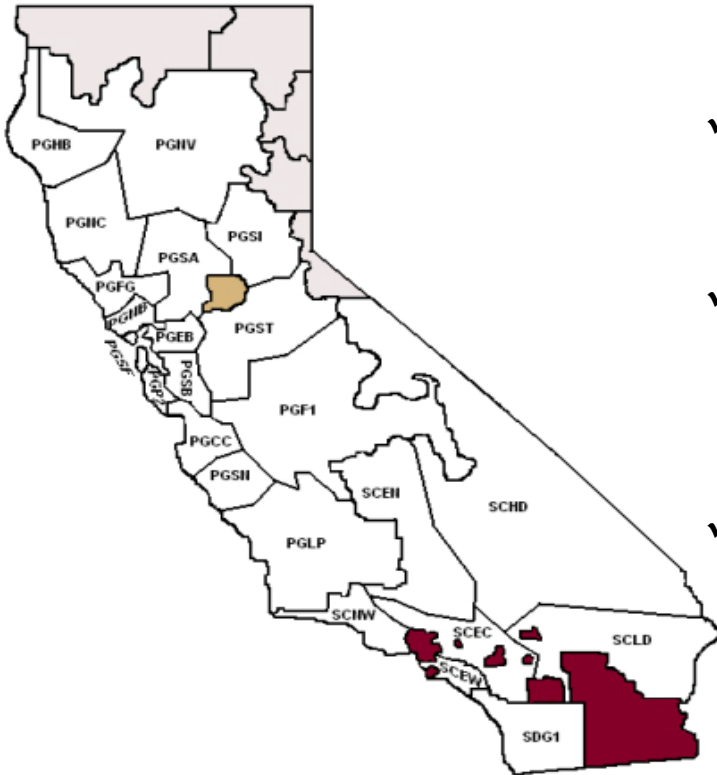
- Day-Ahead energy market
- Day-Ahead and Real-Time Non-Spinning Reserve market
- 5- Minute Real-Time Energy market

PDR must have minimum load curtailment:

- 0.1 MW (100 kW) for Day-Ahead and Real-Time energy
- 0.5 MW (500 kW) for Day-Ahead and Real-Time energy Non-Spinning Reserve
- Smaller Loads may be aggregated together to achieve minimum

Resource aggregations are required to be within a single sub-Load Aggregation Point (LAP).

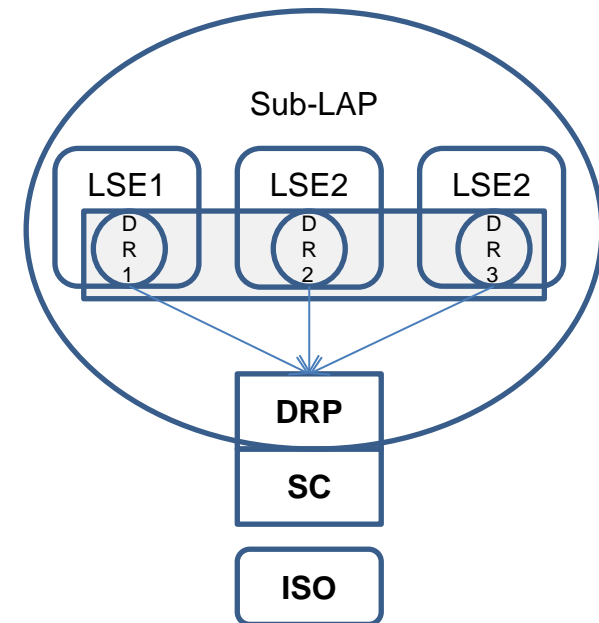
- *Ensures demand response resource dispatch does not create additional congestion*



- ✓ A sub-LAP is an ISO-defined subset of pricing nodes (Pnodes) within a default LAP.
- ✓ 24 sub-LAPs were created to reflect major transmission constraints within each utility service territory (default LAP)
- ✓ Developed initially for congestion revenue rights (CRRs)

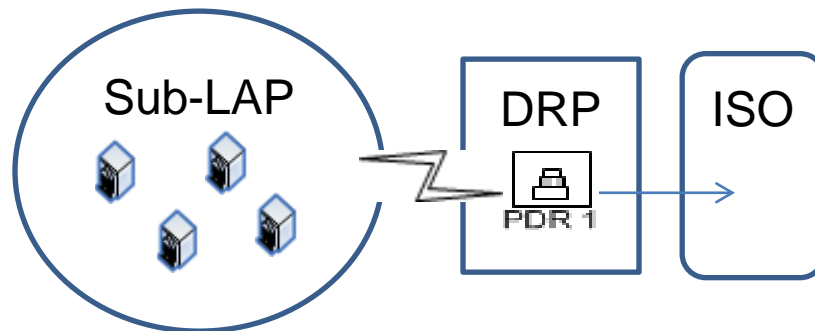
Resource aggregations are required for a single load serving entity (LSE)

- ✓ Provides visibility of DR awards to LSEs
- ✓ Ensures ability to identify individual default load adjustment (DLA) contribution of LSE specific location performance

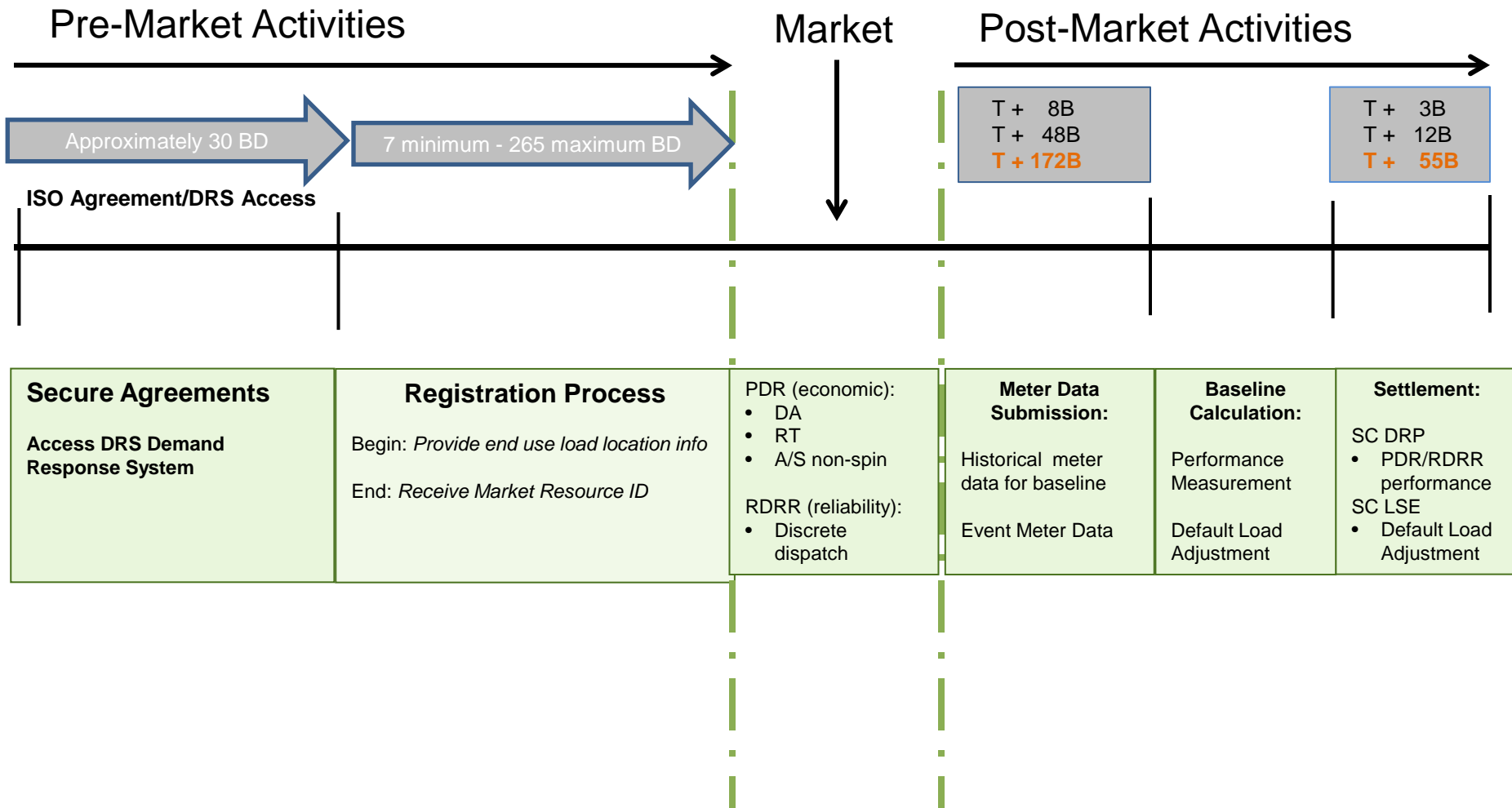


Resource aggregations of 10 MW and above and those providing ancillary services require telemetry.

- ✓ RDRR does not require telemetry
- ✓ Telemetry is provided for the aggregate resource
- ✓ A single remote intelligent gateway (RIG) can represent multiple DR resources (1:many)



Sequential activities prepare for PDR/RDRR market participation



Registration provides visibility and auditability of aggregated participation to multiple entities.

Create location

- UDC account # primary key
- validations
 - duplication check between DRP's registered locations
 - completeness validation

Create registration

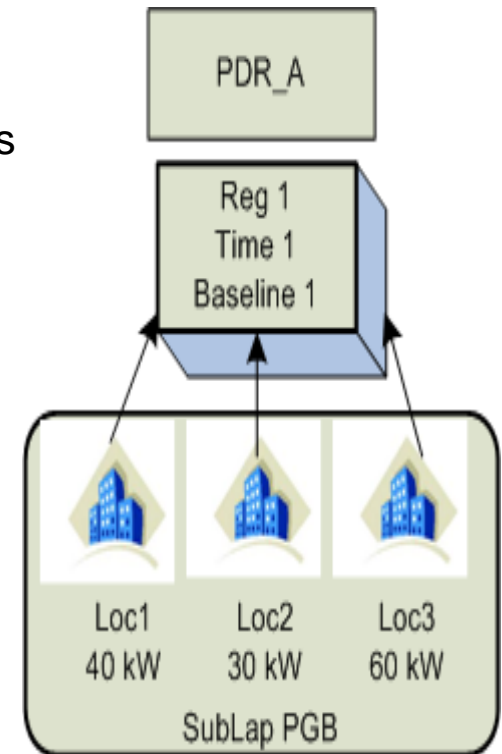
- locations aggregated to create registration
- validations
 - duplicate location check across DRP registrations
 - Sub-Lap/LSE/total load reduction

LSE/UDC/ISO registration review

- UDC/LSE review registration including locations

Create resource and confirm

- resource ID provided, Resource data template submitted
- masterfile updated



Deadlines for DR resources remain consistent with timelines for all resource types including load.

Meter data submitted by SC as SQMD

- historical meter data for baseline
- event meter data

T + 8 B initial
T + 48B recalculation
T + 172B recalculation

Calculation in DR system

- baseline
- performance measurement
- only

Settlement

- Direct settlement of PDR/RDRR performance with DRP's SC
- Default load adjustment calculated and applied to LSE load meter data if applicable

T + 3B initial
T + 12B recalculation
T + 55B recalculation

Participants have options for their baseline methodology.

- ✓ **10 in 10 non-event day baseline methodology will be calculated by ISO**
- ✓ **Alternative baseline can be used with ISO approval**

- Conform to North American Energy Standards Board (NAESB) standards
- May require tariff amendment
- Submitted as generation meter data
 - “Hourly Gen” choice in DRS

| Date | Type | Event | HE14 |
|-----------|------|-------|-------|
| 4/15/2009 | WD | N | 15.00 |
| 4/16/2009 | WD | N | 15.75 |
| 4/17/2009 | WE | N | 10.50 |
| 4/18/2009 | WE | N | 9.50 |
| 4/19/2009 | WD | N | 13.75 |
| 4/20/2009 | WD | N | 14.00 |
| 4/21/2009 | WD | N | 14.75 |
| 4/22/2009 | WD | N | 14.00 |
| 4/23/2009 | WD | N | 13.75 |
| 4/24/2009 | WE | N | 6.00 |
| 4/25/2009 | WE | N | 15.75 |
| 4/26/2009 | WD | Y | 14.80 |
| 4/27/2009 | WD | Y | 15.50 |
| 4/28/2009 | WD | N | 14.00 |
| 4/29/2009 | WD | N | 14.00 |
| 4/30/2009 | WD | N | 13.80 |

| Date | MWH | Selection |
|----------------------------------|--------------|-----------|
| 4/15/2009 | 15.00 | 10 |
| 4/16/2009 | 15.75 | 9 |
| 4/19/2009 | 13.75 | 8 |
| 4/20/2009 | 14.00 | 7 |
| 4/21/2009 | 14.75 | 6 |
| 4/22/2009 | 14.00 | 5 |
| 4/23/2009 | 13.75 | 4 |
| 4/28/2009 | 14.00 | 3 |
| 4/29/2009 | 14.00 | 2 |
| 4/30/2009 | 13.80 | 1 |
| 10 Day Avg (Raw Baseline) | 14.28 | |

Selection Criteria Type=WD
 Event=N
 Where WD = Week Day
 WE = Week End
 Event = Y if DA schedule, RT/AS dispatch or Outage

CAISO website has comprehensive training material for PDR and RDRR participation

Reliability Demand Response Resource link:

<http://www.caiso.com/Pages/documentsbygroup.aspx?GroupID=8642B12B-43E5-42B8-BC31-662880F6565A>

Proxy Demand Resource link:

<http://www.caiso.com/Pages/documentsbygroup.aspx?GroupID=F5B0124F-E035-45C3-A482-7F1F3F8B590A>