



# ***Market Bidding Challenges for Demand Response Resources***

## ***Commitment Cost Enhancements Phase 3 (CCE 3) Workshop***

**2016-06-15**

# Background

- Per CCE 3 Draft Final Proposal, DR resources (PDR / RDRR) would no longer be considered Use-Limited Resources (ULR) by default.
  - It is unclear if DR resources could still apply for, and then receive ULR status.
- As such, PDR and RDRR would not be able to bid (directly include) start-up and P-min / no-load (opportunity) costs.
  - The CAISO notes that PDR and RDRR bids are not subject to bid insertion and bid mitigation; hence their energy bids could include opportunity costs.
- Once use limitations are met (e.g. available calls exhausted), DR resources can use a work outage card to avoid Resource Adequacy Availability Incentive Mechanism (RAAIM) penalties for that month.
  - It is unclear if this is a temporary measure or a permanent “solution”.

# Current DR Program Limitations

- SCE has several programs that have been integrated into the CAISO
  - In 2016, SCE integrated 70+ DR Resources with over 1,100 MW of capacity
  - Each program has separate characteristics and limitations
- DR Program have limitations to minimize customer impacts
  - Summer Discount Plan (SDP) has hourly limits
  - Agricultural Pumping – Interruptible (API) has hourly and event limits
- Each limitation is binding
  - For example, once API is called 25 times, it is done for the year

Program	Max Hours/Year	Max Hours/Day	Max Events/Year
<b>SDP</b>	180	6	n/a
<b>API</b>	150	6	25

# Challenges with DR Commitment Costs

- DR resources generally have limited number of calls (not MWh), hence the opportunity cost is a per call/hour (not per MWh) cost.
  - E.g. Summer Discount Plan (SDP) allows for 180 hours of dispatch, independent of how many MWh are delivered; hence the opportunity cost is per dispatch hour.
- DR Resources cannot be “block bid” into the market; and as a result can be partially dispatched for less MW and hours than available.
  - Current rules don’t allow for a discrete dispatch bids (e.g. “x” MW for “y” hours).
  - Some programs limit the number of calls, but allow for multiple hours per call.
- Partial awards/dispatches still count as full calls.
  - A partial SDP dispatch counts toward the hourly limit just like a full dispatch does.
  - A 1-hour API dispatch counts toward the event limit just like a 6-hour dispatch.

**Energy bids alone are inadequate for capturing DR opportunity costs**

# Illustrative DR Bidding Example (1)

## Resource with hourly limits (e.g. 180 hours per year)

- Assume a 10 MW PDR with a \$1,000 per hour net opportunity cost, and a \$50/MWh energy cost.
  - Hourly dispatch cost would be  $\$1,000 + \$50/\text{MWh} \times 10 \text{ MW} \times 1 \text{ hour} = \$1,500$
  - An energy-only bid would be  $\$1,500 / 10 \text{ MWh} = \$150/\text{MWh}$
- If such a resource is partially dispatched, it is used sub-optimally
  - A partial dispatch (e.g. 5 MW) would recover only a fraction of the opportunity cost ( $5 \text{ MW} \times \$150/\text{MWh} = \$750$ ) – meaning the resource could have been used at a time of higher system need (value).
- Bidding in at a higher cost could result in the opposite problem, with the resource again used sub-optimally
  - If the resource was bid at \$250/MWh, to fully recover the variable and opportunity costs in a partial dispatch, it may not be called even if market prices hit \$249 – meaning the resource is not being used at a time of high system need.

**A min-load cost may better capture hourly DR limitations.**

# Illustrative DR Bidding Example (2)

## Resource with call limits (e.g. 25 calls per year).

- Assume a 10 MW PDR with a \$4,000 per call net opportunity cost, a \$50/MWh energy cost, and a 4-hour availability.
  - A 4-hour dispatch cost would be  $\$4,000 + \$50/\text{MWh} \times 10 \text{ MW} \times 4 \text{ hours} = \$6,000$
  - An energy-only bid would be  $\$6,000 / 40 \text{ MWh} = \$150/\text{MWh}$
- If such a resource is partially dispatched, it is used sub-optimally
  - A partial dispatch (e.g. 5 MW for 2 hours) would recover only a fraction of the opportunity cost ( $5 \text{ MW} \times 2 \text{ hours} \times \$150/\text{MWh} = \$1,500$ ) – meaning the resource could have been used at a time of higher system need (value).
- Bidding in at a higher cost could result in the opposite problem, with the resource again used sub-optimally
  - If the resource was bid at \$450/MWh, to fully recover the variable and opportunity costs in a partial dispatch, it may not be called even if market prices hit \$449 – meaning the resource is not being used at a time of high system need.

**A startup cost may better capture per-call DR limitations.**

# BTM Energy Storage as DR

- Energy Storage resources have physical & contractual use limitations
  - Hourly limits (per day/month/year)
  - Call (cycling) limits (per day/year)
  - Dispatch and charging hours limits
    - Seller can only charge in “off-peak” hours; Buyer can only dispatch (bid into CAISO) in “on-peak” hours
- Use limitations lead to challenges in bidding opportunity costs
  - Storage faces challenges shown in both examples above (startup & min-load costs)
  - Daily start limits cannot be directly managed w/ bids and RDTs
    - Max. Daily Energy Limit does not address multiple starts or varying MW (e.g. A/C load)
- Energy Storage resources are expected to have more dispatches
  - While higher availability is a good quality, a mismatch between market rules and resource use limitations may cause increased challenges and sub-optimal resource dispatch

# Outstanding CCE 3 Questions

- Can DR Resources apply for, and receive ULR status?
  - What are the criteria the CAISO will use to approve / reject ULR applications?
- How would the CAISO calculate the opportunity costs for DR ULRs?
  - What is the methodology the CAISO would use? (Or would it defer to the SC?)
  - How would the CAISO track the resource use?
- How should Scheduling Coordinators manage yearly use limitations on a monthly basis?
  - How should we allocate yearly limits to a single month? (We shouldn't!)
    - Monthly allocations could result in arbitrary over (or under) use in a single month
  - When do we enter the work outage card?
    - What if a yearly limit is not exhausted, but resource has been dispatched multiple times within a single month?



# Additional DR Challenges

- There is currently no option to bid economically in Real-Time for RDRRs that have an economic Day-Ahead Award (i.e. no dec bids).
  - Often, when a resource is awarded at a relatively high price in DAM, RTM prices can be significantly lower due to change in system conditions (e.g. lower temps).
  - Even though the RT prices may not meet the Net Benefits Test threshold, there is no mechanism for the CAISO to “call-off” awards if RDRRs are no longer needed.
  - A possible solution would be to allow economic “dec” bids, similar to non-DR resources. E.g. RDRRs with Day-Ahead awards could be exempt from the current requirement for RDRR RT bids at 95% of bid cap.
- (Re)activating Maximum Run Time for DR
  - Daily energy limits do not work well for DR, as the resource capacity often changes throughout the day (e.g. AC cycling capabilities vary by hour).

# Next Steps

- SCE hopes to continue the discussions on how to more effectively integrate Demand Response and BTM Energy Storage resources into the CAISO markets, and maximize the value of such resources.
- For questions and comments, please contact:

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