



# Load Shift Working Group

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MARCH 21, 2018

10AM – 3PM PST

CPUC

<https://gridworks.org/initiatives/load-shift-working-group/>

# Agenda

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10:00 – 10:20am: Intro and Purpose (Gridworks)

10:20 – 12:00pm: Homework Findings (Gridworks and subgroup leads)

12:00 – 1:00pm: Lunch

1:00 – 2:30pm: Addressing Threshold Questions: Market Participation

- Load Bidding (Gigio Sakota, SCE and Peter Alstone, LBNL)
- PDR Enhanced (Eric Kim, CAISO)
- Retail Program Informed by LMPs (Nora Sheriff and Paul Nelson, CLECA)
- Facilitated Discussion (Gridworks)

2:30 – 3:00pm: Next Steps (Gridworks)

# Introduction and Purpose

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Roll call

Purpose: Establish attributes of a load shift product, develop consensus on what market participation means, and determine remaining threshold questions for the LSWG

# Homework Findings

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Recap: WG members were asked to address:

1. Definitions and attributes of “Load Shift”
2. Threshold questions
3. Prioritization and sequencing of topics

Sub-Group Leads:

- Brian Kooiman, Ohmconnect (Group 1)
- Fabienne Arnoud, PG&E (Group 2)
- Erica Keating and Ryan Bullard, SCE (Group 3)
- Helena Oh, CPUC ORA (Group 4)

## Attributes of a Load Shift Product

**Table 1:** Attributes of a Load Shift Product in the context of LBNL’s shift product, PG&E’s XSP pilot and ESDER 3’s charge shift product.

Attributes	“LBNL SHIFT” Dispatchable TAKE coupled with SHED	“PG&E XSP Pilot” Dispatchable TAKE, independent from SHED	“ESDER phase 3 Charge Shift” Dispatchable TAKE ; independent from SHED
Dispatchable or Non-Dispatchable	SHIFT (TAKE <i>coupled with</i> SHED) is dispatchable by the grid operator	<ul style="list-style-type: none"> <li>TAKE is dispatchable by grid operator</li> <li>SHED is independent (could be bid in as PDR)</li> </ul>	
Status Today in the Market: Pathway to CAISO Dispatchability	<ul style="list-style-type: none"> <li>No participation model in place at CAISO</li> <li>Would require CAISO to co-optimize take and shed which is not functionality in place today, and may not be feasible</li> </ul>	<ul style="list-style-type: none"> <li>Not integrated today as it requires a participation model (e.g., PDR to be load increasing)</li> <li>Could be integrated as a take product with an independent shed (i.e., PDR / used by customer)</li> </ul>	
Technology neutral	Yes	Yes	BTM energy storage specific; Requires MGO methodology metering configuration B2
Dispatched Energy Neutral	Theoretically energy neutral (24 hour / longer time frame)	<ul style="list-style-type: none"> <li>Not defined as a specific pilot’s rule (equivalent to LNBL TAKE, with participants largely influenced by retail rate to prevent frivolous use). Solving for grid needs first.</li> <li>SHED is independent (could be bid in as PDR)</li> </ul>	<ul style="list-style-type: none"> <li>Not by design as the product solves for grid needs first (but participants are largely influenced by retail rate to prevent frivolous use).</li> <li>SHED is independent (could be bid in as PDR)</li> </ul>
CAISO market Integration defined as: (a) Enhanced PDR (b) Informed by CAISO prices (c) Load Bid*	Not defined	<ul style="list-style-type: none"> <li>Option (b) currently, but TAKE model could eventually be CAISO market integrated as in Option (a)</li> </ul>	<ul style="list-style-type: none"> <li>Option (a)</li> </ul>
Capacity Payment	<ul style="list-style-type: none"> <li>Possible for the shed portion, if it participates as PDR</li> <li>Possible for product if it meets flex RA attributes</li> <li>Load increase (TAKE) solves an economic issue today; no RA value</li> </ul>		
Available to LSEs & Third Party DRPs	Yes		

# Load Shift Working Group

Subgroup #1

March 2018

# Topics Discussed

- Definition of “load shift”
- Proposed prioritization plan
- Remaining foundational questions

# Definition of “load shift”

- Should the product be energy neutral?
  - Technology neutral, not energy neutral.
- Should bi-directional dispatch be required?
  - Bi-directional dispatch is feasible, but not required.
    - Similar to the design of the XSP.
- Should the product be dispatchable?
  - Is there a distinction between time-of-use rates?
  - With which market is dispatchability determined?



# Proposed Prioritization Plan

- Pathway depends on whether there is consensus on the type of product:
  - If consensus on the type of product is reached, Option A (defining by product type) is preferred.
  - If consensus on the type of product is *not* reached, Option B (addressing issues) is preferred.
- PROPOSAL - Option C:
  1. Product is defined.
  2. Product is built out based on the definition.

# Remaining Foundational Questions

- What level of integration should this product have with CAISO?
  - Economic market prices, out-of-market based on prices, etc.
- Is dispatchability necessary for this product?



## Sub Group 2 – Topic 1 How To Define Load Shift

Should the product be	“LBNL SHIFT” Dispatchable TAKE coupled with SHED	“PG&E XSP Pilot” Dispatchable TAKE, independent from dispatchable SHED	“ESDER phase 3 Charge Shift” Dispatchable TAKE with non-dispatchable SHED	Main Conclusions
Technology neutral	Yes	Yes	Behind-the-meter energy storage	<i>Product should be technology neutral (though some end uses’ operating characteristics may be better suited than others)</i>
Energy neutral	Modeled as service / energy neutral over a defined time window, though this isn’t perfectly enforced in practice	<ul style="list-style-type: none"> <li>Not defined as a specific pilot’s rule (equivalent to LNBL TAKE, with participants largely influenced by retail rate to prevent frivolous use). Solving for grid needs first.</li> <li>SHED bids done independently</li> </ul>	<ul style="list-style-type: none"> <li>No / solving for grid needs first (but participants are largely influenced by retail rate to prevent frivolous use)</li> <li>No grid operator’s control on subsequent SHED)</li> </ul>	<i>Not viewed as a key attribute of the load shift product. Focus should rather be on grid needs.</i>
Dispatchable or Non-Dispatchable	SHIFT (TAKE <i>coupled with</i> SHED) is dispatchable by the grid operator	<ul style="list-style-type: none"> <li>TAKE is dispatchable by grid operator</li> <li>SHED may be bid and dispatched by grid operator independently per grid needs</li> </ul>	<ul style="list-style-type: none"> <li>TAKE is dispatchable by grid operator</li> <li>SHED is persistent / non-dispatchable by grid operator</li> </ul>	<i>Recommended a dispatchable product by the grid operator to provide more certainty in the resulting load response</i>
CAISO market Integration defined as: <ul style="list-style-type: none"> <li>- PDR (modified)</li> <li>- Out of PDR but using CAISO’s LMPs</li> <li>- Load Bid *</li> </ul>	Not defined	<ul style="list-style-type: none"> <li>Option (b) currently, but TAKE model could eventually be CAISO market integrated per option (a)</li> <li>Available to third-party and IOUs as DR Providers</li> </ul>	<ul style="list-style-type: none"> <li>Option (a)</li> <li>Available to third-party and IOUs as DR Providers</li> </ul>	<i>No clear consensus.</i>

## Sub Group 2 – Topic 2

### Threshold Questions

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What are we solving for?

What are the grid needs we're trying to answer by designing this product?

Would consumption/bi-directional provide RA value?

What are the right incentive levels for customers to engage on a regular basis?

How to best represent actual capabilities of customers / business models of companies? Assessment of customer engagement, motivation and capabilities / willingness

# Lunch Break

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# Addressing Threshold Questions: Market Participation

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- Load Bidding (Gigio Sakota, SCE and Peter Alstone, LBNL)
- PDR Enhanced (Eric Kim, CAISO)
- Retail Program Informed by LMPs (Nora Sheriff and Paul Nelson, CLECA)
- Facilitated Discussion (Gridworks) – *What does market participation mean in the context of the LSWG?*

# Load Bid Concept: *Demand Bidding for Shift*

LOAD SHIFT WORKING GROUP | MARCH 21, 2018

PETER ALSTONE

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SCHATZ ENERGY RESEARCH CENTER / LAWRENCE BERKELEY NATIONAL LABORATORY

GIGIO SAKOTA

SOUTHERN CALIFORNIA EDISON

<https://gridworks.org/initiatives/load-shift-working-group/>



# General Concept

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DR Aggregator (either 3<sup>rd</sup> party or LSE) develops **price responsive load / demand bids** that are placed in CAISO market on the demand side.

The bids lead to **elasticity in demand**: reduced demand if prices are high and increased demand at low price times.

The market clears, and the aggregator controls load at customer sites to attempt to **match and optimize demand with market outcomes**.

## **Two sources of value:**

- Reduction in cost of serving overall load due to arbitrage (and reduced renewables curtailment)
- Reduced peak capacity from demand elasticity (RA / Local RA value)

**Significant opportunity to capture low prices in mid-day and avoid peak prices.**

**Average day in Feb-Mar 2017 with \$50-60/MWh spread from peak to trough.**

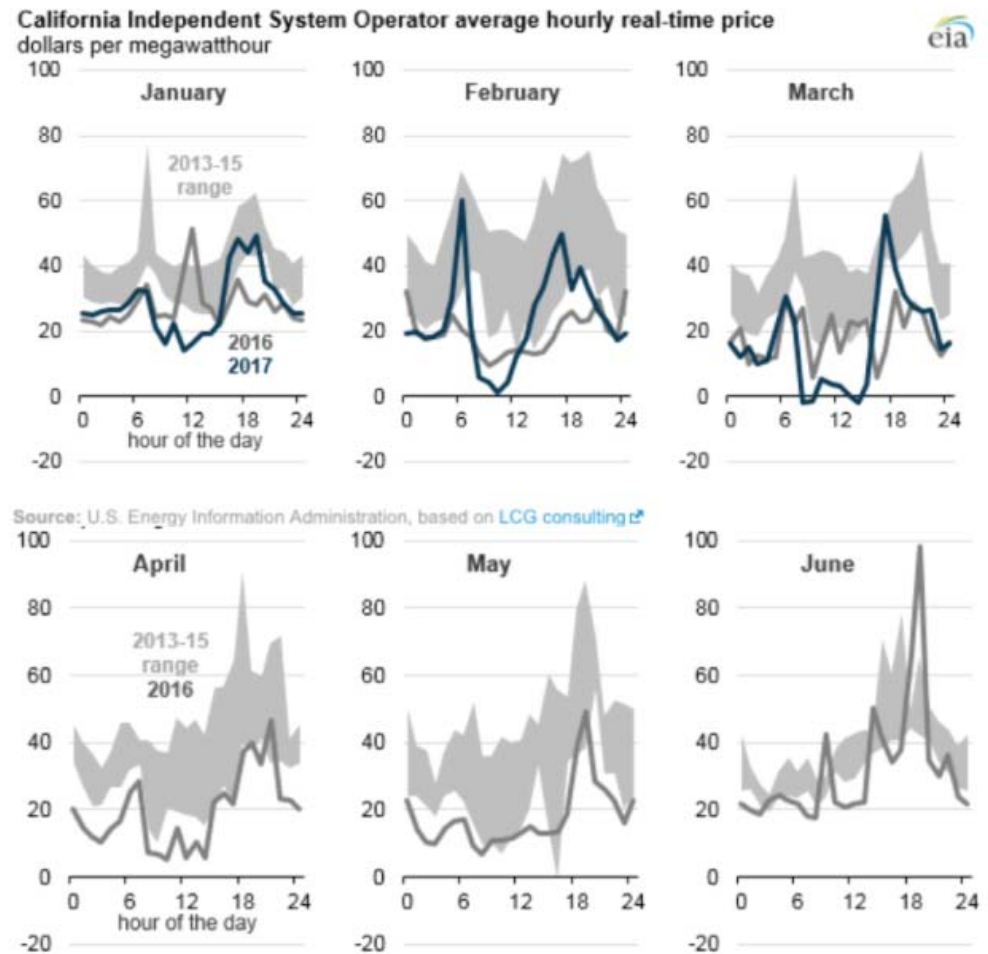
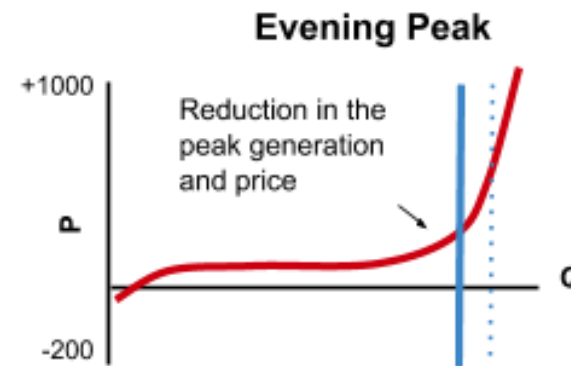
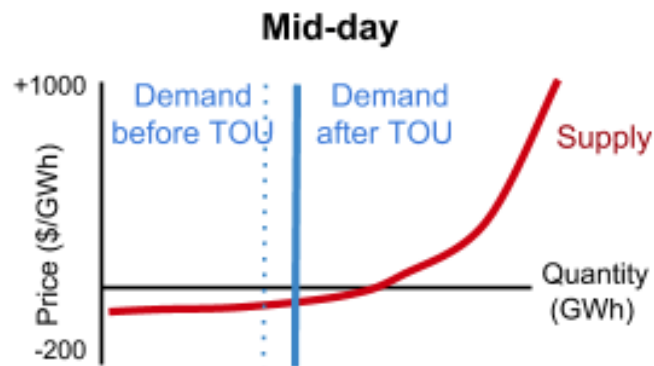


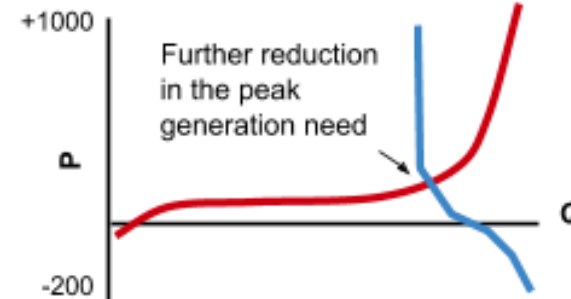
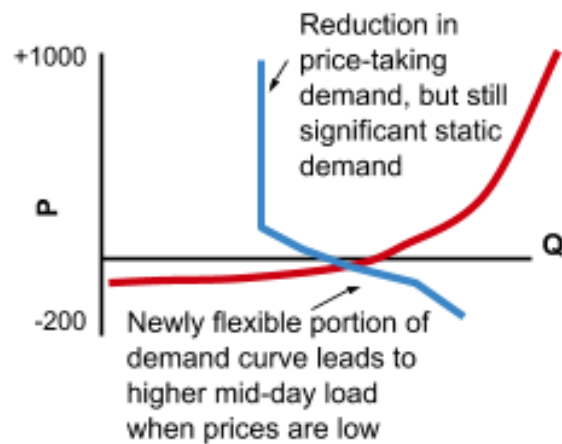
Figure 2: CAISO market price ranges for 2013-15, and prices for 2016 and 2017 for select months. From <https://www.eia.gov/todayinenergy/detail.php?id=30692>

# Use TOU first, then bid Shift-able loads based on expected price response

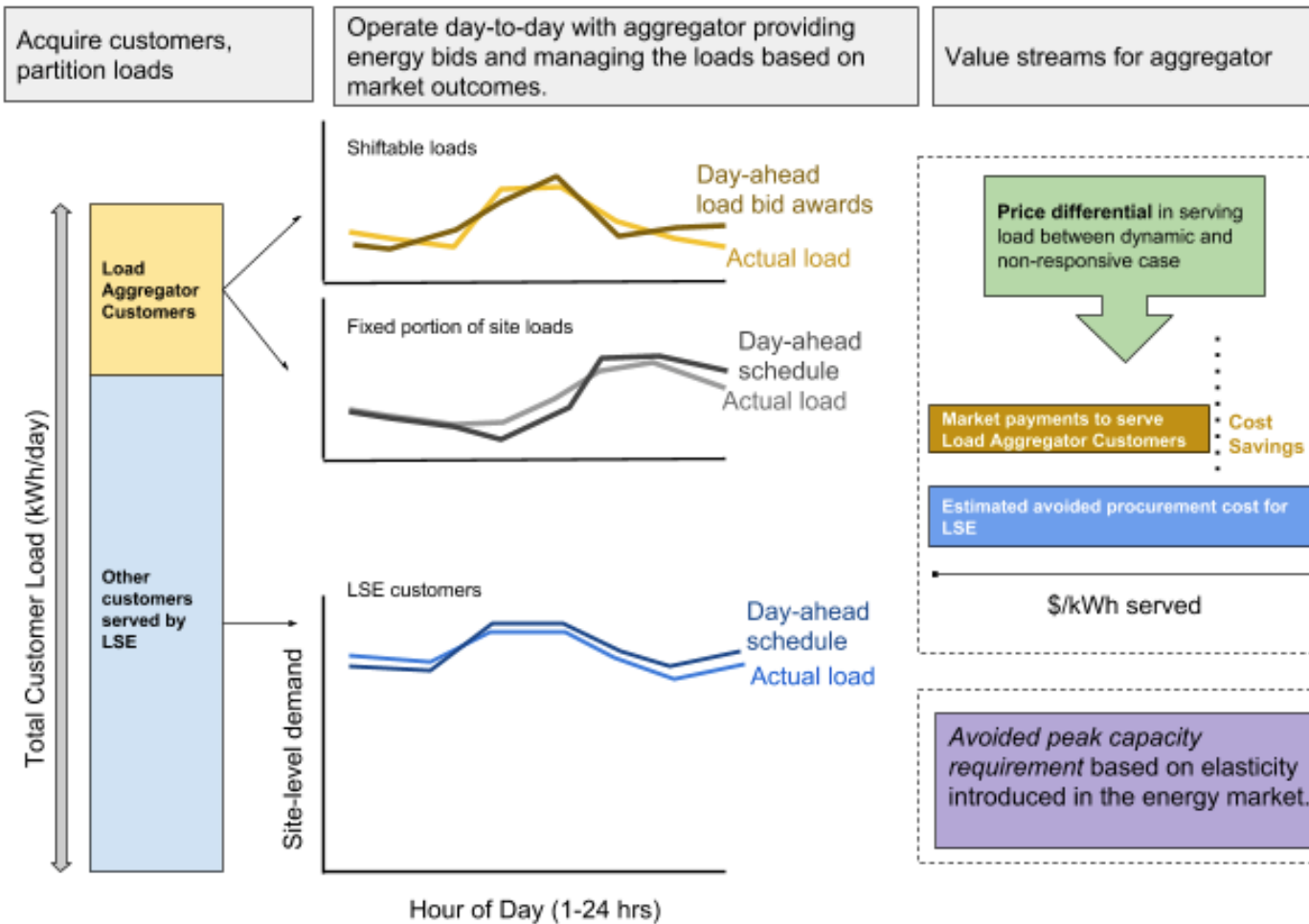
## TOU Price Effects



## Load Shift Bid Effects



# A demand bid business model concept



Key Issue for discussion later:

**How to settle between LSE, Aggregator, and Customer?**

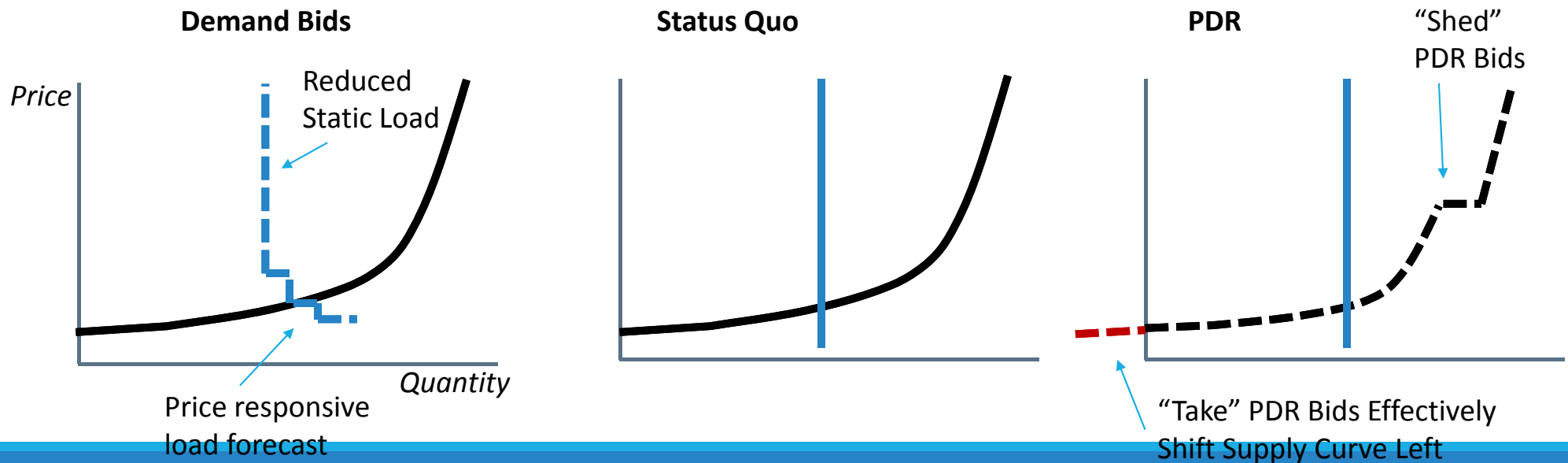
- Pass through RTP to customer, and customer fees to LSE?
- Estimate "baseline" expected cost of serving load vs. actual market procurement cost, and that revenue flows to aggregator, who provides customer incentives as bill modification.
- Other / hybrid?

# Demand Bid vs. Proxy Demand Resource (PDR)

Load bid steps add demand elasticity.

PDR modifies the supply curve

Theoretically, it is possible to get the same market price and demand response outcomes with either one.



# Demand Bidding Benefits

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**Conceptual elegance:** Let loads be loads --- don't need to act like a generator.

**May simplify CAISO settlements:** Potentially reduces the need for baselines.

- No baseline needed for CAISO settlements
  - Energy settled as measured (IFM and/or RT awards, with imbalance charges)
  - Could simplify / reduce data reporting to the CAISO
- A baseline may still be needed for payments to aggregators and/or customers
  - There is still a need to measure program performance, and allocate incentive payments (e.g. pay for performance)

# Demand Bidding Challenges

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**Reduction in geographic granularity:** Demand bids are placed at DLAP level, while PDR bids are at the SLAP level (finer control).

- Would not be able to dispatch for a Local RA need only
- There can be congestion (price difference) between SLAPs, where the CAISO would want to only dispatch one SLAP (or both, but in opposite directions).

**Limited Demand Bid steps:** Demand Bid can have only 10 steps, while there is virtually no limit on number of PDRs.

**Only LSEs can place bids:** DR Providers / customers need to go through the LSE, similar to existing DR programs

**LSE fragmentation:** demand bidding requires daily LSE participation, which may be a challenge across a growing number of CCAs.



California ISO

# Energy Storage and Distributed Energy Resources Phase 3 (ESDER 3)

## ***Load Shift Product***

Eric Kim

March 21, 2018



## Load shift product for behind the meter storage

- The load shift product is being developed as an enhancement to the PDR participation model.
- Initial focus on behind the meter storage load shift
  - Facilitates consumption/take of load during oversupply conditions with subsequent curtailment/shed as needed

### Key features

#### Maintains PDR

- Separation of LSE and DRP for load curtailment/consumption
- RA capacity qualification for load curtailment only
- Non-export rules for behind the meter storage
- Retail rate for charging

#### Adds to PDR

- Submits bids to consume load when Real Time market prices are negative
- Facilitates capabilities being developed in Day Ahead market enhancement initiatives (Imbalance Energy Reserves)

## Demand Response Provider Agreement

Proxy Demand Response	Reliability Demand Response Resource	Load Shift
<ul style="list-style-type: none"> <li>• Load curtailment</li> <li>• Resource Adequacy</li> <li>• Non-export</li> <li>• Rule 21</li> <li>• Economic product (bids both day ahead and real time)</li> </ul>	<ul style="list-style-type: none"> <li>• Load curtailment</li> <li>• Resource Adequacy</li> <li>• Non-export</li> <li>• Rule 21</li> <li>• Non-economic product (bids day ahead)</li> <li>• For contingency use only</li> </ul>	<ul style="list-style-type: none"> <li>• Load consumption</li> <li>• Load consumption does not qualify as Resource Adequacy</li> <li>• Non-export</li> <li>• Rule 21</li> <li>• Economic product (bids both day ahead and real time)</li> <li>• BTM storage participation <u>must</u> be sub-metered</li> </ul>

Load Shift Features	Notes
Load consumption is not RA capacity	PDR that provides both load curtailment and load shift will only be qualified for RA on load curtailment. Must bid according to must offer obligation for load curtailment.
Non-exporting product	Maintains resource as demand response.
PDR bids load consumption and curtailment directly with the CAISO	Maintains third party participation provisions.
Resource manages own state-of-charge SOC	Bidding of curtailment or consumption must reflect resource response capability.
Directly metered load with removal of “typical use”	Need to develop performance measurement specific to load shift participation to ensure incremental provision of service.
All load/energy is purchased at applicable retail rate settled by LSE	Maintains separation of LSE and DRP.
Ability to bid both a negative quantity and price for energy services	Evaluate the applicability of NBT to demand responding to negative pricing signal for consumption.

## Next Steps

- Hosting a technical working group meeting to discuss in detail the Load Shift and the recognition of an EVSE's load curtailment proposal.
  - March 29, 2018 (10 a.m – 4 p.m. PST)
  - RSVP by March 27 at <https://caiso.regfox.com/esder-phase-3-technical-working-group>

### **Phone Participation**

- Call: 877-369-5230, Access code: 0335696##

### **Web Connection**

- Web Address  
(URL): <http://ems8.intellor.com/login/804259>

# Buchalter

## **CLECA: Market “Participation” Through Retail Program informed by LMPs**

Presented by  
**Nora Sheriff, Counsel to CLECA**  
[nsheriff@buchalter.com](mailto:nsheriff@buchalter.com)

March 21, 2018

# Market Participation through Retail Program informed by CAISO Market Prices

Tasks

Proposal: Retail *Pilot* Program informed by  
~~LMPs~~ Wholesale Market Prices

Details: Why; Who; How; When

## TASKS

- Proposal for new load consumption and bi-directional products
- Whether and how to pay capacity value for load consuming and bi-directional products
- List of data access issues for new model of DR
- Proposal on how to better coordinate Commission and CAISO efforts to integrate new models of DR
- Proposal to ID value of new products to provide to RA proceeding before Jan. 31, 2019

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# PROPOSAL

- Pilot *Retail* Program for Market Participation Informed by LMPs Wholesale Market Prices
  - Similar to SDG&E Schedule VGI
    - hourly commodity base rate adjusted based on CAISO DA hourly price, plus adder for top 150 system peak hours, plus adjustment to reflect surplus energy hours
  - Similar customer communication/optionality as SCE RTP
  - No requirement for exact 1:1 load shift; allow more flexibility for customer response to wholesale market pricing signal



## PROPOSAL (2): Limited Pilot

- Limited to bundled large power customers
  - PG&E E-19, E-20; SCE TOU-8
- **MUST ALLOW DUAL PARTICIPATION WITH BIP**
  - No need for capacity value payment *if* can dual participate with BIP (capacity program) and pilot (energy program)
- Limited impact on the bundled rate
  - Generation component only
- Need to ensure communication between CAISO and Utilities re expected loads

## WHY

- **Why** enable pilot “participation” in the market?
  - Help reduce renewables curtailment
    - **EIM Q4 2017:** reduced renewable energy curtailment.  
Q4 estimated reduction = 18,060 MWh displacing approximately 7,730 metric tons of CO2
      - 9,444 MWh (October)
      - 5,974 MWh (November)
      - 2,642 MWh (December)

## WHY (2)

Per CAISO Q4 2017 EIM Benefits Report:  
Avoided Renewable Generation Curtailment

Year	MWh	Eq. Tons CO2
2015	31,082	13,220
2016	328,238	140,468
2017	161,097	68,951
Total	520,417	222,639*

\*CAISO Report totaled 222,657

## WHY (3) & WHO

- California customers should also be able to access that excess, low cost, renewable supply
- California customers have already paid for those renewable resources and will continue to pay for them in utility rates

Who:

- California customers, specifically, large manufacturers taking bundled utility service

## HOW

- Devil is in the details... TBD, but CLECA suggests modeling this pilot on SDG&E Schedule VGI and SCE Schedule TOU-8-RTP

## WHEN

- As soon as possible
- Should be sooner than retail rate TOU period changes (which CLECA understands will be the fall of 2019 at the earliest)

- Questions?
  - Nora Sheriff
    - Direct Dial: (415) 227-3551
    - Email: [nsheriff@buchalter.com](mailto:nsheriff@buchalter.com)
    - [www.buchalter.com](http://www.buchalter.com)
  - Paul Nelson
    - Direct Dial: (213)444-9349
    - Email: [paul@barkovichandyap.com](mailto:paul@barkovichandyap.com)

# Next Steps

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Recap: Prioritization and sequencing

Homework: Customer Perspective Assignment (4/18)

Upcoming meetings:

April 18

May 23

June 19

July 18

August 22