

**BEFORE THE PUBLIC UTILITIES COMMISSION
OF THE STATE OF CALIFORNIA**

Order Instituting Rulemaking to Enhance the
Role of Demand Response in Meeting the
State's Resource Planning Needs and
Operational Requirements.

Rulemaking 13-09-011
(Filed September 19, 2013)

**PACIFIC GAS AND ELECTRIC COMPANY'S (U 39-E), SOUTHERN
CALIFORNIA EDISON COMPANY'S (U 338-E), AND SAN DIEGO GAS &
ELECTRIC COMPANY'S (U 902-E) QUARTERLY LOAD SHIFT
WORKING GROUP STATUS REPORT**

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ATTACHMENT 1

Quarterly Report of the Load Shift Working Group (LSWG)

Pursuant to Decision (D.) 17-10-017

July 16, 2018

Facilitator	Gridworks
Working Group Member Organizations	Advanced Microgrid Solutions, California Efficiency + Demand Management Council, California Energy Storage Association, California Independent System Operator, California Institute for Energy and Environment, California Large Energy Consumers Association, California Public Utilities Commission (Energy Division and the Office of Ratepayer Advocates), California Solar & Storage Association, Center for Sustainable Energy, Clean Coalition, CPower, Douglas & Liddell, Energy Center, EnerNoc, Humboldt State University, Lawrence Berkeley National Laboratory, Natural Resources Defense Council, Nest, NRG Curtailment Solutions, OhmConnect, Olivine, OpenEE, Oracle, Pacific Gas & Electric, San Diego Gas & Electric, SCD Energy Solutions, SLAC National Accelerator Laboratory, Sonnen Batterie, Southern California Edison, Steffes, Stem, Strategen Consulting, Strategy Integration, and the Union of Concerned Scientists.

Overview of the Report

This Quarterly Report of the Load Shift Working Group reports on the following:

- A. The tasks for the working group per (D.) 17-10-017;
- B. Summary of the LSWG meetings held to date;
- C. Status of the issues/topics discussed in the working group; and
- D. Next Steps for the working group.

A. Tasks for the working group per D.17-10-017 and the Decision Modifying D. 16-09-056

- Defining and developing new products including load consumption and bi-directional products;
- Developing a proposal of whether and how to pay a capacity value for load consuming and bi-directional products to provide to the RA proceeding;
- Developing a list of data access issues relevant to new models that should be addressed prior to launching new models;
- Developing a proposal on how to better coordinate the efforts of the California Independent System Operator (CAISO) and the Commission;
- Identifying the value of new products to provide to the RA proceeding; and
- Considering an appropriate energy storage emissions metric, as part of any proposals involving energy storage.

B. Summary of Meetings Held:

The Load Shift working group has met three times since the last compliance report was submitted.

- Meeting 4: April 18, 2018 The April LSWG meeting agenda was designed around determining what the “grid needs” are and how grid needs link with operational requirements for a load take product. A summary of findings from the day include:
 - A load take product is increasingly viable as a competitive product as compared to export or renewables’ curtailment with higher levels of renewable energy penetration or more stringent GHG reduction goals. This assumes that retail rate structures are largely unchanged and that export limits are not increased.
 - Broadly, policy objectives when designing a load take product include: low cost, low pollution, maintained reliability, and provision of equal service to all customers.
 - Shift DR can provide additional value to the grid by considering local reliability needs and local distribution-system services by way of avoiding local renewables’ curtailment.
 - Revenue opportunities for shift DR should align with provision of services to meet grid needs.
 - CAISO identified the times of greatest grid need as the 3-hour evening ramping period, with fluctuating seasonality.
- Meeting 5: May 23, 2018 The May LSWG agenda addressed what grid needs the load take product could serve and a discussion around an enhanced PDR product:
 - Humboldt/LBNL presented on a revised Grid Needs Matrix, reflecting comments from stakeholders. This matrix is a working document to help the working group organize its thinking and identify a range of possible value streams based on the service the resource could provide.
 - PG&E presented on the oversupply analysis, which developed a heat map of average MW by hour per month of when CAISO’s non-dispatchable, GHG-free generation exceeds CAISO load for four years (2018, 2022, 2026, 2030) using publicly available data from IRP, CAISO’s resource mix, and IEPF load forecasts. This overview kicked off a discussion on forecasted need for a product that would need to compete with exports or renewables’ curtailment, as well as prompt discussion on the needed level of granularity of dispatch for a load take product.
 - CAISO presented on how PDR can be considered as a load take product, including key features of the PDR-LSR product, bidding behavior, energy services that can be provided, performance evaluation methodology, and “typical use” calculations.
 - The JDRPs presented an alternative to CAISO’s PDR-LSR model, which was modified to be both technology neutral and provide a response at the premise level.
- Meeting 6: June 19, 2018 The June LSWG meeting agenda focused on baselines. Specifically, the group discussed the CAISO’s proposal for baselines in ESDER 2, a PG&E/SLAC study on the effectiveness and limitations of ESDER 2 and load increasing baselines, baseline considerations the CAISO had considered when developing their load take product for BTM batteries, and an overview of how PG&E’s Excess Supply Pilot developed baselines for a load increase pilot. A summary of the baseline discussions yielded a set of additional questions to address related to:
 - 1) Frequent vs. Infrequent Dispatch
 - 2) Devise vs. Premise Participation
 - 3) Retail and Wholesale Participation
 - 4) Participation in both TAKE and SHED services
 - 5) Technology Impacts on a Baseline

C. Summary of Status of Working Group:

**Issues 1-5 were described in the April LSWG compliance report. Where applicable updates are provided.*

Issue 1: Technology Neutral

Issue Statement: Is being technology neutral a principle for the working group?

Background: A technology neutral product would allow any technology to participate as an eligible resource providing load take. Currently, in parallel, CAISO's ESDER 3 initiative is developing a load shift product (the Proxy Demand Response – Load Shift Resource (PDR-LSR) product²), which is limited to behind-the-meter, directly-metered batteries.

Majority/Minority Positions and Consensus/Non-Consensus Views: Majority: Technology neutrality is a priority. However, some technologies' or resources' operating characteristics may be better suited than others to provide load shift, similar to today's load reduction demand response (DR).

Recommended Policy Changes from Parties: The load take product should be technology neutral.

Status of Issue: Open or Closed: Closed.

Issue 2: Energy Neutrality

Issue Statement: Is being energy neutral a principle for the working group?

Background: An energy neutral product would mean that on a given interval (for market integration purposes, daily), total energy consumption ("take") would have an equivalent curtailment ("shed").

Majority/Minority Positions and Consensus/Non-Consensus Views:

- Majority: Energy neutrality is not an important feature of the load take product as:
 - There may not be symmetry in what the grid needs in the belly (take) vs. the neck of the duck (shed). As the grid needs are not symmetrical, the LSWG should not design a product around symmetry.
 - There is a risk that if we are too stringent in developing a product that is energy neutral, the LSWG will be limited in its ability to develop a product that is a viable CAISO alternative to the energy imbalance market (for real time export/energy transfers) or renewable curtailment. LBNL acknowledges that an exact match between load increase and load decrease is unlikely in real world conditions, and that the choice of modeling shift as energy neutral in the *2025 California DR Potential Study*³ was a simplifying assumption.
 - Some technologies are not inherently energy neutral (e.g., storage with efficiency losses, HVAC pre-cooling or thermal shifting that will lose heat or have operational adjustments, and energy efficiency) – which leaves valuable DR on the table if energy neutrality is required.
 - The fact that the load take product would still be subject to paying retail rates is a barrier to increasing consumption for the sole sake of compensation..
- Minority: CESA: Energy neutrality may be important as a means of ensuring "useful consumption" as consumed load is used to reduce load later (not necessarily symmetrical), which provides capacity and GHG benefits, whereas those benefits are not necessarily delivered through consumption decoupled from load shed.

Recommended Policy Changes from Parties: The DR new model product does not have to be energy neutral. Accordingly, it may be more aligned with the attributes of the product we are designing to refer to it as either "load take" or "load consumption". This will both avoid confusion and reflect the fact that the design of the product will not require that total energy consumption would be followed by an

² CAISO Initiative Homepage: Energy Storage and Distributed Energy Resources:

https://www.caiso.com/informed/Pages/StakeholderProcesses/EnergyStorage_DistributedEnergyResources.aspx

³ CPUC DR Potential Study Materials, including the LBNL Study: <http://www.cpuc.ca.gov/General.aspx?id=10622>

equivalent amount of curtailment. All three products under consideration, are currently designed around the concept of load increase.

Status of Issue: Open or Closed Closed.

Issue 3: Market Integration

Issue Statement: What does it mean for the load take product to be a market integrated product?

Background: The working group is exploring three paths to market integration including:

- 1.) An enhanced version of CAISO’s PDR-LSR product
- 2.) A program not integrated but influenced by wholesale triggers (e.g., PG&E’s Excess Supply Pilot)
- 3.) Load Bidding (currently theoretical)

Table 1: Comparison of Attributes of a Load Take Market Integrated Product

Attributes	PDR Enhanced:	Market Price Proxy Program	Load Bid
Description	A proposal to create a load increasing product for DR in the CAISO market. Distinct from PDR or RDRR.	A non-CAISO integrated market pilot which calls on participants to increase load based on a variety of factors, including wholesale market prices.	A proposal to incorporate all DR into an LSE’s load bid.
Dispatchable or Non-Dispatchable by CAISO	- TAKE is dispatchable by grid operator		- TAKE is non-dispatchable by CAISO at a granular level as the load increase would be integrated into LSE load bids
Status Today in the Market: Pathway to CAISO Dispatchability	- Not integrated today as it requires a new or enhanced CAISO participation model. - Could be integrated as a TAKE product with an independent SHED (i.e., PDR or used by customer)		- Load bidding available today - As load bidding is currently designed it does not allow for granular dispatchability by CAISO; dispatched at the DLAP
Technology neutral	Limited to BTM energy storage for the CAISO’s current PDR-LSR product proposal; a future version could be technology neutral	Yes	
Dispatched Energy Neutral	-Not by design as SHED is independent (could be bid in as PDR)	-Energy neutral take is not defined as a specific pilot’s rule, with participants largely influenced by retail rate to prevent frivolous use). Solving for grid needs first.	-N/A
Capacity Payment	-Possible for product if it meets flex RA attributes -TAKE solves an economic issue today; no current RA value		Unknown
Available to LSEs & Third Party DRPs	Yes		- Available to LSEs; third parties would not be able to bid independently from an LSE - Limited opportunity for differentiated load increase prices as LSEs only have 10 demand bid segments today.

Majority/Minority Positions and Consensus/Non-Consensus Views: There is no majority position or consensus to date on what it means to be market integrated (*e.g.*, whether it must be dispatchable in CAISO market or whether it is sufficient to be “informed” by CAISO market prices).

Recommended Policy Changes from Parties: No policy change recommended to date.

Status of Issue: Open or Closed Open; an ongoing discussion in the working group influenced by guidance from the CPUC and evolution of the three products described above.

Issue 3a: Dispatch Granularity

Issue Statement: When considering the market integration of a load take product, what granularity of DR dispatch best meets grid needs?

Background: The granularity of DR dispatch impacts what market issues the dispatch can resolve. For example, a more granular dispatch allows local conditions to be addressed (*i.e.*, local curtailment or local negative pricing). Each of the products discussed to date have varying levels of dispatch granularity. Today, market integrated DR as PDR is dispatched based on the aggregated pricing node (APNODE) which can be defined as a single resource or an aggregation of resources (but can only be as large as a sub-LAPs boundaries).

Table 2: Granularity of Load Take Dispatch for Each Proposed Product

Product	Granularity of Load Take Dispatch		
	LSE DLAP (<i>i.e.</i> , LSE service territory). Mitigates: a.) CAISO system-wide curtailment b.) System-wide negative pricing	APNODE Mitigates: a.) Local area/sub-lap curtailment b.) Local area negative pricing	Resource Level Mitigates: a.) Local area/sub-lap curtailment b.) Local area negative pricing
PDR		X	X
Informed by Wholesale Prices	X	X	X
Load Bidding	X		

Majority/Minority Positions and Consensus/Non-Consensus Views: N/A

Recommended Policy Changes from Parties: N/A

Status of Issue: Open. This is an operational attribute being discussed as a part of the criteria for the LSWG and tied to the value a load take product provides. It is an ongoing discussion item.

Issue 4: Issues out of scope

Issue Statement: What are issues that are related, but out of scope of the LSWG?

Background: There may be some issues that are related to the working group but are out of scope.

Majority/Minority Positions and Consensus/Non-Consensus Views: The consensus, based on direction from the Commission is that both rates and DR serving a distribution need are out of scope, as:

- Rates are being addressed in the GRC Phase 2 and Rate Design Windows. While a future product should not be a retail rate, it should be complementary and mindful of what is occurring related to rates.
- DR as it relates to serving a distribution need is being addressed in both the Distribution Resources Plan (DRP) and Integration of Distributed Energy Resources (IDER) proceedings.

Recommended Policy Changes from Parties: N/A. No policy change recommended

Status of Issue: Open or Closed: Closed.

Issue 5: Threshold Questions

Issue Statement: What are threshold questions that need to be answered for the working group to proceed?

Background: There may be some issues that need to be addressed prior to moving forward with defining a load take product.

Majority/Minority Positions and Consensus/Non-Consensus Views:

The majority position of the group is that there are threshold questions that warrant future sessions before creating the product definition of load take product(s).

- What do we mean by “CAISO integrated” when it comes to a requirement for this product?
 - Update: Addressed in Issue 3 “Market Integration”
- What do we mean by dispatchability as it relates to this product?
 - Update: Addressed in Issue 3 “Market Integration”
- What is the value of this product to the grid?
 - Update: This Issue will now be updated to “Value of Load Take to the Grid”

Recommended Policy Changes from Parties: N/A

Status of Issue: Open or Closed: Open. Issue 5 “Threshold Questions” will now be re-named, “Value” in order to answer, “What is the value of load take to the grid?” as the remaining threshold question. This value will be based on defining what value it provides to the grid and will be incorporated into future LSWG meeting agendas.

Issue 6: Safety and Reliability of the Distribution System

Issue Statement: How will we ensure that a load take DR product does not negatively impact the safety and reliability of the distribution system?

Background: If resources increase load in a manner that is not consistent with how they have been studied by the Utility Distribution Company during the interconnection and distribution planning processes to operate on the distribution system there could be distribution level safety and reliability impacts. Additional safety and reliability problems could result if DER operators are unaware of circuit reconfigurations that affect their DERs (i.e., abnormal configurations).

Majority/Minority Positions and Consensus/Non-Consensus Views: Issue in progress. The Utility Distribution Company perspective is that processes to ensure resources are properly interconnected, studied, and later operated will be needed as it relates to a load take resource.

Recommended Policy Changes from Parties: N/A to date; issue in progress. This does have cross over with the work in Rule 21.

Status of Issue: This will be a topic of a future working group meeting.

Issue 7: Performance Evaluation Methodologies

Issue Statement: What baselines are most appropriate for a load take product?

Background: Baselines are used to determine typical use to assess what service was incremental for compensation. Baselines are a means of estimating what would have been used by a facility or device participating in a DR program if a DR event had not been called. Because it calculates normal energy usage, the baseline is the most important tool to measure participant’s change in load during an event. FERC has summarized the need for accurate measurement and verification of DR baseline performance as⁴:

⁴ FERC. Measurement and Verification for Demand Response. Vii. <https://www.ferc.gov/industries/electric/industryact/demand-response/dr-potential/napdr-mv.pdf>

1. Providing accurate payments to DR resources leads to improved market efficiency at both the wholesale and retail level.
2. The ability to predict DR response at the individual and aggregate level improves operational efficiency for both wholesale and retail markets.
3. Measured DR performance is a key input to planning and designing retail programs (i.e., accurate cost-effectiveness assessments).
4. Meaningful measurement provides the basis for fair and transparent financial flows to and from market participants.

To date baselines have been researched and viewed from the perspective of load curtailment. The working group still has questions related to how baselines developed to date can be applied to a load take product.

Majority/Minority Positions and Consensus/Non-Consensus Views:

- The working group has members with the perspective that the proposed ESDER 2 baselines cannot be applied to a load take product. (Olivine)
- The working group also has members with the perspective that there is not any evidence to prove that all baselines, including those developed in CAISO’s ESDER 2 initiative, can be applied to a load take product and therefore research may be needed. (CAISO, PG&E)

Recommended Policy Changes from Parties: While there is no recommend policy position, there is general recognition that the themes discussed throughout baseline discussions warrant additional consideration. Many of these issues do not just affect baselines for load consumption but also load curtailment due to the changing nature of what resources are participating in demand response.

1. Frequent vs. Infrequent Dispatch

- **Background:** With new technologies such as batteries providing load response, DR is moving from a product that is infrequently dispatched to one that is dispatched more frequently.
- **Questions:**
 - What constitutes frequent use?
 - Can baselines still capture incrementality with frequent use?

2. Device vs. Premise Participation

- **Background:** For some load it may be beneficial to only have a device participate, for other load it may be beneficial to have the premise participate.
- **Question:**
 - How do we ensure the net grid impact is in a desired direction to support grid needs?
 - How do we design baselines so that either the device’s participation in a DR event does not impact the settlement associated with the premise participating in DR or vice versa?

3. Retail and Wholesale Participation

- **Background:** There are both retail and wholesale DR settlement methods which may not be aligned.
 - i. **WHOLESALE:** The baseline is settled in aggregate for the performance of energy.
 - ii. **RETAIL:** Baseline is typically settled at the individual resource level for the performance of energy. In some cases such as PG&E’s Capacity Bidding Program, the retail capacity is tied to an energy baseline.

- **Questions:**
 - How do we design programs that do not provide payment for the same capacity between retail and wholesale?
 - How do we design programs so that consumption in the wholesale side in response to an event on the retail side does not affect the baseline?
- 4. Participation in both TAKE and SHED services**
- **Background:** With new models of DR you could have a resource that provides both TAKE and SHED services. For example, in ESDER 3, CAISO’s PDR-LSR product allows a DR resource to provide take and shed services in different intervals.
 - **Questions:**
 - How do we develop a baseline that does not introduce more bias in estimating the typical use when the resource provides TAKE and SHED services?
 - How can CAISO integrate a DR resource that provides TAKE and SHED that does not result in conflicting dispatch signals?
- 5. Technology Impacts on a Baseline**
- **Background:** Different technologies may have different abilities or characteristics that influence the development of a baseline.
 - **Questions:**
 - How can we develop a baseline for storage so that its actions taken in previous intervals do not introduce bias into the baseline?
 - How can we develop a baseline for a device that can move (i.e. EVs can move from the EVSE charging station to the premise)? Should each device have its own baseline?

Status of Issue: Open. There is agreement that baselines are necessary to determine what value the DR resource is providing. However, many of the baseline issues described above are not just applicable to a load take product but also applicable to DR for load curtailment. The topic of baselines is being discussed in CAISO’s ESDER 2 tariff implementation as a part of implementing new baselines and in CAISO’s ESDER 3 policy development for a load take product, and may warrant additional discussion in future DR meetings. SLAC is also conducting research on performance evaluation methodologies as it relates to the ESDER 2 baselines and DR that is frequently dispatched and increases load.

Issue 8: Storage GHG Emissions Metric

Issue Statement: How will the working group consider incorporating a GHG emissions metric for storage into the load take product?

Background: On May 15, 2018 the CPUC issued their Decision Modifying D. 16-09-056 as a part of the Prohibited Resources proceeding which states in Ordering Paragraph 3 that, “The Load Shift Working Group established in Decision 17-10-017 should consider an energy storage emission metric for any storage related proposal.”

Majority/Minority Positions and Consensus/Non-Consensus Views: N/A

Recommended Policy Changes from Parties: N/A

Status of Issue: Open. The July 18, 2018 working group meeting will brief stakeholders on this issue and develop a plan for addressing this new issue.

Issue 9: Evaluation Criteria

Issue Statement: How will the LSWG evaluate each product?

Background: To evaluate the load take products, the working group is planning on applying each of the criteria below. The purpose of the criteria is to provide a common comparison of proposals for a load take product. Key criteria in the evaluation framework will include:

1. Is this product technology neutral?
2. To what extent is this product market integrated?
 - a. Is this product dispatchable by CAISO?
3. What grid needs does this product solve?
 - a. What are the operational requirements of this product?
 - i. At what geographic granularity is this product needed?
 - ii. What frequency of dispatch is needed (i.e., x/day, x/month)?
 - iii. What is the response time needed by the grid (i.e., RT, FMM, DA)?
 - iv. What duration of operation is needed (i.e., 5 min, 15 min, 1 hour, 2 hours)?
 - v. What is the notification time to the participant?
 - vi. What kW size is needed by the grid?
4. How is the value determined for each of the grid needs this product addressed?
5. Is the product delivering an incremental service?
 - a. How will we measure performance? (i.e., a baseline or direct metering?)
6. Is this product available to all parties (i.e., IOU LSEs, CCAs, and third-party aggregators)?
7. What is the anticipated ability of customers to respond to the product?

Majority/Minority Positions and Consensus/Non-Consensus Views: N/A

Recommended Policy Changes from Parties: N/A

Status of Issue: Open. As the products under consideration evolve, the LSWG may need to re-evaluate or further define the criteria that has been developed to date.

D. Next Steps:

The working group currently has scheduled meetings for: July 18, August 22, September 17, and October 18. Future compliance reports are due October 15 and January 15, until the final report is served on January 31, 2019.