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Comments on Discretionary policy initiatives catalog submission

Annual policy initiatives roadmap process - 2024

Joint Demand Response Parties

Submitted on behalf of
OhmConnect, California Efficiency and Demand Management Council, Leapfrog Power, Inc.

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1. Submission Title

First entry provide responses to questions 1-7.

Device-Level Metering Proposal

2. Has this issue been previously submitted?

No

3. Issue Description: Briefly provide a description of the issue that the proposed initiative is intended to address.

When advanced metering infrastructure was first introduced in California in 2010-2011, it heralded a new era for grid management. For the first time, utilities were able to receive electricity usage data in real time from millions of customers. The installation of smart utility meters appeared to also usher in a new era for residential demand response, enabling the measurement of the real-time energy reductions of customers participating in demand response programs. But technology and the market have developed in very different ways than could be envisioned over a decade ago.

Today, millions of smart devices capable of both measuring energy consumption and receiving dispatch instructions are in California homes. The exponential growth of smart devices will continue with the state's clean energy goals of installing six million heat pumps by 2030 and eliminating the sale of gas-powered vehicles by 2035. As electrification trends upward, the grid will see higher peaks, but also greater opportunity for demand flexibility. And, thanks to SB 49 (Skinner), the California Energy Commission is adopting standards for appliances that facilitate flexible demand technologies in everything from pool pumps to heat pump water heaters to refrigerators.

But, since fewer than 5% of IOU customers are enrolled in a demand response program, the vast majority of existing smart devices are not currently measured or controlled for the purpose of demand flexibility. If we could measure and control the energy use in those smart devices, the potential benefit to the grid and the grid operator is stunning: an estimated 4 GW of controllable flexible load today – and 20 GW of controllable flexible load by 2030 if California meets its EV and home electrification goals. Unfortunately, however, the continued reliance on smart meter data has many crippling shortcomings in the context of the proliferation of smart devices and the grid's need for demand flexibility:

- CAISO has limited visibility into the quantity and type of devices behind the utility meter that can respond to market signals;
- Meters only record data and do not modify load;
- Current smart meter-based rules limit participation to a single demand response provider;
- The click-through authorization process for sharing utility meter data is cumbersome and many potential demand response customers do not complete the process - providers see completion rates from 35-50%;
- There are many OEMs in the smart device ecosystem; devices are often not interoperable by a single DRP.

Device level information for demand response, by contrast, has many important benefits:

- Dramatically increased participation of distributed energy resources in the ISO's wholesale energy market. Estimated potential of 5 GW for existing smart devices today and 20 GW by 2030 if California meets its EV and home electrification goals;
- Faster and more accurate measurement of load curtailment;
- Increased situational awareness with visibility into the quantity and types of devices responding to market signals;
- Dual participation in conflicting programs can be determined at the device level;
- Does not require meter data for participation or settlement;
- Enables greater customer choice of DRP for devices, aggregators, or IOUs.

4. Propose Initiative Description: To the extent possible, discuss proposed initiative scope. What elements of existing ISO market design do you propose to address?

The Demand Response Registration System (DRRS) should be modified to accommodate device level locations. There is precedent for expanding the capabilities of DRRS: the Energy Storage and Distributed Energy Resources (ESDER) initiative allowed the designation of device types. Similar to the ESDER changes to DRRS, the following modifications would identify participating devices and prevent dual participation of individual devices and premises:

- Expand the number of device types to include capable devices (i.e. heat pump water heaters);
- Add a field for device serial number.

Device-level energy usage data should be permitted for performance evaluation and settlement of Proxy Demand Resources (PDRs). The CAISO Business Practice Manual for Metering, Attachment G Technical Metering Specifications for DER Devices 0.2% accuracy requirement applies if local regulatory standards do not exist. The California Public Utilities Commission (CPUC) previously adopted standards outside of CAISO's requirements for electric vehicle supply equipment. In D.22-08-024, the CPUC concluded it should adopt submeter accuracy standards of 1 percent accuracy tolerance and 2 percent maintenance for electric vehicle supply equipment (p. 40). The CPUC should adopt similar accuracy standards for other device types.

Device level data would undergo the validation, editing, and estimation process to arrive at settlement quality data based on the Business Practice Manual for Metering Attachment H: Data Validation, Estimation and Editing (VEE) for DER Devices if the CPUC does not adopt a different requirement. Existing baseline methodologies described in Section 4.13.4 of the CAISO tariff (and the Business Practice Manual for Demand Response) could be applied to calculate demand response energy measurement (DREM). This proposal requires changes to both the CAISO tariff Section 4.13.4 and the Business Practice Manual for Demand Response to accommodate device level measurement.

5. Business Justification: Does the propose initiative support ISO strategic objectives or existing ISO initiatives? Identify parties potentially impacted by the proposed initiative. Is the proposed initiative in response to regulatory requirements?

This proposal is well aligned with CAISO's strategic objectives one and two shown below:

- Strategic Objective 1
  - Reliably and efficiently integrate new resources by proactively upgrading operational capabilities
    - Modernize tools that support control center operations
    - Ensure IT is secure, scalable, and resilient
    - Increase coordination with distribution system operators
- Strategic Objective 2
  - Strengthen resource adequacy and meet California's SB 100 goals through long-term transmission planning and effective coordination with state agencies

Senate Bill 100 (SB 100, De León) "The 100 Percent Clean Energy Act of 2018" updated the renewable portfolio standard to 60% by 2030 and set a goal that all retail electricity is served by renewables and zero-carbon resources by 2045. According to the 2021 SB100 Joint Agency Report, the state must build 6 gigawatts of new solar, wind, and battery storage annually to meet those goals. However, future risks to the timely procurement and commercial operation of supply resources abound. D.24-02-047 cited the following risks listed in PG&E's most recent Integrated Resource Plan: "Uncertainties regarding project development timeframes including supply chain constraints or delays; Significant demand for projects,

including new construction and emerging resources as LSEs ramp up procurement for increasing GHG emissions reductions and Renewables Portfolio Standard (RPS) requirements for 2030 and beyond; Potential cost impacts due to state and federal policy changes in tax credits and/or tariffs on imported materials; Potential increase in demand due to increased electrification, especially across the transportation sector; Potential transmission constraints for new projects, and potential scarcity of viable projects if required transmission infrastructure does not keep pace with the number of new resources needed; and Potential for competition for out-of-state resources as jurisdictions out of California increase their climate mitigation efforts (p. 43)." The state policy goals and their associated risks to the bulk power system underscore the need for demand-side solutions to maintain system reliability, as recognized by the North American Electric Reliability Corporation (NERC).

The 2023 NERC Reliability Issues Steering Committee (RISC) 2023 Reliability Risk Priorities Report (RISC Report) notes that reliability considerations must match the rapid pace of grid transformation (p. 7). For the first time, the biannual report includes a new risk profile: energy policy. The RISC Report acknowledges there are numerous policy issues, but to enhance reliability, it's crucial to prioritize three policy areas: energy adequacy, coordination between natural gas and the electric industry, and Distributed Energy Resources (DERs)(p. 7). The fast expansion of DERs brings greater opportunity for load flexibility. One subset of DERs, demand response, particularly load modifying smart devices, presents an opportunity to both increase the visibility and number of devices that can respond to market signals. The RISC Report also notes the importance of understanding the grid-supporting capabilities and potential interactions of all technologies and resources and accurately including them in planning and operating analyses (p. 25). Integrating smart devices at the market level in DRRS with details of the technology type and location will inform the ISO's planning and operational needs to harness and maximize their reliability benefits, meeting the strategic objectives of the ISO.

6. Timing and Urgency: Are there regulatory requirements for implementation dates, or time-sensitive reliability impacts? Are there consequences to not addressing this issue?

There are presently no regulatory requirements for the implementation date of this proposal. However, there is substantial urgency to begin efforts to develop the market models and regulations to support device level PDR participation beyond EVSE given the continuance of California's capacity shortage and expected rapid growth of smart devices.

7. Data: Identify existing data and missing data needed to analyze the issue and develop solutions.

The submitting parties are not aware of any data requirements for this issue and solution set.

8. Submission Title

Second entry provide responses to questions 8-14.

Modified Proxy Demand Resource (mPDR) Proposal

9. Has this issue been previously submitted?

No

10. Issue Description: Briefly provide a description of the issue that the proposed initiative is intended to address.

This proposal is focused on the implementation of a Modified Proxy Demand Response (mPDR) product. mPDR is a variant of the Proxy Demand Resource (PDR) product that enables customers with behind-the-meter (BTM) storage (either storage only or solar plus storage) to have their exports counted by netting performance at the Sub-Load Aggregation Point (Sub-LAP) level rather than having exports zeroed out at the individual customer meter level. This concept contemplates an aggregation with a mix of storage and non-storage customers that permits customer exports as long as there are no net exports at the Sub-LAP level of the aggregation. The information provided within this proposal is based primarily on content contained in the Energy Division's August 2023 Industry Briefing (Industry Briefing) titled *Modified Proxy Demand Resource (mPDR)*.

11. Propose Initiative Description: To the extent possible, discuss proposed initiative scope. What elements of existing ISO market design do you propose to address?

This proposal creates a new variant of the PDR, called the mPDR, to more accurately reflect the load reductions of PDR participants with BTM energy storage and Rule 21 export permits. Currently, PDR performance is calculated in aggregate and excludes measured export of energy from any of the individual locations. The primary existing PDR performance evaluation options for energy storage are the Day Matching 5-in-10 and 10-in-10 baseline methodologies, the metering generator output ("MGO")

methodology (including MGO with customer baseline), and the Proxy Demand Resource-Load Shift Resource (PDR-LSR). The Distributed Energy Resource Provider (DERP) is a separate model that is not discussed here as it is ineligible for RA.

The MGO methodology calculates performance solely on the output of the separately metered generator, based on the output in excess of its generating baseline (BPM for DR Section 5.1). However, for individual locations that have intervals in which the net meter shows exports, the amount settled for that interval is zero. This performance evaluation option does not take into account changes in the facility load of the premise. The MGO with customer load baseline methodology incorporates both the behind the meter generator and facility load (BPM for DR Section 5.2). By contrast, the Day Matching 5-in-10 and 10-in-10 baselines measure performance at the individual customer meter (rather than at separately metered generators).

Both of the MGO options and the PDR-LSR are problematic for two reasons: 1) they require separate metering of a generator in addition to the utility meter, and 2) intervals with exports do not receive full credit for settlement. First, securing and installing an additional meter of a generation resource is cost prohibitive for residential customers. Second, the assignment of a zero value for intervals showing exports cuts out a significant portion of the value that a BTM battery can provide the grid. By not allowing battery exports to count towards a PDR's performance in RA, customers are effectively forced to derate capacity nominations for their battery resources.

Due to the technical requirements of the MGO baseline and need for multiple streams of interval data for each device, most customers with BTM storage use the 5-in-10 or 10-in-10 baseline methodologies. However, these methodologies still face the second issue described above because the CAISO's Business Practice Manual specifies that DR performance measurements cannot include exports. As a result, any intervals in which the utility meter load falls below zero will not be credited toward that meter's performance, meaning that battery storage exports beyond the existing site load will still not be compensated. As a result, BTM battery capacity in RA is effectively limited to the site load, regardless of the actual capacity of the BTM battery at that site.

The mPDR addresses these issues by allowing a customer's energy exports to be counted at the resource level as long as aggregate net load of storage and non-storage customers at the sub-LAP level is greater than zero. This effectively means that performance in demand response (DR) events will be measured at the sub-LAP rather than the individual customer meter. If a Rule 21-compliant battery exports power to the grid, it will lower the effective load at that sub-LAP, showing an overall improved performance in that DR event and allowing the aggregator managing that battery to nominate that battery's full capacity for that event. Net exports across the sub-LAP "virtual meter" (i.e. a situation where the sub-LAP load is negative) will not be counted, so from an operating perspective this would only ever look like a load reduction at the relevant sub-LAP.

This proposal requires revisions to the CAISO tariff section 4.13.4. The BPM for Demand Response also requires editing to implement mPDR. The Product Overview (Section 2.1) refers to the overall treatment of exports in PDR. Existing sections that detail the performance calculation methodologies that utilize MGO formulas may be revised if warranted (BPM for DR Sections 5.1, 5.2, and 5.7). DRRS and existing processes should be able to accommodate the mPDR concept without any major changes.

A deliverability study should not be needed to implement mPDR. NEM customers are not subject to deliverability requirements because they are netted with load, and similarly, all participants in an aggregation are located within the same sub-LAP and net energy export would be disallowed at the aggregation level; no energy would be transferred to the transmission system. Exports are likely to be consumed by other nearby customers. Alternatively, a MW cap for exports allowed within a mPDR could be instituted as a stepped-approach while deliverability processes are considered. Additional concerns around deliverability can be addressed during the stakeholder process.

To establish qualifying capacity, it is recommended that the methods in place at the time of implementation are utilized. Given that the mPDR participant mix will include both storage and non-storage customers, the method available today would be the Load Impact Protocol process. However, at the time mPDR becomes a viable performance evaluation option, the supply-side incentive based methodology or some other option may be available.

12. Business Justification: Does the propose initiative support ISO strategic objectives or existing ISO initiatives? Identify parties potentially impacted by the proposed initiative. Is the proposed initiative in response to regulatory requirements?

This proposal would advance the following CAISO Strategic Objectives from its 2022-2026 Strategic Plan:

- Strategic Objective 2: Strengthen resource adequacy and meet California's SB 100 goals through long-term transmission planning and effective coordination with State agencies.
    - 2C: Sharpen the CAISO's resource adequacy strategy and clarify priorities for engagement in CPUC and CEC policy processes.
- Strategic Objective 3: Build on the foundation of the Western Energy Imbalance Market (WEIM) to further expand western market opportunities.
    - 3C: Enable new technologies through efficient market rules and interfaces.

Specifically, this proposal would allow for and incentivize greater participation of BTM storage in the RA program and broader WEIM, providing additional resources at a time when the state is still facing a capacity shortage. At the end of 2023, California had approximately 843 MW of residential battery capacity in the state. However, because the PDR construct does not currently compensate batteries for grid exports, only a relatively small portion of this available capacity is accessible by grid operators.

In a recent pilot project by PG&E testing residential battery exports to the grid (PG&E Emerging Technologies project number ET21PGE7300), the utility found that Tesla Powerwall owners could discharge an average of 4.5 kW to the grid during DR events between the hours of 4 to 9pm. Because this pilot was conducted in October and November, this equated to roughly 3.3 kW of exports per battery. If these battery exports were not credited towards DR performance, the customers' performance would essentially be capped at their household load of around 1.2 kW, reducing the value of these batteries to roughly 27% of their total potential.

Assuming this performance holds true for the majority of residential battery owners in California, this means that close to 620 MW of BTM battery capacity is "inaccessible" to grid operators because there is no mechanism in PDR that will compensate resources for that capacity. Although this estimate may be lower during periods of peak demand when households' site load is higher, it also doesn't include C&I battery installations, many of which are substantially larger than residential systems and can face similar challenges from lack of mechanisms to credit exports. Moreover, BTM storage participation levels in RA are hindered by the reduced compensation expectations as a result of the lack of credit for exports. The opportunity to earn higher revenue will incentivize more customers to participate.

This represents a significant amount of additional capacity that would theoretically be accessible today if exports were credited, and in the future, this potential will grow substantially. If residential battery storage installations rates continue to increase linearly at the same growth rate exhibited over the past five years, California will have over 1.9 GW of residential battery capacity in 2030, roughly 1.4 GW of which would be inaccessible if there is no incentive for them to export to the grid. This is a substantial amount of lost capacity, and it is a relatively conservative estimate considering that Tesla's next generation of Powerwalls are slated to have nearly twice the exporting capacity as those used in the PG&E pilot.

The scale of additional capacity from DER exports will be even more significant as electric vehicles become more ubiquitous across California. The state currently has a goal of having 5 million zero emission vehicles (ZEVs) operating in the state by 2030. By that point, the ability for EVs to export power back to the grid will likely be more common as bidirectional charging technology becomes more widespread. Many passenger EVs also have export capacity greater than the Powerwalls used in a PG&E pilot, approximately 11.5 kW per Level 2 charger. If California meets its ZEV target, and if even 10% of those batteries are passenger EVs participating in vehicle-to-grid export programs, this would equate to a roughly 5.1 GW resource that would be available for CAISO to dispatch provided its RA rules allowed for exports from distribution-connected resources.

There has been significant effort made by energy storage providers in the CPUC's Resource Adequacy proceeding to develop Qualifying Capacity (QC) counting rules for exporting BTM energy storage. However, the inability to receive credits for exported energy is a major barrier - or even the primary barrier - to BTM energy storage participating in Resource Adequacy. If a market product that compensates exporting BTM energy storage can be created in the CAISO market, then recognition by the CPUC as a Resource Adequacy product (like the PDR and Reliability Demand Response Resource (RDRR)) would likely follow. Establishing an "mPDR" product would constitute a substantial step forward in the ability for BTM battery exports to be credited in RA, bringing substantial new capacity into the market today and in the future.

13. Timing and Urgency: Are there regulatory requirements for implementation dates, or time-sensitive reliability impacts? Are there consequences to not addressing this issue?

There are presently no regulatory requirements for the implementation date of this proposal. However, there is considerable urgency to start implementation given the continuance of California's capacity shortage, expected rapid growth of BTM battery and EV sales in California, and multiple steps downstream of finalizing an mPDR proposal, such as incorporating in the year-ahead Net Qualifying Capacity process.

14. Data: Identify existing data and missing data needed to analyze the issue and develop solutions.

The submitting parties are not aware of any data requirements for this issue and solution set.

15. Submission Title

Third entry provide responses to questions 15-21.

16. Has this issue been previously submitted?

17. Issue Description: Briefly provide a description of the issue that the proposed initiative is intended to address.

18. Propose Initiative Description: To the extent possible, discuss proposed initiative scope. What elements of existing ISO market design do you propose to address?

19. Business Justification: Does the propose initiative support ISO strategic objectives or existing ISO initiatives? Identify parties potentially impacted by the proposed initiative. Is the proposed initiative in response to regulatory requirements?

20. Timing and Urgency: Are there regulatory requirements for implementation dates, or time-sensitive reliability impacts? Are there consequences to not addressing this issue?

21. Data: Identify existing data and missing data needed to analyze the issue and develop solutions.

22. Submission Title

Fourth entry provide responses to questions 22-28.

23. Has this issue been previously submitted?

24. Issue Description: Briefly provide a description of the issue that the proposed initiative is intended to address.

25. Propose Initiative Description: To the extent possible, discuss proposed initiative scope. What elements of existing ISO market design do you propose to address?

26. Business Justification: Does the propose initiative support ISO strategic objectives or existing ISO initiatives? Identify parties potentially impacted by the proposed initiative. Is the proposed initiative in response to regulatory requirements?

27. Timing and Urgency: Are there regulatory requirements for implementation dates, or time-sensitive reliability impacts? Are there consequences to not addressing this issue?

28. Data: Identify existing data and missing data needed to analyze the issue and develop solutions.

29. Submission Title

Fifth entry provide responses to questions 29-35.

30. Has this issue been previously submitted?

31. Issue Description: Briefly provide a description of the issue that the proposed initiative is intended to address.

32. Propose Initiative Description: To the extent possible, discuss proposed initiative scope. What elements of existing ISO market design do you propose to address?

33. Business Justification: Does the propose initiative support ISO strategic objectives or existing ISO initiatives? Identify parties potentially impacted by the proposed initiative. Is the proposed initiative in response to regulatory requirements?

34. Timing and Urgency: Are there regulatory requirements for implementation dates, or time-sensitive reliability impacts? Are there consequences to not addressing this issue?

35. Data: Identify existing data and missing data needed to analyze the issue and develop solutions.

Attachments

- Briefing on Modified PDR.pdf