Comments of Pacific Gas & Electric Company

Energy Storage and Distributed Energy Resources (ESDER)

Revised Issue Paper and Straw Proposal

Submitted by	Company	Date Submitted
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Summary of Comments: PG&E appreciates the opportunity to provide comments on the ESDER Revised Straw Proposal. PG&E has foundational policy and implementation concerns, but looks forward to working with the CAISO and other stakeholders to address these concerns prior to the CAISO releasing a Draft Final Proposal. Accordingly, PG&E requests that the CAISO delay the ESDER initiative. In summary, PG&E:

1.) Believes the CAISO should delay its timeline for ESDER in order to allow stakeholders to develop thoughtful feedback in light of:

- Changes in CAISO's policy (i.e. allowing heterogeneous multi-p-node Distributed Energy Resource Aggregations) in the Expanded Metering and Telemetry Phase 2 Initiative, which recently re-opened and will go to the CAISO Board of Governors for approval in November.
- Inadequate time to review the mathematical formulation of how the state of charge (SOC) affects economic dispatch in the NGR model.
- Developments in the CPUC's Energy Storage OIR that need to align with ESDER. Track 2 issues, slated to begin in October, will address multiple-use application topics including the determination of retail versus wholesale energy, cost recovery, interconnection, metering, and dispatch coordination. In addition, the CPUC's Distribution Resources Plan and Integrated Distributed Energy Resource proceedings will address the grid operational and cost-shifting issues associated with various behind the meter DERs. The CAISO should not move forward with its similar initiatives until it has coordinated with the CPUC.
- Pending outcomes of the Supply Integration Working Group effort, which should more deeply inform CAISO's stakeholder process.

2.) Recommends that the CAISO and the CPUC work closely together to jointly develop examples to clarify to stakeholders how the rate treatment, metering and interconnection issues will work for behind-the-meter (BTM) storage. In these comments, PG&E has provided an example of a behind-the-meter storage device which charges (at a wholesale rate) to later discharge into customer load and export as a part of an NGR bid. Discharge to serve customer load provides a retail service, while exporting to the CAISO is a wholesale function. Even with separate metering, it would be difficult to determine what portion contributed to retail load shifting versus the CAISO bid. PG&E is concerned that the failure to pay for distribution grid use to serve a retail need, would disrupt the CPUC's allocation of revenue responsibility between different classes of ratepayers.

3.) Request that the CAISO develop a roadmap with the CPUC on issues such as sub-metering, billing requirements, rates and meter ownership.

4.) Applauds the CAISO's work on the SOC management in the NGR model, but discusses four NGR model limitations, to guide future enhancements and to explain why these limitations make it more efficient for market participants to manage the SOC of owned energy storage resources until the NGR is further enhanced.

5.) PG&E requests that the CAISO provide a more robust design and documentation with examples of the proposed Distributed Energy Resource Aggregation changes (i.e., heterogeneous sub-resources now allowed in a multi-pnode aggregation) in the Expanded Metering and Telemetry initiative, without which PG&E cannot support the CAISO's direction. The current design is incomplete and could lead to market inefficiencies, specifically around the Distribution Factors (DF) and associated processes.

6.) Requests that the CAISO develop reliability processes and procedures for multiple-use applications including:

- a deliverability process to ensure retail generators can safely and reliably participate in ISO markets; and
- distribution level procedures.

7.) Requests additional time to incorporate the needs that multiple-use applications pose, specifically:

- installing advanced protection and control systems, telecommunications, information technology and real time grid sensing devices; and
- completing an assessment of the effect that market participation may have on a retail generation units' reliability.

Background: In its Revised Straw Proposal, CAISO outlined how it will enhance the non-generator resource (NGR) model, demand response products [i.e., the Proxy Demand Resource (PDR) and the Reliability Demand Response Resource (RDRR) products] and removed nearly all of the provisions or limitations which were previously suggested for multiple use applications. Also, CAISO clarified, for multiple use applications, the necessary time horizons for settlement quality meter data (SQMD)[1] from Distributed Energy Resource Aggregations (DERAs) and PDR/RDRR resources, and specified how CAISO will settle DER deviations (when there are conflicts with distribution system needs).

PG&E's detailed comments on the CAISO's Energy Storage and Distributed Energy Resources (ESDER) Revised Straw Proposal, using the comment template requested by the CAISO, follow.

Non-generator resources (NGR) enhancements

1. NGR documentation.

   a. What specific NGR areas do you think require additional documentation that are not already outlined in the revised straw proposal?

   PG&E Comments: PG&E does not have additional documentation to add to the CAISO's list.

2. Clarification about how ISO uses state of charge (SOC) in the market optimization.

   a. What specific NGR SOC areas do you think require additional clarity that are not already outlined in the revised straw proposal?

   PG&E Comments: While CAISO has acknowledged that it will provide more information on, "how the SOC influences model optimization, impacts to mathematical formulation of economic dispatch, examples of how SOC impacts the interplay of capacity and energy over several market intervals, examples of how SOC is used in AGC calculations for resources under NGR REM"— PG&E needs more information in order to evaluate the impacts of CAISO's modeling and to support how CAISO uses the SOC in the market optimization. Accordingly, PG&E requests that the CAISO provide the mathematical formulation of how the SOC is used in the NGR model to stakeholders. Providing the mathematical formulation in the Final Draft Proposal will be too late for stakeholders to adequately review it —which further supports PG&E's proposal to delay the ESDER stakeholder process. Providing these mathematical formulations would increase transparency to market participants, promote better understanding, and enable PG&E to more effectively manage and bid in resources when SOC limitations are managed by CAISO for the NGR model.

[1] CAISO Energy Storage and Distributed Energy Resources (ESDER) Stakeholder Initiative Revised Straw Proposal. September 17, 2015. Page 6. "The ISO will require settlement quality meter data (SQMD) from the SC for a DERA to be submitted on a daily basis in accordance with ISO settlement timelines, and will settle the DERA based on that SQMD, for all market intervals, not just those intervals in which the DERA was issued an ISO schedule or dispatch instruction. PDR/RDRR resources will continue to provide SQMD and be settled through the ISO market in those intervals when a PDR/RDRR resource was dispatched by the ISO." https://www.caiso.com/Documents/RevisedStrawProposal_EnergyStorage-DistributedEnergyResources.pdf

3. Allow for an initial SOC value as a daily bid parameter in the day-ahead market.

   a. Are there any further considerations for allowing for a daily initial SOC bid parameter that are not already outlined in the revised straw proposal?

   PG&E Comments: PG&E supports allowing market participants to set an initial SOC for the day-ahead market. However, PG&E would like CAISO to clarify if there would be any restrictions on the value of the initial SOC, or on any requirements to actually be at (or close to) that SOC.

4. Allow an option to not provide energy limits or have the ISO co-optimize an NGR based on state of charge. Under this NGR option:

   - NGRs that do not have SOC energy limits or choose to self-manage their SOC within resource energy limits, may choose to not use energy limit constraints and SOC in co-optimization or dispatch.
   - NGRs that have an SOC and choose to self-manage their SOC, must provide telemetry SOC values for ISO resource monitoring.
   - NGRs participating under Regulation Energy Management (REM) will not be eligible for this option.

   a. Are there any further considerations for allowing NGRs to not use SOC and energy limit constraints that are not already outlined in the straw proposal?

   PG&E Comments: PG&E is appreciative of the work the CAISO has done to allow an initial SOC value as a daily bid parameter and to provide the flexibility for a resource to self-manage its SOC. However, PG&E's observations to-date that self-managing the SOC is a more efficient outcome until certain enhancements are made to the NGR model (beyond 2015).

   The CAISO's comments to-date on the CAISO managing the SOC versus a resource self-managing the SOC suggest that the CAISO believes it would be rare for a resource to choose to self-manage its SOC. For example, on page 17 of the ESDER Revised Straw proposal dated September 17, 2015, CAISO states, "The ISO recognizes that in some cases, NGRs may have difficulty providing a SOC value based solely on ISO market participation. This may be especially true for sub-resource aggregations which may be composed of multiple types of resources or for resources constantly changing based on aggregations where sub-resources may enter or depart the resource aggregation." Based on PG&E's experience with the NGR model, the determination to self-manage the SOC is not based solely on "difficulty providing a SOC value," but rather also considers that the current NGR model does not fully recognize certain energy storage resource characteristics, as outlined below. Until the NGR model is further enhanced, PG&E believes more efficient market outcomes will occur when we manage the SOC of our resources, as the current CAISO market is unable to take into account the following four factors:

1.) The effect of parasitic load on SOC. Most battery storage devices require power in order to connect to the grid; this "parasitic" load reduces the efficiency of the battery over the course of the day. For example, a resource that provided its initial SOC to the CAISO as a daily bid parameter in the day-ahead market and was never given an award may have a lower SOC at the end of the day due to parasitic load without ever participating in the CAISO market. Without insight into the effect of parasitic load, the CAISO's visibility into the SOC of a resource may be limited and could result in infeasible awards.

2.) Assessing the SOC while the resource is on regulation energy management (REM). To initialize the REM model, CAISO assumes that the resource will be at an initial SOC of 50%. However, if regulation is not used in a predictable way and the resource stays on REM, then there are instances when the initial SOC may not begin each day at 50%.

3.) Actions taken on the battery for maintenance. In order to balance the strings on a battery to effectively "tune up" or calibrate the SOC, the resource periodically needs to be taken to its minimum state of charge so it can later ramp up to its full charge. However, when the battery charges beyond 95% of its state of charge it does not always act in a predictable manner. This change in charging duration is not always visible to CAISO markets and as a result it may be more effective for a resource to manage its own SOC.

4.) Considering throughput limitations. Some of PG&E's storage resources will have throughput limitations (e.g., a maximum annual discharge limitation)—a parameter the current NGR model cannot accommodate. To honor the warranties and maximize the useful life of these resources PG&E believes that self-management of the SOC for any resource with throughput limitations is the most effective solution.

Proxy Demand Resource (PDR)/Reliability Demand Response Resource (RDRR) enhancements

1. Consider/develop an alternative ISO Type 1 performance evaluation methodology base on metering generator output (MGO) concepts.

    a. What is your opinion on the MGO options being considered to represent performance of load offsetting behind the meter generation?

    PG&E Comments: PG&E is generally supportive of the MGO methodology. However, PG&E believes that many of the changes that the CAISO is contemplating will require changes or additions to the CPUC's current set of rates and rules. PG&E's comments are intended to help the CAISO understand the scope of this endeavor from PG&E's perspective, and the value of close collaboration with the CPUC. PG&E recommends that the CPUC and CAISO create a coordinated road map to resolve these issues (i.e., sub-metering, billing requirements, rates, and third party ownership of meters).

    For instance, CPUC Rule 18 (i.e. Supply to Separate Premises and Submetering of Electric Energy) would need to be changed, particularly as it relates to residential customers. While certain metering configurations of the MGO performance evaluation methodology require sub-

metering, Rule 18 generally excludes sub-metering of facilities, with a few exceptions. One provision of Rule 18 may be interpreted to allow master meter installations[2] for non-residential customers, by indicating that IOUs have sole discretion to determine the need for a master meter when it is impractical for the IOU to individually meter each premise or space. In such a case, the IOU could "meter those premises or spaces that it is practical to meter, if any." (Rule 18.C.2.c)." However, generally speaking, the rule is anachronistic and needs to account for the MGO meter configuration contained in the ESDER straw proposal.[3]

Legal determinations also need to be made on whether the submeter rate is billed as wholesale or retail. Assuming it is retail, the CPUC approved rates would also need to be changed depending on CPUC decisions surrounding baseline values for the primary and submeter and required conformance of the primary and submeter rates so that subtractive billing could be done. If the submeter rate is wholesale, the CPUC would need to address the question of wholesale/retail rate arbitrage when the storage device serves both the CAISO market and the customer's retail load. These items may or may not be easily fixed, but need to be addressed. PG&E understands issues such as multiple-use applications will be addressed in Track 2 of the Energy Storage OIR.[4]

A new CPUC rule will also be needed to accommodate submetering situations and potentially third party meter ownership. As an applicable anecdote, the need for this rule became evident during the development of the IOU's Electric Vehicle Submetering Pilot. For instance, questions were raised as to who is responsible for the validating, estimating and editing (VEE) function for the submeter and how the submeter data, if the meter is third party owned, can be provided in a format to the IOUs where it does not have to be manually entered into its billing system. Rules regarding meter synchronization along with standards for metering via internal chips (those that would be directly installed in the storage device) need to be created. It is telling that the current Direct Access Standards for Metering and Meter Data (DASMMD) for third party owned metering was created in the late 1990's and early 2000's when the MV90 meter was the meter technology of choice. Other customer-related issues need to be addressed in this new Rule. For instance, if the IOU is serving a third party behind a customer's retail meter, what are the IOU's remedies if the third party doesn't pay its bill – disconnection of both parties? How are billing adjustments made or re-allocated if either the primary or submeter data is missing or incorrect? How is usage allocated if a PV panel is also behind the customer's retail meter? What are the IOU obligations to post the submetered data?

[2] Master metering arrangements must be supported by CPUC approved rates specifically allowing the resale of electricity.

[3] CAISO Energy Storage and Distributed Energy Resources (ESDER) Stakeholder Initiative Revised Straw Proposal. September 17, 2015. Page 25. Figure 3 (Meter Configuration B) https://www.caiso.com/Documents/RevisedStrawProposal_EnergyStorage-DistributedEnergyResources.pdf

[4] Per the CPUC's Energy Storage Scoping Memo, multiple use applications (topics will include determination of retail vs. wholesale energy, cost recovery, interconnection, metering and dispatch coordination) are slated to be addressed in Track 2 of the CPUC's Energy Storage OIR which should begin in October of 2015.
http://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M152/K484/152484522.PDF

In addition to these regulatory issues, there are significant internal IT and business process changes that need to be funded and built to accommodate Meter Configuration B. For instance, currently, about four million PG&E residential customers lack VEE'd interval data which, as a consequence, does not meet the requirements to be considered revenue quality meter data (RQMD). Raw hourly interval data is collected from all residential customers and posted to PG&E's website for the customer's information. For these four million residential customers, only the monthly quantities used for billing are considered to be revenue quality. The lack of VEE'd hourly data does not affect these customers' bills, as the applicable rate schedules do not require this data granularity. Meter Configuration B requires RQMD hourly data, which is generally not available[5] to most mass market customers at this time.[6]

b. What specific options do you believe need further evaluation in terms of its appropriate use under PDR/RDRR performance measurement methodology?

c. Are there additional variants, specific to configuration B, needing further consideration (i.e. baseline of directly meter generator/device). If so please provide examples of what the ISO might need to consider.

d. Are there concerns on the use of MGO for "frequent" use of load offsetting behind the meter generation?

PG&E Comments: In revised straw proposal[7] the CAISO included the following statement:

> An issue with this option is that it may not be possible to distinguish between the generation device's retail activities (*e.g.,* generating to offset some portion of the load's consumption to reduce the load's peak demand charges) and its wholesale activities (*i.e.,* receiving a PDR/RDRR dispatch instruction from the ISO). **It would be problematic for the wholesale market to pay for demand response when the resource is generating to reduce a customer's demand charges because the grid would experience no true demand response/load modification and no difference in day-to-day or interval-to-interval power flow because of ISO dispatch**. …….. **The ISO requests stakeholder input on how the generator or device under option B2 could participate in the ISO market using MGO in a manner that separates the generator's normal use from its wholesale market use to provide demand response**. [Emphasis added.]

PG&E has not been able to determine an acceptable method to determine the demand response performance under the MGO model when the resource is used on a frequent basis.

[5] PG&E's initial Rule 24 implementation includes the functionality to convert a limited number of customers' raw interval data to VEE'd interval data which would then be considered revenue quality meter data (RQMD).

[6] PG&E has requested funding to change its systems to VEE this hourly customer information by 2018 for a majority of its residential customers, who could move to default TOU by the end of the decade. There will still be a significant percentage of residential customers, however, who are exempt from default TOU, and the systems proposed in PG&E's request would not be sized to include that percentage.

[7] CAISO Energy Storage and Distributed Energy Resources (ESDER) Stakeholder Initiative Revised Straw Proposal. September 17, 2015. Page 26.

The CAISO has proposed to use a "zero" baseline but this proposal does not address the issues that the CAISO has raised itself.

e. What is your response to the ISO's consideration of employing a "reservation of capacity" for load offsetting behind the meter generation to account for potential multi-use of the generator/device?

PG&E Comments: PG&E cannot respond because the CAISO's proposal did not provide adequate information. PG&E requests CAISO provide various scenarios on employing a "reservation of capacity" for load offsetting behind the meter generation to account for potential multi-use of the generator/device.

2. Develop additional detail regarding use of statistical sampling and document that in the appropriate BPMs.

a. What is your opinion on the statistical sampling methodology being proposed as an approved ISO Type 2?

b. Has enough detail been provided? If not, what additional detail is needed?

c. What is your opinion on the applicability currently proposed and being considered by for ISO Type 2?

d. What additional information can you provide the ISO that will help in understanding the need for use of ISO Type 2 in cases where Hourly Interval Metering is available? (i.e. why is the "interval meter data" unavailable to meet SQMD submission timelines) Should provisions for its use for Hourly Interval Metering cases have limitations? What might those limitations be?

PG&E Comments: As mentioned previously in these comments, currently approximately four million PG&E residential customers lack VEE'd interval data. Therefore, though raw hourly interval data is collected from all residential customers and posted to PG&E's website for the customer's information, the hourly data does not meet the requirements to become RQMD for most of the residential customers. As a result, these residential customers could not participate in the CAISO day-ahead energy market using ISO Type 1 performance evaluation methodology. However, using statistical sampling as outlined in the ISO Type 2 proposal for hourly interval data would enable those residential customers that currently lack VEE'd interval data to participate in the day-ahead energy market by being aggregated with residential customers for which VEE'd interval data is currently available.

Non-resource adequacy multiple use applications

Type 2: DER provide services to end-use customers and participate in the wholesale market

As stated in previous ESDER comments to CAISO, PG&E generally supports the ability of behind-the-meter DERs to be compensated according to their temporal and locational value to the system and believe a wholesale rate more accurately reflects the value of the resource. However, PG&E believes that there are significant jurisdictional issues that must be resolved.

To move forward successfully, the CAISO's ESDER initiative must be developed and coordinated in harmony with changes that would be necessary for the IOUs to undertake concurrently, pursuant to guidance from the CPUC and FERC. Coordination would ensure that operational impacts on the electric distribution and transmission grid are manageable and feasible. Such issues are the subject of existing CPUC proceedings, including the Energy Storage OIR, the Distributed Resource Plan, and the new Integrated Distribution Energy Resources proceeding. Regardless of any jurisdictional issues, the need for mutual coordination and collaboration among the CAISO, CPUC, the utilities and other stakeholders is especially important because the CAISO's proposals regarding multiple use applications could significantly impact the operability and costs of the electric distribution grid (e.g., subtractive billing, metering protocols, business processes, IT systems, cost recovery, etc.). PG&E recommends that the ESDER initiative only move forward with CPUC review and coordination with relevant CPUC proceedings.

PG&E appreciates the CAISO's clarification that it believes behind-the-meter resources participating in PDR/RDRR should pay a retail rate for charging as part of the customer load,[8] and PG&E agrees with that position. Behind-the-meter resources may participate in PDR today with retail rate treatment; the energy taken from the distribution grid to serve customer load is purchased at a retail rate, and the adjustment of that load during a bid to meet a wholesale market need earns wholesale compensation as a value stream—in addition to the retail transactions that are enabled by CPUC rates at present.

The jurisdictional issues arise when a behind-the-meter resource is participating in NGR. CAISO's proposal that a behind-the-meter resource participating in NGR be "metered and settled as a wholesale resource in all operating hours"[9] introduces questions about rates, metering and interconnection that have not been resolved.

[8] CAISO Energy Storage and Distributed Energy Resources (ESDER) Stakeholder Initiative Revised Straw Proposal. September 17, 2015. Page 47. "If energy storage is behind the customer meter and participates in a PDR/RDRR resource, it will pay the retail rate for charging as part of the customer load at that meter." https://www.caiso.com/Documents/RevisedStrawProposal_EnergyStorage-DistributedEnergyResources.pdf

[9] CAISO Energy Storage and Distributed Energy Resources (ESDER) Stakeholder Initiative Revised Straw Proposal. September 17, 2015. Page 47. "If the energy storage participates in an NGR, then it is metered and settled as a separate wholesale resource in all operating hours." https://www.caiso.com/Documents/RevisedStrawProposal_EnergyStorage-DistributedEnergyResources.pdf

Figure 1: Example of Behind-the-Meter Storage Participating in NGR - Exporting

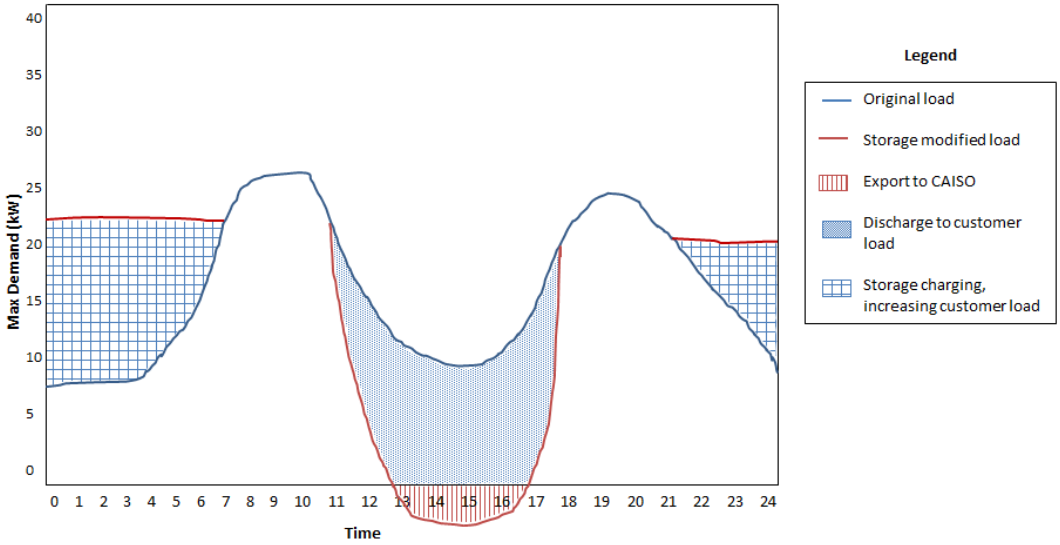

Figure 1 shows the potential behavior of an energy storage device that is separately metered and bidding into the CAISO market as NGR, and in this example, exporting.[10] The energy storage device charges at night to later discharge into customer load and also export as part of an NGR bid. The charging at night is meant to serve both a load shifting purpose for the customer as well as prepare for the CAISO bid the next day, a dual use purpose. Even if the storage device were metered separately from the site load such that the total amount of charging could be measured, it would still be difficult to understand what portion of that charging contributed to the customer load shifting and what portion of that charging contributed to the CAISO bid. If the customer were to pay for all storage charging at a wholesale rate, that would mean that part of the site load (the discharge portion) would only be paid for at a wholesale rate, and therefore the customer would not be paying for their full use of the distribution grid, and associated costs.[11] This failure to pay for the use of the distribution grid to serve a retail need would be unfairly shifted to other ratepayers.

Even if there were a way to 'split' the energy so that the storage device would only pay a wholesale rate for charging to bid into CAISO, there is no existing rate that the CPUC or Load Serving Entity (LSE, in this case PG&E) could offer to the customer. Furthermore, PG&E does not have a method to bill the customer for a 'split' rate.

In addition, CAISO is proposing a separate meter, and in some cases, telemetry, for DERs participating in NGR, and there is no cost responsibility policy for that metering and telemetry arrangement. If an existing customer with a current interconnection agreement (IA) under Rule

[10] PG&E understands that there are a variety of energy storage use cases for participation in NGR. This one example does not cover the extent of use cases where there may be jurisdictional issues; it is only submitted for illustration purposes.
[11] CPUC Ruling 12-06-013. Scoping Memo and Assigned Commissioner's Ruling. "Rates should be based on cost causation principles" pp.6 http://docs.cpuc.ca.gov/PublishedDocs/Efile/G000/M031/K735/31735324.PDF

21 interconnection were to change its energy storage or other DER behavior to serve the CAISO,[12] that customer would have to reapply under Rule 21 with the LSE and sign a new IA memorializing the new behavior and tracking any needed distribution grid upgrades, such that the LSE can maintain safe and reliable grid operations.

Finally, PG&E notes that while the CAISO acknowledged that some stakeholders considered both NEM participation and ESDER participation for the same resource a double payment, the CAISO did not opine on it, and so PG&E offers a further explanation for why it considers dual NEM/CAISO participation a double payment. The current NEM structure compensates all exported energy from a NEM-eligible device at a full bundled retail rate, which includes elements of the CAISO market compensation, including Transmission and Transmission Rate Adjustments, among other charges.[13] For this reason, PG&E believes that NEM participating DERs should be prohibited from participating in ESDER or in the aggregations proposed in the Expanded Metering and Telemetry Options Phase 2 initiative.

Prior to advancing the ESDER initiative and filing changes at FERC, CAISO should better align its processes with the CPUC. Specifically, the above issues as well as any other retail/wholesale issues that arise should be addressed by the CPUC and the CAISO as part of the Energy Storage OIR Track 2 Issue, Multiple Use Applications.

General Comments:

1. Please comment on the ISO's proposal regarding Type 1 multiple-use scenarios.

Comments:

2. Please comment on the ISO's proposal regarding Type 2 multiple-use scenarios.

Comments:

3. Please offer any additional comments on other aspects of the ISO's proposal.

PG&E Comments:

A. PG&E requests that the CAISO provide a more robust design and documentation with examples of the proposed Distributed Energy Resource Aggregation changes (i.e., heterogeneous sub resources now allowed in a multi-pnode aggregation) in the Expanded Metering and Telemetry initiative, without which PG&E cannot support the CAISO's direction. The current design is incomplete and could lead to market inefficiencies, specifically around the DFs and associated processes.

PG&E is concerned that the DERA policy change proposed affects ESDER and could create market inefficiencies. On page 41, CAISO states:

[12] For example, changing from a non-exporting device to an exporting device.

[13] PG&E Electric Schedule E1: Residential Services. "Unbundling of Total Rates." Sheet 2: http://www.pge.com/tariffs/tm2/pdf/ELEC_SCHEDS_E-1.pdf

In the DERP the ISO is considering relaxing the original requirement for multi-pnode DERAs that (a) all sub-resources must be of the same type and move in the same direction in response to an ISO dispatch of the DERA. The ISO is considering instead to impose the requirement – which has been the underlying concern all along – that (b) the net movement at each pnode must be in the same direction as the dispatch and in alignment with the distribution factors (DFs) used in the dispatch. Under requirement (b) the ISO will not require the underlying subresources to be of the same type, or even that they all move in the same direction, but only that the net movement of all sub-resources at each pnode that comprises the DERA be in the direction of the dispatch and in the same relative proportions as the DFs.

This change in policy raises the following concerns for PG&E:

1. CAISO is not clear when it states that, "all sub-resources a DERA must move in the same direction of the dispatch." Does "same direction" mean "total" (Day Ahead + Real Time) or "incremental" (Day Ahead, Real Time) awards? If interpreted as the former, sub-resources at different pnodes may not necessarily move in the same direction in Real Time. Additionally, the comment, "in the same direction" loses clarity when considering a DERA that contains both storage and generation. For example, in a single DERA, a storage resource in p-node 1 could move down, where a generation resource in p-node 2 would remain at "0"—not necessarily moving in the same direction. How would this scenario be treated?

2. Distribution Factors must seemingly need to be dynamic, but the CAISO has not addressed this. DERAs could bid to consume (i.e., storage) or generate in Real Time; the DFs would depend on market awards. For example, if there were five pnodes, storage at the first pnode and generators at the remaining four pnodes, clearly DFs would be different depending on award.

3. Distribution Factors could create market inefficiencies, yet controls to prevent these inefficiencies are not evident. For example:

    - As DFs can be bid, what stops a scheduling coordinator from submitting DFs that do not reflect actual distributions?

    - Could incorrectly submitted DFs allow DERAs to collect undue payments or avoid costs? Would this create uplift? What impact would this have on the modeling of actual flows or distribution in the Day Ahead and Real Time market? Would there be a risk of convergence bidding or CRR gaming opportunities?

B. Multiple-use applications raise operational issues that require resolution.

Multiple-use applications could lead to operational concerns for a Utility Distribution Company. The current retail generator interconnection process for ensuring safety and reliability of the grid does not account for retail generation participating in transmission energy markets. Therefore, to allow retail generation to operate in a multiple use application, additional

reliability analysis, similar to deliverability analysis the CAISO performs for wholesale generation, would need to be performed to ensure all distribution upgrades are identified to allow these distribution connected retail generation units can be operated safely and reliably in a multiple-se manner.

Furthermore, additional coordination (procedures) between the Utility Distribution Company and the CAISO would need to be developed to ensure the safe and reliable operation and dispatch of distribution level retail generation. Currently this coordination exists for wholesale generation, but not for retail generation.

In addition, in order to enable multiple-use applications, additional technology in the area of advanced protection and control systems, telecommunications, information technology and real-time grid sensing devices would need to be deployed by the Utility Distribution Company to be able to manage these cases. For additional details, PG&E further describes these technology requirements in its recent CPUC Distribution Resources Plan filing under its Barriers to Deployment chapter (Chapter 7).

In addition, although retail generation units have an interconnection process that requires various certification requirements of their equipment, it's unclear if the current design and manufacturing of the existing retail generation units can handle the potential demands of what an energy market may require. Primarily, retail generation was designed and manufactured to meet the energy demands of the local host customer/end-user. With the added usage of participating in an energy market, it's unclear as to the impact this may have on the equipment (e.g. will reliability and dependability of these generators be low), as well as the overall impact this may have on distribution reliability.