Energy Storage and Distributed Energy Resources Stakeholder Initiative Phase 2 ("ESDER 2")

Straw Proposal

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Market & Infrastructure Policy

Table of Contents

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1 Introduction

The central focus of the ISO's ESDER initiative is to lower barriers and enhance the ability of transmission grid-connected energy storage and the many examples of distribution-connected resources (i.e., distributed energy resources or "DER") [1] to participate in the ISO market. The number and diversity of these resources are growing and they represent an increasingly important part of the resource mix. Integrating these resources is expected to help lower carbon emissions and add operational flexibility.

In 2015 the ISO conducted the first phase of ESDER ("ESDER 1") which made progress in enhancing the ability of storage and DER to participate in ISO markets. This year the ISO

[1] Distributed energy resources are those resources on the distribution system on either the utility side or the customer side of the end-use customer meter, including rooftop solar, energy storage, plug-in electric vehicles, and demand response.

is conducting the second phase of ESDER ("ESDER 2") to continue this important work and make additional progress.

In the March 22 issue paper (i.e., the previous paper in ESDER 2), the ISO proposed that ESDER 2 comprise the following topic areas: further NGR model enhancements, further demand response enhancements, further work in multiple-use applications, clarify station power for energy storage, and review the allocation of transmission access charge to load served by DER.

In this straw proposal paper, the ISO refines the scope of topic areas being addressed in ESDER 2 and clarifies its proposed direction on these topic areas based on stakeholder feedback (e.g., feedback received from both written comments and the recently held joint workshop with the CPUC). The following describes the refined scope:

- NGR enhancements. Two areas of NGR enhancement will be considered in ESDER 2: (1) representing use limitations and (2) representing dynamic ramping.
- Demand response enhancements. Two areas of demand response enhancement will be considered in ESDER 2: (1) ability for proxy demand resources (PDRs) to be dispatched to both curtail and increase load and provide regulation and (2) alternative baselines to evaluate PDR performance.
- Multiple-use applications. Based on stakeholder comments submitted following the May 2-3, 2016, joint CPUC-ISO workshop on station power and multiple-use applications, the ISO has not yet identified specific multiple-use issues or topics that require separate treatment in the ESDER 2 initiative. The ISO therefore proposes to continue its collaboration with the CPUC in this topic area through Track 2 of the CPUC's energy storage proceeding (CPUC Rulemaking 15-03-011). The ISO is still reviewing the reply comments submitted on May 20, and if those comments reveal an issue that should be addressed within ESDER 2 the ISO can amend the ESDER 2 scope and will develop a response to that issue.
- Resolve the distinction between wholesale charging energy and station power. In this topic area the ISO will continue its collaboration with the CPUC through Track 2 of the CPUC's energy storage proceeding (CPUC Rulemaking 15-03-011) rather than exclusively through ESDER 2.

- Review the allocation of transmission access charge to load served by DER. The ISO agrees with the stakeholders who commented this topic is more appropriately addressed in its own initiative rather than in ESDER 2, and will post a separate issue paper in the near future.

2 Background

The ISO launched ESDER 1 in June 2015 to identify and consider potential enhancements to existing requirements, rules, market products and models for energy storage and DER market participation. The initiative began with identification of a scope of issues and after consulting with stakeholders ESDER 1 ultimately comprised three topic areas:

1. Enhancements to the ISO non-generator resources (NGR) model;
2. Enhancements to demand response performance measures and statistical sampling for the ISO proxy demand resource (PDR) and reliability demand response resource (RDRR) market participation models; and,
3. Clarifications to rules for non-resource adequacy multiple-use applications.

Following determination of the scope, the ISO worked with stakeholders to develop policy proposals, and those triggering the need for tariff change (i.e., topic areas 1 and 2 above) were approved by the ISO Board of Governors at its February 3-4, 2016 meeting.[2] Following Board approval a stakeholder process ensued to develop tariff amendments to implement the proposals. The ISO filed the tariff changes with FERC on May 18, 2016.[3]

The mid-2015 scoping effort also produced an early list of issues for possible consideration in ESDER Phase 2. The mid-2015 list:

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[2] More information about the first phase of the ESDER initiative may be found at: http://www.caiso.com/informed/Pages/StakeholderProcesses/EnergyStorage_DistributedEnergyResourcesphase1.aspx.

[3] The ESDER 1 tariff filing may be found at: http://www.caiso.com/Documents/May18_2016_TariffAmendment_ImplementEnergyStorageEnhancements_ER16-1735.pdf

1. Additional NGR enhancements
    a. Consider a single participation agreement, rather than the current requirement that an NGR execute both a participating generator agreement (PGA) and a participating load agreement (PLA).
    b. Evaluate interconnection requirements for non-exporting NGR.
    c. Explore multiple configurations for a single NGR where each configuration is allowed different operating characteristics and economic bid curves based on physical constraints of the resource.
    d. Evaluate expanding bid cost recovery for NGR to potentially cover additional resource types and configurations.
    e. Enhance load management capability and participation under the NGR model (i.e., both increasing and decreasing consumption).
2. Additional PDR/RDRR enhancements – Explore dispatching DR to increase consumption.
3. Address remaining policy issues from the DERP initiative.
4. Evaluate the distinction between wholesale charging energy and station power.
5. Consider additional multiple use applications.
6. Examine alignment between distribution level interconnection and the ISO NRI process.
7. Consider open policy issues from CPUC demand response working groups.

Following publication of this potential list of topics in mid-2015, some stakeholders provided comments addressing the proposed 2016 scope. Southern California Edison (SCE) sought to verify that two issues would be added to the 2016 scope: defining how an NGR with multiple configurations will bid into the market and modeling of use limitations in the NGR model. Pacific Gas & Electric (PG&E) also asked about modeling use limitations in the NGR model as a topic for 2016 (PG&E again reiterated this interest in comments submitted toward the conclusion of ESDER 1). California Department of Water Resources State Water Project (SWP) expressed its support for including the topic of modeling multiple configurations in the NGR model in the 2016 scope. Advanced Rail

Energy Storage (ARES) urged that regulation market rules for fast-response storage resources be included in the 2016 scope.

To develop the scope of issues proposed in the March 22 issue paper, the ISO used the mid-2015 list of topics as a starting point and expanded that list to include topics that stakeholders have suggested more recently (e.g., review the allocation of transmission access charge to load served by DER). Then the ISO pared this list down to a feasible scope of issues for potential policy development in 2016. The ISO considered several factors including the perceived priority of each topic, the need to allocate ISO staff resources to Track 2 of the CPUC's energy storage proceeding, and the need to balance development of new storage and DER enhancements against implementation of enhancements previously developed in the ESDER 1 and Expanding Metering and Telemetry Options stakeholder initiatives.

Topics areas in the ESDER 2 scope are discussed in more detail section 3. The stakeholder process schedule is provided in section 4. A few topics not selected for ESDER 2 are discussed in section 5.

3 Straw Proposals

3.1 NGR enhancements

During the April 4 stakeholder web conference and in the subsequently submitted written comments, the ISO received valuable inputs to help inform and direct the focus on areas for improving the non-generator resource model. The issue paper identified two areas that the ISO is proposing to explore for NGR enhancement: (1) representing use limitations in the NGR model, and (2) representing multiple configurations in the NGR model. Based on stakeholder comments and continued internal ISO review, the ISO would like use this straw proposal paper to further clarify these areas of NGR enhancement and refine the proposals to focus on facilitating enhancements that provide the highest value to non-generator type resources.

3.1.1 Represent use limitations in the NGR model

Representing use limitations in the NGR model continues to be a high priority among stakeholders and is characterized by a majority of the comments as the higher priority between the two proposed areas of NGR enhancements. Stakeholder feedback from ESDER 1 and more recently in the April 18 comments on the March 22 issue paper have helped to provide information to the ISO in terms of the use limitations of most interest to be considered for NGR model enhancement.

PG&E articulated the challenges of balancing between offering greater resource flexibility and the economic constraints of degrading a resource's useful life. PG&E adds that managing throughput limitations is critical to honor resource warranties and to maximize the useful life of these resources. SCE expressed the need to define and verify that use limitations can be appropriately considered in the NGR model soon since these updates and modeling verifications affect how different technologies can operate in the market and the value they can provide to the system.

The ISO agrees with stakeholders that the ability to reflect use limitations within the NGR continuous energy performance model allows participants to offer more accurate bids and allows the ISO to improve dispatch efficiency.

In ESDER 2, the ISO will work with stakeholders to develop a proposal that enables the NGR model to consider use limitations for annual charge and discharge limitations, physical MW limits based on time of day, and daily limits on cycling, with the ability to change these throughput limitations on a daily basis. The ISO encourages stakeholders to offer their proposals and ideas in their June 9 written comments for ISO consideration.

3.1.2 Represent dynamic ramping in the NGR model

In the March 22 issue paper the ISO proposed a topic area focused on representing multiple configurations in the NGR model. The ISO has refined this topic area to instead focus on dynamic ramping.

The term multi-configuration or multi-stage might be construed as applying the current multi-stage modeling capability for generators to the NGR resource model. While the ISO's multi-stage generator model provides similar concepts of defining multiple configurations within a resource's operating range, it also creates inoperability ranges or forbidden operating regions, and, physical transition periods within the performance curve where a resource is not dispatchable. These concepts are not in current alignment with the concept of continuous operation that is the framework of the NGR model. Within ESDER 2, the expectation is that an NGR resource can operate continuously across its entire operating range, including both positive and negative generation values.

As stated in the issue paper, the intent of this topic is to add functionality to the NGR model that would allow resources to model their operating characteristics in a way that better matches their physical constraints and their physical allowances. Among the many variables that could affect storage performance, and given market participants' limited experience and stakeholder feedback in the operation of different storage chemistries and technologies as market participating resources, the current understanding is that the resource ramping capability could be a function of the resource's state of charge (SOC). Depending on a resource's SOC, a storage resource may behave differently in its ability to accept a charge or deliver a discharge as it moved through its continuous performance curve.

In ESDER 2, the ISO will work with stakeholders to develop a proposal that enables the NGR model to represent dynamic ramping. The ISO proposes to explore dynamic ramping for a single NGR where the NGR experiences different ramping characteristics based on the SOC physical constraints of the resource. The ISO encourages stakeholders to offer their proposals and ideas in written comments for ISO consideration.

3.2 Demand response enhancements

The ISO recommended in the March 22 issue paper that stakeholder-led working groups form to discuss and recommend stakeholder-desired enhancements to proxy demand resource (PDR). Since then, two stakeholder-led working groups have formed and are actively vetting two particular enhancements. The Load Consumption Working Group (LCWG) is exploring the ability for PDR to consume load based on an ISO dispatch, including the ability for PDR to provide regulation service. The Baseline Analysis Working Group (BAWG) is considering additional baseline evaluation methods to assess the performance of PDR when application of the current approved 10-of-10 baseline methodology is sufficiently inaccurate.

Both of these issues – enabling directed load consumption and instituting new performance evaluation methods – require a thorough vetting by stakeholders with special end-use customer and retail ratemaking expertise. Incorporated here for broader stakeholder review and input are the straw proposals of the respective working groups. These are not ISO proposals, but are the work product of the respective working groups. In section 3.2.1 is the straw proposal of the Load Consumption Working Group. The straw proposal of the Baseline Analysis Working Group can be found in section 3.2.2.

3.2.1 Load Consumption Working Group straw proposal

Issues considered in this proposal were teed up by the ISO in its March 22 issue paper and included prior stakeholder input. This paper and the effort of the working group is to vet previously identified enhancements and explore their feasibility. The current state of this section is based on preliminary discussions and, at this point, do not represent a consensus or fully developed concepts by the entire working group.

The ISO's March 22 issue paper contemplated a number of areas that a "load consumption working group" might consider in developing a proposal as well as stakeholder comments from a number of parties. The paper and many of the comments acknowledged that while there were definite areas of opportunity for demand response and PDR to address wholesale market issues, PDR and behind-the-meter distributed resources come with the challenge of addressing the intersection of retail and wholesale energy settlements.

A distillation from those two sources further explored in this paper for consideration are:

- Load consumption to address excess supply and other issues related to the net supply curve;
- A wholesale market methodology to incent general load shifting; and
- PDR frequency regulation.

The intent of this straw proposal is to surface the possibility of further pursuing any or all of these (and perhaps derivatives) as viable wholesale market mechanisms.

3.2.1.1 **Load Consumption**

3.2.1.1.1 Opportunity

With the recognition that oversupply of generation has already resulted in periods of low prices in the middle of the day, incenting additional demand during those hours is a reasonable construct so long as the additional demand is price responsive to the wholesale market. Further, signaling load consumption during periods of excess supply that is primarily a result of increased renewable penetration could in fact reduce the need to curtail renewable generation.

3.2.1.1.2 ISO Product Construct

The ISO has already implemented simultaneous bi-directional bidding at the resource level in the Non-Generator Resource (NGR) implementation. Non Regulation Energy Management (Non REM) NGRs can submit both supply and demand bids under a single resource. It does not seem unreasonable that the supply and load construct applied to the NGR resource type could be extended to an additional resource type (PDR) without extensive market system development. However, this assumption needs to be validated by the ISO.

The point of demarcation for NGR supply and demand bids is energy discharge for supply and energy consumption for demand as would be experienced by a storage device, such as a battery, connected to the grid. PDRs are modeled to invert a reduction in load to appear to the market systems as positive generation based on their behavior and that performance is measured against "normal" consumption (baseline) to the consumption when dispatched (event). It seems straight forward to measure additional consumption that results from a wholesale market dispatch by applying event behavior under a baseline construct similar to the metering generator output (MGO) baseline construct and modified to also accommodate load consumption. The traditional 10-of-10 for load consumption would have all the same problems that it does for demand reduction in that it does not always accurately capture the behavior of the underlying technology

Just as it is for load reductions, the PDR construct is an appealing model for instructing additional consumption since the model segregates the roles of scheduling the underlying load from the bidding of the load response capability in the wholesale market. Additionally, the model allows for the aggregation of customers' load response. To deviate from the PDR construct and not allow load consumption to be bid and dispatched by a third party into the wholesale market would either limit participation to the incumbent LSE or raise a set of issues that have not yet been resolved.

3.2.1.1.3 Jurisdictional Issues

No matter what the design or ultimate outcome, a basic tenant must not be compromised; the legal authority by which the ISO, regulated by the Federal Energy Regulatory Commission (FERC), “directs” market behaviors such as load-consumption, even when the activity seems wholly unrelated to transmission or the sale of energy for resale (which generally are viewed as setting the parameter of the FERC’s domain under the Federal Power Act) must not interfere with the right of the state to regulate retail rates. Additional consumption on a retail meter that results from a wholesale market dispatch is recorded as retail consumption. Under the current regulatory construct, consumers generally pay retail prices for load consumed that includes generation (which may include demand charges for capacity), distribution, transmission, and non-bypassable charges. The ISO would only pay or charge for energy at the wholesale market clearing price. The bid to consume load will simply be a price the bidder is willing to pay or be paid for energy. The bidder could structure a negative bid which means the bidder expects to be paid for consumption of energy if negative bids are in the money and clear the market in certain intervals. A bidder can also place a low bid to consume energy at a low price; however, this all has implications and interactions with retail ratemaking raises retail jurisdictional issues. In this discussion there is no presumption of “capacity-like” payment to address the challenge of excess energy and over-supply in the forward planning horizon as there is no payment like “installed capacity” or resource adequacy capacity which are not wholesale products. Such capacity is currently procured bi-laterally in California. The customer would pay its LSE for the power it consumes at the retail energy rate and would under one scenario have to be paid more by the ISO than it is paying its LSE, so that it would benefit if it otherwise would not need to consume (i.e. wholesale price received greater than retail price paid). Alternatively, a participant may be willing to pay more for the retail energy than they would receive for the wholesale energy if the participant receives a capacity-like payment from the LSE to address over-supply (e.g. through participation in a demand response program).

California Public Utilities Commission (CPUC) retail rate designs could and perhaps should impact usage and create a more favorable system load profile. An alternative approach would be to modify retail rates to enable retail customers at their discretion to respond to day-ahead or real-time wholesale pricing, particularly when wholesale energy prices are near zero or negative. This would require a rate that substitutes a wholesale commodity charge in lieu of a utility procurement commodity rate, but include other "non bypassable" distribution charges.

3.2.1.1.4 Working Group Discussion

One of the challenging aspects of this concept is, as outlined in the Jurisdictional Issues, is how to separate or compensate wholesale behavior from retail settlement. In the case of storage it is important to understand that storage does not need the wholesale price to be greater than the retail price paid, because the energy "consumed" will be dispatched later to offset retail consumption. So, the storage device only needs the wholesale price to be greater than the money lost in storage roundtrip efficiency (and the physical cost of that cycle).

The payment for load consumption is in almost all ways just the inverse of demand reduction participation in wholesale markets. Any discussion of jurisdictional issues or some kind of settlement against the retail meter needs to specify why the treatment of load consumption is different than existing rules for demand reduction

If the act of load consumption will have an uneconomic impact on the customer's retail bill, then it is up to the resource operator to make that decision. It does not need to be handled in the retail rate or PDR design.

3.2.1.2 Daily Load Shift

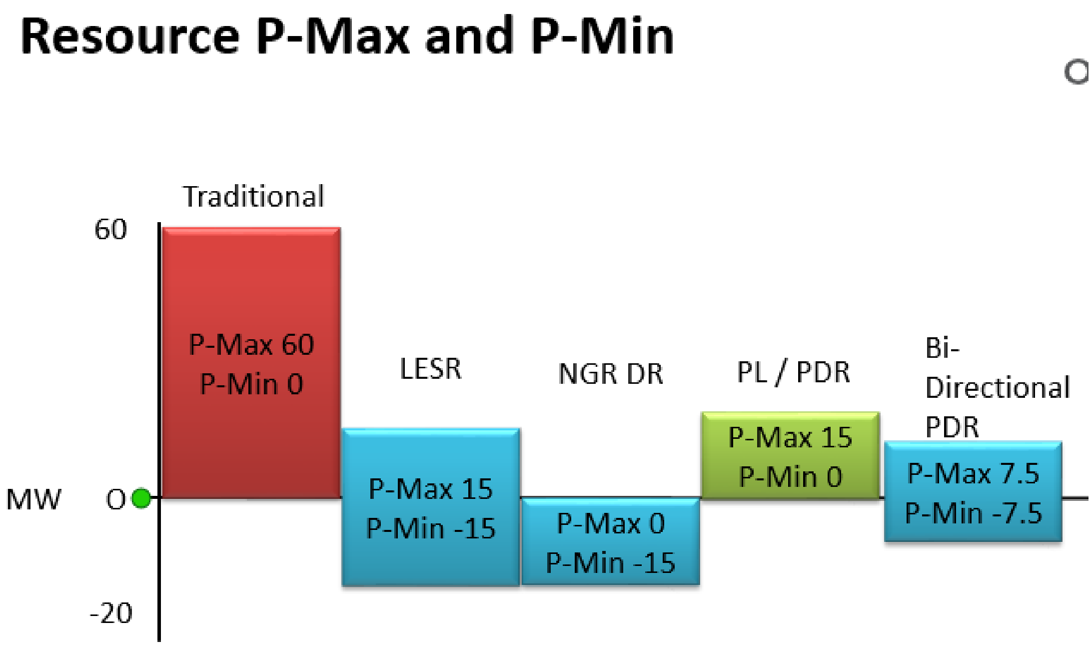
3.2.1.2.1 Opportunity

The current and future daily net load curve, especially during annual shoulder months, dips during mid-day and rapidly increases to an evening peak creating very steep ramps that are in part being addressed by flexible capacity resources and flexible ramping products. A longer duration product, for example 'X' hours of consumption during the net load trough followed by 'X' hours of load reduction during the ramp up to the peak (e.g. through load shifting like precooling). Such a product would allow for increased usage during periods of excess supply and/or lower market prices and decreased usage during periods of high ramping, high net load, and/or higher market prices. Such a longer-duration product does not yet exist in the ISO market, although efforts are underway to achieve such usage patterns on the retail level through such proposals as the matinee pricing option under discussion in CPUC Rulemaking 13-12-011. A product of this sort could serve to simultaneously address over supply situation and reduce the severity of the ramp into the evening peak by flattening the net load increase.

3.2.1.2.2 ISO Product Construct

This product would require "bi-directional" PDR and would likely more closely look and feel like the NGR model as it would likely necessitate that a single resource be able to both offer as supply (load reduction) and load (load consumption). It would also require that a bi-directional PDR establish a "mid-point" to establish a demarcation between supply and consumption based on directional capability which would likely require a split baseline for energy measurement. The resource range is likely a parameter that would be set in the Resource Data Template (RDT) allowing it to be tuned up periodically rather than a daily bidding element.

Traditional generators are defined within a range of zero as a minimum to a positive number as a maximum. When the ISO developed NGR, for Limited Energy Storage Resources (LESR) it introduced the concept of resources with a range from negative to positive and at the same time contemplated that NGRs comprised of demand would have a range from a negative value to a maximum of zero. PDRs and participating loads have their capability "inverted" so they can be modeled and treated the same as traditional generation. The extension of the LESR to PDR would allow the statement of a range that would accommodate both additional consumption (negative) and reduction (positive). In the figure below, a PDR with 15 MW of dispatchable range could set half as additional consumption and half as reduction.



While referring to this element as a mid-point, it would not need to be symmetrical since a PDR might have more capability in one direction than the other (e.g. drop more load for supply since it could include processes and house loads while additional consumption might be limited to adding processing loads).

3.2.1.2.3 Jurisdictional Issues

Since the heart of this product would entail energy settlement, all of the issues discussed in the Load Consumption of this straw proposal would exist. It also may be further complicated (or resolved in part) by including some sort of monthly or daily netting credit such as the short-term solution for the Los Angeles Air Force Base Vehicle to Grid Pilot.

3.2.1.2.4 Working Group Discussion

The position that this service is better addressed by retail rates has been raised by several parties which could, through further discussion, result in recommending this issue not be pursued. Points have been made that the concept might be better suited as a retail rate design solution, with TOU/load shift rates designed to reshape the system load profile day in and day out, not based on a fluctuating market clearing price.

In other words, it is not a solution that should rely on load balancing techniques/prices or market models (i.e. NGR) that are well-suited for addressing imbalances, using these techniques to try and incent load shifting. The outcome should be a more permanent reshaping of the net load curve so that is flatter across the year. It seems it would be less efficient to try and have the "balancing market" create this flatness in the load profile day-in and day-out.

3.2.1.3 PDR Capacity Only Frequency Regulation

3.2.1.3.1 Opportunity

Extending frequency regulation participation to PDR would allow a set of DER deployed resources to bring their capability to a regulation market that is ripe for improvement. As more new technologies are being deployed behind the meter, tapping into storage and other resources that can rapidly respond to an automatic generation control (AGC) signal can serve to increase ISO control performance results. The fleet of regulation resources fell short of reasonable performance as evidenced by the year one pay for performance enhancements which resulted in a reduction of 50% performance to 25% performance before sanctioning a resource. The current ISO frequency regulation market provides a level of revenue through capacity and mileage payments that possibly support the additional technology costs of telemetry for a PDR that could participate. Moreover, allowing PDR resources to provide regulation may improve the competitiveness, depth, and liquidity of ISO markets, thereby improving efficiency.

3.2.1.3.2 Product Construct

Unlike conventional regulation services which may require sustained energy output for across multiple dispatch intervals, PDR resources might be better suited to provide dispatchable regulation services in a "zero-net energy" (ZNE) structure. Similar to REM, a ZNE dispatch could function by returning a regulating resource to its original energy set-point every so often, e.g. every 15-minutes. As a PDR, the ZNE set point would be the baseline load level or some equivalent scheduling set point. With a ZNE focus, and also to mitigate retail/wholesale rate complications, PDR ZNE Regulation could have no energy settlement since energy deliveries would be netted to zero within a small period, implying regulation up and regulation down services could likely occur at similar consecutive 5-minute RTD prices. The PDR ZNE regulation service would respond to

AGC signals. Performance would be measured through telemetry. This follows the notion of eliminating wholesale energy settlement since regulation should be tilted toward energy neutrality for bidirectional participation. No specific concessions to the existing requirements for the frequency regulation product would be required. PDRs would need to be at least 500 kW to participate and acquire certification through testing. The resource type construct would have to accommodate the bi-directional design of positive and negative ranges for PDRs as discussed in daily load shift section. There are reasonably defined rules for telemetry aggregation that are applicable DERs. Direct telemetry assures visibility to the ISO and is the basis for determining accuracy and mileage independent of interval metering (point being little revenue would be lost w/o energy settlement).

3.2.1.3.3 Jurisdictional Issues

Elimination of wholesale energy settlement largely avoids the jurisdictional issues discussed in the two other products discussed in this straw proposal. If a behind-the-meter (BTM) storage device is providing the regulation service, any energy charged/discharged that modifies the customers load would be charged at the retail rate, i.e. there would be no wholesale energy settlement or compensation, only a regulation capacity payment. The regulation capacity bids (and subsequent payment) would have to be structured to cover any retail energy charges that might exist (including the round-trip efficiency of the storage device).

3.2.1.3.4 Working Group Discussion

For resources seeking to provide traditional Regulation Down/Up services and exposed up to a full hour of dispatch in one direction (and not ZNE regulation), the costs of retail energy settlements may create barriers to participation. For instance, to provide 1 MW of PDR Regulation Down dispatch for a full hour, a resource could conceivable show an extra 1 MWh on their retail bill if the metering does not adjust for the Regulation-directed energy. Regulation capacity and mileage payments are unlikely to cover such costs. For this reason, ZNE options are preferred. Solutions to hour-long regulation services from PDRs will likely require some form of either a) energy payments from the ISO and/or b) other solutions, maybe involving utility metering adjustments.

As part of this effort, accuracy considerations should inform the design. FERC Order 755 directed rules to compensate regulation resources for being faster and more accurate while also noting that Regulation capacity procurement can be lower through the use of fast and accurate resources. As part of these PDR enhancements to provide regulation, the ISO should also apply the regulation accuracy adjustment to the regulation capacity payments to providers so that the capacity of highly inaccurate resources is more appropriate valued.

3.2.2 Baseline Analysis Working Group straw proposal

3.2.2.1 Background

Currently, the proxy demand resource (PDR) and reliability demand response resource (RDRR) use a 10 of 10 baseline with same day adjustment to estimate the load impact achieved by the resource. While research has shown this baseline to be accurate for many medium and large commercial customers, research has also shown that this baseline is not accurate for all customer types. The purpose of the Baseline Analysis Working group (BAWG) is to identify additional settlement methods which when offered in addition to the 10 of 10 baseline will enable the load impacts from a wider variety of demand response resources to be accurately estimated.

The BAWG has identified three major areas of research. The first area that the working group will explore is the use of alternative traditional baselines methods to estimate the load impact of current demand response resources. The second is to explore the option of using control groups rather than traditional baselines to estimate the load impacts of demand response resources. The third is to explore ways to accurately measure load impacts of resources that are frequently dispatched.

3.2.2.2 Traditional baselines methodologies for current demand response resources

The research objective is to identify additional traditional baselines that accurately estimate the load impacts of existing demand response resources which are not accurately estimated by the current PDR approved 10 of 10 baseline. Research has shown that the 10 of 10 baseline underestimates the load impact from residential customers so identifying baselines for residential customers is an important task. In order to address this issue, analysis will be done using data from the air-conditioning cycling programs of all three utilities. The analysis will estimate the effectiveness of the current 10 of 10 baseline and test the effectiveness of alternative baseline methodologies. In addition, the effectiveness of the 10 of 10 baseline on estimating the load impacts of reliability programs such as the Base Interruptible Program (BIP) has not been rigorously tested. Customers participating in this program select a firm service level (FSL) and receive penalties if their energy use is higher than their FSL during events. Since customers are not paid according to a 10 of 10 baseline this program may attract customers with load profiles that are not well estimate by a 10 of 10 baseline. Therefore additional research will be done to assess the effectiveness of the 10 of 10 baseline at estimating the load impacts of emergency demand response programs and to propose alternative methodologies if needed.

The working group will also address the issue of how to determine which baseline should be applied to which resources. Offering more than one baseline option raises the issue of whether or not all baseline options should be available to all customer types. For example, if a particular baseline is more accurate for residential customers than it is for commercial customers the baseline might only be made available to resource consisting of residential customers. The working group will also identify any other operational barriers that may arise due to offering more than one baseline option.

3.2.2.3 Control Groups

Control groups provide an alternative to traditional baseline methodologies for the estimate of load impacts. Control group methodologies use the energy use of a group of customers who do not participate in the demand response event to those that do. There are two main types of control groups: 1) a randomized controlled trial (RCT) and, 2) a matched control group. In the RCT a subset of participants is randomly selected in advance and withheld from curtailment during the event period. A matched control group consist of non-participants which similar characteristics to participants. The working group will study control group settlement methodologies already in use by other independent system operators and determine if they can be implemented by the ISO. Questions that need to be addressed in this area include:

a. What requirements would need to be put in place to ensure the energy use of the control group accurately reflects the energy use of the treatment group?

b. What requirements regarding samples sizes or precision should be established?
c. How will the control groups be identified operationally?
d. Is it feasible to allow control groups to vary by events/rotate?
e. How can control group methodologies be established that work for both utilities and third party demand response providers?

3.2.2.4 Frequent Dispatch

The current 10 of 10 PDR baseline methodology relies upon historical non-event data in order to estimate a baseline. It may be challenging to find 10 previous non-event days for resources which are frequently dispatched that are within a reasonable proximity of the event day. In particular, behind the meter storage which is not separately metered and participating in a PDR or RDRR product may participate frequently in the market. The working group will explore how the load impact of frequently dispatched resources can be accurately estimated using only data from the premise. Cases in which meter generator output is available and used for settlement will be considered out of the scope of this working group because it has been handled in the ESDER 1 initiative. Research will be conducted to examine how many days are necessary to establish an accurate baseline and existing rules in place for scenarios where limited non-event data is available.

3.3 Multiple-use applications

Multiple-use applications are those where an energy resource or facility provides services to and receives compensation from more than one entity. DER could potentially provide and be compensated for many services to customers, the distribution system and the wholesale markets as new markets and services evolve across the energy supply chain.

3.3.1 Progress made in ESDER 1

In ESDER 1, the ISO addressed two broad categories or types of multiple-use applications: (1) DER providing reliability services to the distribution grid and services to the wholesale market; and (2) DER providing services such as demand management to end-use customers while participating in the wholesale market. ESDER 1 limited its treatment of these multiple-use applications to circumstances where the resource either is not providing resource adequacy (RA) capacity or can set aside a portion of its installed capacity not providing RA capacity. The criterion “not providing RA capacity” was defined to apply on a monthly basis for purposes of the initiative; i.e., the capacity in question should not be included in a load-serving entity’s RA plan for the given month.

In the case of DER providing services to the distribution system and participating in the wholesale market (the first category of multiple use applications examined in ESDER Phase 1), the ISO posed three questions and developed a proposed approach to each.

First, if DER is procured by the distribution utility to provide a grid service and bids into the ISO market, how should conflicting real-time needs of the distribution utility and the ISO be managed? The ISO proposed that it would settle a DER dispatch as other generating resources are settled – i.e., that if the DER deviates from an ISO dispatch instruction to provide service to the distribution system or for another reason, its deviation will be settled as uninstructed imbalance energy. Rather than establish a priority among conflicting needs, the ISO proposed to leave it to the resource owner or operator to decide how to respond in light of the settlement consequences for deviating from an ISO dispatch instruction.

Second, for any market interval in which the DER follows an ISO dispatch instruction that aligns with the service the same DER is providing to the distribution utility, is there a double payment concern that must be addressed? The ISO proposed not to implement any provisions to address potential double payment situations where a DER is compensated by the distribution utility and is also settled through the ISO market for responding to an ISO dispatch. Instead, the ISO indicated that although it may reconsider this position, it did not believe the issue is ripe for resolution because distribution-level services have not yet been defined. The ISO’s position is that double payment concerns from both the distribution utility for distribution-level services and the ISO for wholesale market participation must be based on an understanding of the specific distribution-level services involved and how they are procured, utilized and compensated by the distribution utility. These questions are being considered in CPUC proceedings[4] and may or may not be ripe for consideration by the ISO in ESDER Phase 2.

Third, the ISO considered whether there should be limitations on the provision of distribution-level services by a multi-pricing node DER aggregation or the sub-resources of a single-pricing node or multi-pricing node DER aggregation that is an ISO market participating resource? If so, what limitations are appropriate? The ISO proposed not to impose any such limitations. This is because under the ISO's proposed DER aggregation framework[5], the ISO will require no specific performance by sub-resources that comprise either a multi-pricing node or single-pricing node DER aggregation. The ISO's requirement is that when the ISO issues a dispatch instruction to a DER aggregation, the net response at each constituent pricing node be in the direction of the dispatch and the net response across constituent pricing nodes be in proportion to the DER aggregation's distribution factors. As long as the DER aggregation complies with this requirement, the operational behavior of individual sub-resources will not be subject to ISO requirements. An individual sub-resource could respond to the needs of the distribution system as long as the DER provider who operates the DER aggregation delivers the net response at the associated pricing node that is in the same direction as the dispatch instruction and aligns with the distribution factors for the DER aggregation.

With DER that provide services to end-use customers and participate in the wholesale market (the second category of multiple use applications examined in ESDER Phase 1), the ISO determined that no additional new provisions were needed beyond the provisions developed in ESDER Phase 1 for PDR/RDRR involving behind-the-meter generation devices. To accommodate the proliferation of behind-the-meter generation devices involved in demand response, the ISO developed an alternative performance evaluation methodology that directly meters the behind-the-meter generation device to measure the demand response provided by the device separate from the facility load.

[4] See in particular the CPUC Distribution Resources Plan (DRP) proceeding (R.14-08-013) and the Integration of Distributed Energy Resources (IDER) proceeding (R.14-10-003).

[5] See the ISO's filing with the Federal Energy Regulatory Commission at this link: http://www.caiso.com/Documents/Mar4_2016_TariffAmendment_DistributedEnergyResourceProvider_ER16-1085.pdf

The demand response performance is the demand reduction resulting from the output of the behind-the-meter generation device for the dispatch interval. Under the ISO's proposal, the resource's response is evaluated based on the physical meter generator output for the dispatch interval and reduced by an estimate of the typical energy output of the device used for retail load-modifying purposes and benefits. This adjustment appropriately removes an estimated quantity of energy delivered by the device to the facility for its retail load-modifying purposes, i.e., energy not produced in response to an ISO dispatch. The adjustment is intended to mitigate issues of wholesale and retail service overlap and the potential for double compensation present in this multiple use application scenario. The adjustment is calculated by taking an average of the energy delivered by the generation device during a prescribed number of prior non-event hours. This proposed solution to address this PDR-related multiple-use application scenario was approved by the ISO Board of Governors during its February 3-4, 2016 meeting.

3.3.2 Proposed effort in ESDER 2

In ESDER Phase 2 the ISO plans to continue its efforts to address multiple-use applications through its participation in the CPUC's energy storage proceeding.[6] The ISO and CPUC began a collaborative stakeholder process on this subject with a joint workshop held on May 2-3 at the CPUC to address station power (see section 3.4) and multiple-use applications. Many stakeholders made informative presentations at the workshop, and the CPUC and ISO received extensive written comments on May 13 and reply comments on May 20. Although the ISO and CPUC are still reviewing the reply comments, based on the workshop presentations and the initial round of comments the ISO has not identified any issues or topics that should be addressed in a separate effort under ESDER 2. If further consideration of the workshop comments identifies issues that require treatment in an ISO initiative or develops proposals appropriate for ISO consideration, refinement and possible adoption, the ISO can open a new initiative or expand ESDER Phase 2.

[6] CPUC Rulemaking 15-03-011.

The subject of multiple-use applications is receiving significant attention in Track 2 of the CPUC's energy storage proceeding. Following the input received from several informative stakeholder presentations at the May 3 joint workshop on this topic, Track 2 is delving into many aspects of multiple-use applications including identification of use cases that provide multiple services and participate in the ISO market, and cost-recovery issues such as double payments, overlapping value streams, and redundant compensation.

3.3.1 Additional background from the ESDER 2 issue paper

The viable revenue streams available to energy storage resources will drive the number and variety of energy storage use-cases and configurations that will appear in the evolving DER marketplace. Revenue or "value streams" reflect the energy and capacity services energy storage resources can or will be able to provide and be compensated for as new markets and energy services evolve across the energy supply chain.

Rocky Mountain Institute ("RMI") published a study on the economics of battery storage to address what services exist or may exist that will drive multi-use applications and the value proposition for energy storage. The study identified 13 services that energy storage can provide to three distinct stakeholder segments or areas of the supply chain, summarized in the table below.[7]

STAKEHOLDER GROUPS	SERVICES
ISO/RTO SERVICES	• Energy Arbitrage • Frequency Regulation • Spin / Non-Spin Reserves • Voltage Support • Black Start
UTILITY SERVICES	• Resource Adequacy • Distribution Deferral • Transmission Congestion Relief

[7] Rocky Mountain Institute Economics of Battery Storage study may be found here: http://www.rmi.org/Electricity

	• Transmission Deferral
CUSTOMER SERVICES	• Time-of-Use Bill Management • Increased PV Self-Consumption • Demand Charge Reduction • Back-up Power

The list can be augmented in the future by distribution-level operational services being considered in the Commission's Distribution Resources Plan proceeding, services such as local voltage support and power quality that would be additional utility services in the above table. Definition of distribution-level services that can be provided by storage and other DER is also being considered in the More Than Smart working group, which is an ongoing venue for stakeholders interested in the growth of DER and their impacts to discuss related planning and implementation issues.

Although some are not yet fully specified and ready to be turned into revenue streams, the list reflects existing and potential future revenue opportunities storage and other DERs can participate in if they have the right characteristics and, importantly, are interconnected where needed. In particular, a key insight of the RMI study is that it matters where the resource is interconnected, because it affects services and value streams the device can provide across the energy supply chain.

RMI points out that if a resource is interconnected to the ISO/RTO operated transmission system, it can offer only the ISO/RTO services, i.e., five of the thirteen services. However, if interconnected on the distribution system, in front of the customer meter, it can offer all four utility services, plus all five ISO/RTO services. Finally, a resource located behind the customer meter can offer all 13 services, four customer services and the other nine utility and ISO/RTO services. A resource's potential value and service offerings increase when it interconnects further out at the edge of the grid. This means we should expect to see use cases and configurations involving storage devices behind the customer meter designed to provide services directly to the customers where they are located and to the distribution and transmission systems. Because most of the distribution-level services identified in concept have not yet been specified in sufficient detail for implementation, we should expect configurations that serve end-use customers and participate in the ISO/RTO markets to dominate the multi-use arena in the near term.

Multi-use scenarios reflect distributed energy resource owners offering combinations of these thirteen (or perhaps more) services to the three identified stakeholders: the ISO, UDC, and end-use customer. As an industry, we need to define each service, its rules, performance requirements, measurement, etc., so the incremental value each service provides is fairly paid to each resource that provides the service while safeguarding against fraud, manipulation, and unearned revenue.

For instance, interconnecting a device at the edge of the grid enables the resource owner to capture multiple value streams, between the customer and ISO/RTO. Two problematic multi-use scenarios emerge, including variations on these scenarios, which include offering services mutually exclusive, and selling the same energy or capacity twice without adding incremental value.

Mutually Exclusive Capacity and Energy

The offering of capacity and energy services can be mutually exclusive. An example from the ISO market is that a successful bidder in the ancillary services market cannot resell the energy behind the ancillary services capacity award. For a spinning or non-spinning reserve award, the energy must be bid into the ISO market and must remain available so the ISO can dispatch it if and when needed in a contingency. The ISO has a means to monitor such activity and employs a no-pay settlement rule to subtract the ancillary services capacity payment if it finds that the energy behind an ancillary services capacity award was unavailable.

Another example of this mutual exclusivity between energy and capacity is when the capacity of a storage resource located behind a customer's meter is sold as resource adequacy capacity to an LSE, making that resource's capacity subject to a must-offer obligation. Because a storage resource has limited energy production capability, conflict can raise if the same capacity is also used to manage its host customer's demand charges and perform retail rate arbitrage. Because resource adequacy capacity comes with a must offer obligation, the energy is dedicated to the ISO, but if the resource exhausts its charge before the ISO needs to dispatch it, it will have violated its resource adequacy obligation to the ISO.

Selling the Same Energy Twice

The sale and export of energy sourced in the distribution system and sold into the bulk power system via a Wholesale Distribution Access Tariff ("WDAT") is an approved and acceptable means of providing energy services. The WDAT enables the safe and reliable interconnection of a distribution connected resource to sell its energy into the wholesale market. Other scenarios may exist that require no WDAT, but still allow resources behind the meter to export energy onto the grid, such as with Net Energy Metering ("NEM"). What must be avoided is a resource getting paid two or more times for the same energy delivered, capturing unearned value by simultaneously selling and banking the same energy.

Suppose a resource owner sells energy to the ISO/RTO from a large solar resource behind its facility meter, while the facility is enrolled under a utility's NEM tariff. The owner of the resource sets the resource up for participation in the ISO market and bids the excess energy from the resource into the wholesale market. Simultaneously, the owner "banks" the excess energy from the resource under the NEM tariff to be withdrawn and consumed by the facility at a different time. In this simple example, the resource owner would receive a double value or compensation: paid once by the ISO for wholesale energy and a second time for the value of energy withdrawn and consumed at a later time via the NEM tariff, receiving two value streams for the same energy.

In its opening comments in Track 2 of the energy storage proceeding, the ISO recommended the following to the CPUC:

1. <u>Refine and assess the list of energy and capacity services</u>: Start with the 13 services identified by RMI and the distribution-level services being considered in the DRP proceeding, and then refine the list in ways meaningful to the CPUC and the market structures in California. Each service type can then be evaluated against different use-cases to test for new rules, incompatibilities, and requirements, ensuring every identified service delivers incremental value when bundled with other energy and capacity services under a multi-use scenario.
2. <u>Identify energy and capacity services already compensated</u>: The CPUC should identify what incentives, tariffs, and rates exist that already compensate for certain energy and capacity services as identified in the RMI study and refined in this proceeding. If a multi-use scenario emerges where one or more of these services are already compensated, then such multi-use applications should be modified or rejected to account for the services already compensated.

3. Establish guiding principles: The ISO recommends CPUC staff work with interested parties to develop a set of principles that can test the validity of different multi-use scenarios. Does each service in a multi-use scenario provide incremental value, or is the same energy or capacity service being sold twice with no added benefit. Questions like these can be turned into guiding principles and are instructive for evaluating myriad different multi-use scenarios that will emerge.

3.4 Distinction between charging energy and station power

3.4.1 Background

Under this topic the ISO intends to resolve the distinction between wholesale charging energy and station power. The ISO is examining this topic area through its continued collaboration with the CPUC in Track 2 of the CPUC's energy storage proceeding (CPUC Rulemaking 15-03-011) rather than exclusively through ESDER 2.

The ISO tariff defines station power as "energy for operating electric equipment, or portions thereof, located on the Generating Unit site owned by the same entity that owns the Generating Unit, which electrical equipment is used exclusively for the production of Energy and any useful thermal energy associated with the production of Energy by the Generating Unit; and for the incidental heating, lighting, air conditioning and office equipment needs of buildings, or portions thereof, that are owned by the same entity that owns the Generating Unit; located on the Generating Unit site; and used exclusively in connection with the production of Energy and any useful thermal energy associated with the production of Energy by the Generating Unit."[8]

The ISO tariff explicitly states that station power includes, for example, the energy associated with motoring a hydroelectric generating unit to keep the unit synchronized

[8] Appendix A to the ISO tariff.

at zero real power output to provide regulation or spinning reserve.[9] Importantly, because the ISO tariff allows for netting of consumption against output within a five-minute interval, station power under the ISO tariff is only measured as the amount of consumption that exceeds output within a five-minute interval.[10]

As part of the ISO's new resource implementation process, the ISO verifies that new resources have a load serving entity in place to meet station power needs prior to commercial operation. Similarly, an energy storage facility owner should consult with its load serving entity to determine how retail charges may apply to its station power consumption.

The ISO recognizes the need to further evaluate methods to distinguish between wholesale charging energy and station power and address such issues as the merits and drawbacks of treating battery temperature regulation as wholesale charging or station power; possible metering and battery configurations that would enable distinguishing among traditional station power uses, charging, and battery regulation; and any other areas where additional clarifications or enhancements to ISO rules are warranted. Revising the definition of station power to allow for energy consumed to regulate battery temperature could require revision to the ISO tariff's definition of station power, which would require FERC approval. The Federal Power Act requires equal treatment of similarly situated customers, so there would have to be a compelling difference between, for example, energy consumed to regulate battery temperature and energy consumed to start a combustion generator in order to consider one wholesale and the other retail.

The ISO also recognizes that its efforts in re-defining station power from a wholesale perspective could be unproductive if a different determination is made from the retail perspective by the CPUC.[11] The same energy could incur both wholesale and retail charges, resuscitating the years of litigation that preceded the current station power

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[9] Station power does not include any energy used to power synchronous condensers; used for pumping at a pumped storage facility; provided during a black start procedure; or to serve loads outside the ISO BAA.

[10] See Sections 10.1.3, 10.2.9.2, and 10.3.2.2 of the ISO tariff.

[11] See, e.g., *Southern California Edison Co. v. FERC*, 603 F.3d 996, 1002 (D.C. Cir. 2010)

framework.[12] The ISO recognizes that its determinations regarding station power should be consistent with the CPUC's, and vice versa.

3.4.2 Straw Proposal

The ISO definition of station power is broad, but has some specific exclusions, such as energy used for pumping at a pumped storage facilities. The ISO proposes to modify its definition of station power to also exclude energy used to charge batteries for later resale. This charging load would include "efficiency losses," which are energy drawn from the grid to charge the battery for later resale, but ultimately lost because of the physics of the battery. Excluding charging load from settlements for station power would require a separate meter to distinguish the charging load from station power.

At this time, the ISO does *not* propose to modify its definition of station power further to allow energy drawn from the grid to be consumed in support of the production of energy to be subject to a wholesale rate (e.g., for temperature regulation). As explained below, the ISO lacks the authority to do so, and therefore defers to the CPUC and state-jurisdictional tariff process. The ISO takes no position on whether energy consumed for the production of energy should be subject to a wholesale rate such as the ISO LMP. In this initiative the ISO will seek Board approval so that if state-jurisdictional tariffs are revised to exclude auxiliary load, temperature regulation, or any other uses of energy for the production of energy, the ISO may modify its tariff for consistency at that time.

Until then, amending the ISO tariff to attempt to claim certain uses as wholesale would be futile. The Federal Power Act gives FERC jurisdiction over the transmission of electric energy in interstate commerce and the "sale of electric energy at wholesale," which the Federal Power Act defines as "a sale of electric energy to any person *for resale*."[13] The ISO tariff therefore only applies to transmission and sales for resale, which would exclude even those sales of power to be consumed to support the production of energy (i.e., station power). For this reason FERC held that "state-jurisdictional retail sales of

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[12] See, e.g., *id.*; *Calpine Corp. v. FERC*, 702 F.3d 41 (2012); *Duke Energy Moss Landing LLC v. CAISO*, 134 FERC ¶ 61,151 (2011).

[13] 16 U.S.C. § 824(d) (emphasis added).

station power are properly the subject of state tariffs"[14] after the U.S. Court of Appeals for the D.C. Circuit rejected FERC's monthly netting period to determine what level of consumption would be subject to wholesale settlement or retail charges.[15]

As many commenters point out, the Federal Power Act also requires that the ISO treat similarly situated customers similarly. While the ISO agrees with commenters that neither generation nor transmission are perfect analogs for storage, the ISO believes that generation is the appropriate analog unless and until FERC chooses to mandate the creation of a new and separate model for storage. Storage resources generally seek to provide supply and ancillary services to the ISO market, and do not transmit electric energy over any meaningful distance. As such, storage resources are similarly situated to generation resources for most purposes, including station power. The ISO cannot therefore create separate station power rules on the consumption of power to support producing power without also amending the station power rules for all generation resources. As stated above, because neither FERC nor the ISO has jurisdiction to resolve questions on consumed energy such as station power, the ISO defers on whether this amendment would be appropriate.

Accordingly, the ISO does not propose to address questions regarding the principles that would guide potential new station power rules, such as whether the load is for discretionary purposes or consumed when the storage device is charging, discharging, idle, or off.

3.5 Review allocation of transmission access charge to load served by DER

In comments submitted on the ESDER 2 issue paper on this topic, several stakeholders pointed out that this topic should be taken out of ESDER 2 and addressed in its own initiative or within the in-progress TAC Options initiative. The ISO agrees. The compelling rationale for taking the Clean Coalition proposal out of ESDER 2 is that potential changes

[14] *Duke Energy Moss Landing v. CAISO*, 132 FERC ¶ 61,183 at P 2 (2010).

[15] *Southern California Edison Co. v. FERC*, 603 F.3d 996, 1000-1 (D.C. Cir. 2010).

to the TAC billing determinant will be of interest and importance to many stakeholders who may not be concerned with the other ESDER 2 topics, and who might inadvertently miss this important topic due to its reduced visibility within ESDER 2.

The ISO will therefore open a separate initiative to address the Clean Coalition proposal. To avoid any delay to the consideration of this topic, the ISO will post an issue paper in the very near future.

Creating a separate initiative is preferable to including this topic in the TAC Options initiative because the latter is focused more narrowly on the question of how to allocate transmission costs over a much broader geographic region in the event that a large transmission-owning utility with a load-service territory joins the ISO and expands the ISO balancing authority area (BAA). In contrast, the questions raised by the Clean Coalition proposal need to be addressed regardless of whether any expansion of the ISO BAA occurs. The ISO has considered the potential linkages between these two topics and has concluded that they can effectively be treated separately.

The ISO will issue a market notice in the near future to announce the posting of the issue paper on this topic.

4 Stakeholder process schedule

The following table outlines the schedule for the policy development portion of ESDER Phase 2. As a next step, the ISO will discuss this proposed scope of issues with stakeholders and solicit stakeholder written comments. After considering the feedback received, the ISO will make any necessary adjustments to the scope and then develop a straw proposal on each topic for posting in May.

The objective is to bring proposed resolutions to the issues in the ESDER Phase 2 scope to the Board in October of this year. This schedule does not include implementation steps including development and filing of tariff amendments, changing business process manuals, and making and implementing changes to market system software and models.

Stakeholder Process Schedule		
Step	**Date**	**Activity**
Issue Paper	March 22	Post issue paper
	April 4 (1-4pm)	Stakeholder web conference
	April 18	Stakeholder comments due
Straw Proposal	May 24	Post straw proposal
	May 31	Stakeholder web conference
	June 9	Stakeholder comments due
Revised Straw Proposal	July 12	Post revised straw proposal
	July 19	Stakeholder web conference
	August 2	Stakeholder comments due
Draft final proposal	September 8	Post draft final proposal
	September 15	Stakeholder web conference
	September 29	Stakeholder comments due
Board approval	October 26-27	ISO Board meeting

5 Topics not selected for ESDER 2

"Twenty four by seven" participation in ISO markets. The ISO initially addressed this topic in ESDER 1 under multiple-use applications. In ESDER 1 the ISO clarified that settlement quality meter data (SQMD) from a scheduling coordinator representing a DER aggregation must be submitted daily according to ISO submittal timelines, and that the ISO will settle the DER aggregation based on that SQMD for all market intervals not just those intervals in which the DER aggregation was issued an ISO schedule or dispatch instruction. This is what is meant by "twenty four by seven" participation. The ISO recognizes this issue is tied to ongoing efforts to define policies for resources or facilities that want to provide services to and receive compensation from more than one entity. However, this issue is much broader than just NGR participation. This is an existing requirement for all resources participating in the ISO market.[16] Reconsideration of this fundamental requirement is complex and may have broad implications. The ISO is not proposing to consider this topic in ESDER 2.

Enhancements to NGR REM. PG&E suggests consideration of a new enhancement for the NGR regulation energy management (REM) model to allow the resource owner to define a SOC target instead of the ISO default target of 50% SOC. PG&E explains this feature is valuable in storage applications where a certain amount of resource energy capacity must be held in the resource as reserve to fulfill a non-ISO market obligation. Given the two NGR enhancements the ISO is already proposing to consider (as previously discussed in section 3.1), the ISO is not proposing to consider this third topic area in ESDER 2. However, as the ISO evaluates the two areas of NGR enhancement in scope – representing use limitations and dynamic ramping – the ISO could reconsider this third topic if the technical feasibility and/or market benefit of the two proposed NGR enhancements do not materialize.

Market design for compensation of resources in the regulation market. Advanced Rail Energy Storage (ARES) suggested that a review of the current market design regarding compensation differentiation between fast and slow responding resources be a topic for consideration in ESDER 2. The ISO has considered this suggestion but has determined this is not a topic ripe for consideration in ESDER 2.

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[16] The only exception is in the case of demand response participating as PDR and RDRR. These demand response resources have the ability to provide SQMD and be settled through the ISO market only for intervals in which they were dispatched by the ISO.