# Stakeholder Comments Template

| Submitted by | Company | Date Submitted |
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| Jack Stoddard, Crowell & Moring, on behalf of Ice Energy | Ice Energy | October 9, 2015 |

Please use this template to provide your comments on the Revised Straw Proposal posted on September 17, 2015 and as supplemented by the presentation and discussion during the stakeholder web conference held on September 28, 2015.

Submit comments to InitiativeComments@caiso.com

Comments are due October 9, 2015 by 5:00pm

All documents for the energy storage and distributed energy resources (ESDER) initiative, including the September 17, 2015 Revised Straw Proposal and the presentation discussed during the September 28, 2015 stakeholder web conference, are available on the webpage for the ESDER initiative at: http://www.caiso.com/informed/Pages/StakeholderProcesses/EnergyStorage_AggregatedDistributedEnergyResources.aspx

Ice Energy appreciates the opportunity to provide comments on the CAISO's Energy Storage and Distributed Energy Resources (ESDER) Revised Straw Proposal. The Revised Straw Proposal represents a step in the right direction towards increasing participation of DER into the CAISO markets. Ice Energy's comments are primarily focused on issues concerning demand response resources and multiple use applications and the issues that must be addressed to facilitate participation of thermal energy storage (TES) in CAISO markets.

In order to provide context for its comments and further inform the ESDER process, Ice Energy provides the following background regarding its thermal energy storage resource and its interests in the ESDER stakeholder process. Ice Energy's flagship product, the Ice Bear system, is a distributed thermal energy storage solution that works in conjunction with commercial air-conditioning systems common to most small to mid-sized commercial buildings. The Ice Bear consists of a large thermal storage tank that connects directly to a building's existing air-conditioning system. Once installed, the Ice Bear energy storage unit operates in two basic modes, ice cooling and ice charging. The Ice Bear is installed behind the utility-customer meter, but is a fully controllable, centrally operated grid asset. Aggregated Ice Bear resources include over a thousand units installed at hundreds of locations.

An Ice Bear resource would qualify as a multiple-use application with multiple potential value streams. It can provide permanent load shifting, by shifting customer AC load from on peak to off peak periods, or it can be dispatched within 5 minutes to reduce or increase load in response to orders from the CAISO or the utility.

TES represents a significant technical potential for providing over 300 MW of peak and flexible capacity in California.[1] TES has been recognized by both the CPUC and CEC as a demand-side resource that that can provide robust and verifiable peak load reduction and load shifting.

The use cases for thermal energy storage are different from those considered in the Revised Straw Proposal in two fundamental ways:

- TES provides verifiable demand (kW) and energy (kWh) reductions, but the electrical energy (kWh) output cannot be measured directly at the device (as it can for energy storage or a generator).
- TES provides permanent load shifting so traditional Meter Before/Meter After or 1-in-10 Day baseline methods do not capture the value provided to the grid.

Importantly, due to these two key differences, **none of the baseline methods proposed by CAISO or NAESB will facilitate wholesale market participation by thermal energy storage. We recommend that consideration of the issues necessary to facilitate participation by thermal energy storage be prioritized by the CAISO in 2016.**

***Use Cases***

Depending on the CAISO market and utility procurement frameworks, Ice Energy could operate its resource to conform to any of the following use cases, which are discussed in more detail in the Appendix:

Use Case #1: The resource provides permanent load reduction to distribution utility and/or end use customer, for which it receives resource adequacy (RA) credit as a load modifying resource, and bids any dispatchable load increase capacity into CAISO market in the Day-Ahead or Real-Time energy market.

[1] TRC Energy Services and Energy and Environmental Economics (2015), *Process Evaluation of California's Statewide Permanent Load Shifting Programs*, Table 12.

Use Case #2: The permanent load reduction provides RA to the utility as above. However the load reduction is bid into the CAISO market as a Supply Resource. The entire load reduction capacity for the resource is bid into CAISO markets as proxy demand response (PDR)/Reliability Demand Response Resource (RDRR) in the Day-Ahead market. The dispatchable load increase is bid into the DA or RT energy market as above.

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

Please provide your comments in each of the two areas of proposed enhancement.

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?

The MGO option would not work for thermal energy storage products such as the Ice Bear because they do not generate electrical output.

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?

The proposed sampling methodology, while an improvement relative to requiring physical metering data for all locations, is overly conservative and still imposes a significant burden on aggregated behind-the-meter resources. Based on the proposed statistical sampling methodology, even for a resource with 250 PDR locations there would need to be revenue-quality metering at 52% of the locations. Given that the CAISO's stated goal in developing the Type-II Baseline is to expedite demand response participation of residential or small-commercial customers in wholesale markets, the CAISO should give further consideration to the assumed error rate and level of confidence employed in developing the statistical sampling methodology. For certain types of resources, such as Ice Energy's Ice Bear, performance is highly consistent and predictable. Ice Energy records high resolution system performance data that could be used in conjunction with temperature data, customer meter data and revenue grade meters at select sites to perform robust baseline calculations. As such, a smaller sample size would be sufficient. In addition, resource performance based on statistical sampling could be audited after the fact. For example, it could be compared against internal resource system data and measured for consistency against non-interval customer meter data for locations that are part of the resource but were excluded from the sample. Accordingly, CAISO should maintain flexibility for demand resource providers to propose and justify alternative, custom statistical sampling methodologies.

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

See response to 2a above.

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

See response to 2a above.

***Non-resource adequacy multiple use applications***

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

Comments:

**Double Payment**. The CAISO defers addressing double payment concerns until the CPUC has defined distribution-level services. While Ice Energy agrees that identifying categories of distribution services is appropriately left to the CPUC, the CAISO should establish general guidance regarding double payment based on the record developed in the current ESDER stakeholder process. This guidance, in turn, would inform the CPUC process as well as the 2016 ESDER process. Accordingly, the CAISO should clarify that a resource should not necessarily be prohibited or discouraged from receiving multiple revenue streams for a single operation event provided that the services or products offered are distinct. Services or products which differ as to terms, pricing, and attributes, even if they overlap in other respects, should not be limited to a single payment. Just as a generator can be compensated for providing multiple products and services at the same time, multiple-use DER can simultaneously provide benefits to end-use customers, distribution utilities and the ISO.

**No restrictions on sub-resources**. Ice Energy supports CAISO's proposal to not impose restrictions on the provision of distribution services by sub-resources provided that the net response is directionally consistent with the ISO dispatch instruction and in proportion to the distribution factors.

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

Comments:

Ice Energy agrees that there is no need to further address multi-use applications providing services to end-use customers while participating in wholesale markets. Services provided to end-use customer are separate and distinct from PDR bid into the CAISO market.

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

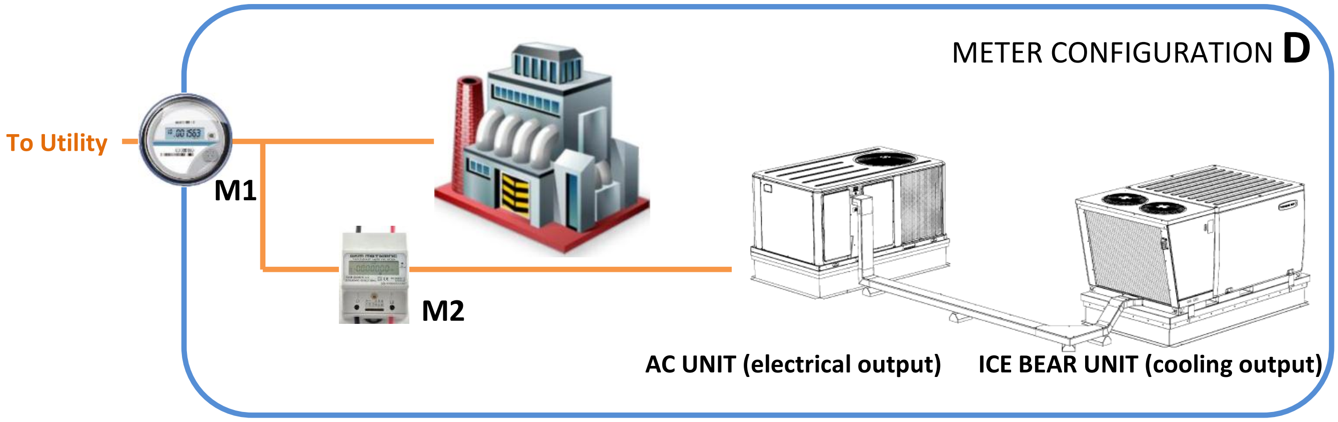
Comments:

In addition to the responses to the CAISO's questions above, Ice Energy offers the following general comments:

- **RA.** While Ice Energy understands that the CAISO declined to address RA as part of the 2015 ESDER process, unless and until it determines that there is a reason not to treat DER like generation, the CAISO should clarify that resources which have sold RA to distribution utilities can still bid PDR into the CAISO market. A conventional combustion turbine generator which has sold capacity to a utility under a power purchase agreement can still sell energy into the day-ahead (DA) and real-time (RT) markets. Similarly, DERs that are included in utility RA reports should not be prohibited from bidding PDR into CAISO markets on a day-ahead basis.
- **Custom Baselines.** The CAISO should further clarify that, notwithstanding baseline revisions adopted here, DRPs may still propose custom baselines where appropriate. Experience gained from developing custom baselines would provide valuable information for the 2016 ESDER process as well as proceedings at the CPUC.
- **Metering.** The CAISO should include within the scope of the 2016 ESDER process, consideration of the feasibility of evaluating resource performance using data aside from that provided by revenue-grade metering. While installing revenue-grade meters at all, or most, Ice Bear resources is cost-prohibitive, Ice Energy has internal system data, with necessary intervals, that could be used in conjunction with customer meter data and revenue grade meters at select sites.
- **Demand Forecasting.** Section 7.5 of the Revised Straw Proposal suggests that demand forecasting is best left to CPUC IDSM proceedings and should not be included in ESDER. ICE Energy disagrees with this assertion. The demand (kW) load reduction is verifiable by showing that a device of a certain size (e.g. 10 kW) is off when it otherwise would have been on. However, the total energy shifted can only be quantified by estimating the operating profile of the unit over a given time period (e.g. 4 hours). This requires estimating or predicting what the load for that device would have been absent the present of thermal energy storage. There is no way to meter that load reduction directly. However the operation of AC load, and therefore TES, is well studied and understood and can be predicted very accurately based on readily available weather data. Load forecasting is instrumental to allowing thermal and load shifting resources to participate in CAISO markets and should be on CAISO agenda for 2016.

## APPENDIX

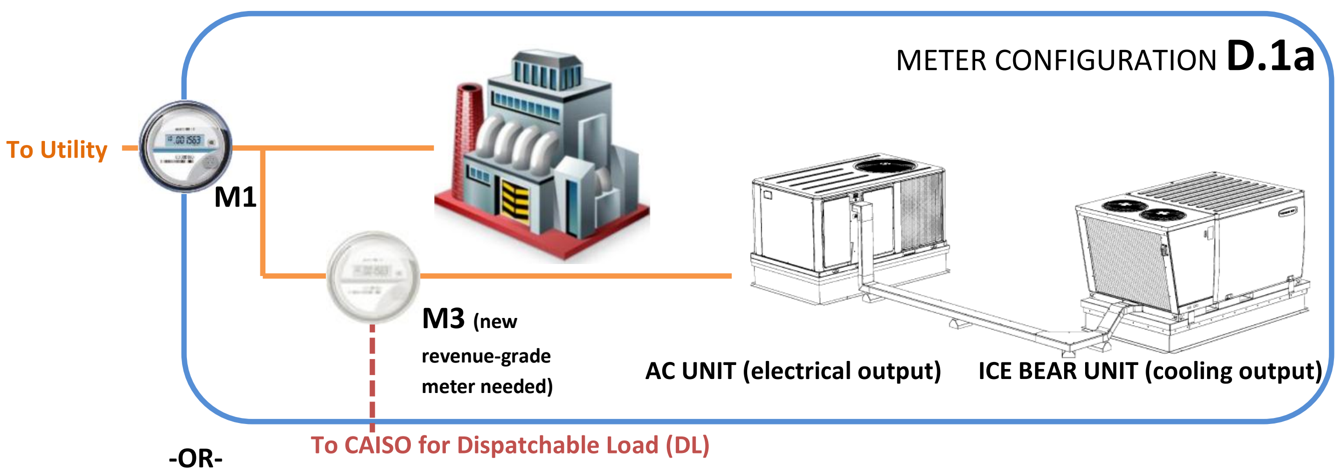
### Current Metering Configuration for Ice Bear




The current configuration for the Ice Bear is to connect directly to a commercial customer's AC system. Each unit is equipped with internal performance data that can be converted to metering data, represented by M2. This simple M2 meter will not be sufficient to bid Dispatchable Load (DL) into the real-time market under current CAISO rules, but may be sufficient to bid Permanent Load Shifting (PLS) into the day-ahead market as described below in Use Case #2.

**For the purposes of these use cases we have assumed a 10 kW PLS reduction available from a single Ice Bear unit every day and 5 kW dispatchable load *increase* possible during an overgeneration event.**

### Use Case #1: Ice Energy provides Permanent Load Shifting (PLS) RA capacity product to utility and bids only dispatchable load (DL) into CAISO wholesale market as PDR

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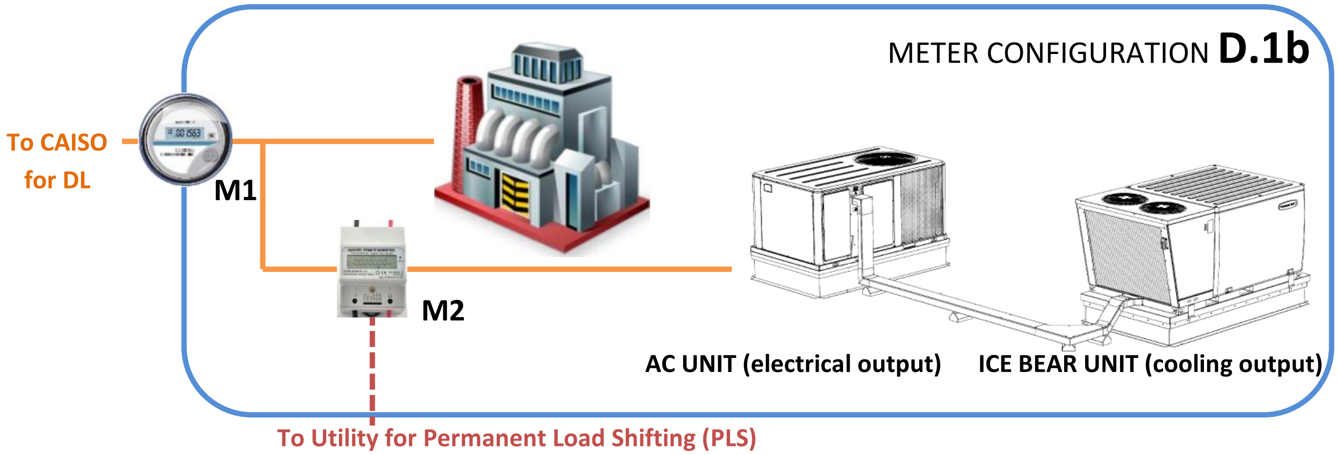



In this case, the PLS will be provided to the utility, PG&E for example, for day-ahead (DA) planning. PG&E would compensate Ice Energy directly for PLS, and the CAISO would be concerned only with the dispatchable load component.

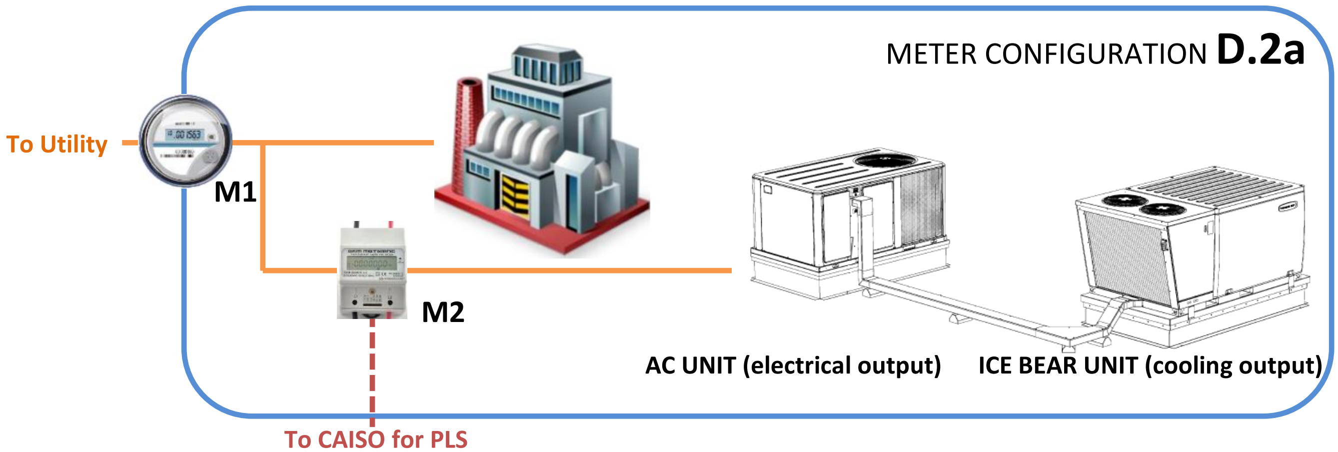
In this scenario, Ice Energy provides 10 kW of PLS to PG&E, who counts the resource towards RA requirements. PG&E receives value both in procuring less RA and in procuring less DA energy. The value of the permanent load shift has already been captured in that PG&E has adjusted its DA forecast to procure 10 kW less energy from the CAISO in the DA market. There would be two choices for compensation for RA by the utility. PG&E could pay Ice the full RA value of in a single annual or monthly capacity payment. Alternatively, PG&E could pay a lower RA payment to Ice Energy and provide additional variable energy payment to Ice Energy based on avoided DA energy procurement costs.

There are two metering options for Ice Bear dispatchable load to bid into the real-time CAISO market. The first is shown in Configuration D.1a, where a revenue-grade meter (M3) would be added to the Ice Bear system. This is likely to be prohibitively expensive even with statistical sampling at the thresholds currently proposed p.39 of the Revised Straw Proposal page 39 (e.g. 47% of units sampled for a 300-unit population). The second metering option (Configuration D.1b) does not modify the internal metering on the Ice Bear and instead uses the total customer meter (M1). Metering at M1 can provide a pre-event/during-event baseline comparison useful for dispatchable load, but likely only with a Meter Before/Meter After baseline, which is not currently supported by CAISO. Meter Before/Meter After would not work for permanent load shifting however. In any case we expect that load forecasting would provide a more accurate measure of performance for the CAISO.

For the additional 5 kW of dispatchable load, when overgeneration occurs and the load increase is dispatched, the CAISO "charges" the DR provider at the RT price, which would be negative during overgeneration. Thus the CAISO would pay the DER a negative RT energy price for beneficial load during overgeneration. 10 kW of permanent load shifting is compensated in the DA market as above.

For the dispatchable portion, the utility as scheduling coordinator has a deviation of 5 kW of load in the RT market not scheduled in the DA market. The CAISO would have to implement rules to not double pay the negative RT energy price to both the scheduling coordinator on the load side and the DER provider as a Supply Resource twice for the same load increase. This is similar to, but distinct from the so-called "missing money" problem identified in prior Proxy Demand Resource discussions where the dispatch of directly participating DER acts as a supply resource, but also impacts the scheduling coordinator or local service entities (LSEs) load.

**Use Case #2: Ice Energy bids both PLS as supply resource and dispatchable load into CAISO wholesale market as PDR**

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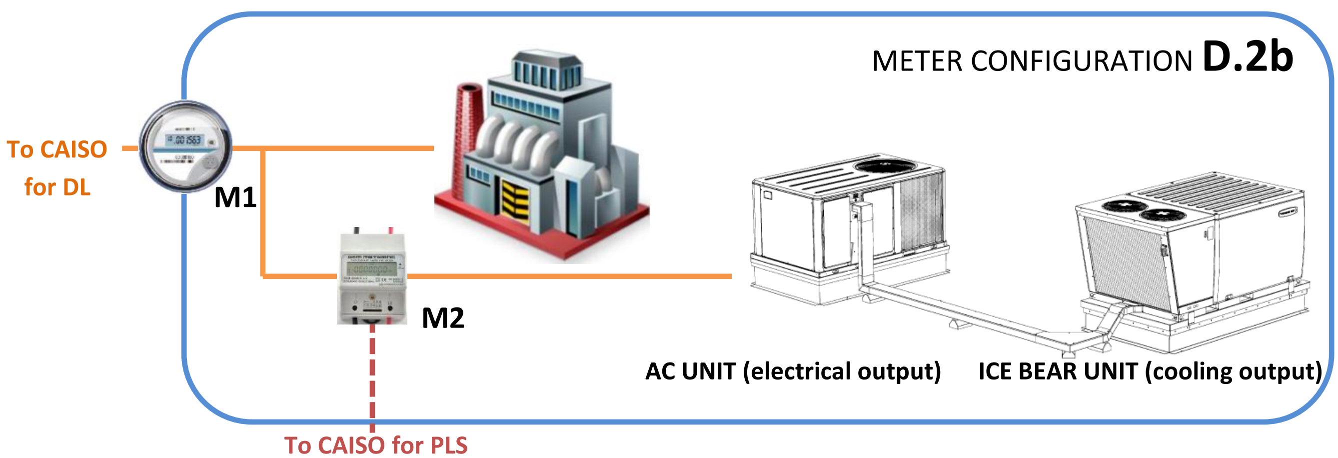

In this case, Ice Energy receives a fixed annual or monthly payment for RA from the utility and bids both the permanent and dispatchable load reduction into the CAISO markets. Variable compensation for energy provided would come from direct participation in CAISO DA or RT energy markets. The 10 kW PLS will be bid into the CAISO day-ahead market and an additional 5 kW of dispatchable load up could be bid into the real-time market when overgeneration occurs. The CAISO would compensate the DER (Ice Energy, in this case) at DA prices for 10 kW and charge the DER at the real-time price for 5 kW of load when dispatched for overgeneration.

In contrast to use case 1, the utility pays a fixed RA price to the DER provider, but does not adjust its load forecast for the PLS quantity. Instead, the utility pays for 10 kW of energy in the DA market. PG&E pays the CAISO for 10 kW in the DA market, and the CAISO pays Ice Energy for 10 kW at the DA market price for the permanent load reduction.

For the additional 5 kW of dispatchable load the treatment is the same as above. When overgeneration occurs, the CAISO “charges” the DR provider at the negative energy price for beneficial load during overgeneration periods.

In terms of physical metering, the PLS product would not have any direct electric metered data, but the M2 data should be sufficient for confirming that the AC unit is off. The PLS baseline would be a predicted temperature weighted operating schedule that would have occurred if the AC unit was on (e.g. if the thermal energy storage was not present). This approach is not explicitly under consideration by the CAISO. It is similar to NAESB Baseline Type-I that measures a generator. In this case we are measuring the lack of a kW load. The gap, however, is that we cannot meter kWh energy output like one can with a generator or battery. To calculate energy, we need to construct a baseline assumption of how the unit would have operated without the Ice Bear unit. NAESB does not appear to accommodate this use case that is necessary to calculate energy output provided by thermal energy storage (where there is no direct electrical energy output to meter). This gap should be addressed in 2016 to support California’s thermal energy storage and PLS goals.

The dispatchable load product would be the same as in Use Case #1. The simple M2 metering configuration would not be sufficient for bidding DL into the RT market under currently proposed baselines, so either an additional M3 revenue-grade meter would be necessary, or a Meter Before/Meter After baseline would have to be considered with the M1 meter.