Stakeholder Comments Template

Submitted by	Company	Date Submitted
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Please use this template to provide your comments on the presentation and discussion from the California Energy Storage Roadmap workshop held on October 13, 2014.

Submit comments to EnergyStorage@caiso.com

Comments are due October 27, 2014 by 5:00pm

Presentation materials and background information discussed during the October 13, 2014 workshop may be found at:

http://www.caiso.com/informed/Pages/CleanGrid/EnergyStorageRoadmap.aspx

Please provide your comments regarding each of the actions listed below that were discussed during the workshop. In particular, please direct your comments towards refinements needed to each action and any additional actions that may not have been identified or discussed. Also, please provide feedback on the priority of the proposed actions.

Actions and venues to address barriers

a. Actions to advance revenue opportunities

i. Defining and communicating grid needs will clarify gaps in existing markets and help identify new products

Action[1]	**Venue(s)**
Describe and clarify operational needs at the transmission level, and the operating characteristics required of storage and other resources, connected at either the distribution or transmission level, in order to meet these needs.	CAISO
Describe and clarify operational needs at the distribution level, and the operating characteristics required of storage and other resources connected at the distribution level in order to meet these needs.	CPUC
Facilitate clarification by IOUs of operational constraints that would limit the ability to accommodate storage on the distribution system and behind the customer meter.	CPUC

Comments:

We appreciate the inclusive wording chosen above which states: " … storage and other resources …" and we believe that making that distinction stated in the very first group of actions indicates an expansive consideration in this effort that might have been stunted by adhering strictly to the title of this "Energy Storage Roadmap".
Our particular technology, Grid-Interactive Electric Thermal Storage (GETS), is behind the meter energy storage – a type which is commonly vastly underestimated as a viable, scalable, and significant resource simply because of the term "grid-edge". Yet aggregating resources like electric water heaters by adding real-time telemetry and verification enables these collective endpoints to emulate many of the aspects of fast-ramp battery – with speeds matching the requirements of the fastest grid services such as regulation and contingency reserves. To a utility or system operator this type of collection appears as a flexible "virtual generator" which can perform functionally identical to traditional ultra-fast devices and assets. Importantly, the utility or system operator would view this aggregated asset – not as behind-the-meter – as it would be represented and appear to the operator as though it was actually further upstream. We see this as a very important point for consideration because a casual reading would lump this technology as "behind the meter" when in actuality the effect of load shifting, load shaping, load balancing, peak shifting, or stabilizing the grid at a "virtual" distribution level.
The way to visualize GETS is to imagine 3 intersecting circles with GETS in the center shared core. GETS is that shared link of DR, Energy Storage, intersecting the "Conscious Home" that completes the system. It is exceptionally odd that the key to bringing so much together is an "unloved" electric water heater retasked to become an instantaneous stabilizer that optimizes such a complex system.
Returning to our 1st statement, the GETS system occupies that " … storage and other resources …" space. It is not Direct Load Control (DLC) nor DR although it has Advanced DR aspects, it is energy storage which can duplicate other ultra-fast energy storage devices but does so without injecting electricity back into the grid, yet it boosts the simple duty of an existing and ubiquitous device found in every home to readily utilize more renewable energy while at the same time stabilizing the grid.

[1] WDAT and Rule 21 are addressed under section 2.C.i

ii. Clarify existing wholesale market product opportunities for storage

Action	Venue(s)
Clarify existing energy and AS market products and requirements for energy storage to participate in the ISO market	CAISO
Clarify roles of storage in an evolving RA framework	CPUC

Comments:

From our perspective, the way to foster the maximum innovation for entry of creative solutions to the California roadmap is to leave enough flexibility in the design of the framework to easily adopt new, emerging and even unexpected technologies and systems. Again, in our case, we see our system intersecting and overlapping traditional borders occupied by DR, Energy Storage, and Grid Services. For that reason we urge that the framework focus on functionality rather than process.
An example of that would be the very counterintuitive capability of GETS to do both up and down frequency regulation without the ability to export or inject electricity into the grid. That "function" is accomplished by varying the charge rate from a baseline. So, by aggregating 10's of thousands of electric water heaters in real-time, a completely new resource tackles a very traditional need.

iii. Refine existing and add new wholesale market products to meet grid needs

Action	Venue(s)
Identify gaps and consider changes or additions to existing wholesale market products that would better meet grid needs and improve revenue opportunities for resources such as storage that can provide those needs.	CAISO
Further examine and clarify the role of storage in deferring or eliminating the need for transmission or distribution upgrades	CAISO, CPUC
Consider revising the ISO's procedure for testing and certifying resources for ancillary services	CAISO
Streamline rules for aggregations of distributed storage units to participate in CAISO markets, including participation via use of the NGR model.	CAISO
Evaluate the need and potential for the development of distribution level grid services and products that provide new revenue opportunities for distribution connected storage	CPUC

resources.	

Comments:

Often, the capability of an energy storage resource to perform "peak shift / valley fill" dooms it to only perform that function. Part of the reason it occurs is that a label is applied to that device or system. So one way to eliminate gaps is to avoid this silo effect and again concentrate on functionality.
Some leading modeling work has been done by a team led by Seungwook Ma ("Ookie" Ma) of EERE (202-586-9645) seungwook.ma@ee.doe.gov and some of that recent work has been focused in the US Western region. That work should be quite familiar to certain CAISO people who offered technical collaboration. Due to the fact that there is no ISO / RTO and therefore a less organized structure, those studies have already begun to tackle the job of defining roles and carving out potential opportunities for emerging assets and systems. One such draft study suggests that there may be approximately a 3x $ multiple for operational values compared to shifting and - although it was not studied in detail - that study also suggests that capacity value of DR can be several times larger than the operational value.

Due to the aggregation of an asset such as GETS, it more properly belongs in the distribution segment of the stream – despite it not being "connected" there. Once again, by concentrating on functionality we avoid the bad habit of pre-sorting a new technology or system into a convenient and simple box or category.

iv. Identify gaps in rate treatment and identify existing rules that could address issues

Action	**Venue(s)**
Clarify rate treatment for the charging mode of grid-connected or distribution-connected storage participating in the wholesale market under current ISO market settlement rules.	CAISO, CPUC
Clarify existing tariffs for Behind the Meter storage devices that are paired with NEM generators	CPUC
Consider new proceeding for stand-alone Behind the Meter storage devices to address rates for charging and exporting power	CPUC

Comments:

We have found that there is a strong compunction to establish a meter on each end device. That tendency comes from a traditional view of the end-point being a larger generating asset or load. Real-time 4-second data on thousands of devices makes for a lot of data in a hurry. The significant cost of standard metering is aggravated not by the cost of the storage of this metered data but the sheer

management and retrieval of that data. Our metered endpoint system is designed to kick out avalanches of data but we think that in most cases that is overkill.
PJM has begun to deal with how to meter, what to meter, how to audit and verify, and how providers should manage and retrieve that type of data. Few others have had yet to tackle this non-traditional aggregation of tiny end-points. Our suggestion is to simplify and to recognize and fight the traditional bias created by a history of managing large single non-aggregated assets.
Also, in regards to the interaction of energy storage and DGPV we suggest reviewing very recent filings on Hawaiian PUC DOCKET NO. 2014-0130 regarding adjusting an existing tariff (Rule No. 14 Section H Interconnection of Distributed Generating Facilities Operating in Parallel with the Company's Electric System submitted by the Hawaii Consumer Advocate as well as that of The Alliance for Solar Choice (TASC). In particular, it may be valuable to study the TASC position on "potential to export energy" supported by the Consumer Advocate.
Once again simplicity and functionality are the guides.

v. Define multiple-use applications of storage to facilitate development of models and rules

Action	**Venue(s)**
Define and develop models and rules for multiple-use scenarios of storage where feasible.	CPUC, CAISO

Comments:

The desire should be to welcome and encourage multiple and concurrent use technologies and systems. Traditional Demand Response Management Systems think in terms of *devices* and that same thing is true when we think about Energy Efficiency. Yes, it is great to focus on and measure at the device level, yet as laid out 1st in June of 2012 by ACEEE, if we take a systems view we can earn substantially greater savings. Those same savings / optimization will stem from systems that perform multiple duties sometimes ignoring borders, barriers, and silos of traditional methodologies.

vi. Determine hybrid storage configurations to enable prioritization and development of requirements

Action	**Venue(s)**
Identify and develop clear models of use cases for hybrid energy storage sites, and prioritize them for purposes of facilitating their participation	CAISO, CPUC, IOUs
For the use cases of greatest interest or greatest likelihood of near-term development, clarify the requirements and rules for participation.	CAISO, CPUC, IOUs

Comments:

"Hybrid" sounds complex – but just as mentioned above, they fit well into systems that can multi-task.

vii. Assess existing methodologies for evaluating storage and identify or develop a preferred common methodology

Action	Venue(s)
Prepare report or summary of efforts underway to develop publicly available models for assessment of energy storage	CEC
Consider refinements to the evaluation methodologies used by IOUs for to support CPUC decisions on storage procurement	CPUC, CEC

Comments:

Our suggestion is to make all possible use of and leverage from the exhaustive work of the stakeholder group led by Dave Conover david.conover@pnl.gov
Protocol for Uniformly Measuring and Expressing the Performance of Energy Storage Systems
http://www.sandia.gov/ess/docs/ESS_Protocol_Rev1_with_microgrids.pdf
Inventory of Safety-related Codes and Standards for Energy Storage Systems
http://www.sandia.gov/ess/docs/safety/ESS_Inventory_9-15-14_PNNL_23618.pdf

b. Actions targeted at cost reduction

i. Review metering requirements for opportunities to reduce costs

Action	Venue(s)
Establish the value of and develop a regulatory and policy framework under which the ISO and UDC can share metering and/or meter data.	CPUC, CAISO
Establish rules for resource owners to submit settlement quality meter data	CAISO
Establish rules for UDC subtractive metering for BTM wholesale resources	CPUC

Establish rules for certifying sub-metering and third-party meter data collection and VEE	CPUC
Complete the Expanding Metering and Telemetry Options Phase I and II initiatives – "expand scenarios for SC metered entities"	CAISO

Comments:

Our best suggestion is to think out of the box and imagine an influx of distributed aggregated end-points similar to the overwhelming adoption of DER and DGPV. We also suggest keeping metering specifications and requirements reasonable. In many situations, the metering system at storage system is secondary to a primary or master meter. Our recommendation is to set metering requirements where they need to be to be effective but not so stringent that it adds significant cost penalties and development constraints that will deter participation and impact innovation as well as affordability.

ii. Review telemetry requirements for opportunities to reduce costs

Action	**Venue(s)**
Evaluate CAISO telemetry requirements for smaller resources	CAISO
Evaluate KYZ, increasing 1-minute requirement, 10 MW limit	CAISO
Evaluate value of common telemetry framework for California	CAISO
Complete the Expanding Metering and Telemetry Options Phase I and II initiatives – definition and support for "data concentrators"	CAISO

Comments:

This section is beyond our level of familiarity but we again stress simplicity in metering and urge that aggregated end-points be recognized for their functionality in the distribution segment - not in their location which is behind-the-meter.

iii. Assess codes and standards to identify gaps and best practices

Action	**Venue(s)**
Review existing fire protection codes for various energy storage technology and applications and identify best practices	CEC
Determine applicability and scope of UL and other certifications for stationary storage	CEC

systems	

Comments:

Local codes and certain changes to existing water heaters destined to be telemetry linked will sometimes fall into code and UL parameters. Visibility of those rules, codes, and prohibitions is paramount.

iv. Review interconnection process for small distribution-connected resources to reduce costs

Action	**Venue(s)**
Address certification process for integrated device metering	CPUC
Address fees for interconnection of non-exporting resources	CPUC

Comments:

See comments made earlier on the effort made in Hawaii on 14H.

c. Actions focused on process and timing improvement

i. Clarify interconnection processes to make it predictable and transparent

Action	**Venue(s)**
Clarify existing interconnection processes, including developing process flow charts and check lists	CAISO, CPUC
Coordinate between Rule 21 and WDAT to streamline queue management processes	CPUC
Evaluate the potential for a streamlined or 'faster track' interconnection process for storage resources that meet certain use-case criteria	CAISO, CPUC, and IOUs

Comments:

Hawaiian Electric has recently provided interconnection detail on the web as well as on PUC filings. Investigation of techniques, barriers, definitions, and best practices is readily available for examination.

d. Identify interdependencies and determine priorities to minimize delays

During the workshop the Roadmap team highlighted the importance of identifying interdependencies among the actions. Correctly prioritizing actions and selecting the ones that currently either prevent other actions from being productive or directly prevent storage contracts from being signed will enable the CPUC, the CAISO and the Energy Commission to maximize progress in removing roadblocks to storage. Please provide comments on important interdependencies among actions that should be factored into the roadmap.

Comments:

Time is of the essence as the cost of DER in the form of rooftop DGPV shows no sign of stopping. PV system prices dropped by 12% to 19% nationwide in 2013, according to NREL and LBNL, and are expected to drop another 3% to 12% this year, depending on system location and market segment.
http://apps1.eere.energy.gov/news/news_detail.cfm/news_id=21706
The risk clearly is underestimating the speed of adoption combined with very rapid and sometimes unexpected consequences.

Applicability to Storage Configuration and Use Cases

The Roadmap team presented an early draft of a "matrix" that seeks to convey what actions will support each identified use case or storage configuration to come online and contribute to grid stability. Please provide comments and suggestions on how such a matrix can be made the most useful to stakeholders. If applicable, please provide examples.

Comments:

We presume that this refers to page 30 of the workshop presentation pdf.
One problem begins on the left of the diagram where it says "where the resource connects to the grid" and next to it is "customer sited – separate meter". Whether individually or combined these restrictions can erect a barrier that eliminates technologies from later use cases.

An example of this occurring was in the extraordinarily useful ES-Select software program licensed by Sandia from KEMA (DNV GL) which made no allowances for higher level grid services once that location was set. We think that this is an example of the need for functionality superseding the comfort of sorting or putting the technology into a category or categories.

A good example of how good intent can go off track is multiple “behind the meter” locations that when aggregated become for all intents and purposes the equivalent of an upstream asset “virtually” located at distribution.

The natural tendency of a reader of that particular diagram is to go from left to right – starting with location (where it interconnects to the grid) followed by another limiter (technology and co-location). We think this should be highly discouraged because it will necessarily diminish or eliminate the advantages of aggregated grid-edge / behind the meter assets.