

## Stakeholder Comments Template

Submitted by	Company	Date Submitted
Chris Edgette <a href="mailto:cedgette@strategen.com">cedgette@strategen.com</a> 415.424.8475	California Energy Storage Alliance	October 27, 2014

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](mailto: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 <sup>1</sup>	Venue(s)
1 and 2. 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
3. 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
4. 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:**

1. It would be useful throughout the Roadmap to eliminate use of the phrase “and other resources” from action descriptions related to storage in order to narrow the focus to characteristics specific to storage resources.
2. In addition to TPP, other specific CAISO Stakeholder Processes and Initiatives should be identified by name. From there, particular subsets of the topic of operational needs should be mapped to relevant BPMs and items identified for work in the Stakeholder Initiatives Catalog Process.
3. This CPUC topic should be referred to R.14-08-013 (DRP).
4. This CPUC topic should be referred to R.14-10-010 (RA).

**ii. Clarify existing wholesale market product opportunities for storage**

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

**Comments:**

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<sup>1</sup> WDAT and Rule 21 are addressed under section 2.C.i

1. In addition to flexible capacity and frequency response, other specific CAISO Stakeholder Processes and Initiatives should be identified by name. From there, particular subsets of the topic of operational needs should be mapped to relevant BPMs and items identified for work in the Stakeholder Initiatives Catalog Process.
2. This CPUC topic should be referred to R.14-10-010 (RA).

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

Action	Venue(s)
1. 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
2 and 3. Further examine and clarify the role of storage in deferring or eliminating the need for transmission or distribution upgrades	CAISO, CPUC
4. Consider revising the ISO’s procedure for testing and certifying resources for ancillary services	CAISO
5. Streamline rules for aggregations of distributed storage units to participate in CAISO markets, including participation via use of the NGR model.	CAISO
6. Evaluate the need and potential for the development of distribution level grid services and products that provide new revenue opportunities for distribution connected storage resources.	CPUC

**Comments:**

1. In addition to flexible capacity and frequency response, other specific CAISO Stakeholder Processes and Initiatives should be identified by name. From there, particular subsets of the topic of operational needs should be mapped to relevant BPMs and items identified for work in the Stakeholder Initiatives Catalog Process.
2. Actions assigned to both the CAISO and the CPUC should be assigned instead to one or the other or there is unlikely to be meaningful progress.
3. This topic should be divided along jurisdictional lines.
4. This topic should be assigned to the relevant provisions of the CAISO’s Tariff as they relate to certification for product eligibility and compliance generally and also as to specific ancillary services.

5. This topic should be referred to the CAISO's stakeholder processes and initiatives focused on deliverability of storage resources for RA. Currently, rules around deliverability and the associated study process which must be undertaken to receive RA credit are onerous, particularly for smaller systems. Rules should be reevaluated with the practical implications of those rules on the ability of small and aggregated systems at the distribution level and on the customer side of the meter to provide RA services.

The ability for distributed resources, whether on the customer side or utility side of the meter, to provide RA is significantly constrained by existing rules used to determine deliverability.

In order for a resource to be eligible to provide RA it must be found to be fully deliverable. The current study process requires project developers to pay \$50,000 per location and additionally would appear to require project developers to have clear visibility into the specific location of a facility that is to be used to provide RA. Both of these requirements preclude developers of aggregated solutions from providing RA akin to what has been historically provided by large, central station facilities. For obvious reasons, the \$50,000 study fee renders the economics non-viable for small projects that would make up an aggregation. Additionally, the need for site certainty also presents certain challenges, and poses something of a Catch-22 for developers.

We would anticipate that developers of aggregated solutions would approach the market very differently than a large central station developer. Instead of identifying a specific location to develop, aggregators would look to develop projects across a given electrical area, seeking a portfolio of customer host sites to deploy storage solutions. However, absent assurance that resources in that area will be deemed deliverable, the appetite of an aggregator to incur the significant customer acquisition costs associated with developing a portfolio is going to be quite limited.

Modifying the deliverability process to enable resources located within a given area or region, rather than site specific determinations, is therefore critical in allowing aggregated solutions to actively participate in the market.

While we understand that the CAISO has been envisioning customer-side storage as participating as a proxy demand resource, limiting the ability of aggregated storage to participate only to offset onsite loads is likely to leave significant value on the table. This is of particular concern as storage gains traction at residential locations where the storage systems being deployed are likely to offer capacity well in excess of onsite loads at peak times, especially when these systems are paired with onsite solar.

6. This topic should be referred to R.14-08-013 (DRP). It should be clarified that this topic includes storage resources connected on the customer side of the meter. More generally, when the roadmap refers to activities intended to address issues that relate to distribution connected storage resources, it should clarify that this includes resources on the customer side of the meter.

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

Action	Venue(s)
1 and 2. 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
3. Clarify existing tariffs for Behind the Meter storage devices that are paired with NEM generators	CPUC
4. Consider new proceeding for stand-alone Behind the Meter storage devices to address rates for charging and exporting power	CPUC

**Comments:**

1. This topic should be referred to the CAISO alone as it relates to only wholesale rates.
2. The CAISO should devote an initiative specifically to this topic, with a goal of an expedited tariff revision proposal submitted to FERC before the end of 2015.
3. This issue should address and facilitate utilization of storage systems connected behind the meter to effectively integrate and optimize the value of renewable resources. Specifically, the current rules appear to limit the ability to use a storage device to shift energy produced by a renewable resource for export at later times of day without significantly limiting the ability of the host customer to receive NEM credit for those exports. Additionally, the metering requirements or alternatives thereto for purposes of maintaining NEM integrity need to be further developed, specifically for DC-coupled storage and solar generating systems. Finally, the CPUC should work with the IOUs and stakeholders to develop tariffs that specifically create opportunities for storage deployed on the customer side of the meter, irrespective of customer context, to provide peak load reduction services. For example, currently storage systems deployed at residential locations are ineligible to participate in the utilities’ capacity bidding programs. Programs that are tailored to, and recognize and encourage effective utilization of customer side storage devices paired with renewable resources is critical to accessing the capabilities and value of storage assets on the customer side of the meter.
4. This CPUC topic should be referred to R.14-07-002 (NEM Successor Tariff).
5. This CPUC topic should be referred to R.14-08-013 (DRP).

Regarding Tariff Treatment, CESA provided a straw proposal table in an effort to form a consensus around what loads should be considered wholesale and what should be considered retail.

That table is replicated below:

Interconnection Type		Storage Input Energy Function	Wholesale vs. Retail	Comments
Transmission Connected	1	Storage charging during REM	Wholesale	Includes RTE Losses
	2	Storage charging for Non-REM wholesale market functions	Wholesale	Includes RTE Losses
	3	Storage charging for Transmission Support activities	Wholesale	Includes RTE Losses
	4	Pre-chilling of a thermal resource that directly offsets chilling at a later time	Wholesale	
Distribution Connected	1	Storage charging for REM	Wholesale	Includes RTE Losses
	2	Storage charging for Non-REM wholesale market functions	Wholesale	Includes RTE Losses
	3	Storage charging for Distribution Support activities	Wholesale	Includes RTE Losses
	4	Pre-chilling of a thermal resource that directly offsets chilling at a later time	Wholesale	
Behind the Meter - Non NEM Tariff	1	Storage charging during REM	Wholesale	
	2	Storage charging for Non-REM wholesale market functions	Wholesale	
	3	Storage charging to offset customer load	Retail	
	4	Storage charging to provide Demand Side DR	Retail	
	5	Storage charging to provide Supply Side DR	TBD	
	6	Ancillary battery heating/cooling	Retail	
	7	Pre-chilling of a thermal resource that directly offsets chilling at a later time	Retail	
Behind the Meter - NEM Tariff	1	Storage charging during REM	Wholesale	
	2	Storage charging for Non-REM wholesale market functions	Wholesale	
	3	Storage charging to offset customer load	Retail	
	4	Storage charging to provide Demand Side DR	Retail	
	5	Storage charging to provide Supply Side DR	TBD	
	6	Ancillary battery heating/cooling	Retail	

	7	Pre-chilling of a thermal resource that directly offsets chilling at a later time	Retail	
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**Round Trip Efficiency vs. Station Power**

Regarding the issue of what loads should be considered Round Trip Efficiency (RTE) versus Station Power, CESA asserts that loads which are directly related to the throughput of the energy storage system should be considered to be part of RTE. Those losses occur when the system is delivering power, storing power, or in idle ready to respond to system instructions. RTE includes inverter losses, thermal management of the storage system equipment, control system losses, wire losses within the system, and storing process losses. In pumped hydro storage, those losses include pipe friction and pumping losses; in electro-chemical storage, losses include exothermic reaction; in flow battery storage, losses include pump and friction losses, trickle flows, etc. required to stay synced and ready, and so forth.

RTE should include all energy flows needed to operate the storage, meaning that if those loads were turned off, the energy storage system could not operate. All RTE loads should be included in the efficiency calculation and included in the storage rate. These are the loads that are non-discretionary, and needed for plant operation when the energy storage is being made available to the grid operator.

Systems that are not part of the system operation, HVAC and lighting for personnel, which do not affect the throughput of the system, which if turned off do not affect the operation physically, should be considered station power. These are unchanged whether the battery is charging, discharging, or off. These loads are discretionary, could be turned off during a rolling-black out, and could be increased or decreased without regard to the battery operation.

- 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:**

This topic should be referred to a new energy storage rulemaking proceeding to be opened by the CPUC in Q1 2015.

**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:**

This topic should be referred to the CPUC exclusively as part of a new energy storage rulemaking proceeding to be opened in Q1 of 2015.

It is important that the CPUC clarify that storage projects co-located with existing RA renewable generators are eligible for storage procurement by utilities. Improving the operational characteristics of existing renewable generators provides benefits to utilities, ratepayers, and the system operator, and should be encouraged.

**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:**

This topic should be referred to the CPUC exclusively as part of a new energy storage rulemaking proceeding to be opened in Q1 of 2015.

The system benefits of energy storage can more accurately be accounted for in production cost modeling than in other modeling scenarios. As California evaluates its future resource options, it makes sense to leverage the existing LTPP modeling process to evaluate the impact of varying forms of energy storage. The outputs of energy storage LTPP sensitivities would help guide future procurement.

Failing incorporation into the LTPP modeling process, an independent evaluation of the need for storage should be undertaken on a regular basis, using updated inputs and pricing. The modeling outputs could inform the valuation, GHG impact, and procurement of energy storage going forward.

**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:**

Complete the Expanding Metering and Telemetry Options Phase I and II initiatives – “expand scenarios for SC metered entities”

**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
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**Comments:**

CESA looks forward to working with the CAISO on these initiatives.

**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 systems	CEC

**Comments:**

This topic should be referred exclusively to the CPUC as part of R.11-09-011 (DG Interconnection).

**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:**

CESA recommends dividing energy storage interconnection processes into three scenarios, based upon the operation of the storage resource. The scenarios and process are outlined below:

**Scenario 1:** No net export from energy storage.

- A study process waiver would be required with a contractual commitment not to export from the storage system (perhaps in the form of a simple interconnection agreement waiver with penalties for violations, and simple verification process).
- For a standalone energy storage system, no extra meter would be required to verify compliance.
- For energy storage paired with NEM-eligible generation, a simple submeter (not revenue grade) would be required on the NEM-eligible resource to verify compliance.

**Scenario 2:** Storage paired with NEM-eligible generation but with a contractual commitment not to export in excess of the standalone NEM generation pMax.

- A study process and interconnection agreement would be required.
- The pMax is specified in the application process, and is a contractual commitment in the interconnection agreement for the combined storage plus NEM generation pMax not to exceed the standalone NEM generation pMax.
- In the study process, the storage system pMax will not be studied as stacked on top of NEM-eligible generation pMax (e.g. the combined pMax will be equal to the NEM-eligible generation).
- No additional meter would be required to verify compliance.

**Scenario 3:** Storage paired with NEM-eligible generation, acting independently.

- The pMax is specified in the application process, and is a contractual commitment in the interconnection agreement.
- In the study process, the storage and NEM generation can be stacked up to the pMax specified by the customer in the interconnection application.

***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
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**Comments:**

Please see above recommended interconnection process and scenarios.

***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:**

Rule 21 and WDAT must be completely synchronized to the maximum extent possible.

**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:**

CESA appreciates the Roadmap Team's willingness to account for actions by use case. This will support various stakeholders and policymakers in their prioritization of storage barriers and solutions.