

## Stakeholder Comments Template

Submitted by	Company	Date Submitted
Keith White <a href="mailto:kwh@cpuc.ca.gov">kwh@cpuc.ca.gov</a> (415) 355-5473	California Public Utilities Commission Staff	April 15, 2014

Please use this template to provide your comments  
in the Energy Storage Interconnection stakeholder initiative.

Submit comments to [EnergyStorage@caiso.com](mailto:EnergyStorage@caiso.com)

[Comments are due April 14, 2014 by 5:00pm](#)

The presentation discussed during the April 7 stakeholder meeting may be found at:

[http://www.caiso.com/Documents/Agenda-Presentation-EnergyStorageInterconnectionApr7\\_2014.pdf](http://www.caiso.com/Documents/Agenda-Presentation-EnergyStorageInterconnectionApr7_2014.pdf)

The ISO is requesting that stakeholders provide comments in one or both of the following two subject areas:

1. Issues and/or questions of more immediate concern relating to the submission of interconnection requests in the Cluster 7 application window. To the extent possible, the ISO will seek to address such issues/questions prior to the close of the Cluster 7 application window (i.e., prior to April 30).
2. Policy issues that may require more comprehensive examination through this initiative. As a reminder, policy issues relating to interconnection of energy storage to the ISO controlled grid are within the scope of this initiative. In contrast, interconnection below the ISO controlled grid, and market and rate issues, are examples of subject areas not within the scope of this initiative.

To aid the ISO in differentiating between comments in these two subject areas, please insert your comments under the appropriate heading below. Thank you.

**Issues/questions of more immediate concern relating to the submission of interconnection requests in the Cluster 7 application window:**

CPUC Staff believe that it is timely for the CAISO to open an initiative examining issues and potential process reforms for interconnecting storage, and to begin by seeking broad stakeholder input. The issues that should be pursued are partly apparent but will likely evolve and be clarified as procurement, development, interconnection and operation of storage proceeds. We recognize that some important issues affecting storage deployment are out of scope for this interconnection-focused initiative, including market rules and processes under which grid-connected storage will pay and be paid for energy and other services, as well as the potential for *customer* storage to ultimately participate in CAISO markets.

Some storage interconnection issues are likely amenable to productive near term steps heading into the Cluster 7 interconnection process that is expected to include storage projects. On the other hand, these issues and also others could benefit from subsequent more comprehensive examination. Therefore, CPUC Staff comments are not divided into issues of “immediate concern” versus issues requiring “comprehensive examination.” However, in the following initial comments we point out where early action in preparation for the Cluster 7 appears feasible or necessary.

***1. It is Essential That There be a Transparent Integrated Interconnection Process Treating Storage both as Generation and as Load.***

Stakeholders on the April 7 call, and CPUC staff as well, are concerned that the entire interconnection process from application and data submittals through studies and interconnection agreements should fully and transparently integrate the “generation” and “load” aspects of storage - - just as the generation and load roles are fully integrated physically and financially. Thus the technical and operational aspects of a storage project should be represented in a consistent manner across both the generation and load roles, even if the actual studies are divided between the CAISO and PTOs.

There should be a clear process for accomplishing this integration. This includes a clear and consistent definition of how a storage project is assumed to operate in generating and charging modes for purposes of interconnection studies, along with delineation of the sequence of studies including who does them (e.g., CAISO or PTO) and who are the key points of contact for the developer. Besides benefitting developers, this process information is also valuable for CPUC Staff. Whether or not the CAISO would study the “generation” role first as suggested during the stakeholder call, everyone needs to be working from a common, explicit plan, and affected parties need to know the plan and its data requirements.

An integrated interconnection process addressing storage’s unique role as both generation and load will undoubtedly be refined with time and experience. Initially, for Cluster 7, the CAISO and PTOs should develop and communicate an integrated study process that accounts for the expected operation of particular kinds of storage facilities. This process must be transparent for interconnection customers so that they can not only understand how their projects are being studied, but can also provide clarifying information as needed to best reflect their intended configurations and operations.

***2. Interconnection Studies Should Realistically Reflect the Expected Operation of Storage, Including Provision of System/Local Capacity and Flexibility.***

The CAISO and CPUC envision storage as contributing to System and Local RA and to Flexible RA requirements in both the upward and downward directions, and so presumably do storage developers. It will be essential that the manner in which storage is studied and approved for interconnection takes into account how the dual generation-load roles of a storage facility must be coordinated to provide the range of flexibility in the two directions required to meet RA qualification criteria.

The storage interconnection process should thus:

- a. reflect system conditions realistically expected to occur when storage would charge and discharge, such as in responses to market prices, congestion and reliability needs;
- b. give storage interconnection customers good opportunity to communicate their intended operation and needs, including the kinds of services they intend to provide and the constraints they are willing to observe; and

- c. not lose sight of the services sought from storage in a broader planning context – such as for providing System and Local capacity plus Flexible RA.

Given storage's complex and unconventional roles, it is especially important to have clear structure of both studies and information exchange, with ample dialogue among CAISO, PTOs and developers. CPUC Staff also need to be informed as to how the unprecedented interconnection of storage to meet procurement mandates is proceeding, starting with Cluster 7.

### ***3. Identify Information Needs as Early as Possible.***

One important need is obtaining sufficiently detailed and comprehensive technical and other information from entities requesting interconnection of storage. Storage technologies are diverse and relatively new to the interconnection process, and on the April 7 stakeholder call one developer expressed interest in learning more about the information requirements.

As rapidly as possible, the CAISO and PTOs should develop clear and comprehensive specification of information needed in storage interconnection requests. In part, this information should support the objectives recommended in comments 1 and 2 above (generation-load integration, realistic operational characterization). CPUC Staff encourages the CAISO to consider the data requirements specified in the recently released Energy Division proposal, *Qualifying Capacity and Effective Flexible Capacity Calculation Methodologies for Energy Storage and Supply-Side Demand Response Resources*, particularly those listed in the *Nomenclature* section.

Furthermore, storage may involve unique issues and concerns such as regarding control and optimization processes or regarding safety and security. The CAISO and PTOs should work with developers and other knowledgeable parties to develop appropriate information requirements in such areas. Provisions in the CAISO's interconnection process and interconnection agreements regarding certification, standards and testing (e.g., GIDAP Appendices 9 and 10, various SGIA provisions) should be fully applied to storage facilities, and where this requires additional information and procedures those should be identified and incorporated as soon as possible. For example, this should include consideration of safety issues currently being considered by DOE/SANDIA for utility grade storage. As experience with storage grows, the information, testing and certification requirements regarding different kinds of storage should be promptly updated and posted, starting with Cluster 7.

#### ***4. Maximize Opportunities (and Customer Awareness of Them) for Streamlining Storage Interconnection.***

Storage interconnection presents challenges because of the complex operational roles played by storage as well as the relative unfamiliarity of storage interconnection. However, there still may be opportunities for streamlining, and the CAISO and PTOs should be prepared to identify such opportunities and make them known to storage developers. For example, storage might be operated and controlled in conjunction with generation (or load) at certain locations in such a manner that the maximum output (or consumption) at those locations would not be increased, and how this could reduce both study and infrastructure requirements should be clarified and communicated.

#### ***5. The Ability of Storage to Defer, Reduce or Avoid Transmission Investment Should Assessed and Reported.***

New storage facilities may require transmission network investments. However, they may also defer, reduce or avoid transmission network investments, and such possibilities should be studied, reported, and taken into account when the overall impacts and costs of storage interconnection are assessed. In particular, the CAISO should identify and report such beneficial storage locations, starting with Cluster 7.

#### ***6. Ensure That Storage Interconnection Will Support Flexible RA Value.***

For grid operations and planning, system flexibility has received increasing attention and analysis. The most prominent example is perhaps the “duck curve” scenario in which flexible system resources may need to be ramped downward during mid-day to make room for high solar generation, but be prepared to ramp upward rapidly in the evening. This makes it important to have flexible resources that can be ramped down to very low (or zero) output and then be rapidly ramped up later, and/or to have loads that can be “dispatched” (increased) at times of maximum solar output thus reducing the need to ramp down less flexible resources. Storage is unique in its ability to fill *both* roles, i.e., (1) ramping its output down to zero then rapidly ramping up later, and (2) charging (providing negative generation) at times of high solar generation.

The ability of storage to be credited for System or Local RA would presumably be addressed via studying the deliverability (over the grid) of storage output, similar to what is done for conventional resources. *However, this leaves the question of whether and how storage would be interconnected in a manner that provides ability and qualification to provide Flexible RA in either direction.*

The ability of storage to flexibly, controllably and rapidly provide *downward* flexibility over a period of time, increasing consumption via charging, is uniquely valuable. Is studying “deliverability” of storage’s negative generation similar to the more familiar problem of studying reliability of service to a load? How does this differ from the deliverability assessment applied to positive generation resources, considering that negative generation is needed during *off-peak* conditions? This all needs to be clarified because negative generation (charging) is an important attribute of storage from a system planning perspective and presumably also from a storage revenue perspective.

Finally, The FRAC-MOO proposal states that the Flexible RA value of a bi-directional resource will be calculated by the CAISO as the amount by which the resource can ramp upwards at a constant rate over three hours. It does not distinguish between positive and negative operating ranges, but does state that such resources must be registered as non-generating resources (NGRs). It would be helpful to clarify what exactly will be required of storage resources (1) for purposes of Flexible RA qualification (including qualification as a NGR) versus (2) for purposes of interconnection. The two kinds of requirements need to be fully compatible and not unduly restrictive.

In closing, CPUC Staff express our appreciation to the CAISO for seeking input and ideas in anticipation of storage interconnection supporting California’s electricity planning goals. We expect that much will be learned and refined as storage interconnection and operation proceeds, but also believe that for the first wave of storage projects anticipated in Cluster 7 it is possible to have a good foundational process that is clearly structured yet designed to evolve. If BPM changes are required these should be identified when apparent and should be addressed as part of a more comprehensive examination of storage interconnection issues.

**Policy issues that may require more comprehensive examination through this initiative:**

