

## Storage as Pseudo-Tie Resources

### Responses to Frequently Asked Questions

The ISO received a number of questions about the potential use of storage resources as pseudo-ties into the CAISO balancing authority. Although storage as a pseudo-tie is not specifically addressed in the business practice manual, the CAISO views storage resources as generating units. As such, the pseudo-tie rules for storage may be inferred from the existing rules for resources that are pseudo-ties into the CAISO. The CAISO notes that today there is relatively little storage online in the system, but that is rapidly changing in the California market and in other areas of the west. With the integration of new storage resources, the CAISO will be reviewing rules for how storage resources work both within the CAISO system and outside of the system.

Summary of the key points contained in this bulletin for pseudo-ties into CAISO:

- Storage resources may be modelled as a pseudo-tie similar to other generating units
  - Pseudo-tie resources may count for RA, as system or flexible capacity
  - Pseudo-tie resources are treated as import RA
  - Pseudo-tie resources are similar to internal resources in the DA and RT market
  - Pseudo-tie resource schedules are required to be “e-tagged”
  - Pseudo-tie resources that can qualify for ancillary services are scheduled in the expanded “\_EXP” ancillary service regions
- Pseudo-tie resources into CAISO are not subject to the wheeling access charge for energy scheduled in the day-ahead or real-time market

#### Pseudo-tie resources & CAISO dispatch

Today, pseudo-ties resources are physically located outside of the CAISO balancing authority area but can participate in the CAISO day-ahead and real-time markets as if they were located physically within the CAISO. These resources may be awarded energy or ancillary services, given that the resources have been reviewed and certified by the CAISO to provide those services. Because storage is considered a generating facility under the CAISO tariff, current market rules do not preclude storage from participating as a pseudo-tie. If a storage resource is treated as a pseudo tie, then that resource will be able to bid and self-schedule into the CAISO markets. Storage resources in particular will be allowed to bid in a similar manner to other pseudo-tie resources and have access to bidding capability allowed for by the current non-generator resource (NGR) construct.<sup>1</sup> This construct allows resources to bid into the market with a bid curve that includes positive (discharging) and negative (charging) portions of a bid curve, and is currently used to model storage or battery resources that are currently grid connected.

Ancillary services and energy are co-optimized in the day-ahead and real-time market models. These markets use supply bids, demand, resource constraints and grid constraints to determine an optimal market solution. To the extent that pseudo-tie resources are certified to provide ancillary services, they are eligible to participate and bid into the market for ancillary services. Ancillary services are awarded

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<sup>1</sup> Please note that CAISO is currently enhancing the non-generating resource construct in the ESDER 4 initiative, located here: <http://www.caiso.com/StakeholderProcesses/Energy-storage-and-distributed-energy-resources>.

to pseudo-tie resources in the expanded (“\_EXP”) market region, as they are not physically located within the balancing authority area footprint. If ancillary services are awarded the prevailing product specific price in that region is used for settlement. Similar to other resources, the locational marginal price for the resource, which is based on the resources’ location on the grid, is used to settle energy awards.

NERC reliability standards require pseudo-ties to electronically tag (e-tag) their flow of energy. As such, pseudo-tied storage must submit tags for both charging and discharging schedules,<sup>2</sup> at the pre-determined CAISO intertie. Pseudo-tied storage resources may also be scheduled for ancillary services, in addition to energy, which also is required to be e-tagged, with a pseudo-tie e-tag. These tagging requirements are consistent with existing rules already in place.

Storage resources that receive energy and ancillary service awards in the CAISO markets may only have a schedule to inject energy to or withdraw energy from the CAISO grid. They will not have schedules that include both at the same time, and will therefore not have “circular schedules.”

Pseudo-tie resources into CAISO are treated differently than import resources. These resources are treated more similar to generation located within the ISO footprint. These resources are not subject to the wheeling access charge (WAC), and pseudo-tied storage resources would not be treated any differently. Further, these resources would not be subject to any additional fees if they submit schedules to withdraw energy from the grid during charging schedules for the storage resource.

#### **Pseudo-tie resources & resource adequacy**

Pseudo-tie resources are eligible to qualify for system and flexible resource adequacy capacity, as import resource adequacy capacity as long as it is paired with RA import allocation at the associated intertie point. These resource adequacy rules will also pertain to pseudo-tied storage resources, so that these resources can also count as import resource adequacy capacity. This includes the must offer obligations. Import resource adequacy resources are required to economically bid or self-schedule into the day-ahead and real-time markets, although this only applied to the fifteen-minute market for pseudo-tie resources in real-time.

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<sup>2</sup> This assumes the storage resource charges from the grid. A storage resource also could charge from onsite generation, which may not require tagging.