CAISO 2024 Policy Roadmap Storage Outage Improvements

(Vistra & on behalf of IPP & Marketers Sector)

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Value proposition

- Opportunity cost of not improving outage rules and OMS is increasing reliability risks where Value of Lost Load likely outweighs costs.
- During periods of light loads and ample supply, lack of outage reporting requirements, unclear nature of work categories, and the manual nature and time delays of managing forced outages utilizing the current OMS process may not cause a reliability event.
- However, during tight system condition days, these policy gaps and performance limitations could create unforeseen risks negatively impact system reliability.
- Proposed scope will allow resources to be managed more effectively on all days, providing efficiency and reliability benefits to operations.
- While many issues are storage, co-located, or hybrid gaps there are likely other OMS improvements that can benefit all resources increasing the value of this initiative.[1]

1 See BPA outage scope request could also be included at minimal additional cost. See slides 36-37 https://www.caiso.com/InitiativeDocuments/Presentation-Annual-Policy-Roadmap-Catalog-working-group-May8-2024.pdf.

Summary of problem statements

- Issue #1: No Tariff outage reporting requirement for stand-alone storage, co-located resources, or hybrid resources

- Issue #2: Available nature of work types do not cleanly match the types of outages the new technology faces, and there is lack of understanding within the CAISO of the physical outages affecting the new technology.

- Issue #3: Outage management system functionality is not agile enough to facilitate minimizing the gap between change in availability and the market seeing that change driving need for operational improvements, and in some cases does not even allow adjusting the charging availability (Load Max).

Issue #1: No Tariff outage reporting requirement for storage, co-located, or hybrid resources

Generating Unit: An individual electric generator and its associated plant and apparatus with Availability reporting requirement

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Non-Generator Resource: Resource that operates as Gen or Load and should have Availability, Load Max, Energy reporting requirements.

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Eligible Intermittent Resource: Variable Energy Resource that is a Generating Unit or Dynamic System Resource, where VER is device that is: (1) renewable; (2) cannot be stored; and (3) has variability beyond its control with Availability reporting requirements.

- Section 9.3.10.3 applies requirements for advance reporting to the CAISO of anticipated and actual Forced Outages *affecting its Availability (Pmax)* for:
  - Generating Units (a)
  - Resource-Specific System Resource (a)
  - Eligible Intermittent Resource (b)

Not applied to NGR, Co-Located or Hybrid

- Section 9.3.10.3.1 applies requirements if prior notice of a Forced Outage on its Availability (Pmax) cannot be given to the CAISO for:
  - Generating Units (a)
  - Resource-Specific System Resource (a)
  - Eligible Intermittent Resource (b)

Not applied to NGR, Co-Located or Hybrid

- Good Utility Practice dictates outages should be submitted, however without Tariff reporting requirements leads to inconsistent practices, and it is past time to develop Tariff outage reporting requirements.

Issue #2 available nature of work are largely for generating units not non-generating units

- Existing nature of work types were designed for conventional generating units outages and should be revisited to include:
  - Foldback (design characteristic not modeled yet)
  - Inverter outages
  - Rack outages
  - Full output outages for array of reasons
- Effort should discuss outage causes for new technologies including:
  - If existing cards can be used, need to add storage causes in the nature of work description in the outage management BPM
  - If greater transparency into the outage causes is needed (separating foldback from other issues) explore new card type
- Effort would ensure outages can be submitted for the Load Max (Pmin) in addition to Availability (Pmax) especially for Test Energy

Issue #3: OMS application improvements

- Outage Management System (OMS) has limitations if addressed would improve visibility into actual capabilities, and should be enhanced to:
  - System must automatically accept updates to existing forced outage card.
  - System must allow existing or new overlapping outage cards that can adjust Availability, Load Max, Max Energy and Min Energy values on one card and allow non-NULL values in addition to NULL for other card(s).
  - System must allow existing or new overlapping outage cards with adjustments to Availability, where system will allow different values on the two or more cards and system will transfer the most restrictive (highest curtailment MW or MWh) for each parameter to downstream systems.
  - System should add a single Out-of-Service checkbox for NGRs which would result in the system seeing both OOS boxes in the Availability and Load Max tabs being checked. This would allow a single check to reflect full unavailability across Maximum Output to Minimum Output for NGR.
  - System should retain outage card values when existing outage card's end date is extended.

Policy and implementation scope

- Adopt outage reporting requirements for storage, co-located, and hybrid resources including with proposed thresholds for Availability, Load Max, Max Energy, and Min Energy tabs on outage cards,
- Ensure nature of works used by storage outage type are better representation of the cause so that it can be clearly seen outages that are due to known engineering characteristics the market does not model versus other outage types,
- Allow Load Max changes on the testing card in addition to Availability,
- Automate manual processes that the Grid Operations and Plant Operations teams must perform, and
- Address concerns with delays in communicating the real-time physical capability of storage resources.

Appendix

History of calls for outage improvements

- CAISO added Non-Generating Resource participation model in 2010
- Energy Storage and Distributed Energy Resources stakeholder initiatives largely focused on participation model leaving certain areas of policy missing
- On May 20, 2021, Vistra submitted comments on Energy Storage Enhancement's Issue Paper highlighting three areas of concern with existing storage policies including outage management system practices (May 2021 comments)
- On July 20, 2021, Vistra presented additional context for the outage management clarifications on slide 8 (July 2021 presentation)
- On January 18, 2022, Vistra submitted comments on the straw proposal expressing disappointment that operational concerns we proactively brought to CAISO were not included in ESE (Jan. 2022 comments; May 2022 comments; August 2022 comments)
  - In addition, another issue was raised that foldback impacts in the model was also not included in NGR and in lieu outages are the mechanism to reflect foldback
- In Q1 2023, Vistra leadership communicated concerns with ability to effectively manage storage is overly burdensome due to need to manage known design characteristics through outage cards and facing issues with Outage Management System.
- In Q2 2023, Vistra submitted a white paper providing technical explanations for stand-alone storage outages and recommending appropriate clarifications with specific operational improvements requested for Outage Management System.
  - CAISO has been evaluating these requests for almost a year.

Storage outages differ from generating units

- ***Foldback design characteristic:*** Engineering phenomena when energy storage is at either high or low state of charge, the charging or discharging current must be limited to ensure the operating limits of the equipment are not exceeded. CAISO should adopt modeling enhancements to capture charging or discharging rate impacts to Availability or Load Max but they do, have to manage with outage cards.

  Best Nature of Work (NoW) Category: Technical Limitations not in Market Model, however not currently allowed by CAISO so have to use Plant Trouble

- ***Inverter outage:*** Storage operators not able to forecast when, how many, or whether inverter outage will result in full reduction or partial reduction in inverter capability.

  Best Nature of Work (NoW): Plant Trouble

- ***Rack outage:*** Instances when racks (or cells) disconnect from the rest of the operating bank. Storage operators must restore the bank to a similar SOC level those racks that disconnected to allow for them to reconnect to the bank and return to operation.

  Best Nature of Work (NoW): Plant Trouble

- ***Full Plant outage:*** Entire storage resource can become unavailable for various reasons including safety management at resource or neighboring site, control system(s) failures, electrical failure (breakers/cables e.g.) at the array level, transformer failures, or electrical phenomena (lightning) resulting in entire transmission substation failure.

  Best Nature of Work (NoW): Plant Trouble

- ***Co-located or hybrid outages:*** TBD