\*\*\*Market Operation BPM changes due to Hybrid Resources phase 1 initiative\*\*\*\*

**2.1.19 Co-Located Resources**

*Co-located Resource:*A Generating Unit with a unique Resource ID that is part of a Generating Facility with other Generating Units. An EIM Participating Resource with a unique Resource ID that is part of a single resource with other EIM Participating Resources.

Co-located resources may be a combination of different generation technologies or the same generation technology that are part of a single Generating Facility behind a single point of interconnection each of which participates in the CAISO markets as distinct resources with their own resource ID. The collection of resources behind the point of interconnection (POI) are optimized by the ISO’s market using the entire collection of bids or self-schedules. Each resource is individually metered and telemetered. Generally, the combined Pmax and Pmin (in the case of energy storage) of co-located resources may not exceed the Generating Facility’s or Interconnection Service Capacity. If, however, an Interconnection Customer for a Generating Facility with co-located resources elects to utilize the CAISO’s Aggregate Capability Constraint, the co-located resources’ combined Pmax and Pmin may exceed the Generating Facility’s Interconnection Service Capacity. Additionally, an EIM Participating Resource Scheduling Coordinator may elect to utilize the CAISO’s Aggregate Capability Constraint so that the Pmaxs and Pmins of EIM Participating Resources and EIM Non-Participating Resources that are part of a single resource behind a point of interconnection may exceed that resource’s interconnection service capacity.

**2.1.19.1 Business process for Co-Located Resources to elect to utilize Aggregate Capability Constraint**

The CAISO will process requests for Co-located Resources to utilize the Aggregate Capability Constraint in the following manner:

**CAISO BAA**

* Interconnection Customer will elect to have Co-located Resource modeled utilizing Aggregate Capability Constraint (ACC) located at its Point-of-Interconnection (POI) through a revision to Schedule 1 of the Participating Generator Agreement (PGA) and/or Participating Load Agreement (PLA), and direct scheduling coordinator(s) for the resources to submit market model data to Master File.
* The CAISO will map all co-located resources at a single Generating Facility to a specific Aggregate Capability Constraint (ACC). This constraint will reflect the interconnection service capacity at the Generating Facility’s point of if interconnection for purposes of the combined PMax and PMin of the Co-located Resources. The CAISO market will observe this constraint in issuing any awards and dispatches to the co-located resources at the Generating Facility. Co-Located Resources at a single Generating Facility will have their energy dispatch optimized by their economic bids while their aggregate awards and energy dispatch will be bound by the minimum and maximum Aggregate Capability Constraint (ACC) limits applied to those associated resources.
* Operators can override the MW amount of reduction adjustment for the ACC max limit, incremental adjustment for the ACC min limit.
* Operators can set the ACC override start and end time (aligning with market intervals), the system will revert to the Master File ACC limits once the market horizon passes beyond the override’s end time.

**EIM BAA**

* Election of co-located status by the EIM resource owner (whether resource is participating or non-participating) will be managed through a Scheduling Coordinator Selection Letter(s).
* Additionally, ACC information details and resource-to-ACC mapping will also need to be included in the SC Selection Letter, which is submitted by the EIM Entity and approved by the EIM SC. The following information will be required from EIM BAA Entity through the SC Selection Letter:
	+ ACC Identifier that will have two or more resources.
	+ ACC POD Location (substation, voltage level)
	+ Each ACC’s Max, Min Limit (positive = injection, negative = withdrawal)
	+ Mapping of ACC’s associated Co-Located Resource IDs for Participating and Non-Participating resources by SC.
	+ Effective start date of ACC activation
* Within each individual EIM BAA, Operators will be able to reduce ACC max and min limit for a temporary time period (in response to operating conditions) where the reduction value may only be a non-negative value below the max and min limit defined in Master File; max limit shall revert to its Master File default once reduction is released.
* Within each individual EIM BAA, Operators can set the ACC override start and end time (aligning with market intervals), the system will revert to the Master File ACC limits once the market horizon passes beyond the override’s end time

**2.1.19.2 Market Processes for Co-Located Resources**

The CAISO will optimize and dispatch Co-Located Resources utilizing an Aggregate Capability Constraint in the day-ahead and real-time markets while enforcing this security constraint of the associated ACC.

The CASIO will enforce the Aggregate Capability Constraint in the market formulation by prohibiting the combined dispatch instructions of associated co-located resources from exceeding their maximum and minimum interconnection limits (in the positive injection and negative withdrawal directions, respectively). The CAISO will not apply a shadow price to the locational marginal price (LMP) of the Co-located Resource at its point-of-interconnection Pnode.

During time periods when the ACC is binding (either by its Max or Min limit), the CAISO will reduce Co-located Resources’ self-schedules on the basis of scheduled MW amount only for those schedules in the direction of the binding constraint (*e.g.* LESR resources with charging self-schedules will not be curtailed if the ACC is binding in the direction of the POI injection into the grid).

During time periods when a co-located resources are producing energy (i.e. positive energy supply) while one or more associated Co-located Resource(s) are charging (i.e. negative energy supply), the CAISO market systems shall net the energy production and load from Co-located Resources utilizing the Aggregate Capability Constraint when enforcing the Aggregate Capability Constraint..

For example, Wind Resource #1 is producing 30 MW, Solar Resource #2 is producing 25 MW, and Battery Resource #3 is charging 10 MW at the same time under the same ACC ("ACC #1") with a Max Limit of 50 MW. Rather than curtail the resources to 50 MW, the CAISO’s market systems will evaluate all resources with a net injection to grid of 45 MW and not consider the ACC binding as long as the battery has the ability to charge in the market run’s binding and advisory intervals.

**\*\*\*Add to new section below 2.5.2.3**

Pnodes for Co-located Resources utilizing the Aggregate Capability Constraint will be at their point of interconnection. Convergence Bidding Entities may submit virtual bids at this Pnode location. No congestion pricing shall result from a binding Aggregate Capability Constraint between a Co-located Resource and its point of interconnection.

**3.1.14** **Aggregate Capability Constraint for Co-located Resources**

The CAISO will allow Co-located Resources that elect to use the Aggregate Capability Constraint to register their maximum operating limit as their Pmax, even if the aggregate values of these maximum operating limits are greater than the interconnection service capacity set forth in their Generating Facility’s interconnection agreement. Using the Aggregate Capacity Constraint (ACC) functionality, the CAISO will limit market awards and dispatches from co-located resources to the total amount of the Generating Facility’s interconnection service capacity.

**Formulation**

The full constraint follows:

𝑀𝐴𝑋[0,Σ(𝐸𝑁𝑖+𝑅𝑈𝑖+𝑆𝑅𝑖+𝑁𝑅𝑖+𝐹𝑅𝑈𝑖)𝑖∈𝑆]≤𝑈𝐿 𝑀𝐼𝑁[0,Σ(𝐸𝑁𝑖+𝑅𝐷𝑖+𝐹𝑅𝐷𝑖)𝑖∈𝑆]≥𝐿𝐿

Where:

i Resource

S Set of resources

EN Energy schedule

UL Upper limit

 LL Lower limit

RU Regulation up award\*

RD Regulation down award\*

SR Spinning reserve award\*

NR Non-spinning reserve award\*

FRU Flexible ramp up award

FRD Flexible ramp down award

Note: Co-located Resources that do not follow dispatch instructions will lose eligibility to use the aggregate capability constraint. Such co-located resources will revert back to the current methodology where;

 ΣPMax <= ACC max limit and ΣPMin >= ACC min limit.

*\* The CAISO will implement the ancillary services element included in the formulation above in the future. The CAISO anticipates it will do so in the fall of 2021.*