Hybrid Resource – Interim Participation Options

The following options are suggestions for hybrid resource set up and participation in the market until the implementation of the Hybrid Resource Phase 2-B implementation scheduled for Fall, 2022 Release.

Hybrid Resource Model Option

Summary: The hybrid resource model may be used to model multiple technologies at a single point of interconnection, using one resource ID. This resource may have a positive Pmax and a Pmin of 0 or a negative Pmin. This type of resource can bid to discharge/generate and may bid to charge (if Pmin is less than 0 MW) from the grid. Hybrid resources must follow their dispatch instruction from the ISO during all intervals. Today, these resources use "Ambient Due to Fuel Insufficiency" outage cards to indicate availability. This is only required for changes greater than 10 MW. After the Hybrid Phase 2-B functionality is available, the hybrid dynamic limit tool will be used to transmit information to the ISO regarding real-time availability for these resources.

Example 1: Hybrid Resource with Increasing Solar Availability

Assume:

100 MW Solar	+/-50 MW Storage	PMin = -50 MW Pmax = 150 MW

Example:

Interval	Available Solar	Available Storage	Upper Operating Bounds (Solar + Storage)	"Ambient Due to Fuel Insufficiency" Outage Card	Available Generation
1	15 MW	50 MW	65 MW	65 to 150 MW	-50 to + 65 MW
2	25 MW	50 MW	75 MW	75 to 150 MW	-50 to +75 MW
3	38 MW	50 MW	88 MW	88 to 150 MW	-50 to +88 MW

In each interval the available solar increases. The scheduling coordinator submits an outage card to inform the ISO of the limits of availability in each interval.

Example 2: Hybrid Resource with Decreasing Solar Availability

Assume:

100 MW Solar	+/-50 MW Storage	Pmin = -50 MW

	Pmax = 150 MW

Example:

Interval	Available Solar	Available Storage	Upper Operating Bounds (Solar + Storage)	"Ambient Due to Fuel Insufficiency" Outage Card	Available Generation
1	75 MW	50 MW	125 MW	125 to 150 MW	-50 to 125 MW
2	65 MW	50 MW	115 MW	115 to 150 MW	-50 to 115 MW
3	50 MW	50 MW	100 MW	100 to 150 MW	-50 to 100 MW

In each interval the available solar decreases. The scheduling coordinator submits an outage card to inform the ISO of the limits of availability in each interval.

Co-located Resource Model Option

Summary: Multiple resource IDs may be used to model each different component behind a point of interconnection. Each resource ID will reflect the underlying technology of the resource it represents. Using the same example above: the generating facility could be modeled with two resource IDs, one for the solar component, and the other for the storage component. The solar resource and the storage resource would have access to the tools available to other solar and storage resources, respectively. Storage resources necessarily require a negative Pmin to allow for resource charging.

Example:

Assume:

Point of Interconnection	150 MW
Resource 1 – Solar	Pmin = 0 Pmax = 100 MW
Resource 2 - Storage	Pmin = -50 MW Pmax = 50 MW

Example (Resource 1, Solar Component):

Interval	Resource 1 - Solar1	Forecast		Implied Range for Dispatch
1	Bids to decrease output when prices < $0/MWh	15 MW		0 MW to 15 MW

2	Offers 71 MW	17 MW		0 MW to 17 MW
3	Offers 100 MW	20 MW		0 MW to 20 MW

In this example each resource submits separate offers to the market. The solar resource also has functionality available to all solar resources, where forecast values are used to set an upper bound for the dispatch that the ISO may issue. In this case that forecast tracks with the additional solar availability from interval 1 to interval 3, and the market will not dispatch the resource above those values. Solar resources are allowed to produce 'as capable,' unless they receive dispatch instruction to produce less than the forecast.

In this example, the storage resource can bid its full capability into the market, from -50 MW to +50 MW, and the ISO will dispatch the resource economically based during each of these intervals.

Additional Resources

Title	Link	Description
New Resource Interconnection (NRI) Process	http://www.caiso.com/participate/Pages/ResourceInterconnectionGuide/default.aspx	A guide for connecting new hybrid resources to the grid
Hybrid Resources Phase 1 Training	http://www.caiso.com/Documents/PresentationHybridResourcesPhase1Training.pdf	Co-located resource information
Hybrid Resources Phase 2A Training	http://www.caiso.com/Documents/Presentation-Hybrid-Resources-Phase-2a-Training-Aug30-2021.pdf	Hybrid resource information
Business Practice Manual for Market Operations	https://bpmcm.caiso.com/Pages/BPMLibrary.aspx	Section 2.1.19 – Co-located Resources Section 2.1.21 – Hybrid Resources
Business Practice Manual for Market Operations	https://bpmcm.caiso.com/Pages/BPMLibrary.aspx	Appendix B.2.3 Hybrid Components tab for the Generator Resource Data Template.

For further questions, submit a CIDI ticket to you client representative or send questions to CustomerReadiness@caiso.com.