Hybrid Resources Phase 2B Refresher Training

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January 24, 2023

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These labels will let you know what has been changed for this refresher session.
This refresher is intended for:

- New Hybrid Resources
- Existing Hybrid Resources
- Storage and VER Data Consumers

NEW MATERIAL
Housekeeping

Make sure to keep yourself muted unless you have a question.

If you have a question, you may either ask over the phone or in the chat.

If you want to ask a question, you can virtually “raise your hand” in WebEx.
In today’s session we’ll cover:

- **Background** (10 min)
- **New Projects** (10 min)
- **Hybrid Resource 2B Enhancements** (30 min)
- **Displays and Reports** (30 min)
- **Wrap Up** (10 min)
In today’s session we’ll cover:

- Background (10 min)
- New Projects (10 min)
- Hybrid Resource 2B Enhancements (30 min)
- Displays and Reports (30 min)
- Wrap Up (10 min)
Co-located Resources - Multiple resources of different technologies that share a common point of interconnection but are modeled as individual resources

Production date – December 2020
Hybrid Resource - Phase 2
Multiple resources of different technologies that share a common point of interconnection; these resources are modeled as one resource

**Phase 2-A**
Implement High Sustainable Limit (HSL), Ancillary Services (AS),
Production Date – November, 2021

**Phase 2-B**
Implement Master/subordinate Aggregated Capability Constraint (ACC)
Implement Hybrid Dynamic Limit functionality
Changes to various applications, reports and displays
Scheduled Production Date – February 1, 2023

For more information about the Hybrid Resource Initiative visit:
https://stakeholdercenter.caiso.com/StakeholderInitiatives/Hybrid-resources
Standalone Aggregate Capability Constraint (ACC)

ISO Grid

ACC 233 MW

Solar_1 110 MW
BESS_1 55 MW

Solar_2 123 MW
BESS_2 62 MW
Master and Sub-Aggregate Capability Constraint (ACC)

ISO Grid

Master ACC Limit (233 MW)

Sub-ACC Limit (110 MW)

Solar_1
110 MW

BESS_1
55 MW

Sub-ACC Limit (123 MW)

Solar_2
123 MW

BESS_2
62 MW
Q&A
In today’s session we’ll cover:

- Background (10 min)
- New Projects (10 min)

   - Hybrid Resource 2B Enhancements (30 min)

   - Displays and Reports (30 min)

   - Wrap Up (10 min)
Interconnecting to the Grid

What is changing?
• Updated Interconnection Request form
• Updated Project Details form
• New “Hybrid Components" tab in the generator resource data template (GRDT)

Where can I learn more about the interconnection process? Look at the ISO website and attend the next Resource Interconnection Fair.

For more information resource interconnection procedures
Interconnection Request – Appendix 1 Sec. 4.c.

c. Type of project (i.e., gas turbine, hydro, wind, etc.) and general description of the equipment configuration (if more than one type is chosen include gross installed MW for each).

- If project is an increase to an existing project, provide values based on the MW increase only.

| Technology | | | | | |
|------------|------------|------------|------------|------------|
| Select Gen Type | Select Fuel Type | (MW) | Co-Located | Hybrid |
| Select Gen Type | Select Fuel Type | (MW) | Co-Located | Hybrid |
| Select Gen Type | Select Fuel Type | (MW) | Co-Located | Hybrid |

Other (please describe):

Generator Type: ___________ Fuel Type: ___________

Comments: ___________

General description of the equipment configuration (e.g. number, size, type, etc.):

[Blank space]
Project Details Form

Submit a new request through the Resource Interconnection Management System (RIMS) public site. 1) Fill out the “New Request” section 2) Choose the “NRI Project Details Form” drop down 3) Click “Register”. A registration code will be emailed to the email contact in the New Request. 4) Place this code within the “Registration Code” section of the public site. 5) Click “submit” to access the upload screen for the project details form. You will receive an ISO Project code after the form validation is complete. The ISO project code will be used for all filenames.

All fields must be filled in, additional fields for Natural Gas Combustion Turbines complete section 8 A-E. RIG Reconfiguration, Meter Replacement and Meter Maintenance Project Types please only fill out rows 1, 2A-2G, 3A-C, 6A, 7A-C only. The following characters are not allowed in any filename: ~ ` # % & @ * { } ; < > ? / \ ( ) [ ] - _

<table>
<thead>
<tr>
<th>1</th>
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<tr>
<td><strong>Project Type:</strong></td>
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<td>Solar</td>
<td>Wind/Wind Repower</td>
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<tr>
<td>Existing QF</td>
<td>Wind QF</td>
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<tr>
<td>Conventional</td>
<td>Dynamic</td>
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<tr>
<td>Dynamic New Construction</td>
<td>Dynamic New Construction</td>
</tr>
<tr>
<td>Pseudo New Construction</td>
<td>Non-Generation</td>
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</table>

Authorized Contact(s) for the Resource

The resource name that will be used in the CAISO Master File and in Regulatory Contracts is subject to CAISO approval. See resource naming guidelines found in the NRI Section 21.4, for additional information. Email address is required. 

*Email Address:* EIA Generator ID

The EIA Plant Code as generated and provided by the EIA.

The generator ID supplied to the EIA. This ID must be uniquely defined within a plant.

Provide an explanation of the project. Meter Replacement include CAISO meter device ID's.
### Generator Information

**A**  PTO/UDC (transmission/utility owner): [Select One] (If not listed please pick closest)

**B**  Net Output Generation MW for this Resource: [Note: May not exceed the Interconnection Agreement studied MW value.]

**C**  Configuration, Fuel Type(s) and MW(s):

**Configuration:** [Select One]

**Fuel Type:**
- [Select One]
- Single
- Hybrid
- Co-located
- Hybrid Co-located

**Additional Fuel Type 2:** [Select One]

**Additonal Fuel Type 2 MW:** [Blank]

**Additional Fuel Type 3:** [Select One]

**Additional Fuel Type 4:** [Select One]

**Additional Fuel Type 3 MW:** [Blank]

**Additional Fuel Type 4 MW:** [Blank]

**Forecast Election:**
- [Select One]

**Choose Additional fuel type(s) for a mixed fuel resource**

**D**  Point of Interconnection: [If Known] The more detailed information provided here will expedite the modeling.

**E**  Connection Voltage: [SELECT kV] Connection at the utility substation or tap (Select closest value. If less than 12kV Select 12kV)

**F**  Nearest 60kV or Up Substation Name: [Blank] (Can be pole/tower number, bank/bay number, and location name of a tap)

**G**  Generator Interconnection Agreement?

**Agreement Type:** [Select One]

**Enter number here:** [Blank]

- If 2-party, enter Agreement number below (i.e. WDAT Number, Rule 21 Number, etc.)
- If 3-party, look-up CAISO Queue Position number [here] and enter Queue # below, if multiple Queue numbers apply to this project separate with a comma.
- If 3-party QF, please enter Queue Position number in the number field, see Section 4 of [NRI Guide].
- If Dynamic or Pseudo Generator choose the same Agreement and Project Type.
### Generator Resource Data Template (GRDT)

**Fuel type = HYBD for mixed fuel resources**

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<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
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<tr>
<td>PGA Name</td>
<td>Scheduling Coordinator ID</td>
<td>Resource ID</td>
<td>Resource Name</td>
<td>Fuel Type</td>
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<td>XXXX</td>
<td>EXAMPLE_2_HYB1</td>
<td>Example Hybrid</td>
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**Completed by Master File Team**

**Modifiable by customer**

**Flags set for hybrid resources**

NEW MATERIAL
### Generator Resource Data Template (GRDT)

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<th>A</th>
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<th>D</th>
<th>E</th>
<th>F</th>
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<td>MIN_GEN</td>
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<td>0</td>
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<td>130</td>
<td>0</td>
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<tr>
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<td>OTHR</td>
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<td>-36</td>
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</table>

**Fields:**

- **Name of the Hybrid Resource**
- **Name of individual component**
- **Fuel type of the component**
- **Specific technology used for the fuel type**
- **Pmax and Pmin**

**Completed by Master File Team**

**Modifiable by customer**

**UPDATED MATERIAL**
**Generator Resource Data Template (GRDT)**

- **Identifies VER component of NGR**
- **ISO or SC Forecast**
- **Completed by Master File Team**
- **Modifiable by customer**

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<th>DISP</th>
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<th>MAX_CONT_ENERGY_LIMIT</th>
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<td>Y</td>
<td></td>
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</tbody>
</table>

**N – Wind and Solar**

**Y – Storage**

(Used for Effective Flexible Capacity (EFC) calculations)

**Minimum/Maximum State of Charge**

**% of charging energy a battery can store and later discharge**
New Hybrid Resource – Action Items

- Use the updated Interconnection Request form and submit via RIMS
- Use the updated Project Details Form and submit via RIMS
- GRDT – Submit via RIMS (new) or Master File UI (updates)
  - Update modifiable fields, as necessary
  - Check non-modifiable fields for accuracy
  - Submit concerns to RDT@caiso.com
Q&A
In today’s session we’ll cover:

- Background (10 min)
- New Projects (10 min)
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- Displays and Reports (30 min)
- Wrap Up (10 min)
Why would I do this? Used in situations where there are contractual limitations on components that are subordinate to the aggregate capacity constraint of the interconnection.

Why is this important? So that co-located resources are dispatched appropriately.
New Master and Sub-ACC – Action Items

- ISO BAA participants
  - Work with ISO contracts department to set up/update the Participating Generator Agreement (PGA)

- WEIM participants
  - New resources – include request in SC Letter
  - Existing resources – submit a CIDI ticket with this request
What is this? Hybrid customers can choose to submit their own VER forecast data to the ISO, rather than using the ISO’s forecast.

Is this available for other VER resources? Yes, for dispatch and settlement purposes only. An ISO forecast will still be needed for forecasting and internal DOT formation.

How do SCs submit them? Via the Automated Load Forecast System (ALFS) using the API

The technical specifications are located on the Developer’s site (registration required): https://developer.caiso.com/
Signing up to provide SC Forecast

• New customers
  – WEIM participants – request during the onboarding process
  – CAISO BAA participants – request during the NRI process

• Existing customers that want to switch forecast options should submit a CIDI ticket request
California ISO

Developer

Apps ▼

Releases

Resources ▼

Support ▼

Contact

**ADS**
Automated Dispatch System

**ALFS**
Advanced Load Forecasting System

**BAAOF**
Balancing Area Authority Operator Portal

**BSAP**
Base Schedule Aggregation Portal

**CIRA**
Customer Interface for Resource Adequacy

**MNS**
Market Notification Service

**MRI-S**
Market Results Interface - Settlements

**OASIS**
Open Access Same Time Information System

**OMS**
Outage Management System

**RCBSAP**
Reliability Coordinator Base Schedule Aggregation Portal Interface

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**Tech Specs**

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<td>2019</td>
<td>12/6/2019</td>
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</tbody>
</table>

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https://developer.caiso.com
SC Forecast – Action Items

- New customers – indicate your forecast choice in the onboarding process
- Existing customers – submit a CIDI ticket if you want to change your forecast option
- Submit forecast via ALFS (not SIBR)
Dynamic Limits

What are they? Minimum and maximum MW limits for Hybrid Resources that can be submitted for every 5 minute interval.

Why are they important? Enables SC to limit the dispatch instruction from the ISO for positions of the bid curve that are unavailable for dispatch based on actual production limitations for the hybrid resource.

How do SCs submit them? Via SIBR using the API or the UI.

New – Hybrid Dynamic Limit

Real-Time Energy Bid
25 MW for the hour

Forecast of resource availability forecast for the hour

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<th>:10</th>
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<td>23 MW</td>
<td>25 MW</td>
<td>22 MW</td>
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<td>...</td>
<td>19 MW</td>
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<tr>
<td><strong>Lower Limit</strong></td>
<td>1 MW</td>
<td>1 MW</td>
<td>1 MW</td>
<td>1 MW</td>
<td>1 MW</td>
<td>1 MW</td>
<td>1 MW</td>
<td>...</td>
<td>1 MW</td>
</tr>
</tbody>
</table>
Dynamic Limits

https://developer.caiso.com
Select the new Dynamic Limit Tab

Enter the date and the Scheduling Coordinator ID
Select Apply to reveal the grid
Click the “Create Dynamic limit” icon

A new window will open.

Select a resource from the drop down. Also add the Minimum and Maximum limit values.

Click Create.
The pencil icon enables you to edit the limits.

Click "Apply" to save the changes.

The double arrow and triple arrow icons enable you to submit the limits.
Dynamic Limits – Action Items

- Using SIBR UI or API, submit dynamic limit information (minimum and maximum MW) for hybrid resources, every 5 minutes for:
  - Ambient unavailability
  - Unavailability due to:
    - lack of fuel (e.g., wind, sun)
    - State of charge
  - Reflecting onsite charging
What are the requirements? Each VER and storage component of a hybrid resource must have metering and telemetry.

Why is this important? These requirements impact settlements, visibility and reporting for these resources.

Where can I learn more? The BPM for Metering outlines all of the requirements.

The BPM for Metering is located at: https://bpmcm.caiso.com/Pages/BPMDetails.aspx?BPM=Metering
Hybrid resources are required to have revenue quality meters for all VER components to enable the ISO to properly calculate the forecasting fee.

\[ M \times \text{Forecast Fee} = \$ \]

NEW MATERIAL
Telemetry is required for all hybrid components

Visibility in actual operation of each component

• Energy/ancillary services
• Good quality forecasting

Reporting requirements

• CPUC, CEC
• WREGIS, WECC
• Today’s Outlook/ISO Today
Q&A
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Automated Dispatch System (ADS)

**What is it?** An application used to communicate real-time dispatch instructions to Scheduling Coordinators.

**Is there a new display?** No, the displays did not change.

**What is changing?** The rules associated with the FOLLOW DOT flag have been expanded to include situations where VER resources have AS awards.
ADS Clarification – FOLLOW DOT flag is “Y” if:

**Existing Criteria**
- There is an operating instruction in place
- SUPP < 0

**Additional Criteria**
- A VER associated with a co-located or hybrid resource has an AS award
- A VER associated with a co-located resource within a **standalone** ACC has an AS award
- All VERs in a **subordinate** ACC if any resource has an AS award
Balancing Authority Area Operations Portal (BAAOP) - WEIM Application

**What is it?** Used by the WEIM operators to monitor market operations.

**Is there a new display?** Yes, Dynamic Limits.

**Is anything else changing?** Yes, We are adding some new columns to the ACC Schedules and ACC Constraints displays.
BAAOP – Coming Soon – Hybrid Resources Phase 2B
BAAOP – Dynamic Limits Display
BAAOP – ACC Constraints
BAAOP - ACC Schedules

Live data, any edits will be implemented. You are responsible for any operational or market impacts resulting from performed actions.

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Open Access Same-time Information System (OASIS) Reports

What does it contain? Market and operations data that is available to the public via caiso.com.

Which existing reports are impacted? None

Are there new reports? Aggregate Capability Constraint Shadow Prices
## Aggregate Capability Constraint Shadow Prices

![California ISO OASIS interface with aggregate capability constraint shadow prices](image)

**Date:** 12/30/2022  
**Market:** DAM  
**Constraint Name:** [ALL]  
**Report Generated:** 12/30/2022 17:49:27  

**Aggregate Capability Constraint Shadow Prices**

| Market | Opr Date | Constraint Name | Direction | Interval | HE01 | HE02 | HE03 | HE04 | HE05 | HE06 | HE07 |
|--------|----------|-----------------|-----------|----------|------|------|------|------|------|------|------|------|
|        |          |                 |           |          | HE01 | HE02 | HE03 | HE04 | HE05 | HE06 | HE07 |

*No Data found*
**Market Participant Portal (MPP) Reports**

**What does it contain?** It provides links to reports and applications used by market participants.

**Which existing reports are impacted?**
Transmission Limits

**Are there new reports?**
No
Market Modeling Data

This data is protected under ISO tariff and can only be viewed by or shared with persons that have fully executed the applicable Non-Disclosure Agreement.

PLEASE NOTE THAT THIS DATA IS AVAILABLE FOR A LIMITED TIME PERIOD (90-DAY ROLLING LOOK BACK), AFTER WHICH IT WILL NOT BE ACCESSIBLE. PLEASE ACCESS AND DOWNLOAD ACCORDingly.

To the best of CAISO’s knowledge, the information contained herein is true and accurate as of the date published and is provided for informational purposes only. CAISO does not assume any liability whatsoever for the accuracy and completeness of the published information.

Load Distribution Factors (LDF)
Displays the load distribution factors by node used in the Day-Ahead Market. To protect confidential data the load distribution factors for single customer nodes are aggregated and reported by DLAP.

Shift Factors (SF)
Displays the complete list of shift factors for all binding constraints. In the IFM, HASP, and RTD markets.

Transmission Limits (TL)
Displays the transmission limits for all critical constraints in the IFM, HASP, FMM (RTUC), and RTD markets. The term "critical" refers to being close to or at the limit.

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Customer Market Results Interface (CMRI) Reports

**What does it contain?** CMRI reports contain customer-specific market results and information.

**Which existing reports are impacted?**
- Interval Variable Energy Resource Forecast Report
- Variable Energy Resource Forecast Report

**Are there new reports?**
- ACC Definition
Displays 5 minute forecast for VER components
Includes Component ID

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Displays forecasts for VER components in various time frames
Includes Component ID column (not shown)
### Aggregate Capability Constraint Definitions

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Report Generated: 12/30/2022 10:09:36
There will be new hybrid charts in Today’s Outlook & ISO Today

Current hybrids

- **Hybrid solar**: 0.0% (~3 MW)
- **Hybrid wind**: 57.7% (~30 MW)
- **Hybrid batteries**: 42.3% (~22 MW)

Hybrids serving demand: **52 MW**
The batteries trend chart also includes the batteries associated with hybrid resources.

**Batteries trend**
Energy in megawatts in 5-minute increments. Displays stand-alone storage and some hybrid resources, which includes non-storage resources.

**Batteries trend**
Energy in megawatts in 5-minute increments. Displays stand-alone storage and some hybrid resources, which includes non-storage resources.
The battery chart may not provide comprehensive battery data when comparing pre- and post-Feb 2023 data.

Pre Feb 1, 2023 chart includes:
- Stand-alone batteries (includes co-located)
- All components of hybrid resources (includes wind, solar, battery or any type of generation)

Post Feb 1, 2023 chart includes:
- Stand-alone batteries (includes co-located)
- All components of hybrid resources (includes wind, solar, battery or any type of generation) that are not providing component level telemetry yet

NEW MATERIAL
Q&A
In today’s session we’ll cover:

- **Background** (10 min)
- **New Projects** (10 min)
- **Hybrid Resource 2B Enhancements** (30 min)
- **Displays and Reports** (30 min)
- **Wrap Up** (10 min)
Summary of Hybrid Resource 2B changes

• Interconnection
  – Interconnection Request
  – Project Details Form
  – Generator Resource Data Template

• New Master and Sub-ACC Configuration

• SC Forecast Option

• Submit Dynamic Limits

• BAAOP Displays

• New and Updated Reports
  – OASIS
  – CMRI
  – Transmission Limits
  – ISO Today/Today’s Outlook

Coming Soon! BRS Version 1.7
Final Q&A
Thank you for your participation!

For more detailed information on anything presented, please visit our website at:

www.caiso.com

Or send an email to:
CustomerTraining@caiso.com