Hybrid Resources Phase 2-A Training

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Agenda

In this training, you will learn about these topics:

- Hybrid Resources Overview
- Phase 2-A
  - High Sustainable Limit
  - Ancillary Services
- Market Sim Details
- Wrap up

HYBRID RESOURCES OVERVIEW

Acronyms

Abbreviation	Definition
ACC	Aggregate Capability Constraint
ALFS	Automated Load Forecast System
AS	Ancillary Services
BESS	Battery Energy Storage System
CMRI	Customer Market Results Interface
DOT	Dispatch Operating Target
EDAS	Energy Data Acquisition Specialists
EMS	Energy Management System
HSL	High Sustainable Limit
IFM	Integrated Forward Market

Acronyms

Abbreviation	Definition
MRI-S	Market Results Interface for Settlements
OASIS	Open Access Same Time Information System
POI	Point of Interconnection
RIMS	Resource Interconnection Management System
RTM	Real-Time Market
SIBR	Scheduling Infrastructure Business Rules
SOC	State of Charge
VER	Variable Energy Resource

Key Definitions

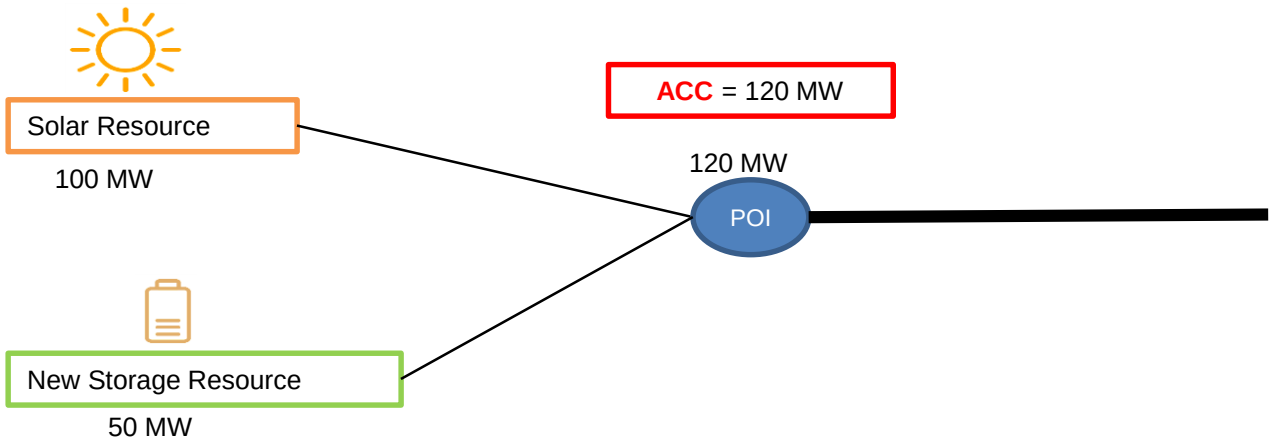
- Co-located Resource – multiple resource IDs behind a single point of interconnection
  - Each resource is modeled and submits bids to the ISO independently
  - ISO will model state of charge, VER forecasts, heat rates independently as appropriate

- Hybrid Resource – Mixed-fuel resource with a single resource ID at a single point of interconnection
  - ISO receives one bid curve which should include any internal optimization
  - Should always be able to respond to any dispatch instruction from the ISO

Hybrid Resource Project - Phase 1

Co-located Resources - Multiple resources of different technologies that share a common point of interconnection but are 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),

Scheduled Production Date – November, 2021

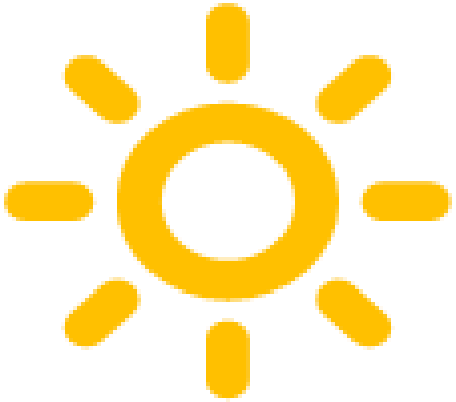
Phase 2-B

Implement Hybrid Dynamic Limit functionality and Master/subordinate ACC along with changes to RIMS, Masterfile, EMS, SIBR, IFM/RTM, OASIS, ALFS, MRI-S, CMRI, Today's Outlook/ISO Today, other reports

Scheduled Production Date – May, 2022

HIGH SUSTAINABLE LIMIT

Example



Current weather conditions allow the resource to produce 10 MW

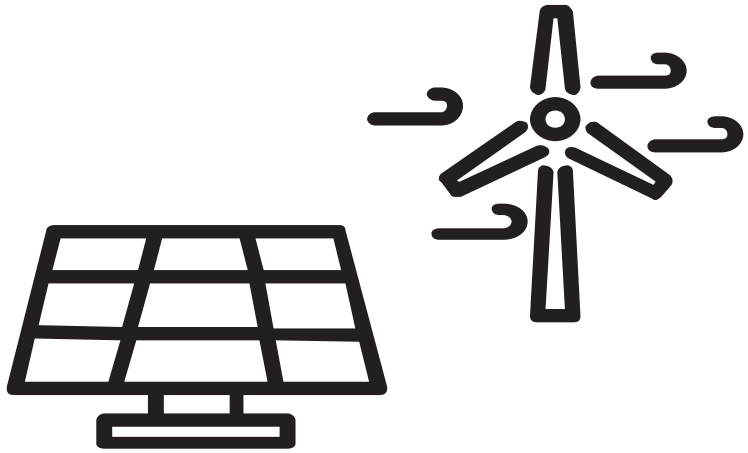
ISO dispatched the resource to produce 8 MW

Telemetry of resource = 8 MW

High Sustainable Limit (HSL) = 10 MW

What is HSL for?

- Improve forecasting for VERs
- Assist with regulation
- Inform uncertainty risk across the system



Systems Receiving HSL Data

- EMS
  - Receive HSL via telemetry every 10 seconds for each
    - co-located VER
    - VER component of a hybrid resource

- Real-Time Market
  - Receive HSL for each resource ID to be used for persistence forecast
  - With existing ACC schedules/RTD screen, RTD shall display Follow_DOT flag and AS

HSL and Persistence Logic

- Persistence Renewable Forecasting is only available for co-located resources at this time

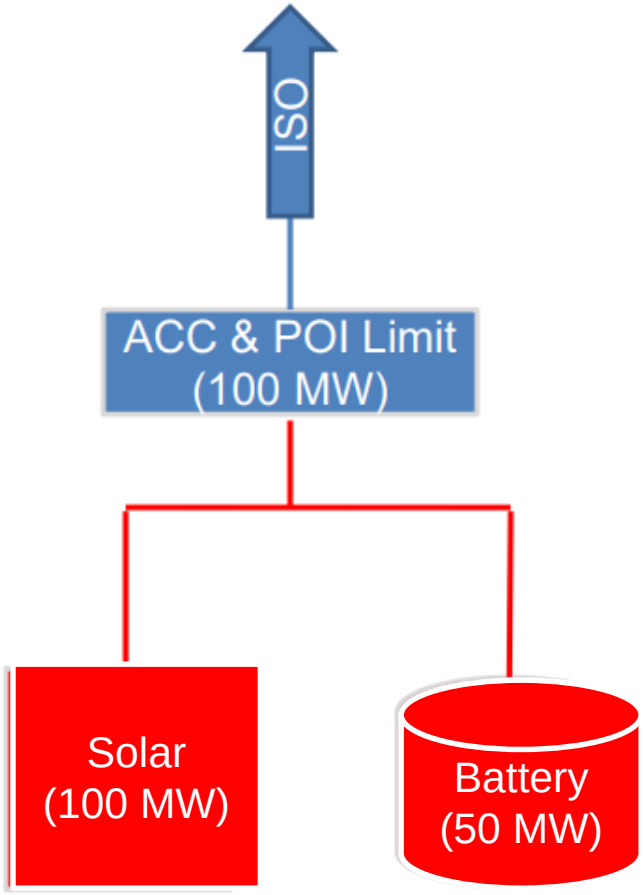
- If a resource is providing HSL, then we can use HSL for persistence as long as the HSL is good quality regardless of market instructions

- If a resource is not providing a good quality HSL, then we will keep the current persistence logic
  - If the resource has an AS award, it will need to follow its DOT

- Hybrid Resources – If dispatched, all resources within the hybrid must work together to jointly follow the DOT

Follow the DOT: Co-Located Resource

HSL is available and will be used to inform persistence regardless of solar or battery market instructions as long as HSL is of good quality



This resource is under an ACC

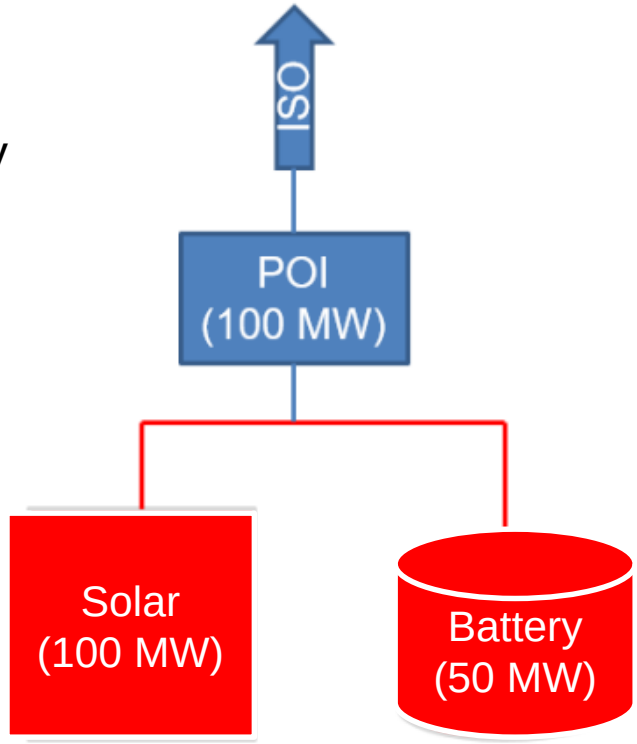
The battery gets an AS award

The solar resource is required to follow their DOT

Solar resource will remain on HSL-based persistence forecast as long as data quality is good

Follow the DOT: Hybrid Resource

HSL is not available. In this case we will use current persistence logic using solar component telemetry



The Hybrid resource is always required to follow its DOT

Solar resource will switch off persistence to vendor forecast for period of battery AS award

Telemetry Details

- New projects
  - Refer to the current NRI process
  - HSL is a new telemetry point that needs to be provided for each VER component
- Existing project
  - Open a new RIG Reconfiguration Project in RIMS
  - Program the RIG with HSL
  - Test with the EDAS Team and then provide HSL data to the ISO
- HSL is not a replacement for MW output of solar/wind site
- All VERs must meet Appendix Q Meteorological Requirements

Metering and Settlements Details

- Individual meter data should be provided for all hybrid components

- New projects
  - Refer to the current NRI process

- Existing project
  - Open a new Meter Project in RIMS
  - Install new meter for all hybrid components
  - Test with the EDAS Team and then provide meter data to the ISO

- Settlements
  - Will use FORECAST_SELECTION flag and new VER_NGR_FF flag to identify an NGR resource with a VER component that is using ISO forecast for calculating a forecast fee.

Additional Resources

- High Sustainable Limit White Paper
  - http://www.caiso.com/InitiativeDocuments/FinalWhitePaper-HighSustainableLimit-HybridResourcesPhase2.pdf
- Tariff - Appendix Q – Eligible Intermittent Resource Protocol (EIRP)
  - http://www.caiso.com/Pages/documentsbygroup.aspx?GroupID=16204F9F-158C-4FD0-A053-BF79A2847466

Questions

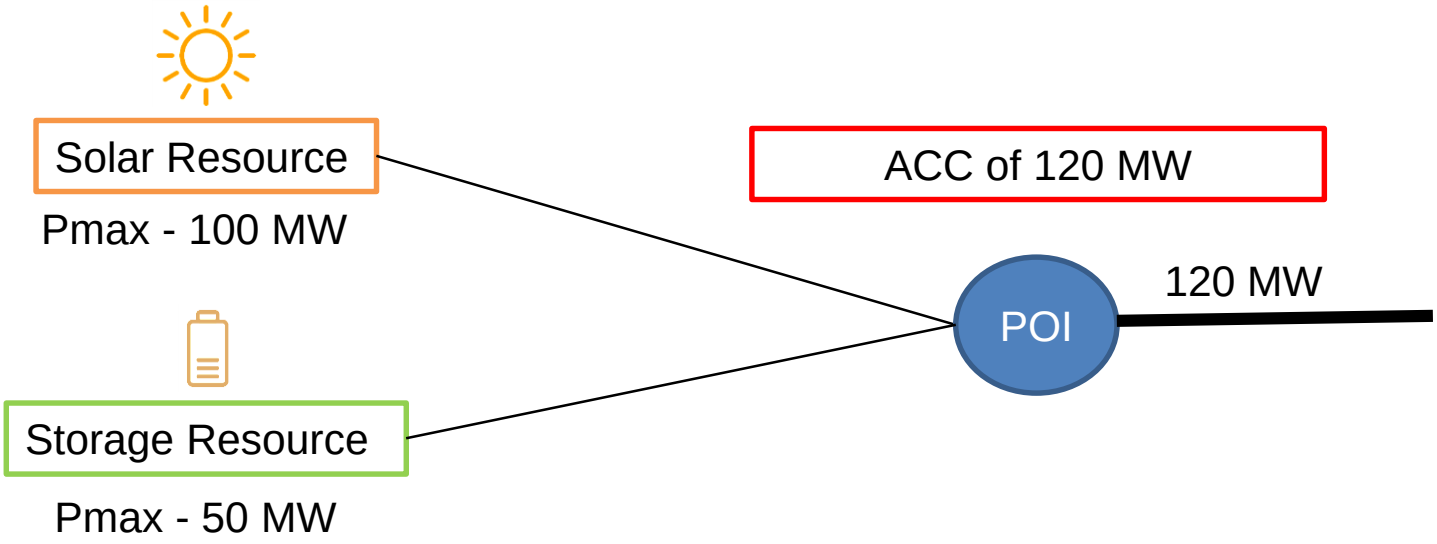
ANCILLARY SERVICES

What's changing?

- Currently the ACC considers energy, not ancillary services for co-located resources.

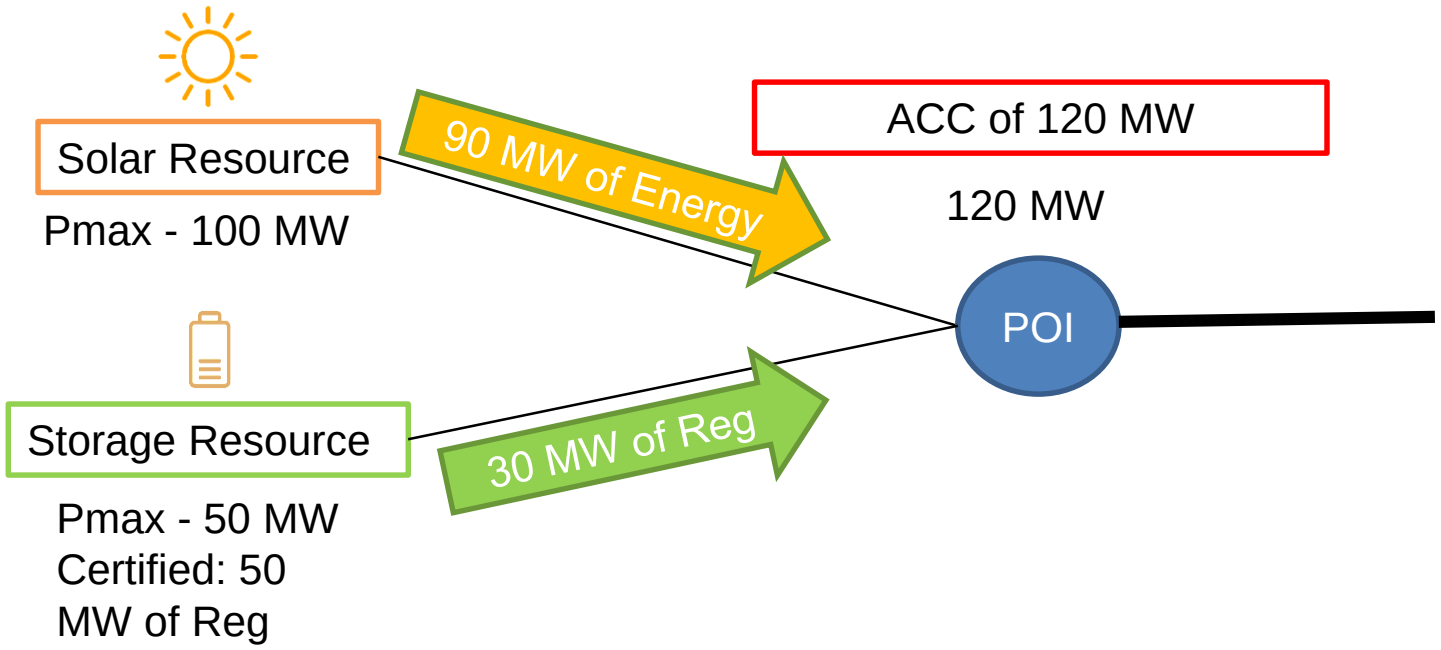
- With this change, the ACC will look at energy + AS when it is making sure that the point of interconnection limit will not be exceeded

Current scenario – no ancillary services



The ISO market software will limit the dispatch of the combined resources to 120 MW because of the ACC

Fall Release



The ISO Market software will limit the dispatch of the combined resources to 120 MW, inclusive of regulation awards, because of the ACC

Determining the limits

- Real-Time Market - ACC constraints validation includes:
  - The sum of energy, reg up, spinning reserve, flex ramp up must be less than or equal to upper limit
  - The sum of energy minus reg down minus flex ramp down must be greater than or equal to the lower limit.

Questions

MARKET SIMULATION

Market Simulation Information

Activity	Description	Timeframe
Release Simulation Begins	Fall 2021 Releases Market Sim in the MAP Stage Environment	8/30/2021
Connectivity Testing	MAP Stage open for interface access validation	8/30/2021 – 9/6/2021
Structured Scenarios	Structured Scenarios to be executed	9/7/2021 – 10/1/2021

Market Simulation Information – Unstructured Scenarios

Unstructured Simulation

To request specific market conditions for a resource please contact ISO at MarketSim@caiso.com preferably TD-1 prior to the unstructured TD's DAM or RT market run.

Regression Simulation

To request specific market conditions for a resource please contact ISO at MarketSim@caiso.com preferably TD-1 prior to the regression TD's DAM or RT market run.

Questions

WRAP UP

Summary of Key Points

- The Fall 2021 Release implements:
  - High Sustainable Limit (HSL) –
    - provides visibility to the production capability of VER components within a Hybrid or co-located configuration
    - Improves forecasting for VERs
  - Ancillary Services
    - Co-located resources with an ACC can provide ancillary services
    - ACC will ensure that the POI limit is not exceeded

Final Questions

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

www.caiso.com

Or send an email to:
CustomerReadiness@caiso.com