WECC Energy Storage Forum:
SRP GFM and IBR Integration and Commissioning

Delivering water and power™

25 June 2025

SRP Grid Forming Initiative

- SRP's Operational Readiness Program is a set of projects to prepare SRP for the operation of high levels of IBR penetration. Part of these initiatives involve prepping for the need for Grid Forming inverters
- Operational Readiness Project 12a covers inverter technical standards which includes:
  - IEEE2800 SRP specification
  - Developed, approved and placed on OASIS a Business Practice for GFM BESS
  - Including in the 2025 all-source RFP a requirement of all BESS resources to have GFM capability. Here is the actual language from this RFP:

13. All battery energy storage systems shall include inverters that can operate in grid forming mode (GFM) that meet the GFM functional specifications and simulation test procedures included in the SRP Business Practice on OASIS.

  - The 12a team will work with SRPs Resource Acquisition and Transmission Planning to help select a BESS project
  - The 12a team will work to develop the specifications for testing and proving the GFM enhancements provided to the BESS as a pilot GFM project

SRP BESS Blackstart Test Project

- As a very specific application of GFM functionality, SRP Operators and SRP Transmission, Generation and Operations have expressed the desire to test a BESS as a Blackstart facility to provide Blackstart functionality from the west side of SRPs grid.
- SRPs Bolster 25MW/100MWHr Tesla Megapack 1 battery is best positioned to provide Blackstart functionality to our Agua Generation Facility gas turbines. Top level tasks include

Initial System Analysis

Analysis of system for protection, control and interlocking arrangements and identify areas that need adjustment

Define restoration sequence and examine initial island and points of synchronization

Simulation Studies

Power flow and dynamic simulations for steady state capability and system response and frequency sweeping and impedance scanning to identify low order resonance conditions

Protection studies to ensure adequacy of protection

EMT analyses for transformer, line and compensation device successful integration into restoration system

Live Testing

Tesla system studies and field changes to Bolster to allow GFM Blackstart functionality

Field demonstration of Blackstart capability

IBR Integration Checklist

- SRP has created an IBR Master Schedule to track new PPA IBR installations from the PPA process stage all the way to commercial operation.

Pre-System Integration

IBR PPA Process Schedule
Interconnection Process
TP Interconnection Facilities Design and Construction
Customer Plant Design and Construction
Operational Equipment Data Design and Installation
Revenue Metering/Telemetry Design and Installation
Market Implementation

System Integration and Testing

Application Setup and Configuration
Balancing Authority Agreement
Station Aux Power Use Requirements
Operational Testing and Commissioning
Training

IBR Site Energization and Syncing and Commission Tests

- Once we get near to IBR substation energization and unit syncing there is a combination of test energy and small site commissioning tests that SRP coordinates in energy schedules and AGC Operator notification.

Critical Milestone Checkout

IBR Substation SCADA points
EMS Back End SCADA point checkout
End-to-End SCADA point checkout
SUBSTATION ENERGIZATION

IBR Unit SCADA points
EMS Back End SCADA point checkout
End-to-End SCADA point checkout
IBR UNITS ALLOWED TO SYNC TO GRID

Test Energy, Operational Testing and Commissioning

Test Energy as IBR units begin hot commissioning

Power Plant Controller tuning tests

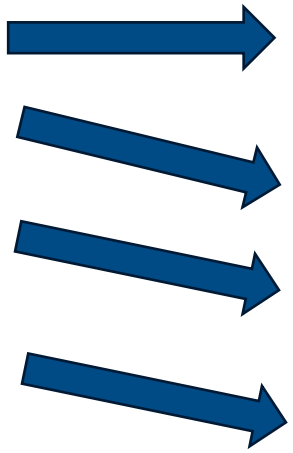
Final commissioning witness tests:

BESS Ramp Rate Tests (MW and MVAR)
RTE and Standby Energy Consumption
Charge and Discharge tests
Voltage Control
Reactive Power control/capability
AVR
Frequency Droop tests

IBR Commissioning Challenges

Challenges

- Overlapping IBR COD dates
- Oversized oscillations during early PPC tuning
- BESS inverter issue curtailing output during the first week of operation
- Early commercial operation of one resource in a Hybrid or Co-Located plant



Solutions

- Work with Resource Acquisition to stagger IBR COD Dates
- Commission testing requirement via SRP/Developer quality and frequent coordination.
- **Potential solution: Require a 5-day break-in period to prove resource reliability.**
- Ensure proper staging of PV and BESS commissioning and avoid operating one resource before the entire site is ready.

Questions?