

## Solar-Battery Hybrid Resources

### Issue Source

PJM Staff

### Key Work Activities and Scope

The scope of this issue will focus mainly on clarifying where and how existing requirements for Solar Parks, solar resources, Intermittent Resources, and Energy Storage Resources do and do not apply to the various categories of inverter-based solar-battery hybrids. However, in certain areas noted below, stakeholders will discuss new requirements needed for solar-battery hybrid resources' market integration. While the initial focus of this effort is on solar-battery hybrids, stakeholders may choose to focus discussion on other combination resources in a later phase of work, as described below.

1. Education, including but not limited to:
  - a. Description of hybrid resources and details on the amount and fuel types of all hybrid resources in the PJM queue
  - b. Electrical configurations of solar-battery hybrid resources
    - i. AC vs. DC coupled systems
    - ii. Open-loop vs. closed-loop solar-battery hybrids (battery can or cannot charge from the grid, respectively)
    - iii. Maximum Facility Output, generator step-up transformer, and shared-inverter power limits that constrain the combined output of the solar and battery components
  - c. The interconnection queue process for hybrid resources, including how existing material modification rules apply.
2. Clarification of how existing requirements for Solar Parks, solar resources, Intermittent Resources, and Energy Storage Resources apply to solar-battery hybrids:
  - a. Metering, telemetry, solar parameters, and meteorological data requirements;
  - b. VAR testing requirements for various configurations of solar-battery hybrids;
  - c. Clarification of the status quo for calculating capability of solar-battery hybrids in the capacity market, which sets eligibility to request Capacity Interconnection Rights among other things;
  - d. Miscellaneous requirements specific to Intermittent Resources, solar, and Energy Storage Resources in Manual 11 (Energy & Ancillary Services Market Operations), e.g.: Tier I calculation, Tier II and DASR eligibility.
3. Potential development of new requirements and provisions:
  - a. Solar-battery hybrid definitions relative to Intermittent Resource, Energy Storage Resource, and Solar Park. Potential development of one or more new resource types;
  - b. Potential development of new requirements for market modeling options for various configurations of solar-battery hybrids;
  - c. Potential enhancements to the status quo for calculating the capacity capability of closed loop solar-battery hybrids.

- i. To be coordinated with Capacity Capability Senior Task Force (i.e. Effective Load Carrying Capability)

4. Phasing

Items in the domain of separately-modeled co-located solar and battery storage will be discussed in a later phase of work, including but not limited to discussion of settlements, energy market participation, and modeling the interaction between the two units. In addition to separately-modeled co-located solar and battery storage, this phase of work will also explore the same potential market participation issues related to other types of hybrid and separately-modeled co-located unit combinations, such as, but not limited to, wind-battery and gas-battery.

**Out of scope**

Key work activities will be coordinated with ongoing stakeholder issues in two other areas, both of which are out of scope for this effort. PJM will provide periodic educational updates to and from the stakeholder bodies addressing these efforts:

- PJM implementation of compliance with FERC Order 845
- Stakeholder engagement related to the FERC directive regarding capability of Energy Storage Resources in the capacity market

**Expected Deliverables**

1. Comprehensive educational material and answers to FAQs regarding solar-battery hybrid resources
2. Proposed revisions to PJM business manuals
3. If needed, proposed revisions to governing documents
4. If needed, FERC filing

**Decision-Making Method**

Tier 1 consensus

**Stakeholder Group Assignment**

MIC Subcommittee

**Expected Duration of Work Timeline**

Given the amount of solar-battery hybrid resources in the interconnection queue and the existing rules clarification and gaps needed to be addressed for this resource type prior to operation in the PJM market, it is recommended that the subcommittee report its findings to the MIC, including any proposed solutions, by the end of 2020.

Start Date	Priority Level	Timing	Meeting Frequency
7/1/2020	<input type="checkbox"/> High <input checked="" type="checkbox"/> Medium <input type="checkbox"/> Low	<input type="checkbox"/> Immediate <input checked="" type="checkbox"/> Near Term <input type="checkbox"/> Far Term	<input type="checkbox"/> Weekly <input checked="" type="checkbox"/> Monthly <input type="checkbox"/> Quarterly



**Charter**

<input checked="" type="checkbox"/>	This document will serve as the Charter for a new group created by its approval.
<input type="checkbox"/>	This work will be handled in an existing group with its own Charter (and applicable amendments).