Solar-Battery Hybrid Resources

Problem / Opportunity Statement

There are over 10,000 megawatts of co-located generation and energy storage "hybrids resources" in the PJM Queue[1]. Over 95% of those megawatts are solar-battery hybrids. PJM staff has identified a variety of existing business rules that would apply to hybrid resources that merit discussion, clarification, and, in some limited cases, enhancement. While there are multiple types of hybrid resources in the PJM interconnection queue, staff's intention is to narrow the scope and focus this stakeholder effort primarily on solar-battery hybrids. Not only does this resource configuration represent the vast majority of megawatts in the queue, but there are certain operational and design features of solar-battery hybrids that require further business rule clarification and enhancement. For example, the expectation that many of these resources will be DC-coupled and will not have the ability to charge the battery from the grid presents modeling and metering questions that need to be discussed and clarified with stakeholders. Where it makes common sense to consider a particular issue or business requirement in the context of other types of hybrid resources (for example, wind-battery hybrid), staff is open to doing so. However, in the interest of narrowing the scope so as to not consider every possible type of generation plus energy storage resource combination, the preference is to more narrowly focus on solar-battery hybrids.

There are several configurations of solar-battery hybrids, each needing its own discussion about how existing business rules may or may not apply, and the need for potential clarification or enhancements. Solar-battery hybrids can use separate inverters for the solar and storage components, or can use a shared inverter for each component. In either case, the hybrid could be set up to be capable of physically charging the battery component from the grid, or could be incapable of charging from the grid and only charging from the generation source directly. Finally, most solar-battery hybrids are expected to have a restrictive combined Maximum Facility Output relative to the two components (that is, the sum of the nameplate capability of the two components exceeds the maximum AC output capability of the combined plant). These various configurations need their own discussion about how existing business rules may or may not apply to each, and the need for potential clarification or enhancement for certain types of solar-battery hybrids. For example, in the case that a solar-battery hybrid shares a single inverter, has a restrictive shared power output limit, and the battery can only charge from the solar, it may be helpful to think about their market participation in terms of a single, integrated market unit. For different configurations, perhaps not.

PJM staff supports the investigation of this problem statement and issue charge for solar-battery resources to ensure that the operation of its markets continue to evolve with advancements in renewable and energy storage technologies.

[1] As of February 10, 2020, the PJM queue includes 10,158 megawatts on an energy basis (MWE) and 6,805 megawatts on a capacity basis (MWC). Of that, 9,829 MWE is solar-storage; 236.5 MWE is gas-storage; 92.5 MWE is wind-storage.