

PJM Updates on DER Issues

MADRI Meeting #52 March 11, 2019 Andrew Levitt Sr. Business Solution Architect Applied Innovation



PJM approach to storage for FERC Order 841 and implications for the distribution system



2018 Battery Storage in PJM





Hopewell Valley Central High School Solar/Storage pilot

- Owned by Public Service Electric and Gas Company (PSE&G) as part of Solar 4 All program
- 876 kWdc solar + 580 kWh batteries
- PJM wholesale power plant
- Also: backup during grid outage







841 Requirements

- 1. Can sell* energy, <u>Capacity</u>, and A/S (incl. Black Start etc.) the resource is technically capable of providing
- 2. <u>Dispatched</u> and <u>sets price</u> as seller and buyer
- 3. Bid parameters that account for ESR characteristics

4. Min market threshold is 100 kW

= already in compliance

5. ESR has right to buy certain charging MWh at wholesale LMP

* "Eligible to provide..."



ESR Accounting Proposal

- Purpose: Fix current limitation in the PJM tariff which restricts multi-use ESRs (currently says 'solely' for wholesale use)
- Allows for trials of settlement and accounting procedures that distinguish between retail and wholesale sales
- PJM requested an earlier order date on the ESR Accounting Proposal, allowing more time to work out implementation details







Order 841: Purchase for Wholesale vs. Retail Resale

- Status quo: 100% of charging for energy storage resources capable of serving end-use load is at retail.
- PJM Compliance with Order 841: For energy storage resources capable of serving end-use load, charging energy that is stored might be later resold (by the storage resource) at wholesale or at retail:
 - Only a Load Serving Energy may purchase from PJM for <u>retail</u> sale.
 - The subsequent retail sale is not PJM jurisdictional.
 - LSEs and their retail sales are subject to state/local laws and regs.
 - By contrast, an ESR will be able to purchase from PJM for <u>wholesale</u> sale (back to PJM).
 - The subsequent wholesale sale is PJM jurisdictional





Compliance filing to **Implementation** phase define charging MWh would establish methods categories & eligibility. **Five batteries in the** for categorizing MWh "resilience" use case Filing: and coordinating with already installed. **Dec 2018** utility. "Direct **Partly Accepted:** Charging Feb 2019 Energy" **Demonstrate metering** "Load and accounting methods Serving Charging **Full implementation:** Energy" **Dec 2019**



PJM STATUS QUO FOR ESTABLISHING CAPACITY VALUE GIVEN LIMITED ENERGY DURATION IS BASED ON 10 HOUR CAPABILITY



Capacity Market (RPM)

Capacity market status quo requirement for energy-limited generators is a minimum of 10 hour duration at RPM cleared MW.

Electric Storage Resources can derate to meet this requirement.



Update on IEEE 1547-2018 and PJM Distributed Energy Resources Ride Through Task Force



Why Care About IEEE 1547-2018?

IEEE standard 1547 facilitates DER interconnection.

- Old IEEE 1547-2003 is retiring, is in laws & regs of most states.
- PJM has long-term reliability concerns with old IEEE 1547-2003.
 No immediate concerns, and no anticipated need for retrofits.
- New IEEE 1547-2018 is a "smart inverter" standard.
- Manufacturers moving away from IEEE 1547-2003 and towards "smart inverters" (e.g., CA, HI, MA). Starting in early 2020s, DER equipment will increasingly be designed for IEEE 1547-2018 and not old IEEE 1547-2003.



New IEEE 1547-2018

Take it or leave it.

"The small generator shall be listed to meet the requirements of IEEE 1547-2003".

Old IEEE 1547-2003

Pick a flavor.

"The small generator shall be listed to meet the requirements of IEEE 1547-2018 using normal operating performance **Category A** and abnormal operation performance **Category II**, with the UV1 trip point adjusted to [Y] seconds and the UV2 trip point adjusted to [X] seconds."



- PJM states, PJM, utilities, and U.S. law cite IEEE Standard 1547 as applicable to DER interconnections.
 - i.e., only generators connected on distribution. NOT those connected on transmission.
 - IEEE Standard 1547 includes many provisions, including trip times (for 2003 and 2018 revisions) and ride through requirements (only for 2018 revision).
 - IEEE Standard 1547-2018 includes 3 options for ride through, each with different default and adjustable trip time options.
 - IEEE Standard 1547-2018 specifies precisely what the dynamic expectations are for trip behavior and for various forms of ride through behavior.
 - The PJM DERRTTF will specify a technical profile for ride through and trip times based on the IEEE 1547-2018 standard.
 - This profile will be included in a voluntary guidance document for DER interconnection requirement authorities (mainly states and/or local utilities).

Jpjm

IEEE 1547-2018 Standards Timeline



PJM ride through and trip profile



PJM Stakeholder Effort for DER Ride Through

Q1 2018: Preliminary trial workshop w/ 4 utilities (T and D)

Q4 2018: Approved DER Ride Through Task Force Charter

Q1 2019: Launch DERRTTF ~monthly meetings.

Q4 2019: Manual Language and state guidance document for Ride Through and Trip parameters

PJM Rules

State Guidance Document



Appendix: Storage Bidding and Operations



Continuous Operation Mode



Continuous operation mode - ESRs can update their max charge and discharge limits hourly in day-ahead and more frequently in realtime.

** State of charge telemetry may be needed in the future



Charge and Discharge Modes

Charge & Discharge mode will be available to ESR resources in Day Ahead and Real Time. a a ta b

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ESR resources can manage their own state of charge through the different modes and updates to limits, as well as hourly price offers in DA. Self-schedule will be available for ESRs.

Asset Owners Manage SoC