FERC Order on Energy Storage

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Market Implementation Committee
April 4, 2018
• November, 2016: FERC Notice of Proposed Rulemaking on Energy Storage and Distributed Energy Resources.

• February, 2018: FERC final rule on storage …
Stakeholder Discussions Scheduled so Far...

- April 4, 2018 Education Presentation at MIC
- Special MIC Sessions
  - May 10, 2018 1-4 PM
  - June 14, 2018 1-4 PM
  - June 27, 2018 1-4 PM
  - August 3, 2018 1-4 PM
  - September 14, 2018 1-4 PM
Electric Storage Resource Definition

- Electric Storage Resource (ESR) = “a resource capable of receiving electric energy from the grid and storing it for later injection of electric energy back to the grid.”
- Connected at: transmission, distribution, or behind a customer meter.
  - PJM has ESR at both T and D today, none behind a meter that inject.
- Excludes demand response.
- Includes pumped hydro

Over 5,300 MW of Electric Storage Resources currently in PJM

- Pumped Hydro 96%
- Other Storage 4%

**Data taken from Generation Queue and EIA 860**
### Initial Reactions on PJM Impact

<table>
<thead>
<tr>
<th>Possible change needed</th>
<th>Home</th>
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<tbody>
<tr>
<td><strong>1. Can sell</strong> energy, <strong>Capacity</strong>, and A/S (incl. Black Start etc.) the resource is technically capable of providing</td>
<td>Rule tweaks</td>
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<td><strong>2. Dispatched and sets price</strong> as seller and buyer</td>
<td>Rule tweaks and software</td>
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<td><strong>3. Bid parameters</strong> that account for ESR characteristics</td>
<td>Rule tweaks and software</td>
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<td><strong>4. Min market threshold</strong> no larger than 100 kW</td>
<td>N/A</td>
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<td><strong>5. Stored MWh are billed at LMP as wholesale</strong></td>
<td>Rule tweaks, PowerMeter</td>
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* “Eligible to provide…”
Energy Market

- ESR charging and discharging: provide bids, set price or be a price taker, and be dispatched as a wholesale seller or buyer
  - De-rate capability to meet minimum run time requirements
  - Pumped hydro implementation today does ~none of these.
- Pumped Hydro: no change required, but: pumped hydro eligible to use new ESR rules.
- Metering and Accounting considerations
- Make Whole and Lost Opportunity Cost required when dispatched off-cost, both discharging and charging.
Revise the tariff to allow ESRs to de-rate their capacity to meet minimum run-time requirements.

- Current 24 hour duration requirement with 10 hour exceptions
- “Must offer” and cost offer requirements given duration limits.
- How to “de-rate” to meet 10 hour exception duration requirement.
Wholesale Stored MWh Are at LMP

- Energy that the ESR takes off the grid and later returns to the grid is “Wholesale Stored Energy”, billed at wholesale at LMP.
- Consistent with PJM proposal in the DER Subcommittee.
- DERS plans to continue handling this component (more work still required).
  - Metering and Accounting considerations
Is PJM Management of ESR “State Of Charge” Required?

- Requirement: participation model must “…account for the physical and operational characteristics of electric storage resources through bidding parameters or other means”.

Mandatory list of characteristics to account for:

- **State of Charge**
- Max/Min **State of Charge**
- Max/Min **Charge Limit**
- Max/Min **Charge Time**
- Max/Min Run Time
- Min **Discharge Limit**
- Min **Charge Limit**
- Charge/Discharge **Ramp Rate**
Important Links


• PJM Request for Clarification: http://pjm.com/mediadocuments/ferc/filings/2018/20180316-rm16-23-000-ad16-20-000.ashx