New Manual 14D and OATT Requirements for Solar Parks

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Generation
Planning Committee
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Increased Solar Power in PJM

Installed Capability of PJM Grid-Connected Solar (MWDC)

Source: Generator Attribute Tracking System, PJM Environmental Information Systems, 2017
Benefits of Solar Power Forecast to PJM Members

- Aggregate forecast data available to all PJM members through Data Viewer

- Provided to Transmission Owners through Data Viewer for use in operations planning and transmission outage coordination

- Provided to Generation Owners / Market Operations Centers through Markets Gateway can use for generation offering and scheduling
Operations Solar Forecast Timeline

2016 Q1-Q3
- Selected vendor and completed security evaluation
- Initiated discussions with stakeholders
- Collected static input data from plant owners

2016 Q4
- Complete software upgrades to receive forecast from vendor
- Complete upgrades to send real-time input data to vendor
- Initiate plan to include additional meteorological data in forecast

2017 Q1-Q4
- Determine benchmark accuracy and improve throughout year
- Integrate forecast into Dispatch and Markets tools
- Implement new data requirements for Solar Parks (M-14D, OATT)
• PJM required by FERC Order No. 764 to develop tariff revisions to include additional data reporting requirements for solar power resources

• FERC requires public utility transmission providers to modify their pro forma LGIAs to include reporting requirements for meteorological data

• “Power production forecasts are only as good as the data on which they rely. The ability of public utility transmission providers to use power production forecasting … may be limited without adequate meteorological and forced outage data from VERs.”

• “An interconnection customer with a VER having solar as the energy source must provide, at a minimum, site-specific meteorological data including temperature, atmospheric pressure, and irradiance.”
### Criteria

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Telemetry Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Generator participates in the PJM market as a capacity resource</td>
<td>Real and reactive power</td>
</tr>
<tr>
<td>Generator 10 MW or larger</td>
<td>Real and reactive power</td>
</tr>
<tr>
<td>Generator greater than 1 MW and connected at a bus operating at 50kV or greater</td>
<td>Real and reactive power</td>
</tr>
<tr>
<td>Distributed generator modeled less than 10 MW</td>
<td>Real and reactive data at the BES injection point of accuracy within 10% of hourly MWh settlements data (revenue meter or accumulator data)</td>
</tr>
<tr>
<td>Solar plant generator <strong>3 MW</strong> or greater</td>
<td>Real and reactive power</td>
</tr>
</tbody>
</table>

**Existing**

**New**
• Additional real-time solar data requirements are needed for accurate RTO-wide solar forecasting

• 3 MW threshold was selected as it will cover vast majority of current installed capacity

• This threshold is consistent with those identified by other RTOs/ISOs for similar purposes
M-14D Section 12.2.1 – Initial Data Requirements

- AC and DC installed capacities of plant (MW)
- For fixed panel sites:
  - Azimuth and altitudes angle of panels
- For tracking sites:
  - Tracker type (single or dual axis), make and model
- Geographic locations of:
  - Center point of Solar Park site
  - Meteorological data sensors
- Manufacturer and model of photovoltaic panels
• All Solar Parks greater than or equal to 3 MW (Maximum Facility Output) must provide real-time MW/MVAR output*

• Data should be telemetered at low-side gross
  – High-side net may also be required as dictated by PJM’s model

• If a Solar Park is collocated with an energy storage facility, then separate metering is required for each component
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Units</th>
<th>Requirement or accepted?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Irradiance</td>
<td>Watts/meter²</td>
<td>Required for plants with Maximum Facility Output of 3 MW or higher</td>
</tr>
<tr>
<td>Back Panel Temperature</td>
<td>Fahrenheit</td>
<td></td>
</tr>
<tr>
<td>Ambient Air Temperature</td>
<td>Fahrenheit</td>
<td></td>
</tr>
<tr>
<td>Wind Speed</td>
<td>meters/second</td>
<td>Accepted</td>
</tr>
<tr>
<td>Wind Direction</td>
<td>decimal degrees from true north</td>
<td></td>
</tr>
</tbody>
</table>
• PJM intends to amend the *pro forma* sections of the Open Access Transmission Tariff:
  – Attachment O, ISA Schedule H
  – Attachment O-1
  – Attachment P, Schedule N

• Revise to extend current requirements to provide meteorological and forced outage data from only wind resources to both wind and solar resources
Endorsement Path

- Intermittent Resources Subcommittee (IRS)
  - Informational
- Market Implementation Committee (MIC)
  - Informational
- System Operations Subcommittee (SOS)
  - 1st read / 2nd read
- Operating Committee (OC)
  - 1st read / 2nd read + endorsement
- Markets and Reliability Committee (MRC)
  - 1st read / 2nd read + endorsement
- Data Management Subcommittee (DMS)
  - Informational
- Reliability Standards and Compliance Subcommittee (RSCS)
  - Informational
- Planning Committee (PC)
  - Informational
- Members Committee (MC)
  - (OATT revisions only)