



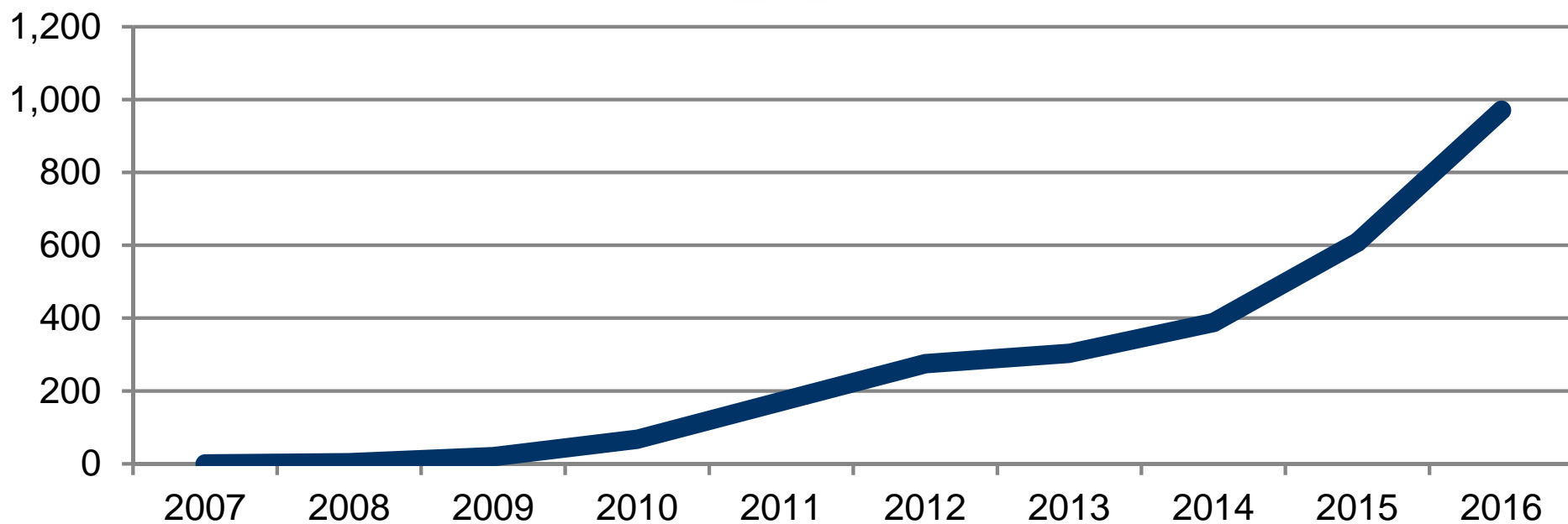
# New Manual 14D and OATT Requirements for Solar Parks



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### 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

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

- 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

- 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





## M-14D Section 12.2.2 – Real-Time Output

- 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



## M-14D Section 12.2.3 – Real-Time Meteorological Station

Parameter	Units	Requirement or accepted?
Irradiance	Watts/meter <sup>2</sup>	Required for plants with Maximum Facility Output of <b>3 MW</b> or higher
Back Panel Temperature	Fahrenheit	
Ambient Air Temperature	Fahrenheit	Accepted
Wind Speed	meters/second	
Wind Direction	decimal degrees from true north	



## PJM Open Access Transmission Tariff Revisions

- 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

