OPPORTUNITIES FOR IMPROVED COORDINATION BETWEEN METEOROLOGY AND OPERATIONS

Meteorology, Climate and the Electric Sector – Forecasting for an Integrated Energy System

2018 ESIG FORECASTING WORKSHOP

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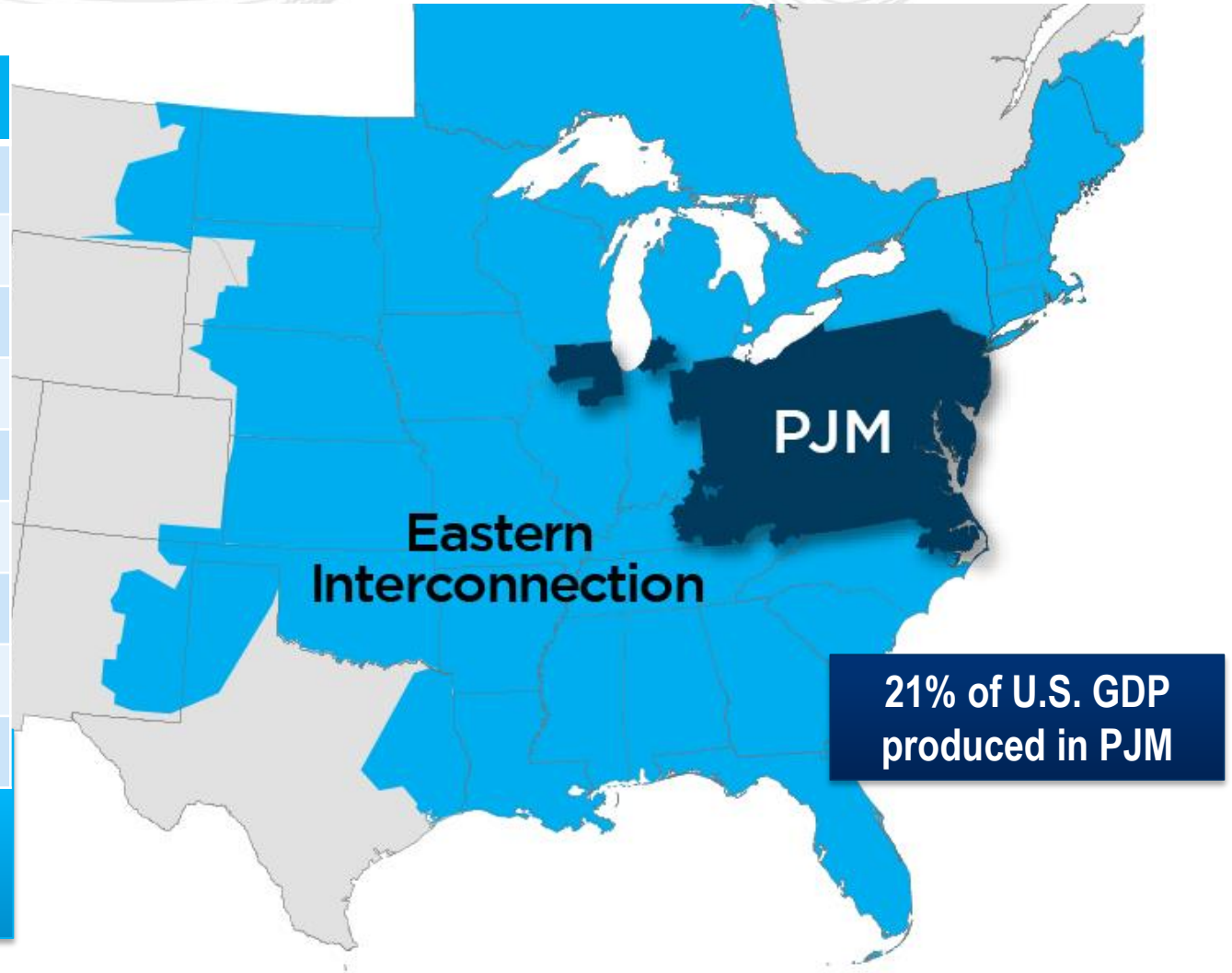
PJM as Part of the Eastern Interconnection

Key Statistics

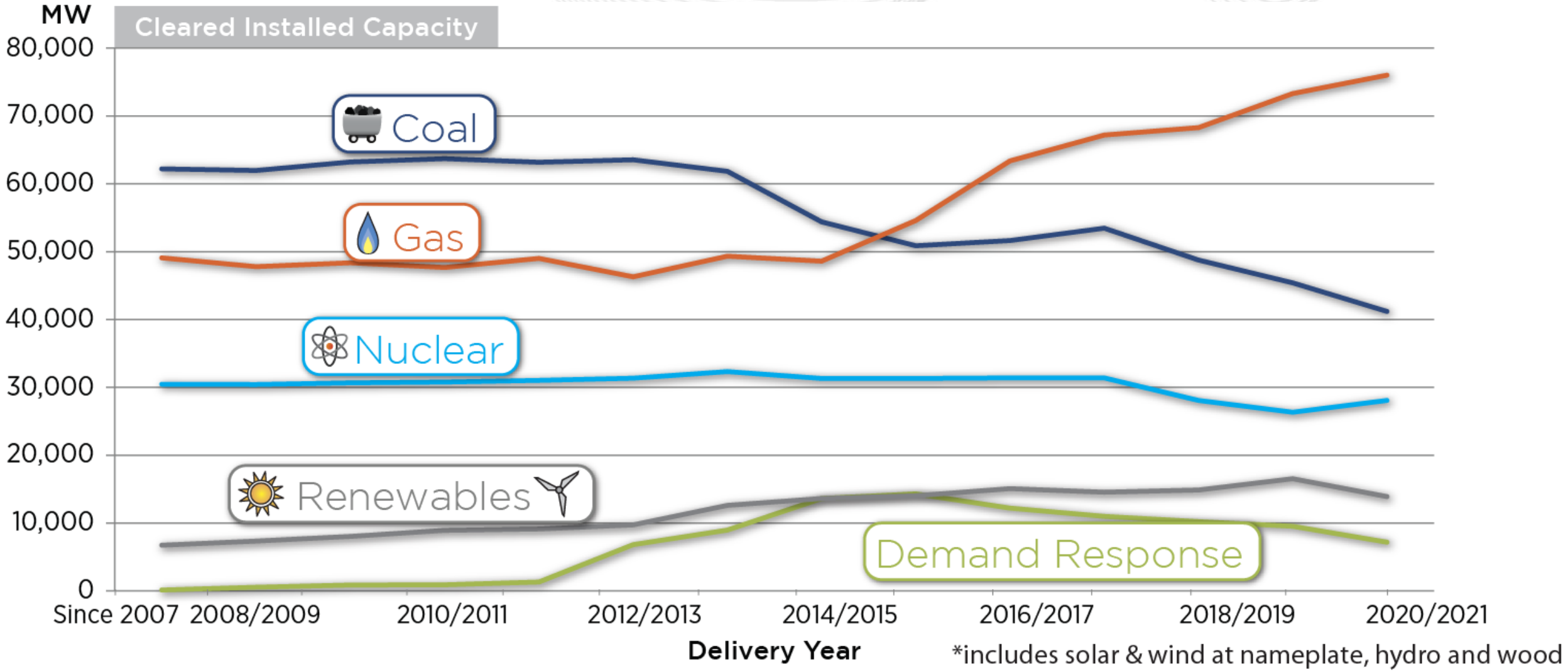
Member companies	1,040+
Millions of people served	65
Peak load in megawatts	165,492
MW of generating capacity	178,563
Miles of transmission lines	84,042
2017 GWh of annual energy	773,522
Generation sources	1,379
Square miles of territory	243,417
States served	13 + DC

- 28% of load in Eastern Interconnection
- 20% of transmission assets in Eastern Interconnection



As of 2/2018

Cleared Installed Capacity



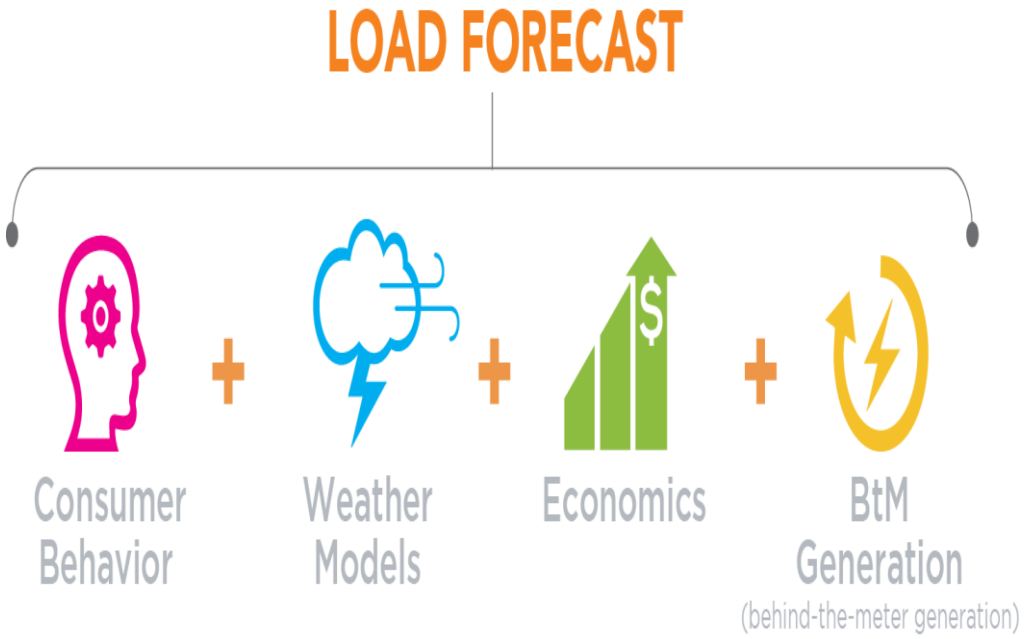
Importance of Meteorology in PJM Operations

Forecasting

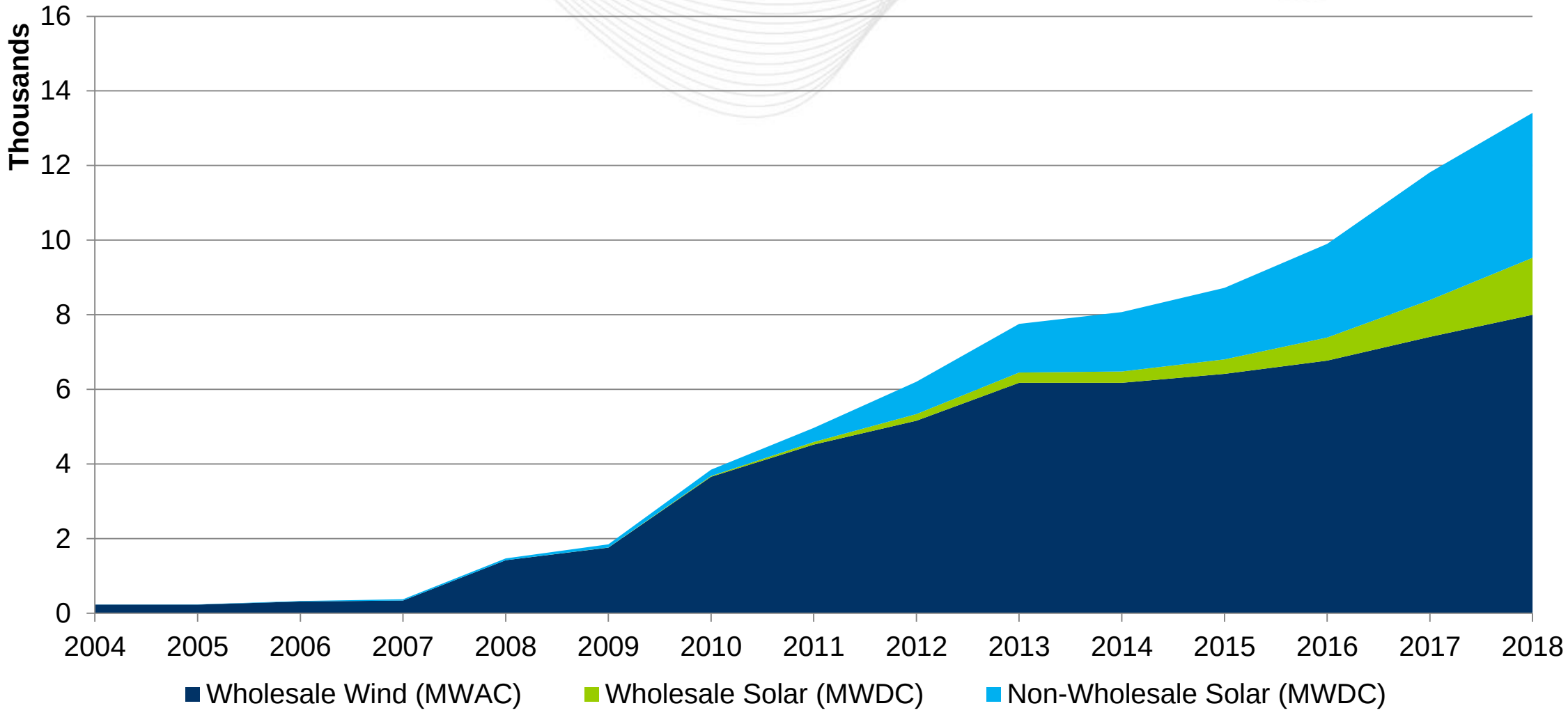
- Load, Wind, Grid-Connected Solar and Distributed Solar
- Short-Term Load Forecasts used for Day-Ahead Unit Commitment, Security Constrained Economic Dispatch, Reserve calculations, Outage approval
- Receive and interpret weather forecasts from multiple vendors
- Weather data important for line ratings, cold weather testing, gas/electric coordination, etc.
- Monitor performance of all forecasts

Severe Weather / Real-Time Monitoring

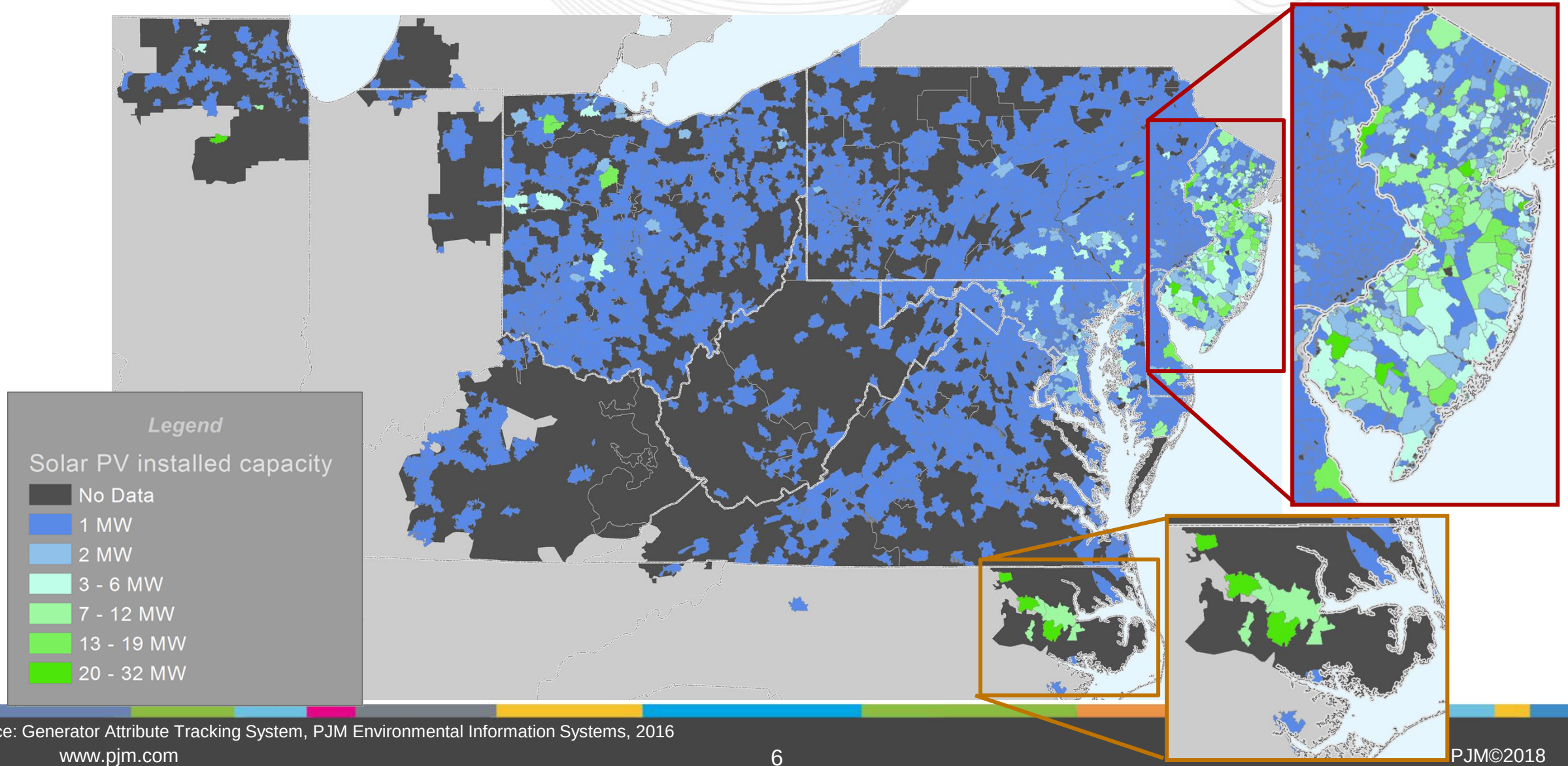
- Meteorologist monitors, provides situational awareness, and helps operators respond to changing severe weather scenarios (e.g. summer afternoon thunderstorms, tropical storms, nuclear unit impacts, etc.)



PJM Wind and Solar Installed Capacity

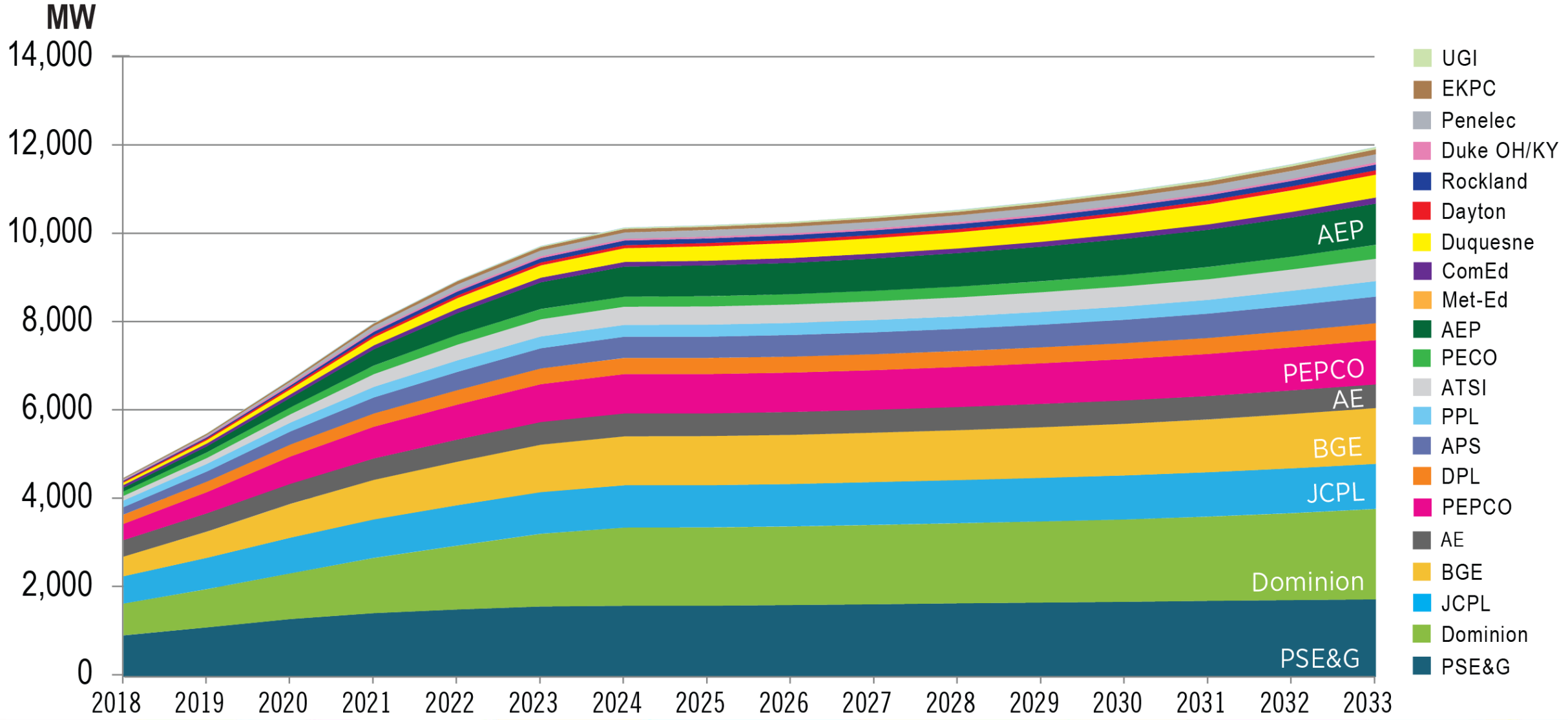


Concentration of Installed Solar Capacity
(Distributed + PJM Grid-Connected)

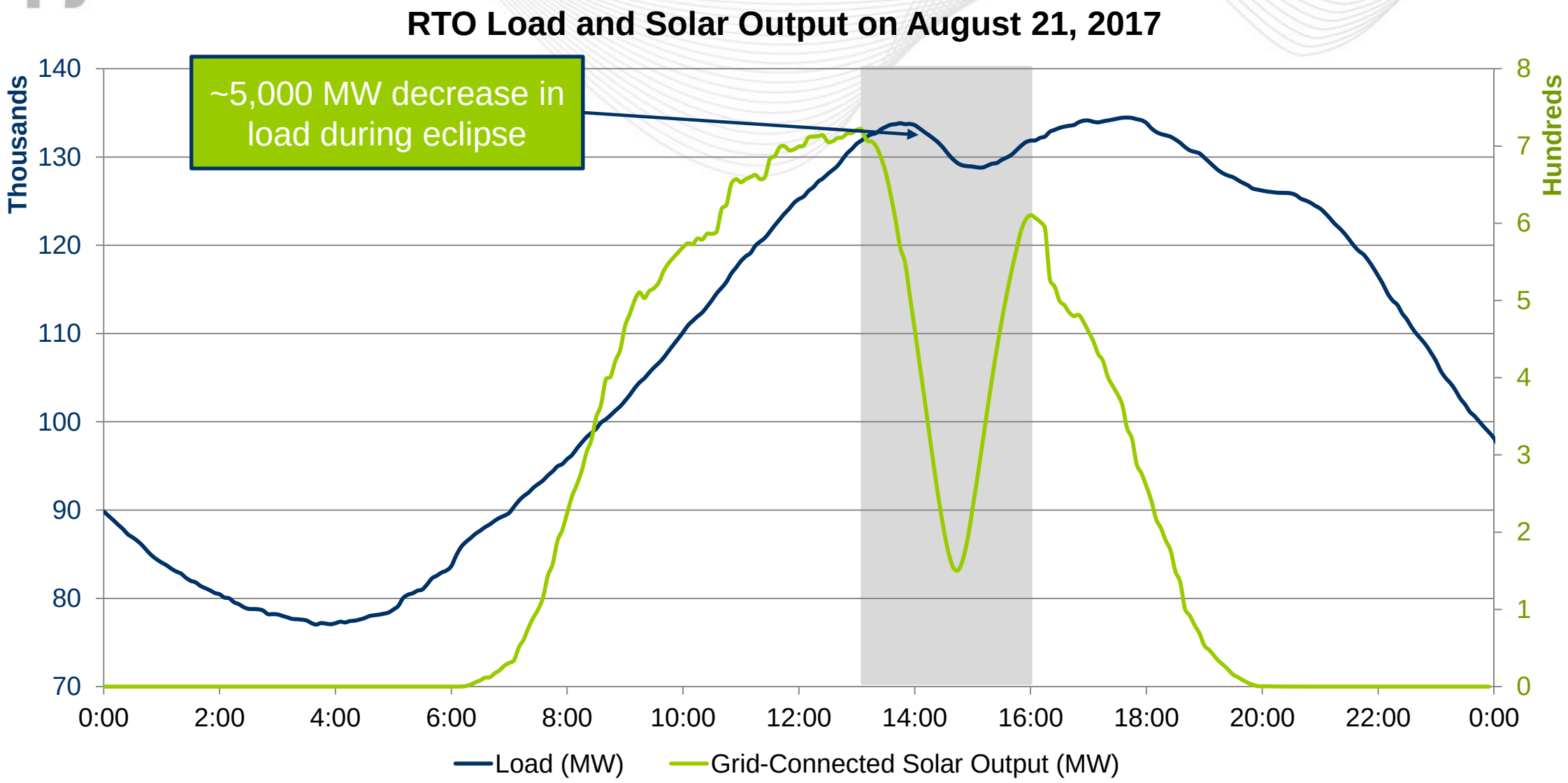


Source: Generator Attribute Tracking System, PJM Environmental Information Systems, 2016

Long-Term Forecast of Non-Wholesale Solar



Solar Eclipse



Incorporating Non-Wholesale Solar into Load Forecast

Three-part strategy

Build

Direct Model: include non-wholesale as model input

Reconstituted Load: forecast total power used

Error Correction: manually adjust load forecast

Test

Different seasons in testing period

Different forecast horizons

Three zones with loads most impacted by solar

Implement

Upgrade forecast applications

Train operators that make forecasts

Increase visibility of solar forecast data

Weather Data : Enhancements / Next Steps

- Increased integration with gas / electric coordination
- More lead time on significant events (e.g. extreme heat or cold)
- Increased granularity of weather data, both spatial and temporal
- Potential use of weather data in new ways
  - Direct input to 5-minute forecast
  - Generator performance / Fuel security analysis
  - Application of weather ensemble concepts to load forecasting

PJM's Control Room