Impacts From Smoke on Solar Generation and Load in PJM Interconnection's RTO in Summer of 2023

Marcus Smith

Lead Engineer – Load Forecasting

PJM Interconnection

AMS 2024

January 30, 2024

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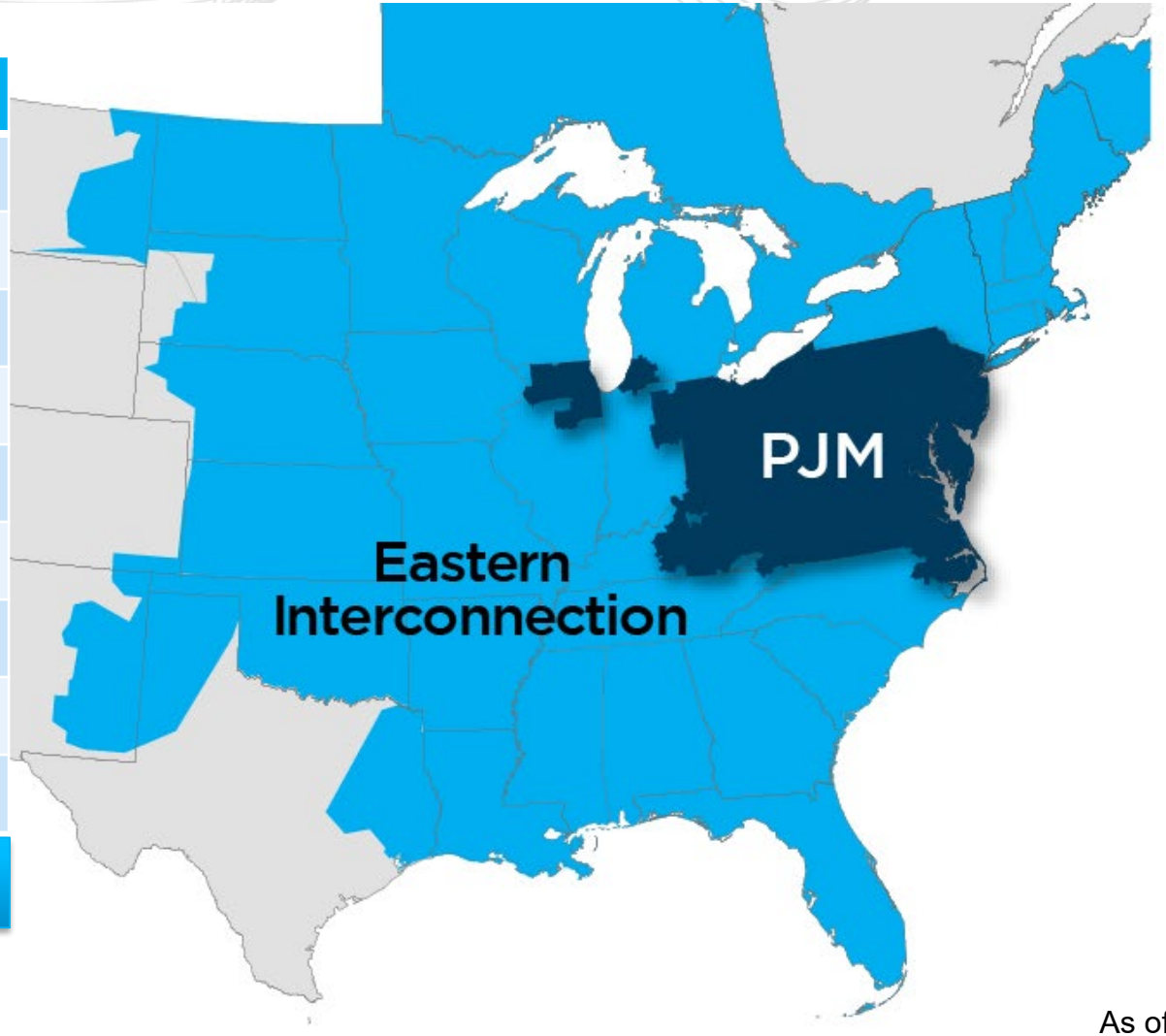
PJM as Part of the Eastern Interconnection

Key Statistics	
Member companies	1,110+
Millions of people served	65+
Peak load in megawatts	165,563
Megawatts of generating capacity	183,254
Miles of transmission lines	88,115
Gigawatt hours of annual energy	795
Generation sources	1,419
Square miles of territory	368,906
States served	13 + DC

21% of U.S. GDP produced in PJM



As of 2/2023

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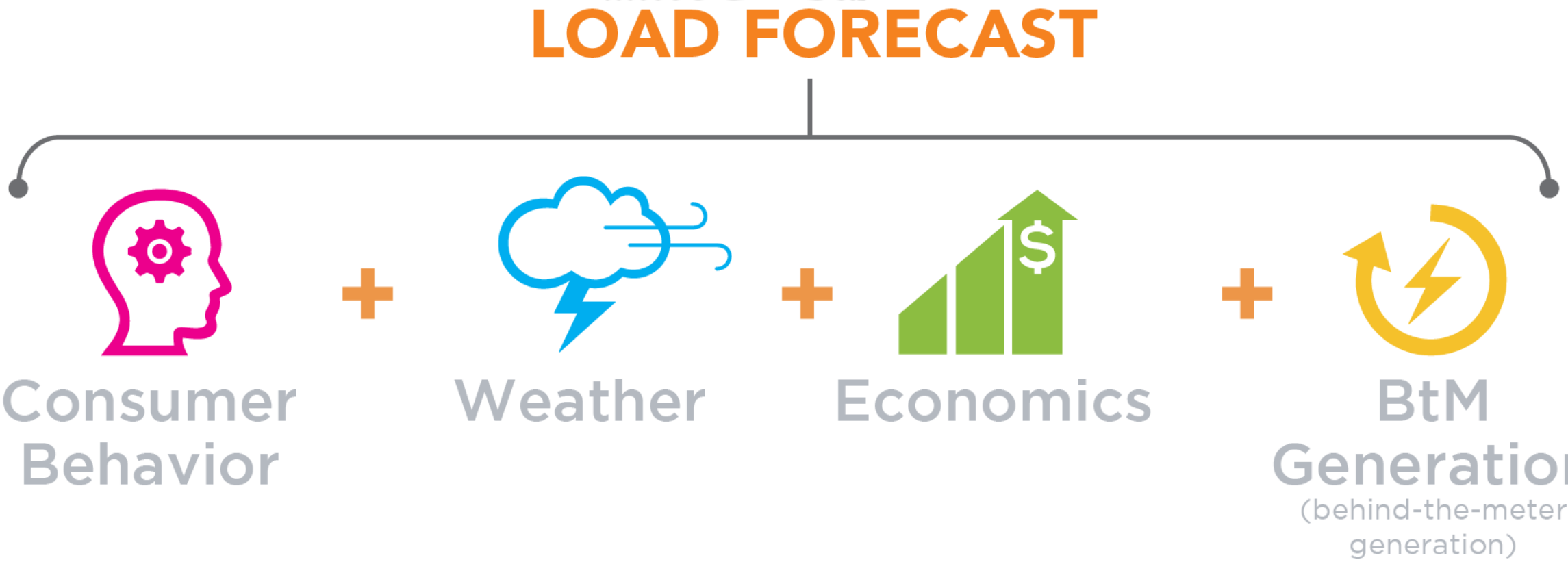
Load Forecast



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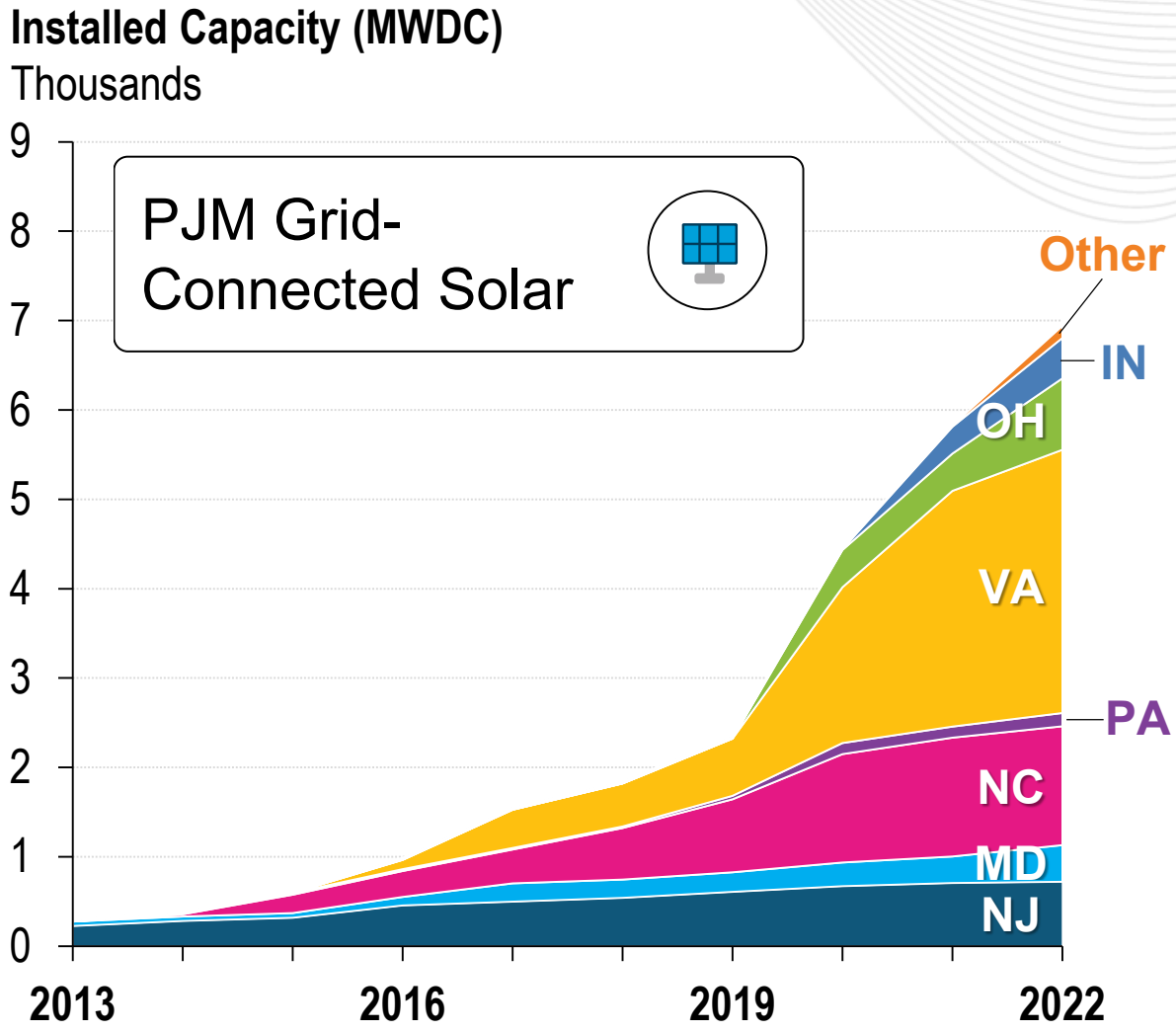
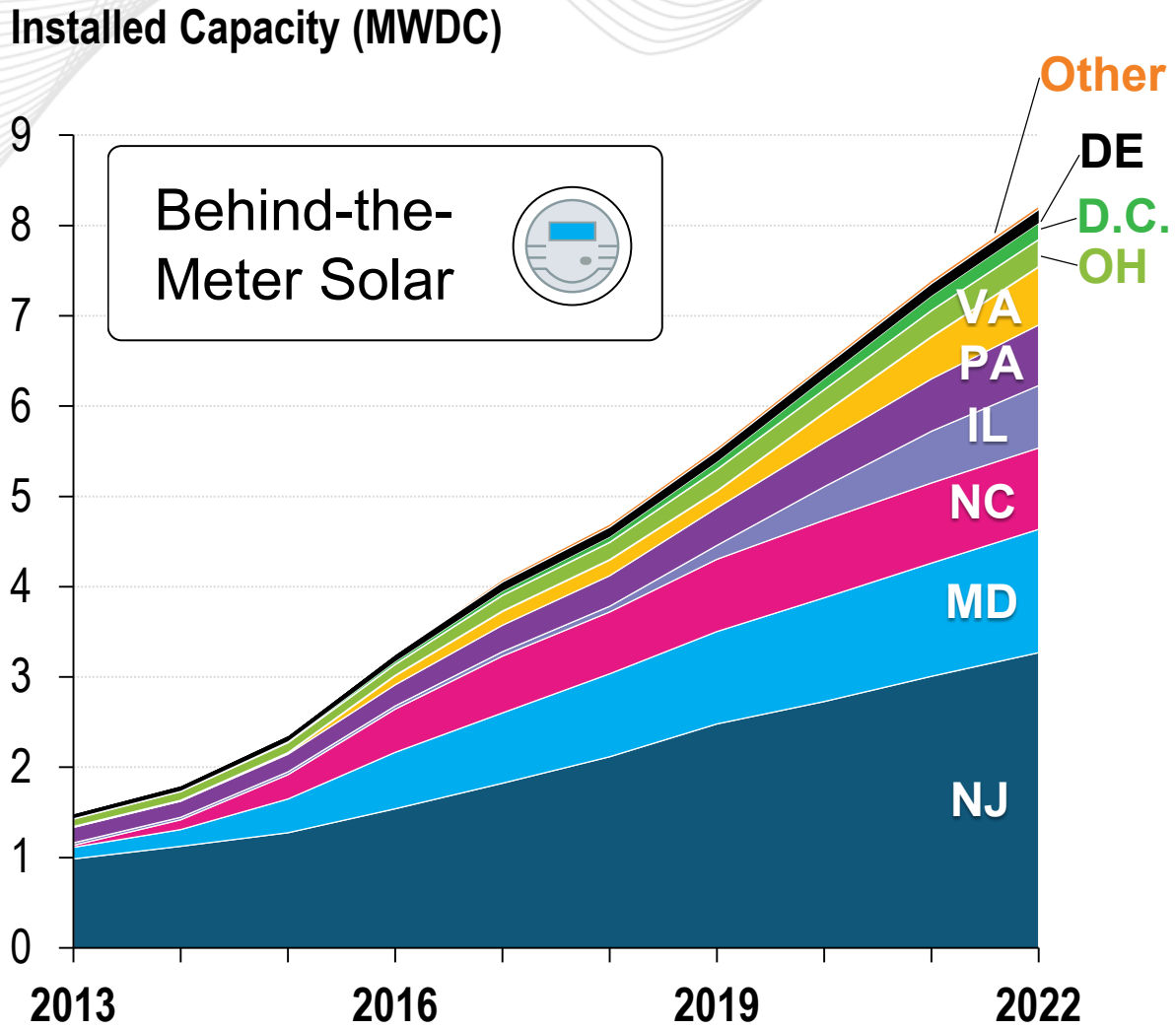
Ten Years of Renewable Growth in PJM





As of April 2023 | Source: GATS

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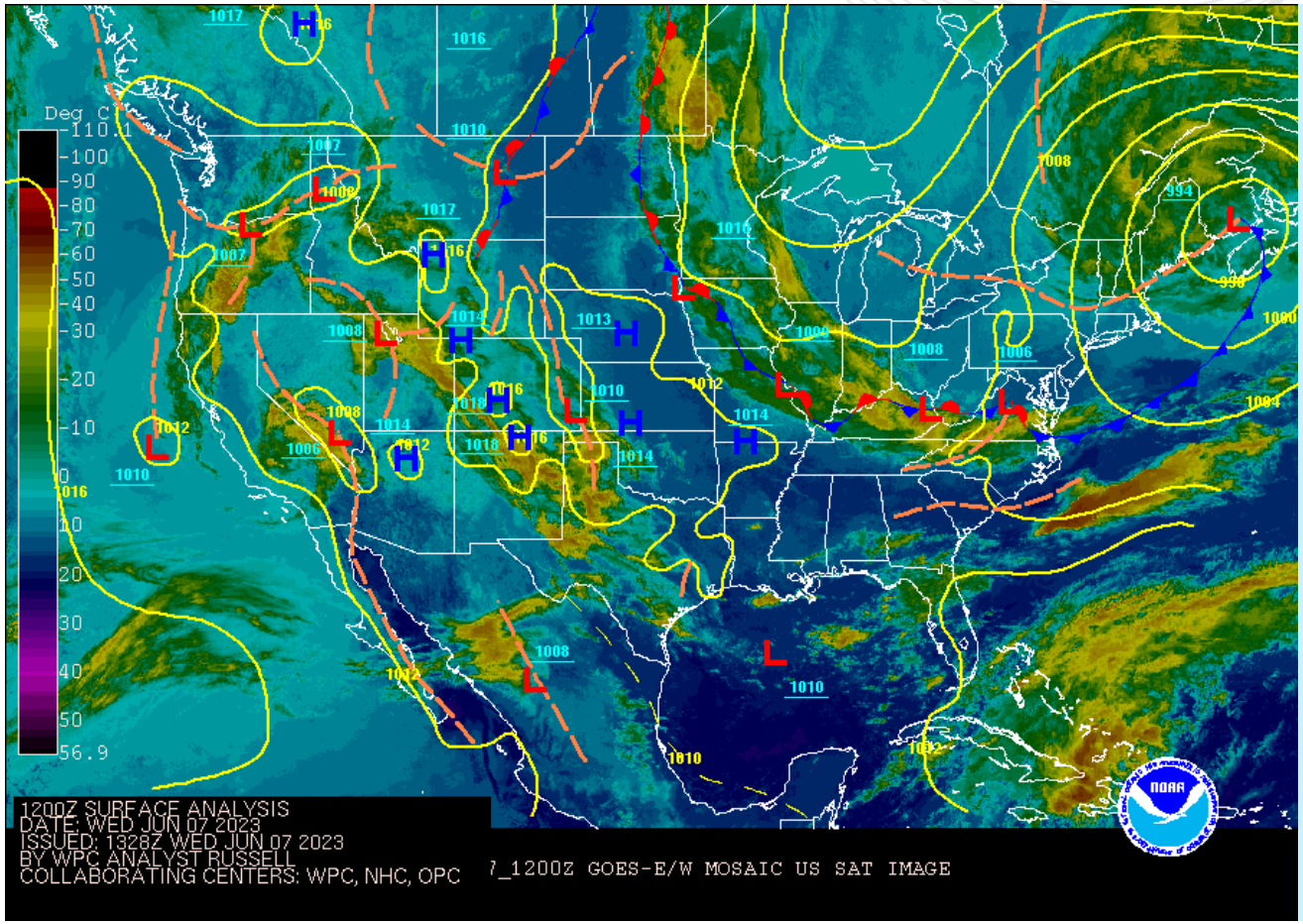
Smoky Days in Summer of 2023



Smoke Event June 5–11, 2023

- Closed/cut off low in Canadian Maritimes drove smoke south from Quebec.
- Event led to unhealthy air quality and sharply reduced visibility.
- Many load centers reported smoke/haze, which helped cool temperatures causing a reduction in load.
- Solar generation metered and behind the meter was depressed.

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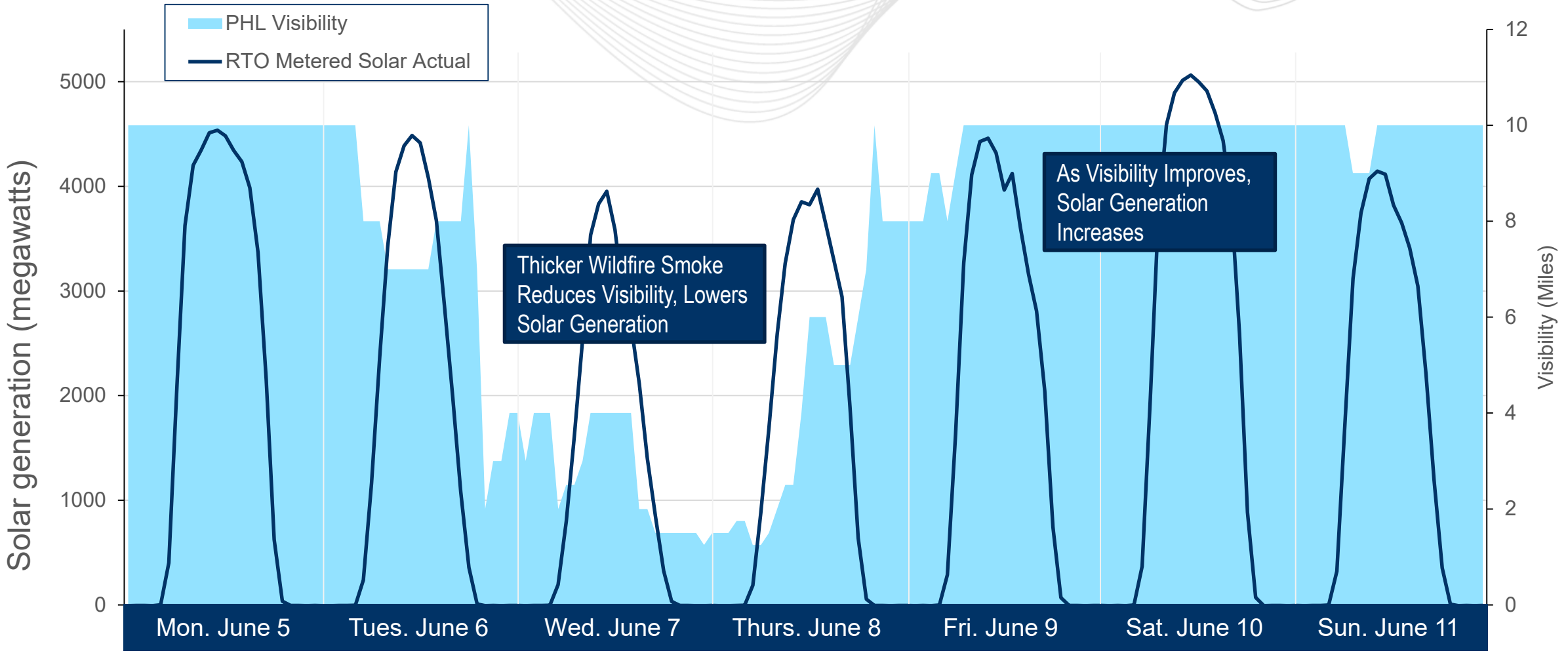
Solar Generation Output in PJM RTO & Visibility in Philadelphia (PHL) June 5–11, 2023



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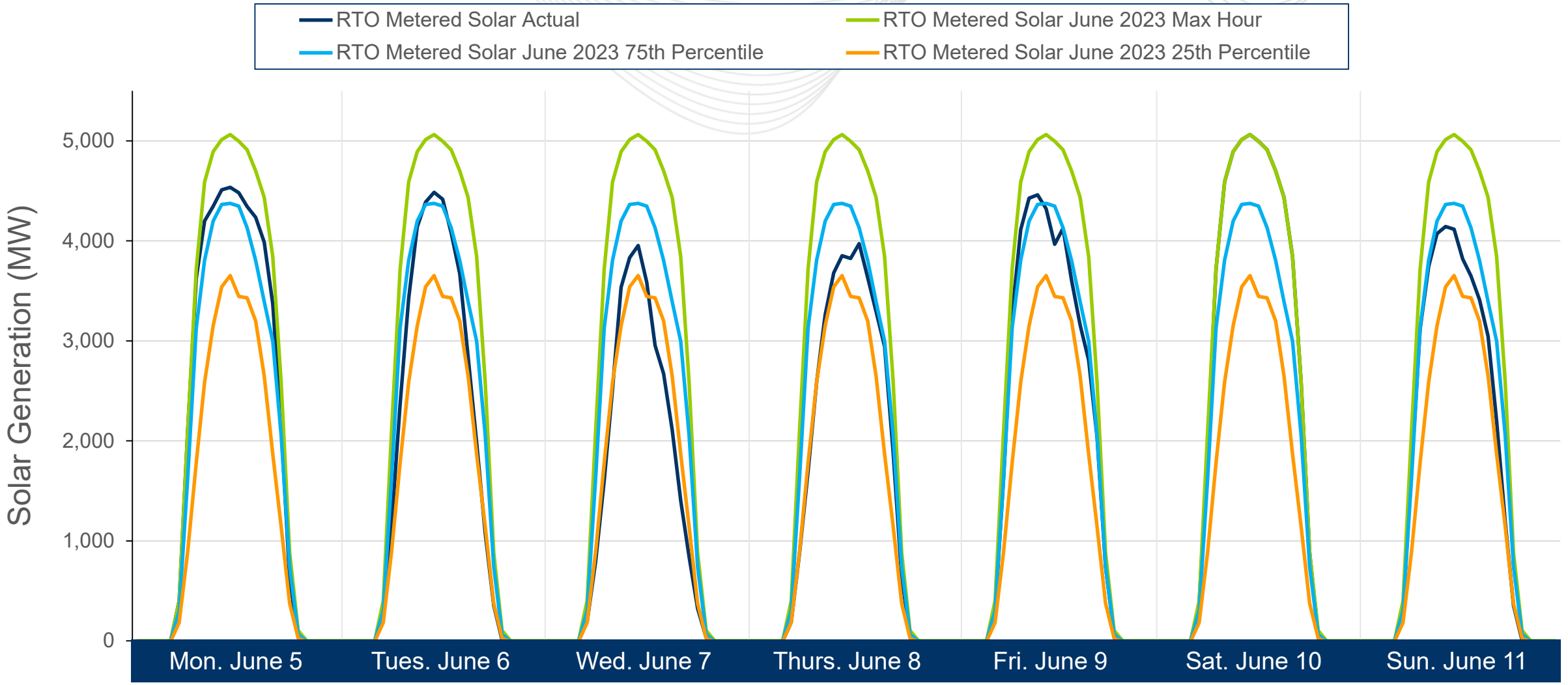
PJM RTO Metered Solar Actuals and Comparisons June 5–11, 2023



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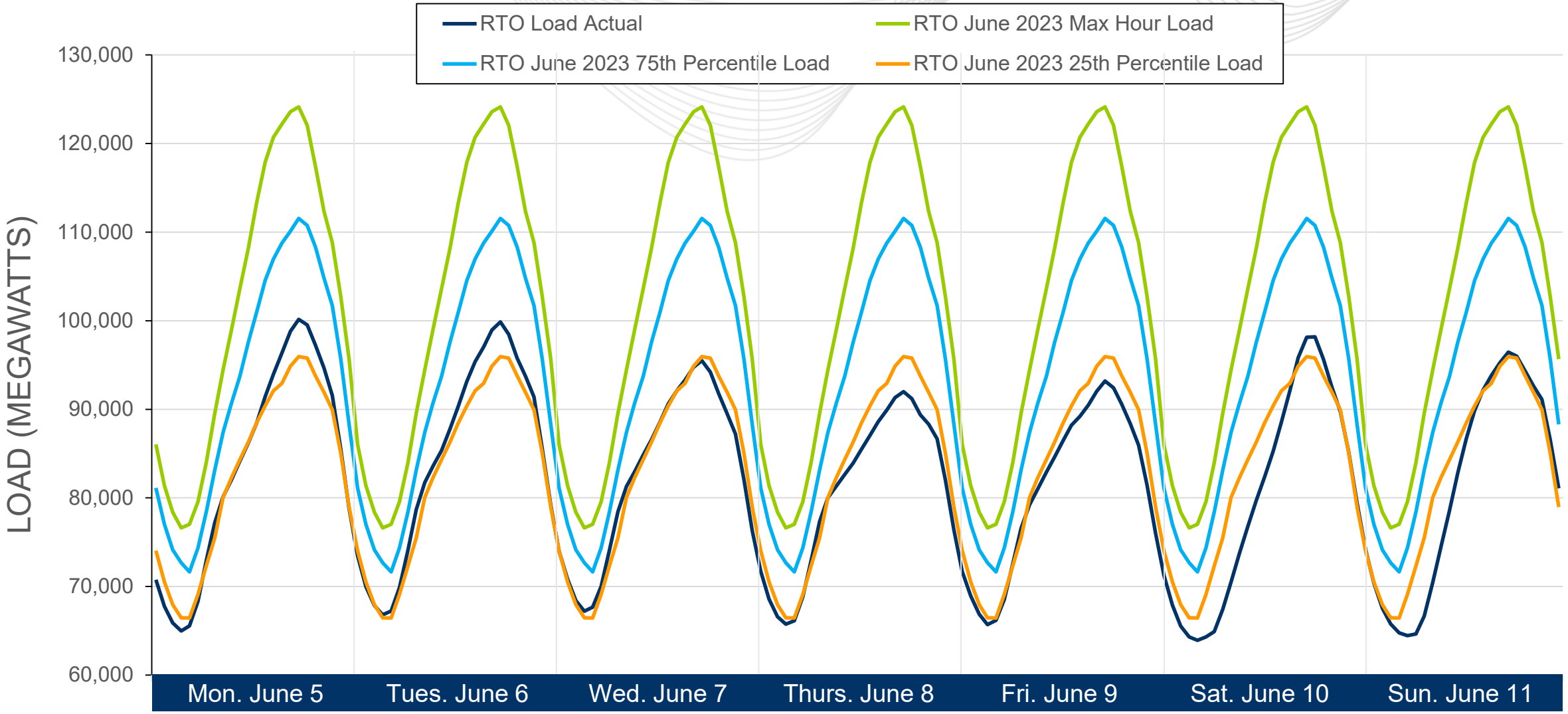
PJM RTO Load Actuals and Comparisons June 5–11, 2023



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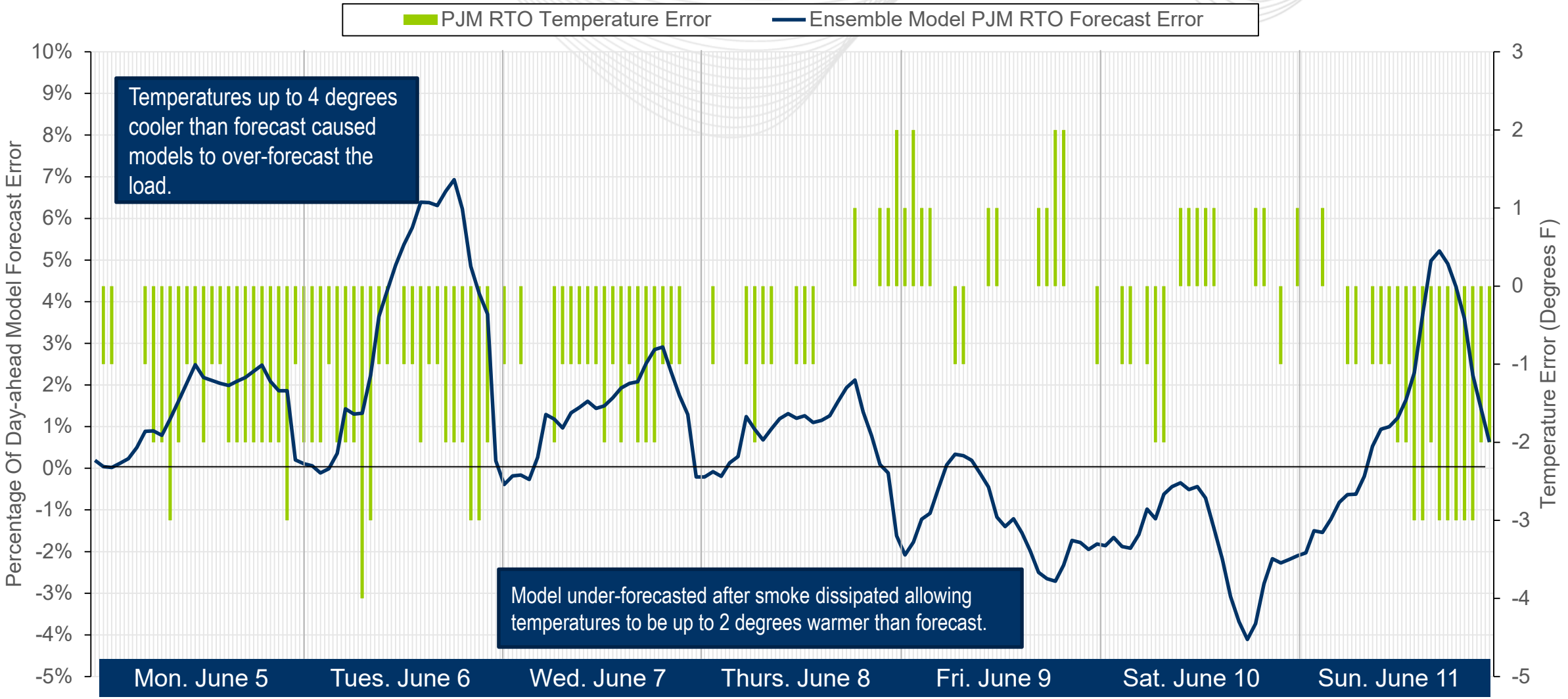
PJM RTO Day-Ahead Model Forecast Error & Temperature Error
June 5–11, 2023



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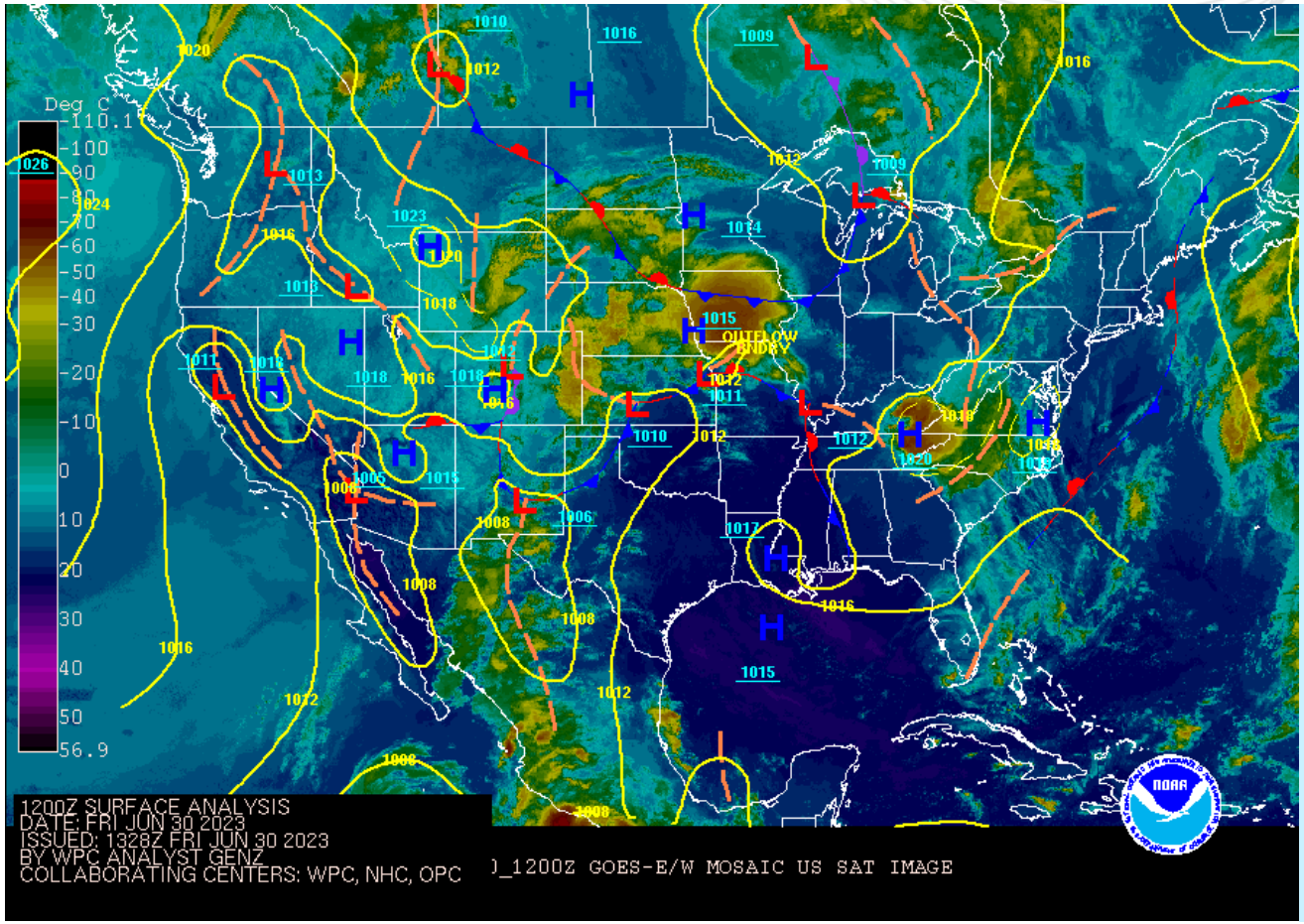
Smoky Days in Summer of 2023



Smoke Event
June 26–July 1, 2023

- Slow-moving low pressure in northern Ontario with confluent upper flow drove smoke from Ontario and western Canada
- More of the RTO affected by smoke, thickest in the Western Region
- Smoke not as thick in the eastern regions as previous event earlier in June

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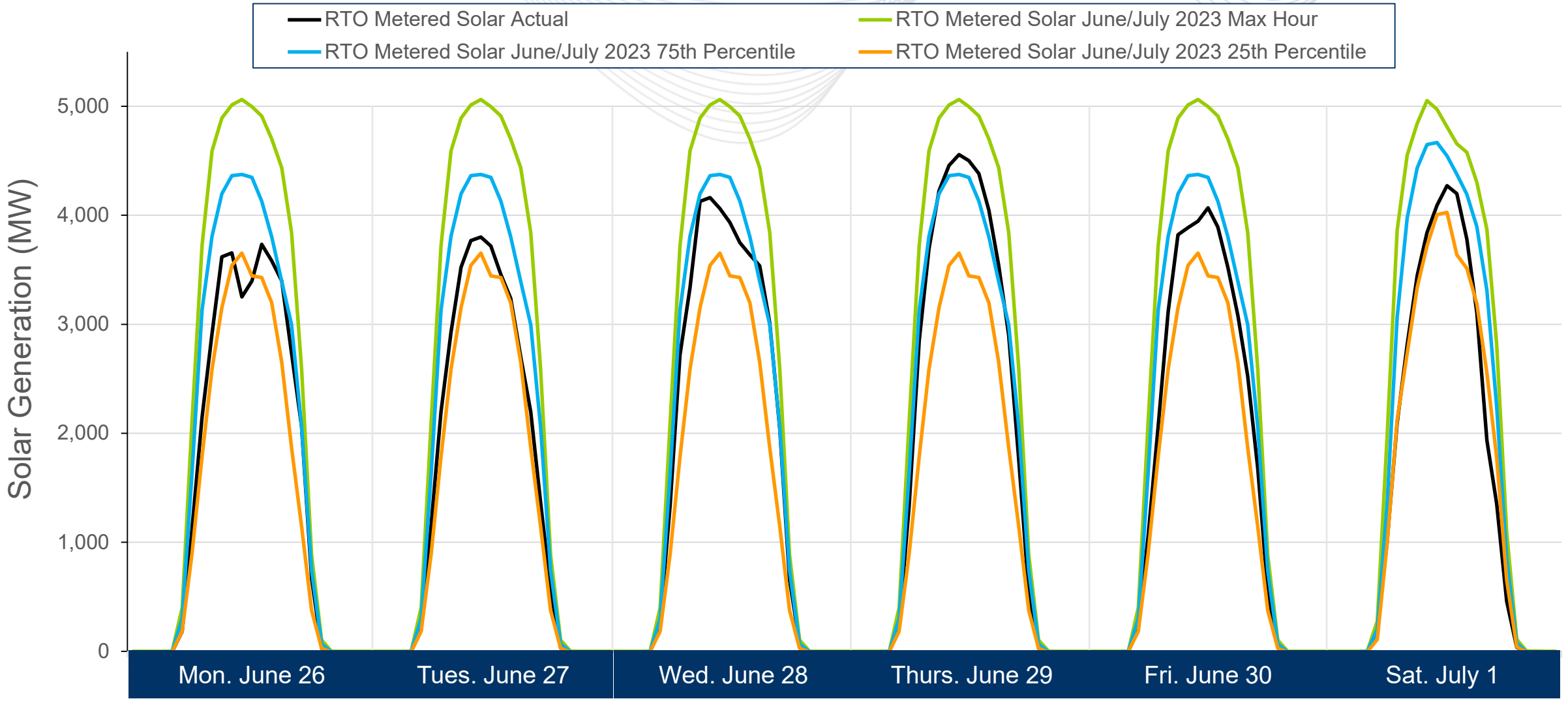
PJM RTO Metered Solar Actuals and Comparisons June 26–July 1, 2023



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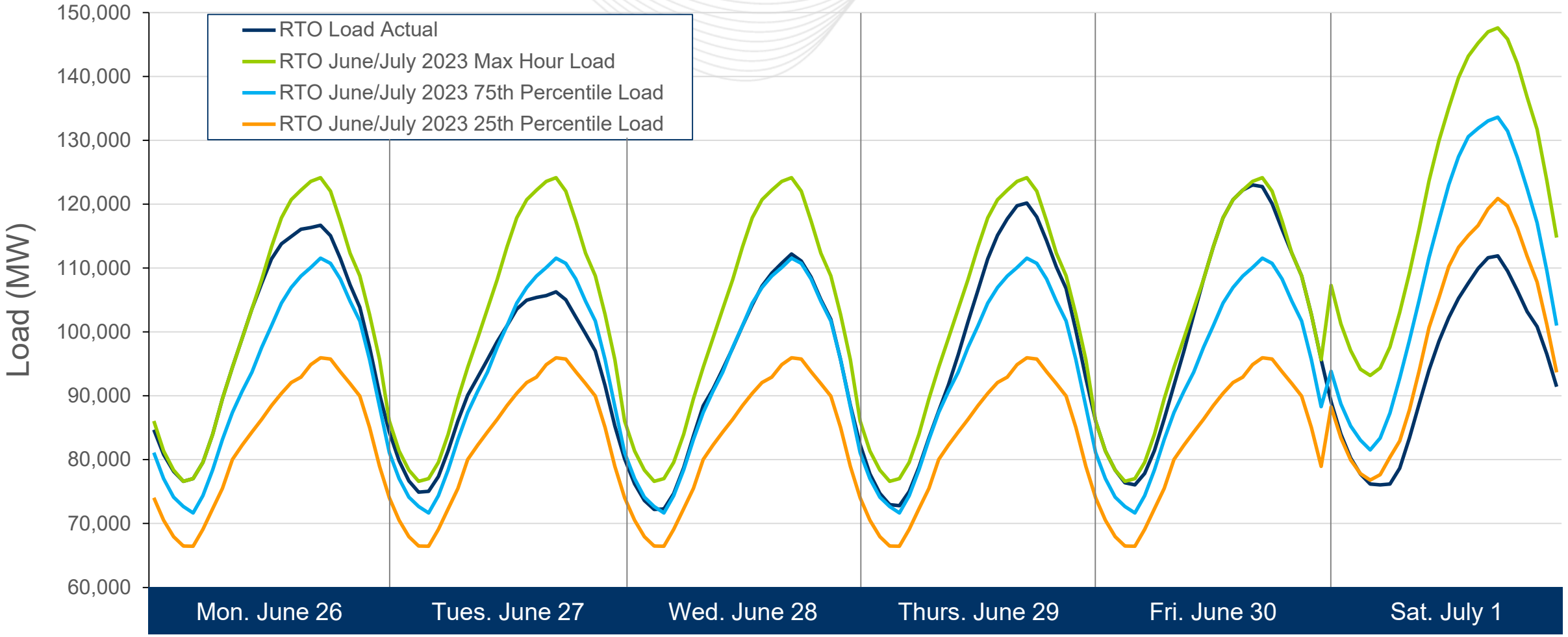
PJM RTO Load Actuals and Comparisons June 26–July 1, 2023



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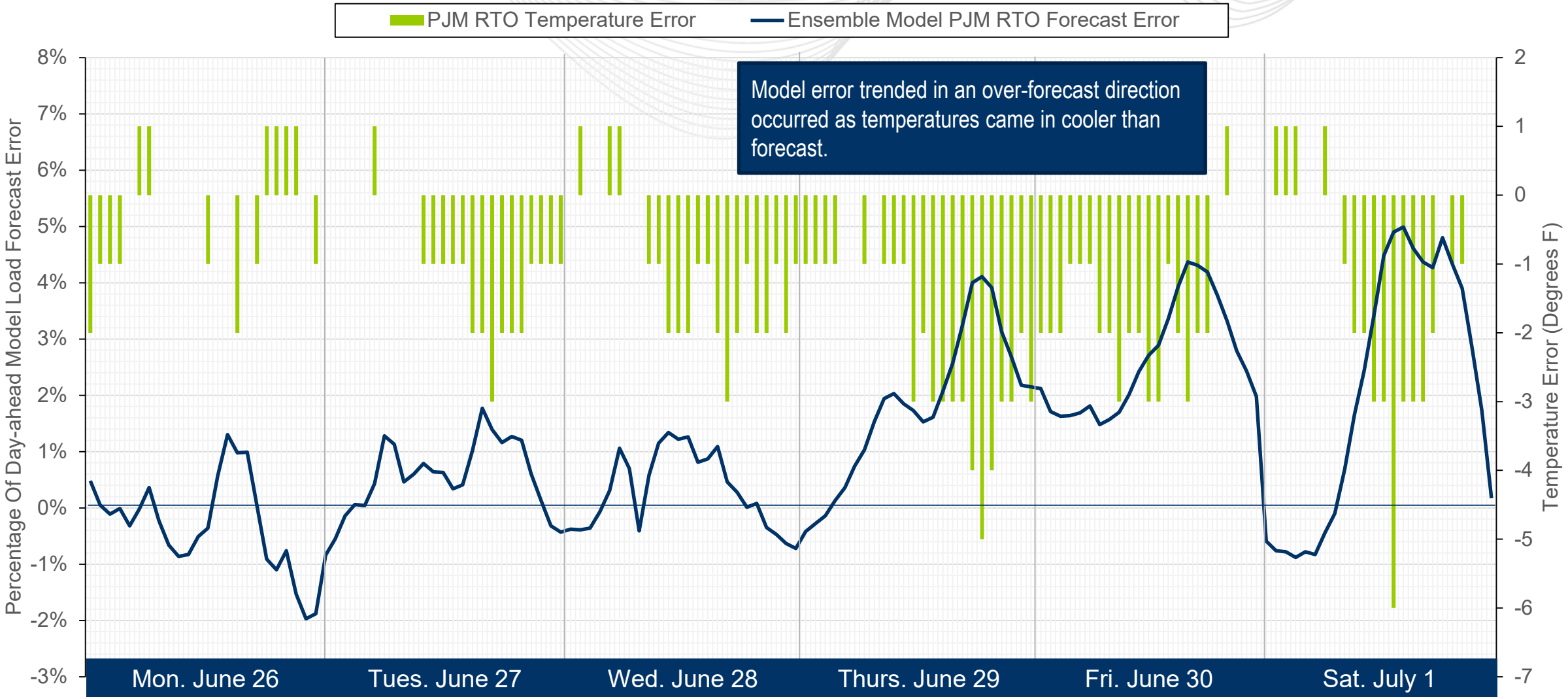
PJM RTO Day-Ahead Load Forecast Error & Temperature Error
June 26–July 1, 2023



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Takeaways

Loads reduced as temperatures came in cooler than forecast due to more sky obscuration from wildfire smoke.

Solar generation reduced the most during thickest smoke concentrations.

Solar generation was between 25th and 75th percentile during higher smoke concentrations in the eastern regions in first smoke event.

Solar generation decreased near/below 25th percentile during higher smoke concentrations (with higher RTO coverage) in second smoke event.

Loads near/below 25th percentile during most of first smoke event but near 75th percentile in second smoke event.

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Contact

Marcus Smith,
Marcus.Smith@pjm.com

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