



California ISO

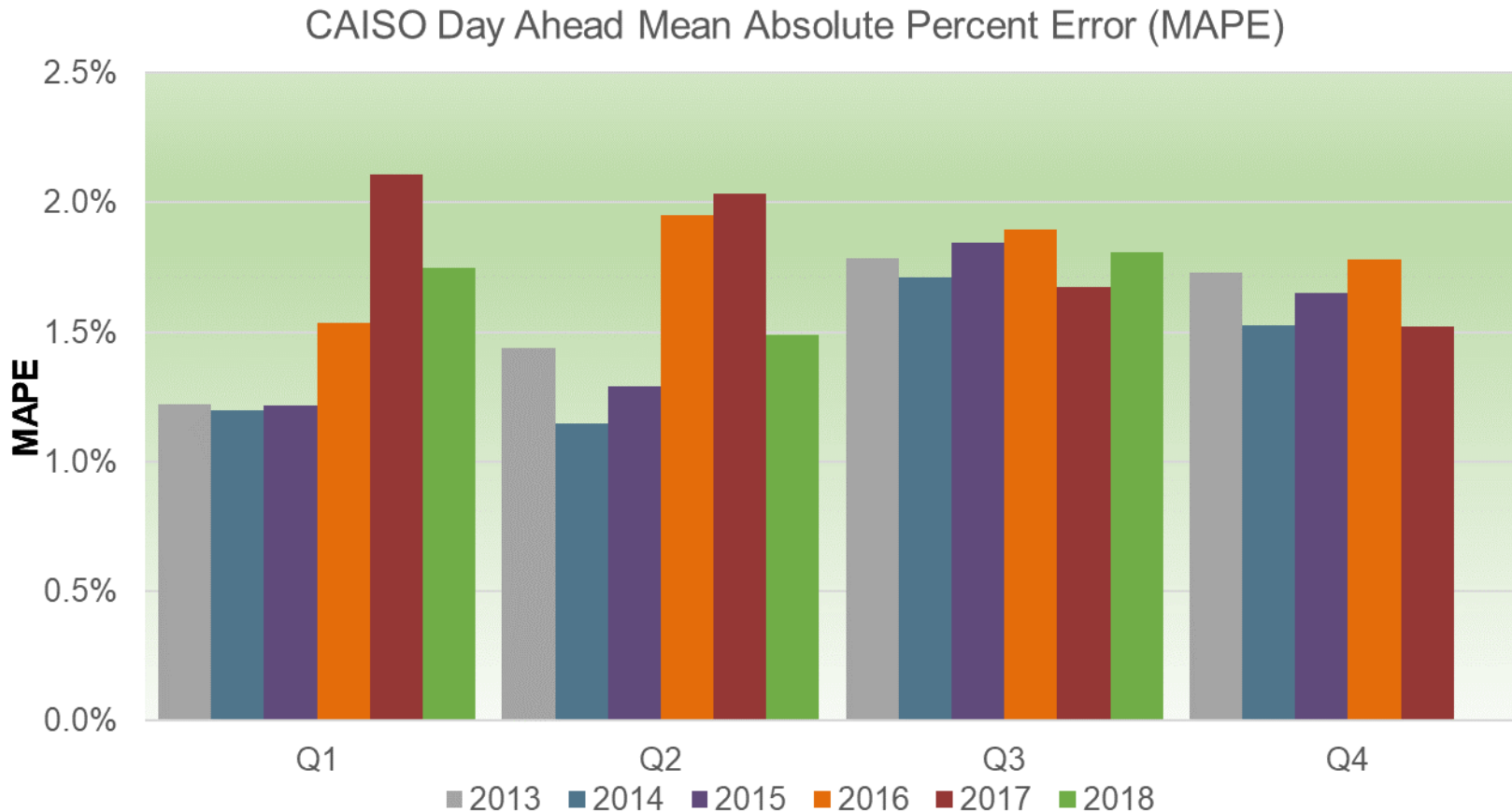
# Impact of BTM on Load Forecasting in CAISO

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Short Term Forecasting

# Load forecast accuracy trend

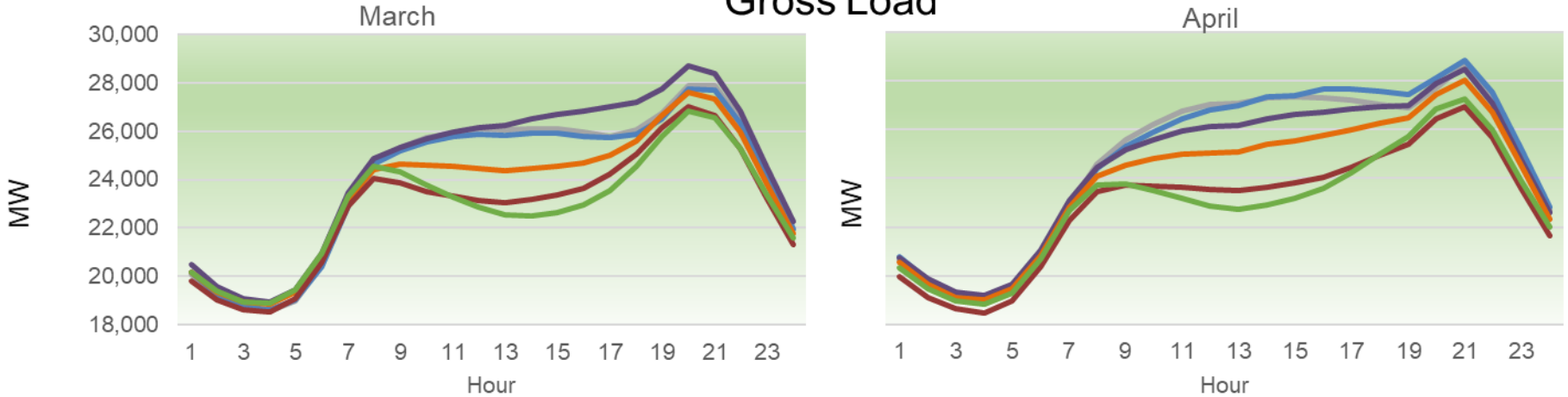


## Analysis of load forecast error looked at the following:

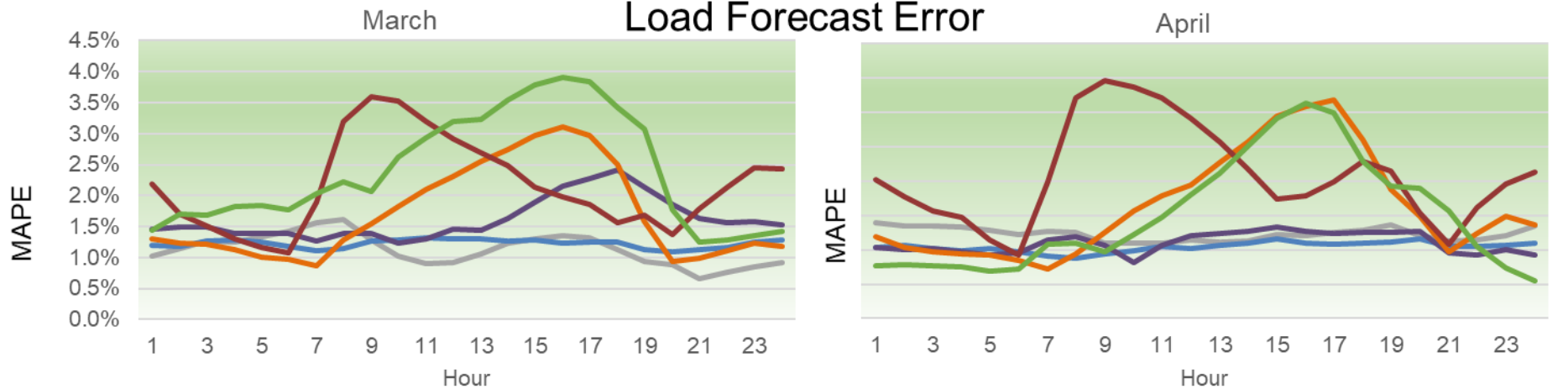
- Effect of behind the meter resource production
- Underlying temperature / weather forecast
- Regional forecast granularity / micro climate effects
- Machine learning model tuning parameter
- Manual adjustments

# Hourly error increases in middle of day due to effects of increasing behind the meter production on mid-day load.

## Gross Load



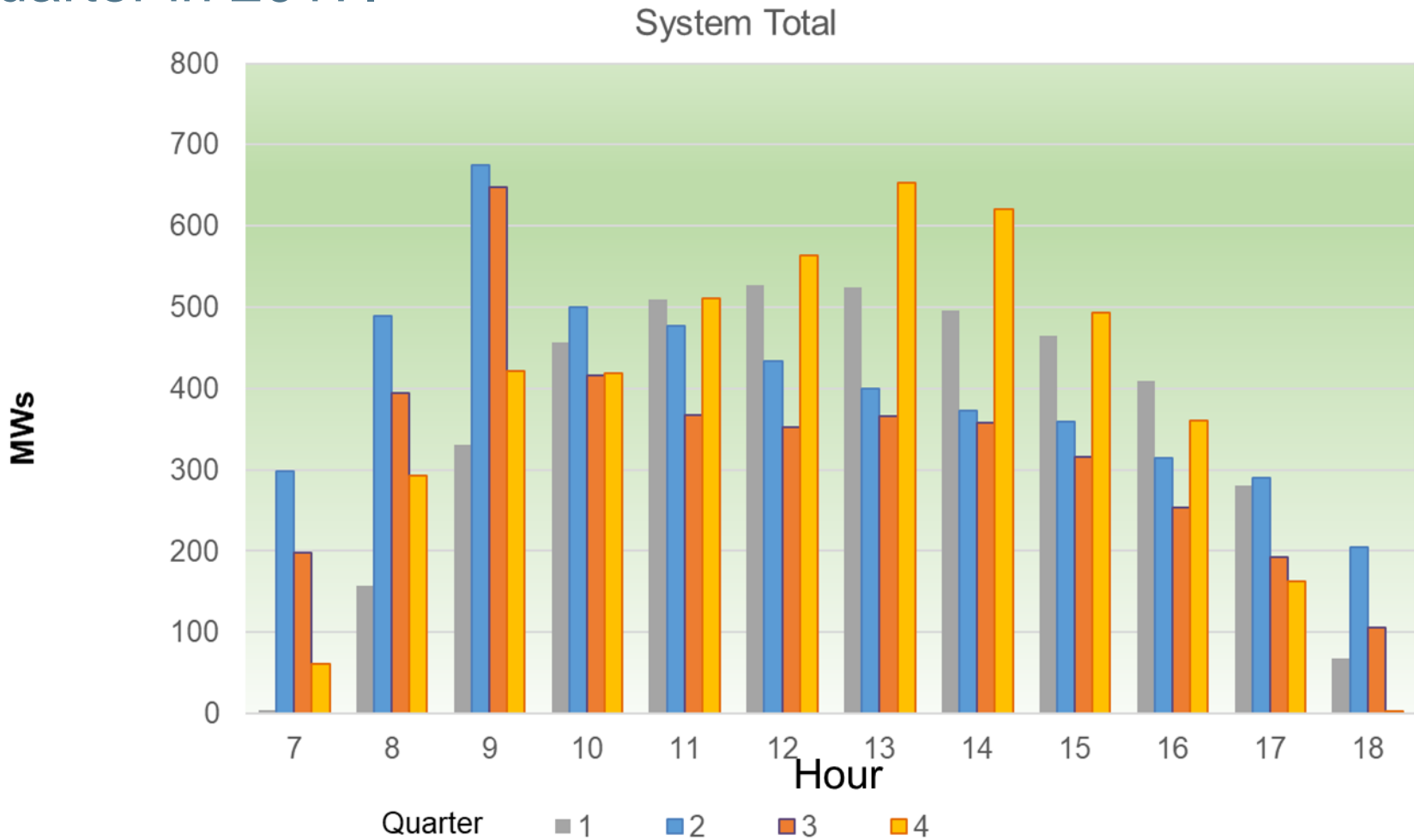
## Load Forecast Error



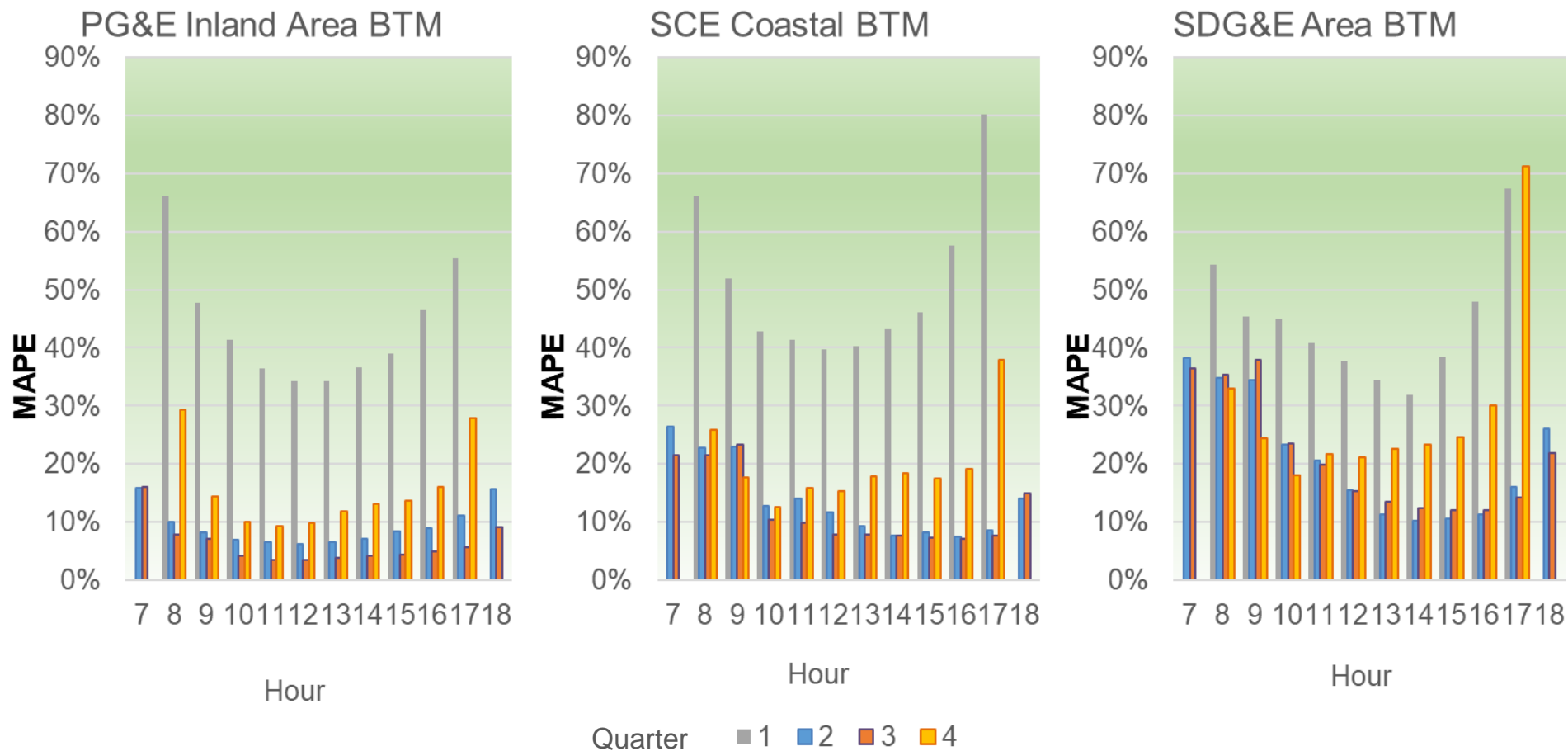
— 2013 — 2014 — 2015 — 2016 — 2017 — 2018

— 2013 — 2014 — 2015 — 2016 — 2017 — 2018

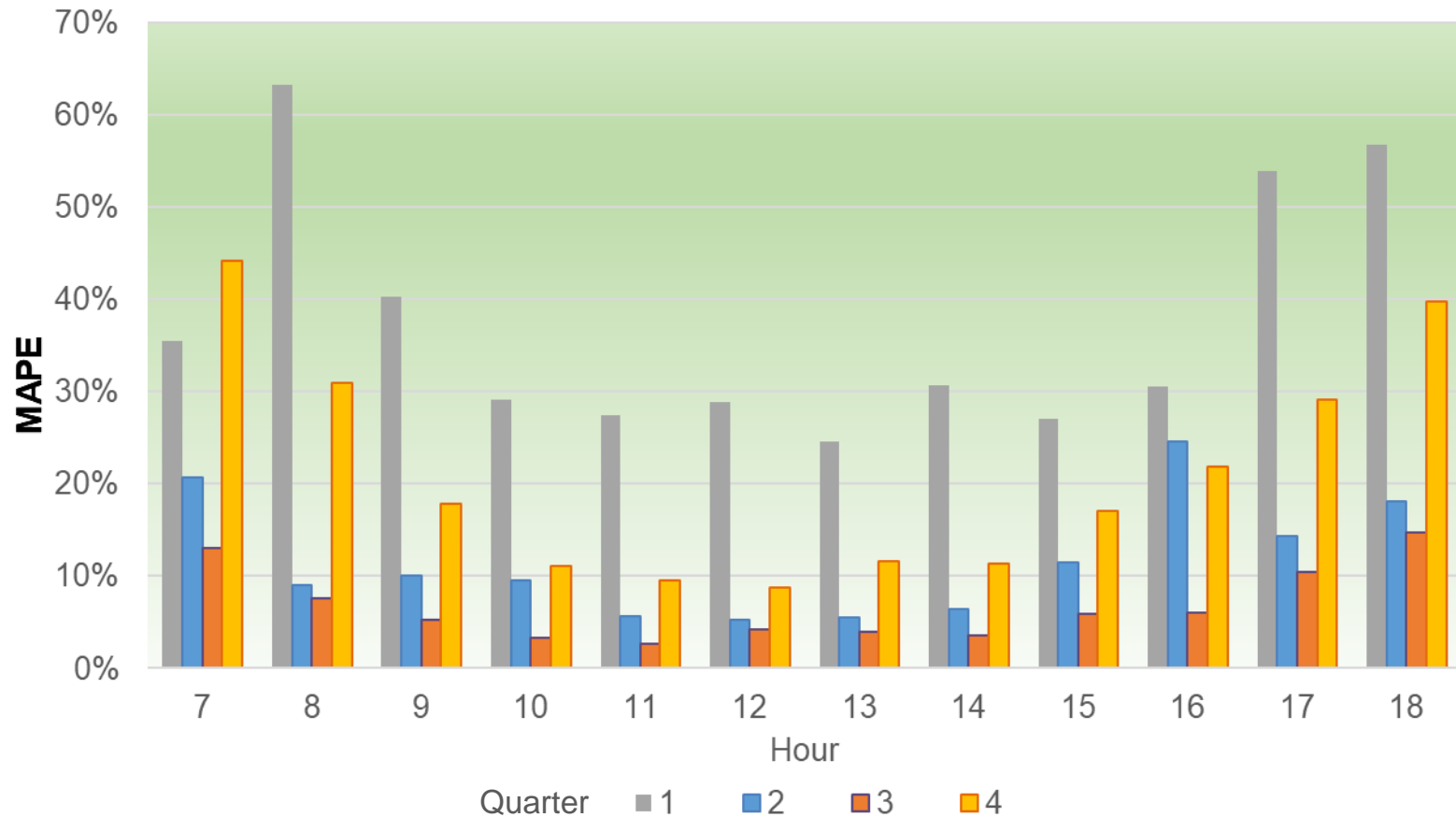
# Average MW behind the meter error varies significantly by Quarter in 2017.



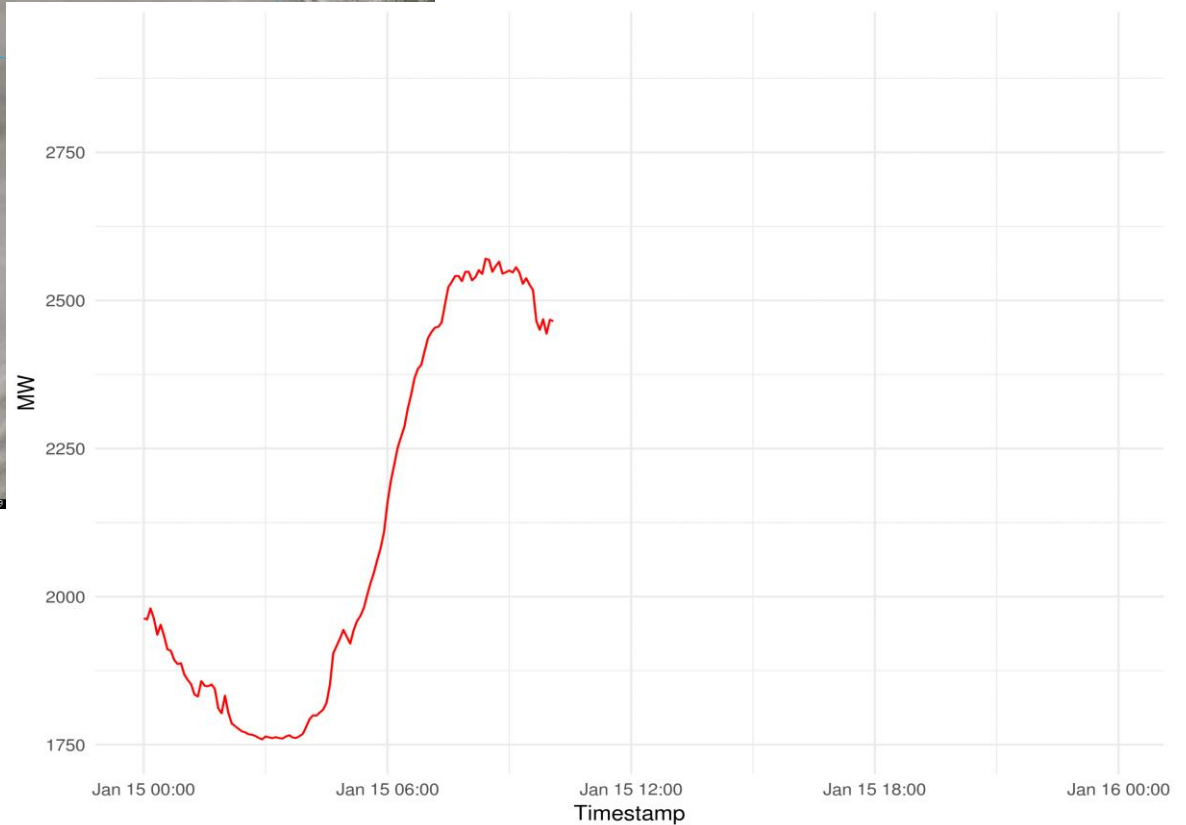
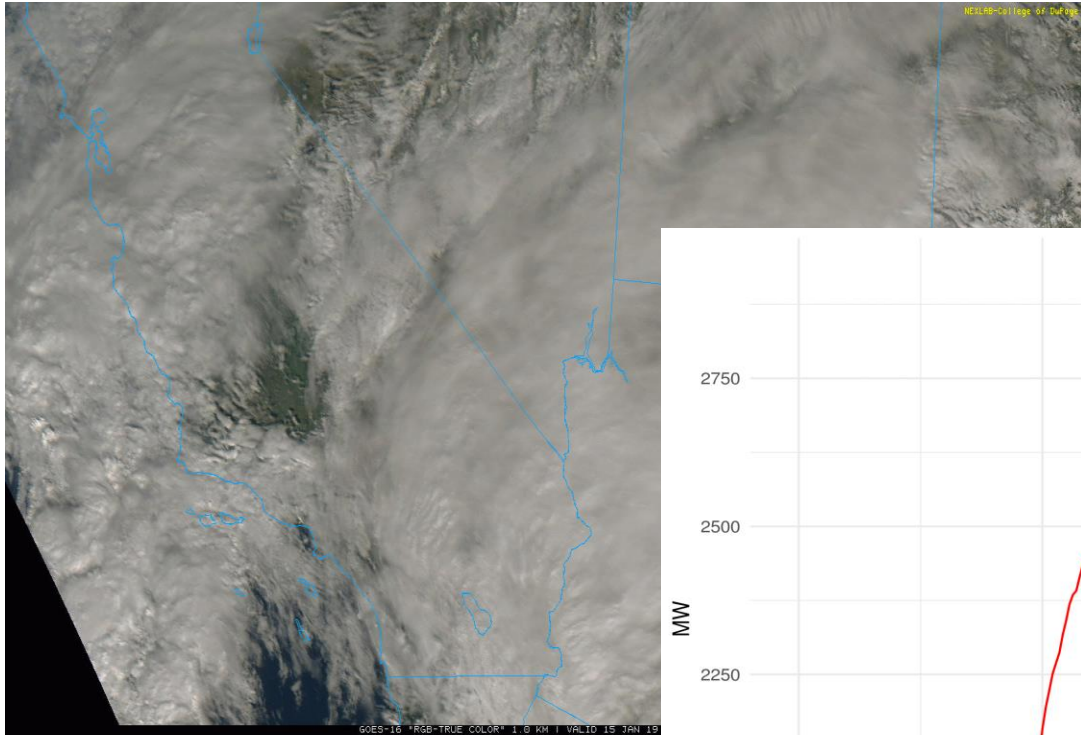
# During Q1, Q2, and Q4 ISO forecasts are driven by cloud cover



There is a difference between ground measured irradiance and satellite interpolated actuals in 2017.



# Enhancing Load Forecasting to account for Behind-the-Meter Solar Penetration





## Conclusion of analysis

- Load forecast accuracy is most impacted by cloud cover variability effects on 7,000MW of behind-the-meter capacity during Q1, Q2, and Q4.
- New forecast techniques are needed to support the magnitude and changes to behind-the-meter resource capacity.
- Improved visibility into the actual aggregate behind-the-meter production is needed to improve calibration of forecast models

# Work plan of next steps

Task	Estimated Schedule
Regional Breakout	End of 2018
Incorporate Behind the Meter Actuals	June 30, 2019
Re-assess BTM Forecast Provider	June 30, 2019
Modeling Environment	TBD; working with IT
Multiple Models	TBD; working with IT
Appropriate Blending Options	TBD; working with Vendor
Probabilistic Forecasting	TBD working with DOE Sponsored Research Project
Develop new forecasting approaches	Continuously researching best practices & new techniques

# Thank you.

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