



**Data and tools for the the
solar powered future**

with Dr. Nick Engerer
Chief Technology Officer

10 June 2021

**ESIG Meteorology and
Market Design Workshop**

**Solar & Wind Nowcasting in
South Australia**

**Engaging an unsolved
problem in renewable
energy forecasting over
short-term horizons**

Context: Who is Solcast?

Trusted by:



台灣電力公司
Taiwan Power Company



AccuWeather



First Solar®

NEOEN



AEMO
AUSTRALIAN ENERGY MARKET OPERATOR

meteocontrol



PVTECH



Solar Industry®



T&DWorld™



Featured in:



Motivation: South Australia Renewables

- 20x large wind farms
- >2GW of solar, more than half of which is rooftop scale
- Operational challenges on the +5min to +4 hours horizon
- Need to improve **situational awareness**

“Having an additional source of rapidly updating forecasts is helping AEMO identify risks and uncertainty to assist management of the power system in South Australia,”

*“One of the biggest challenges this project is helping to develop capability of, is the forecasting of the timing and magnitude of ramping events, **such as movement of large cloud banks over South Australia** which can quickly impact rooftop solar generation.”*

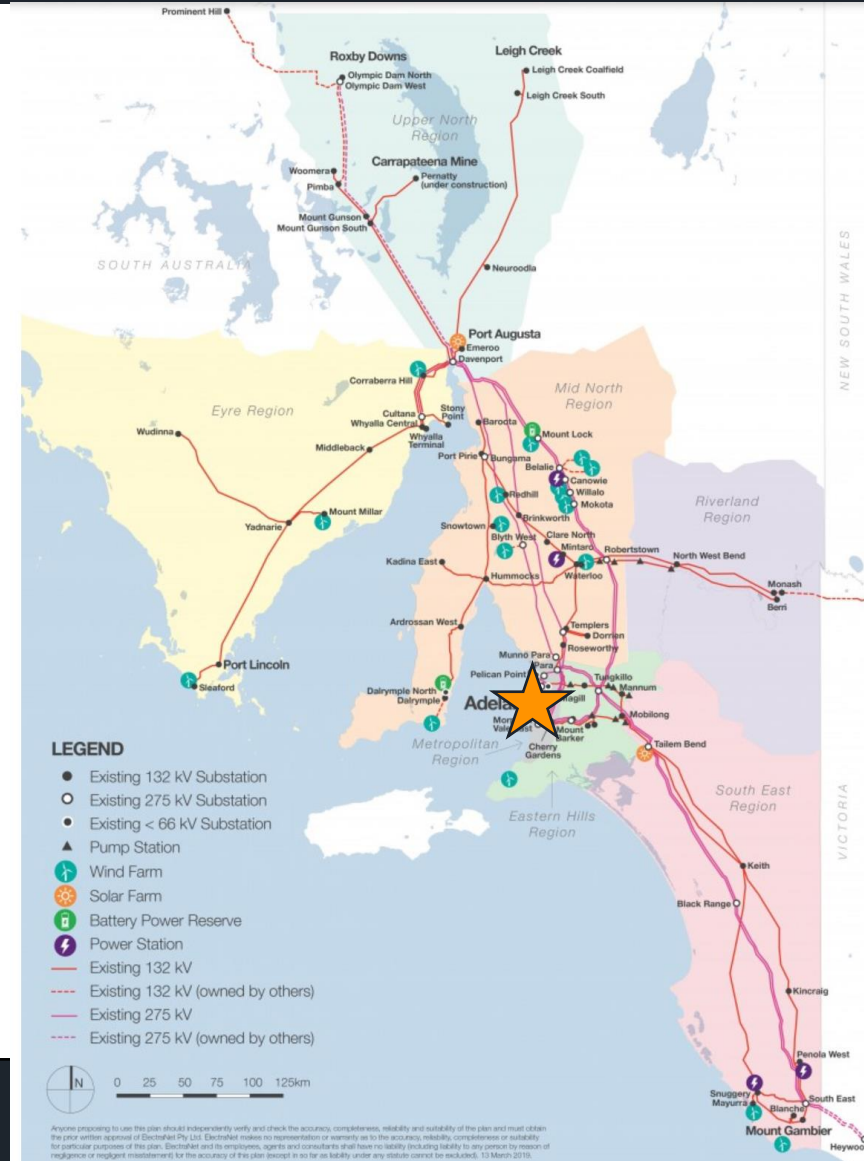
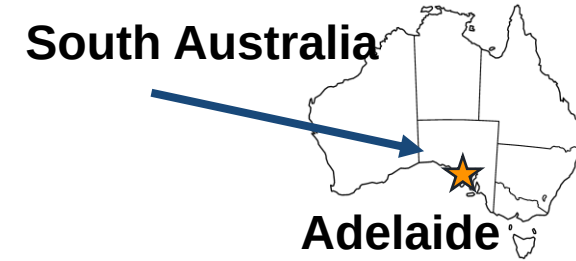
**AEMO Chief Operations Officer
Michael Gatt**

Context: High Penetration Renewables, Network Challenges

2x interconnectors

Nat. gas plants, no
'baseload' coal

Majority of wind
relatively
concentrated



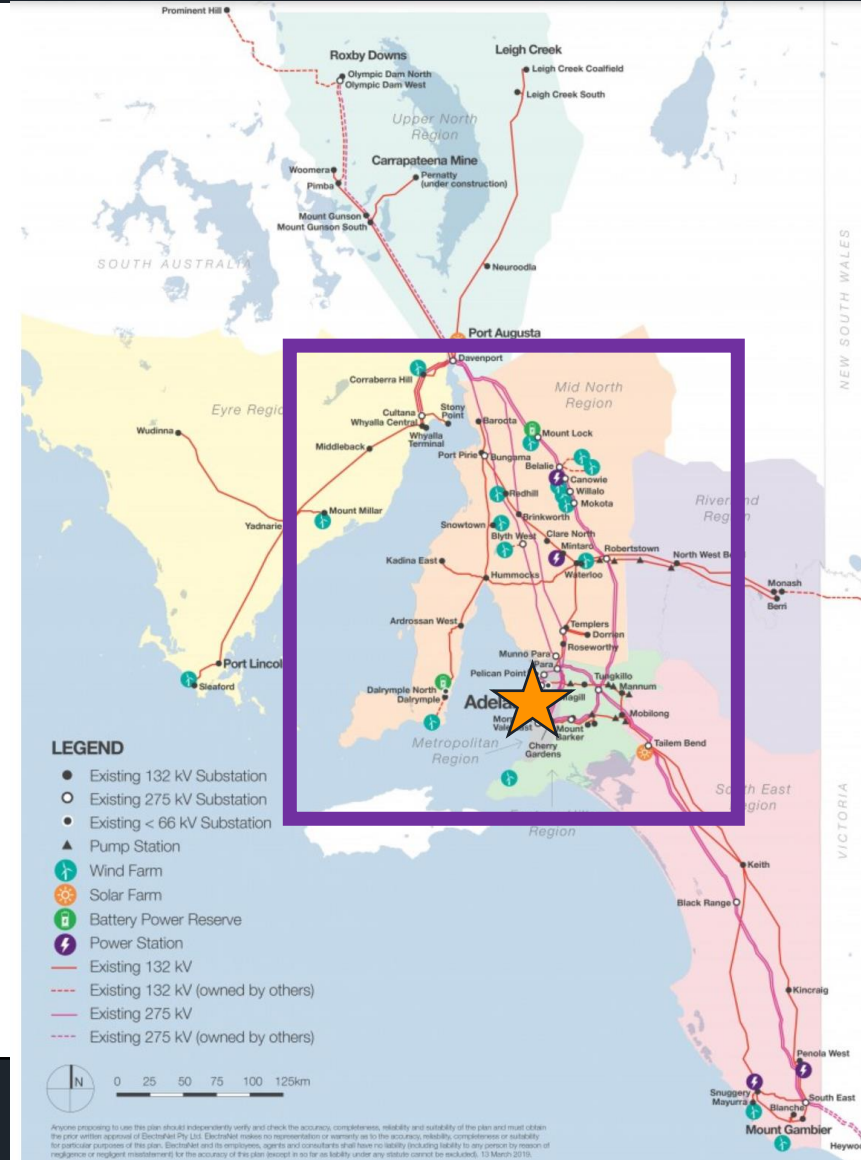
Credit: ElectraNet

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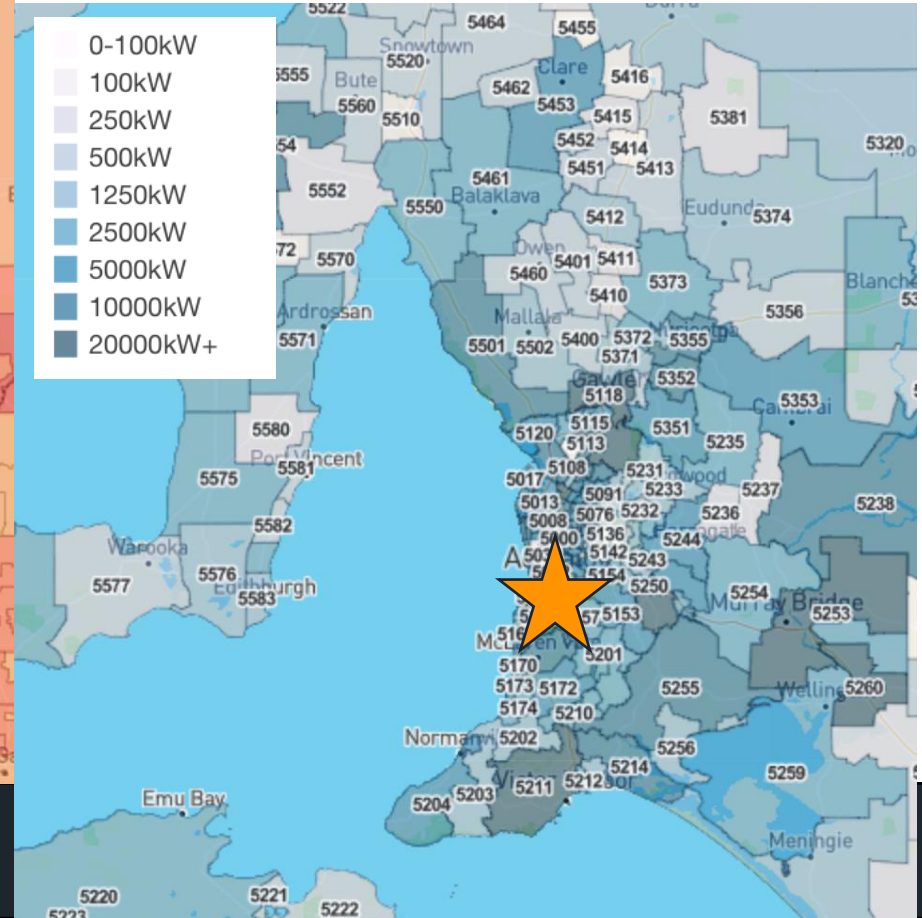
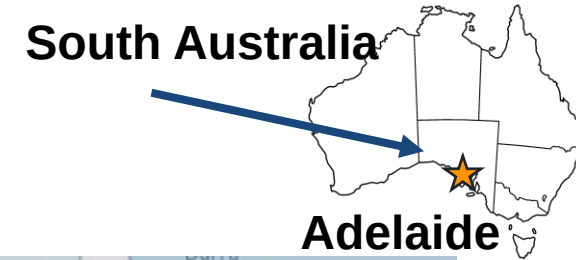
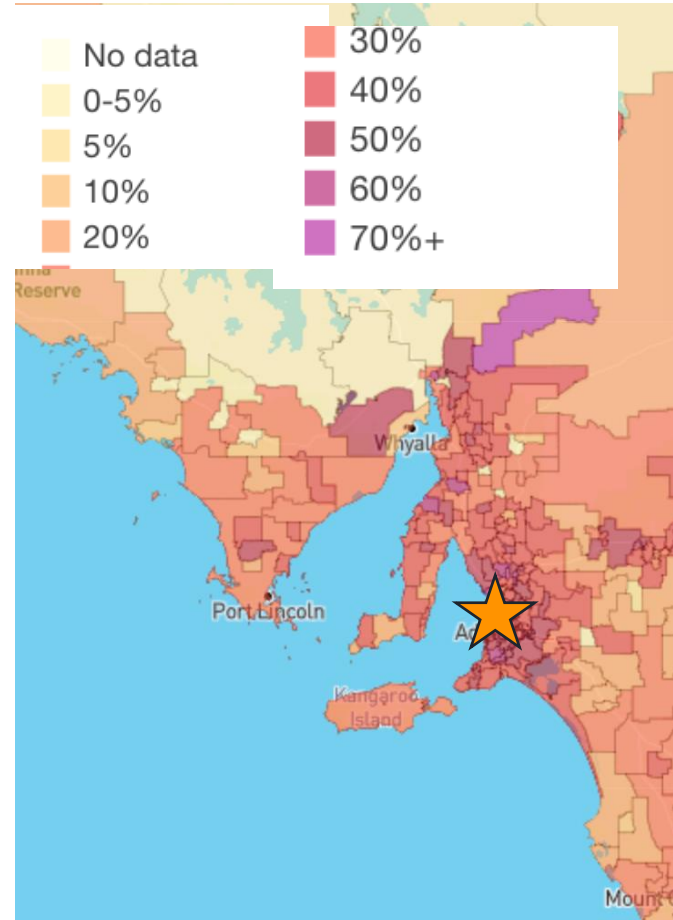


Context: High Penetration of Rooftop Solar in Australia

Rooftop Solar

- 1.16GW of $<10\text{kW}_p$ installations
- 979MW of $>100\text{kW}_p$
- Penetrations as high as $>70\%$ in some regions!

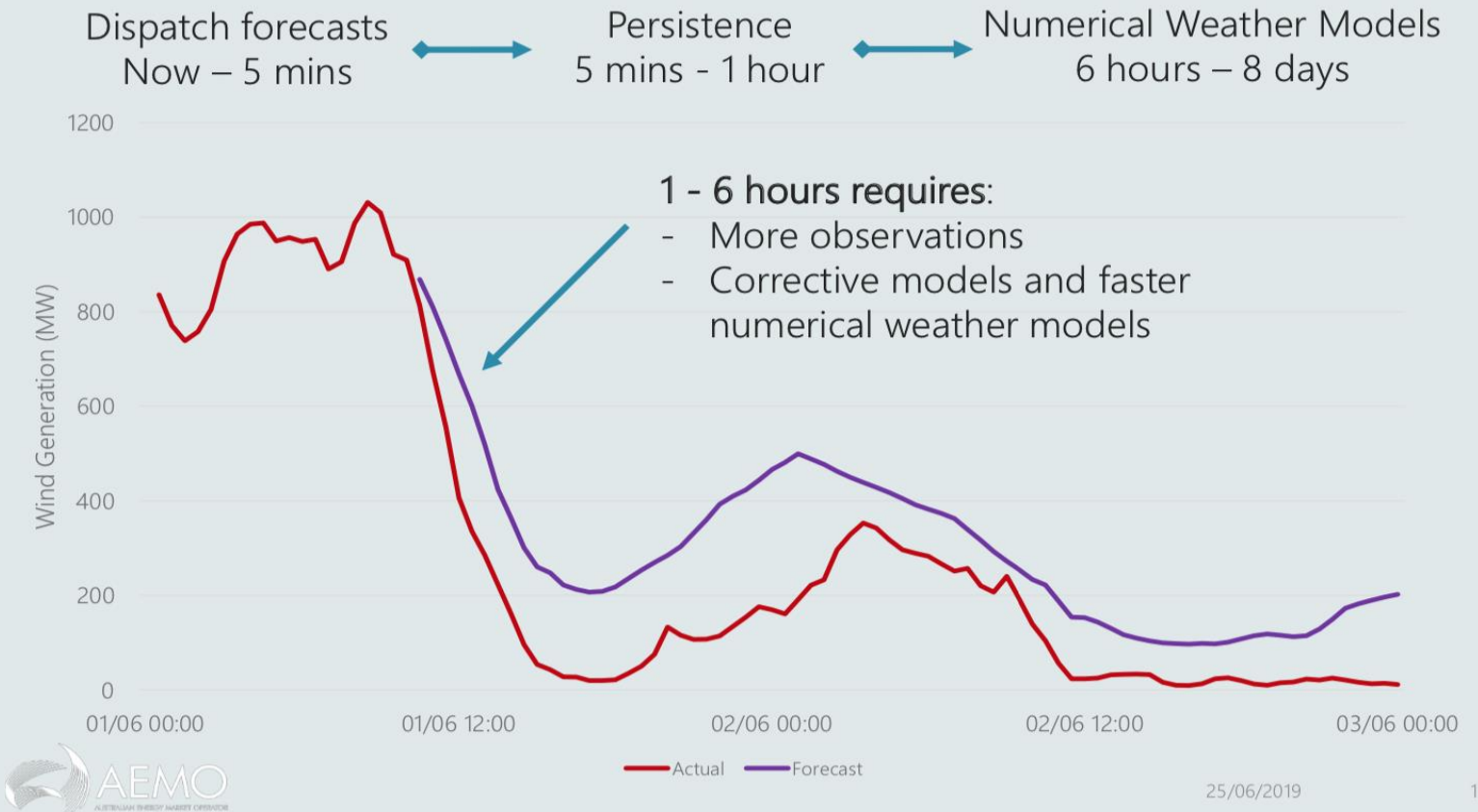
Credit: Australia PV Institute



Opportunity: Nowcasting

- Notable lack of skill in +5min to +6 hour ahead forecasts
- Known challenge in renewable energy forecasting

Forecasting Horizons: Wind



R&D Project: Funding & Goals

- Recipient of \$994k R&D funds from ARENA, \$2.9M total project value



Australian Government
Australian Renewable
Energy Agency

ARENA

- Deploying +5min to 6 hour ahead 'nowcasting' tech
- Large-scale solar + wind, rooftop solar & demand forecasts
- Operational use of project outputs by project partners

<https://arena.gov.au/projects/gridded-renewables-nowcasting-demonstration-over-south-australia/>

R&D Project: Partnerships

weatherzone^o

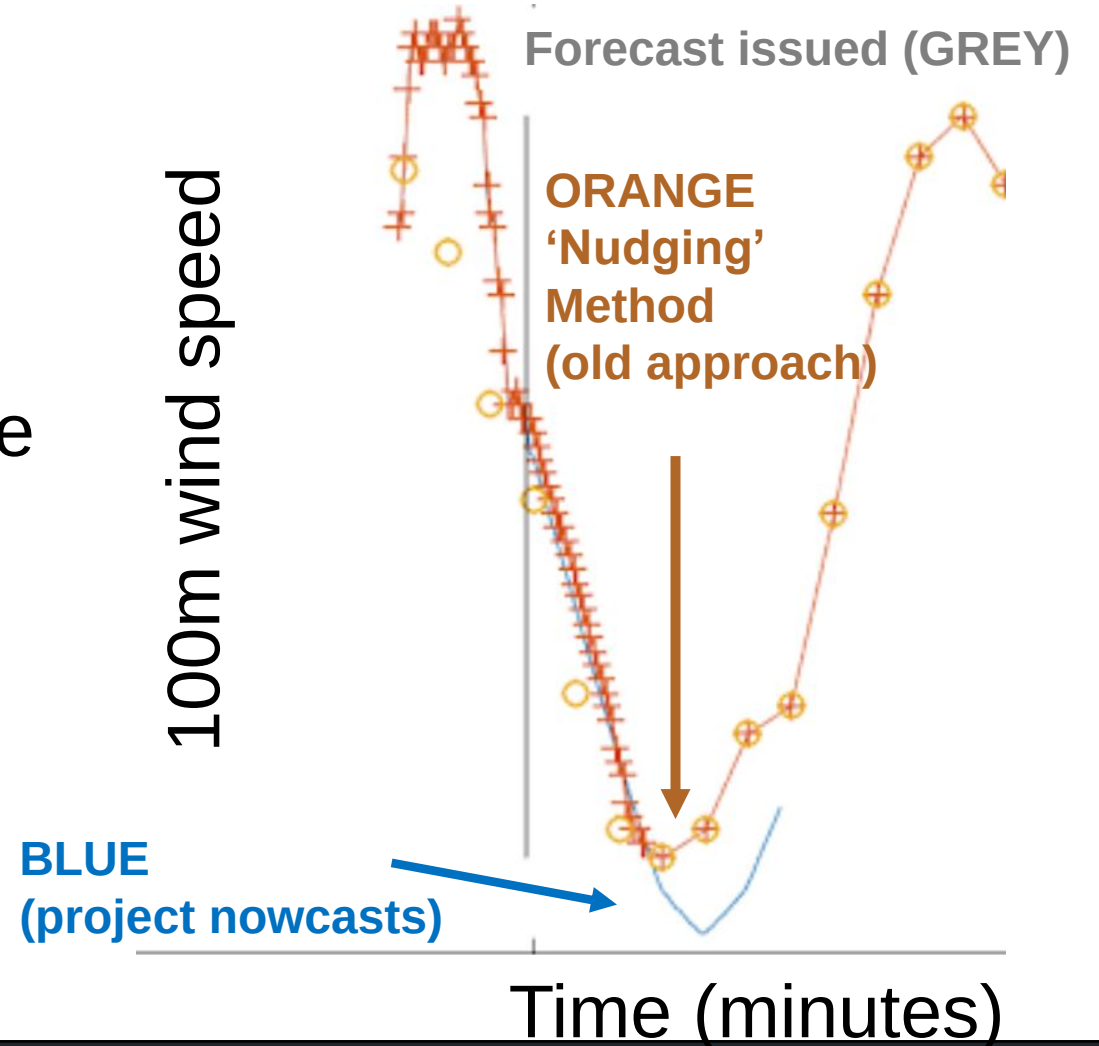


ARENA

- **AEMO** - Grid Operator (ISO equivalent)
- **SnowyHydro, Energy Australia** – Energy Retailers (Utilities)
- **TESLA Forecasting (Asia Pacific)** – Load Forecasting
- **SA Power Networks** - Distribution network

Solar & Wind Nowcasting – Approach

- **Rapid Update** solar nowcasting
 - 10 min 1km² satellite imagery
 - 5-minute forecast resolution
 - Probabilistic, 18 member ensemble
- Wind Nowcasting
 - Real-time generation data
 - 100m wind nowcasts (Solcast)
 - Weatherzone converts to wind power





South Australia - Grid Aggregation



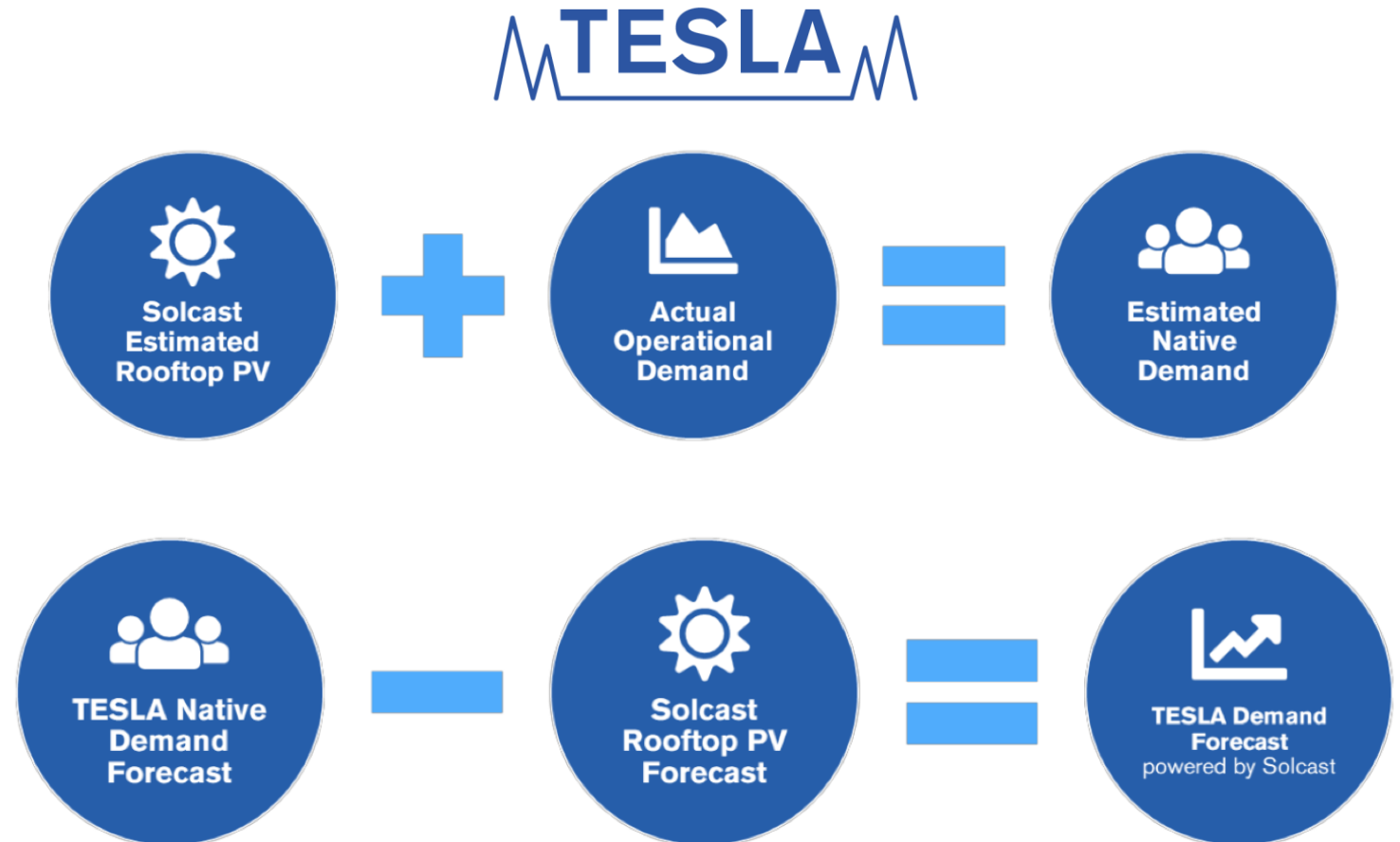
Solcast's BtM solar forecasting

Individual PV system modelling

Aggregation of key market/network regions

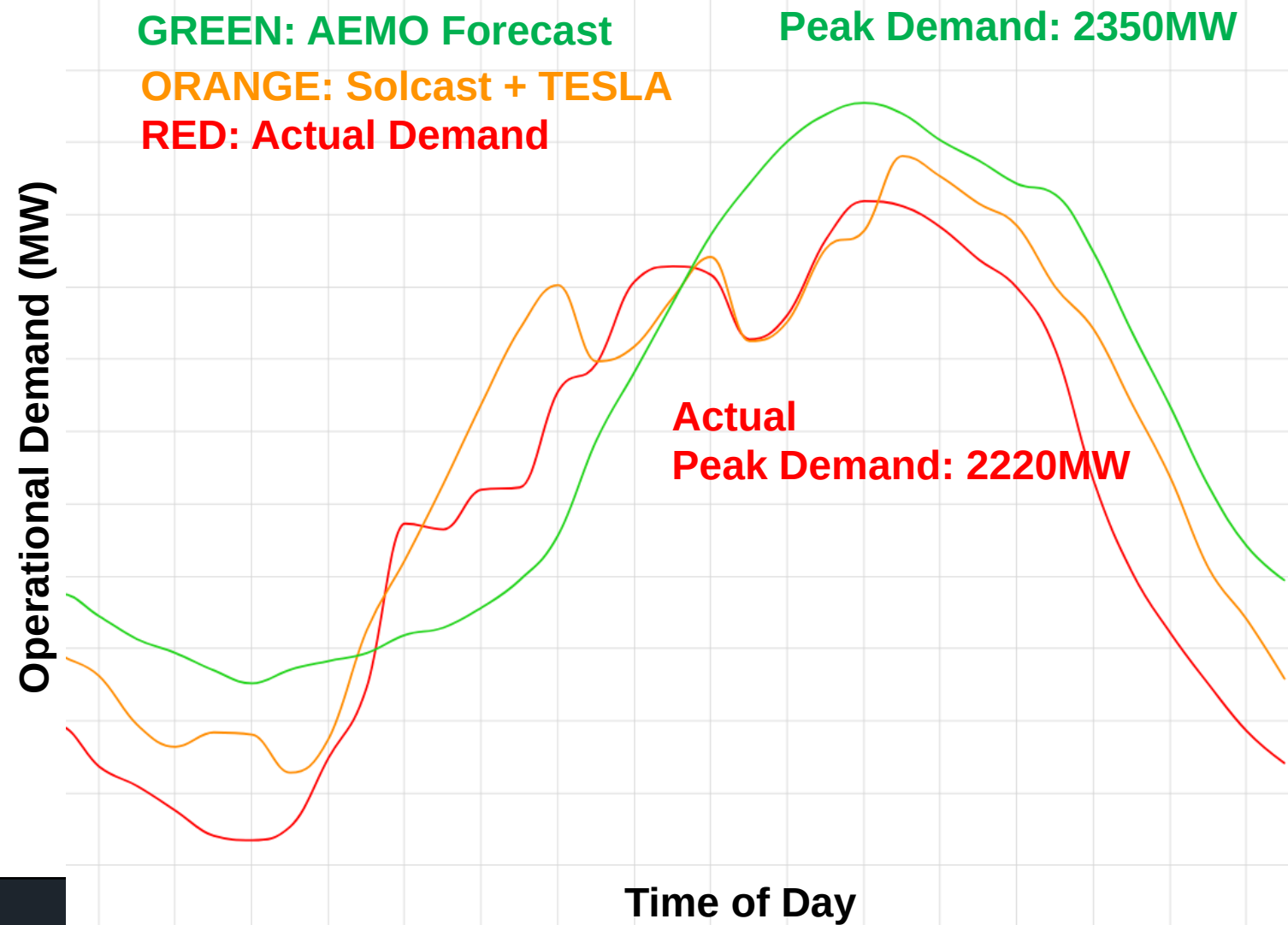
Demand Forecasting - Approach

- Solcast provides **TESLA** with SA Grid Aggregation
- **TESLA** combines them with the Operational Demand forecast
- **TESLA** then creates a 'Native Demand' series, inclusive of the solar forecast



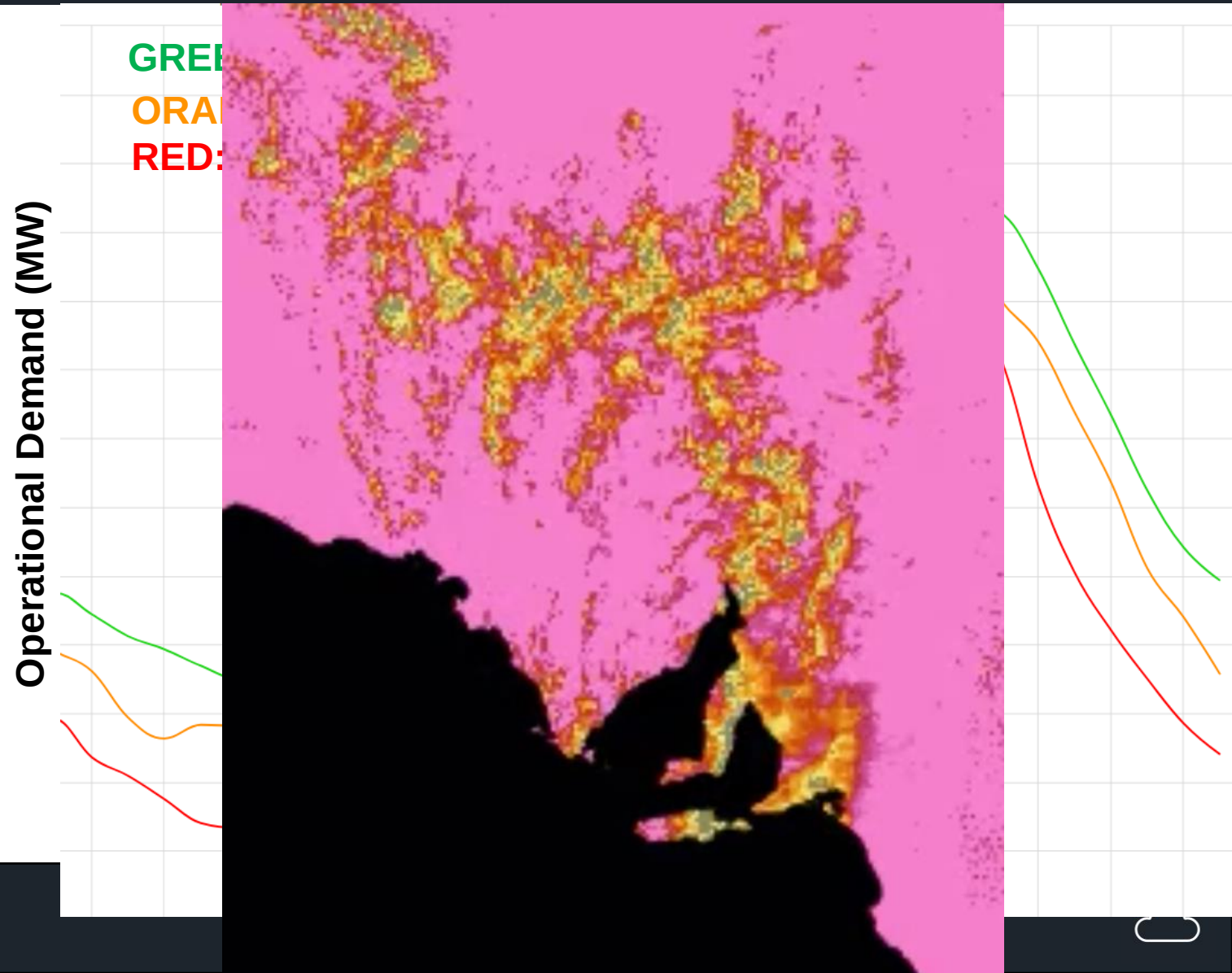
Demand Forecast: Case Study - 10 November 2020

- Early season heatwave
- AEMO model over-forecasts demand
- Why?



Demand Forecast: Case Study - 10 November 2020

- Early season heatwave
- AEMO model over-forecasts demand
- **Why? Pre-frontal convection**

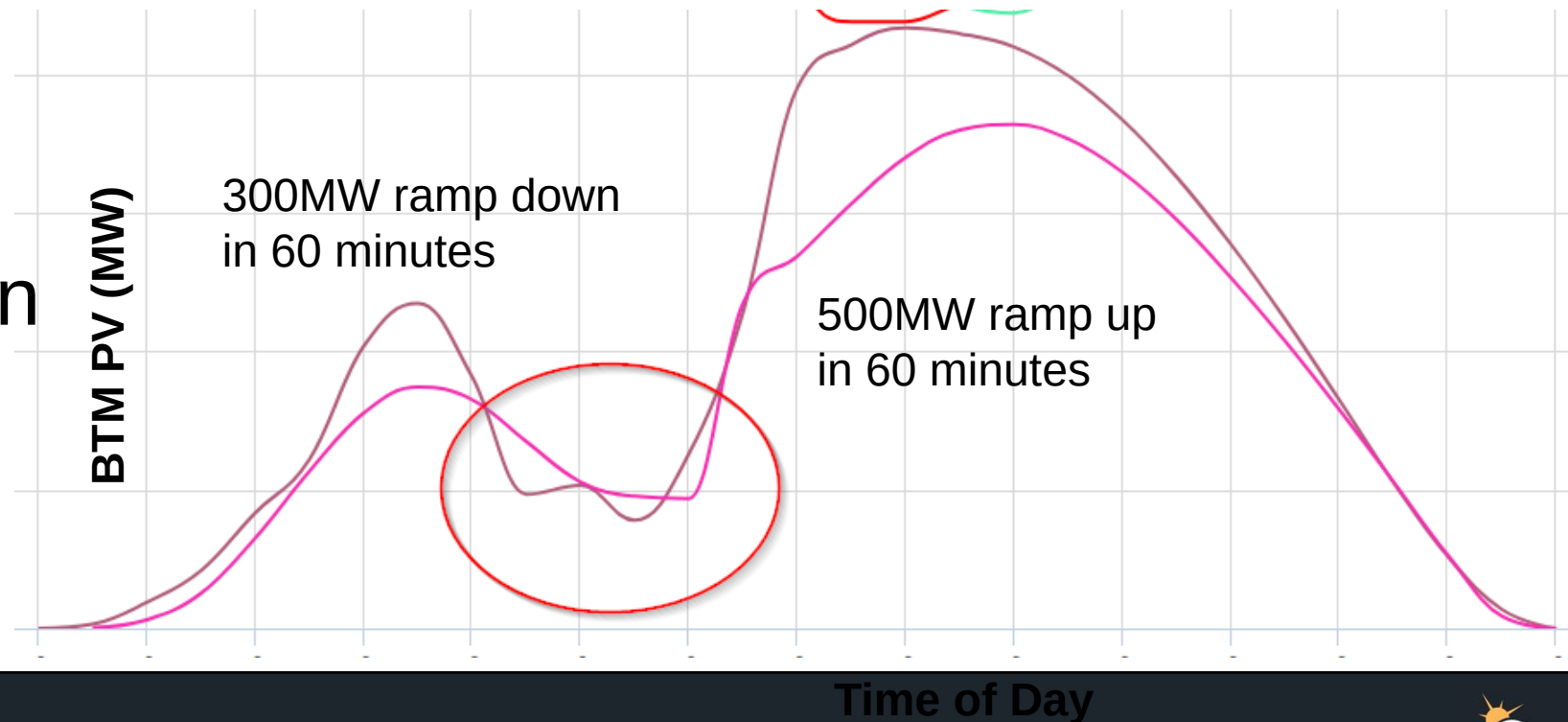


Demand Forecast: Case Study - 10 November 2020

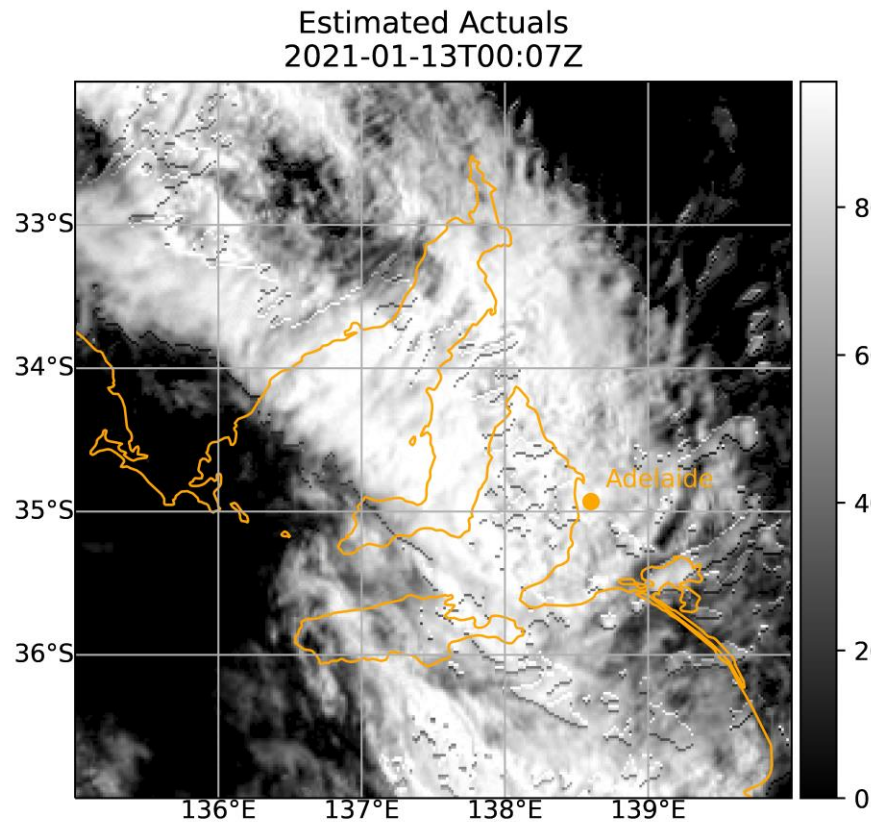
- Fast-moving cold front, extensive cloud cover
- Large, fast ramps in rooftop PV generation

PINK: Solcast BtM Forecast

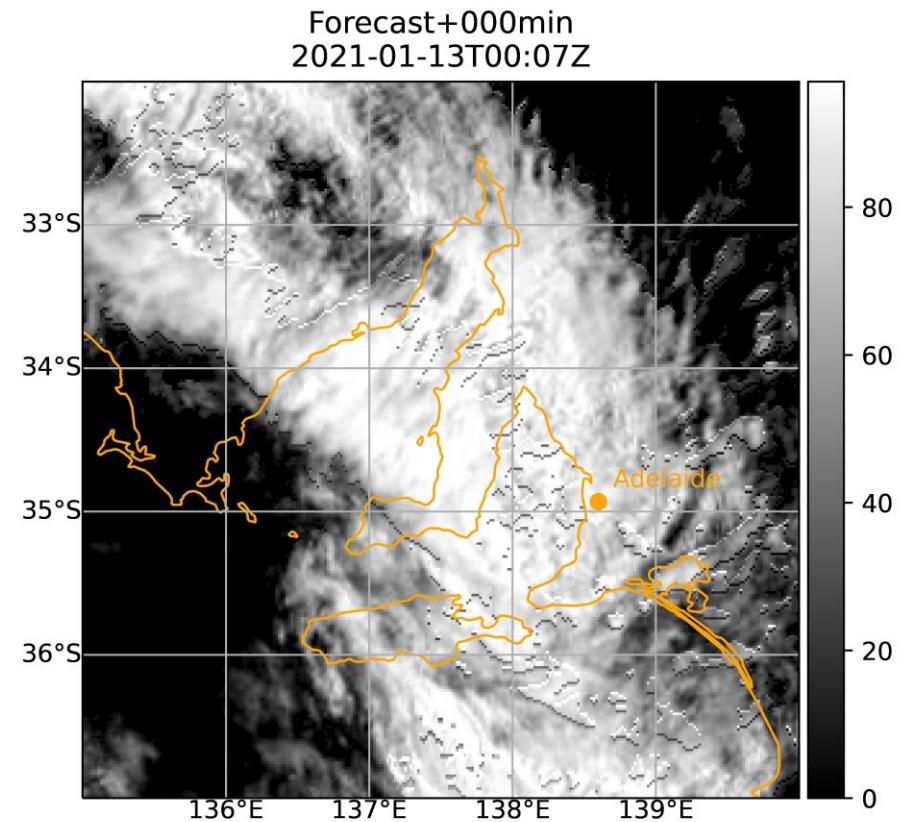
PURPLE: BtM Actuals



Demand Forecast: Case Study - 13 January 2021



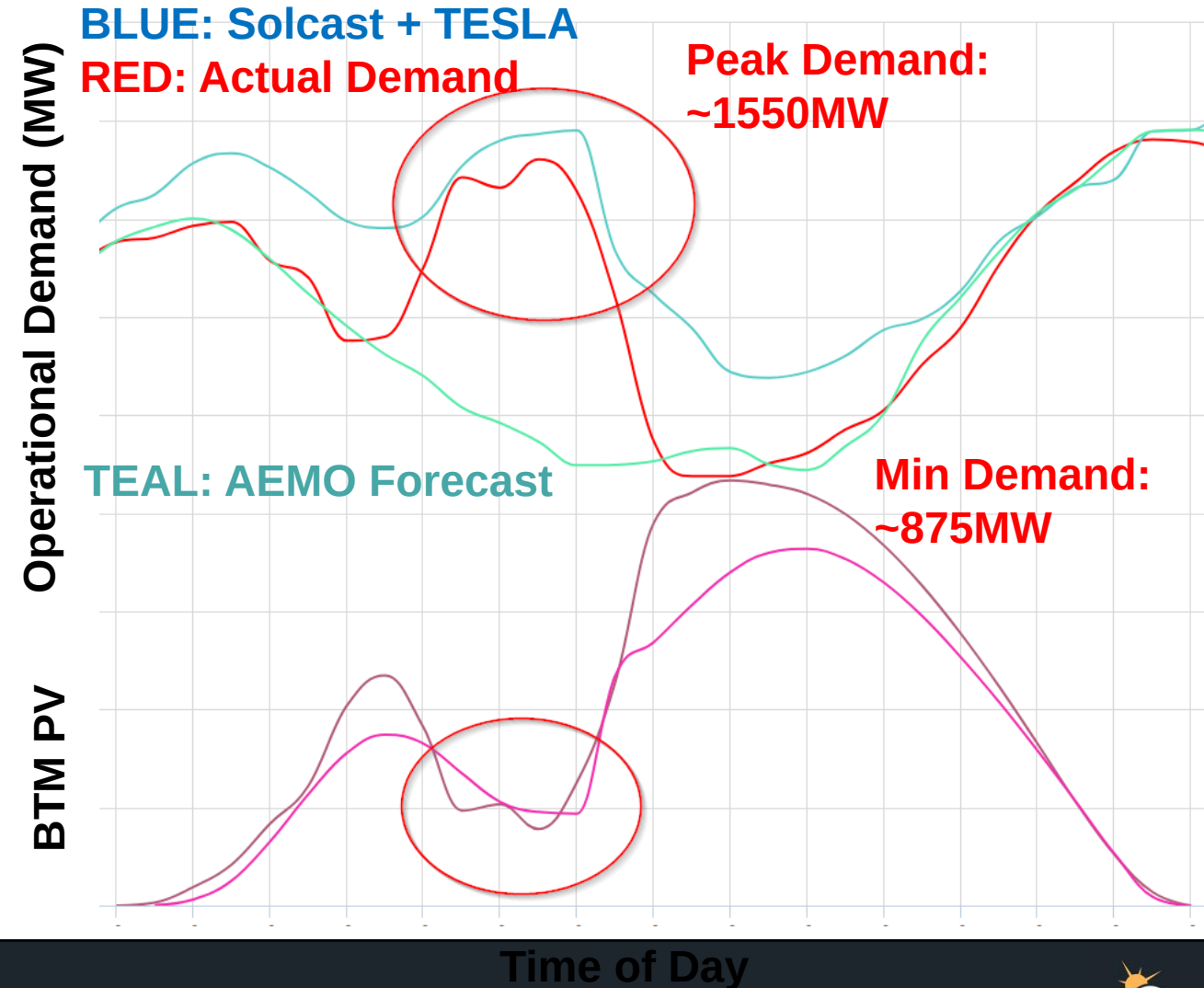
Cloud Observations



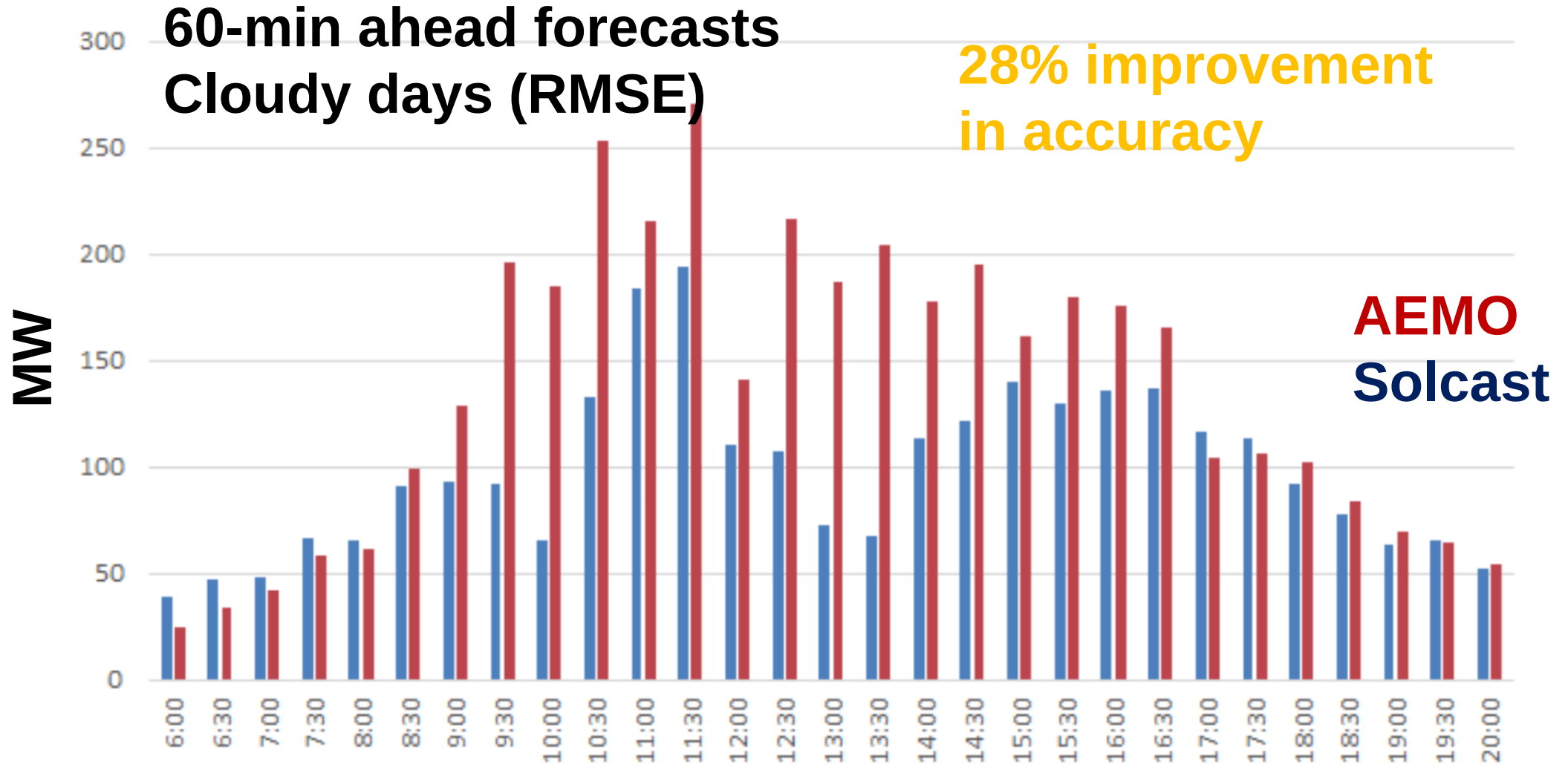
Forecast

Demand Forecast: Case Study - 10 November 2020

- Fast-moving cold front, extensive cloud cover
- Large, fast ramps in rooftop PV generation
- **Large Demand Impact!**



Solar Forecasting – Performance Summary



Direct questions to
nick@solcast.com



Free access for Students & Researchers!

Test out our tech for free solcast.com/register

We have data products for any use case!

- ✓ Solar Radiation 0-7 Day Forecasts
- ✓ Utility Scale Solar Forecasts
- ✓ Real-time Global Solar Radiation Data
- ✓ Rooftop Solar Live & Forecast Data
- ✓ Up to 20 Years of Historical Data (time-series and TMY)