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:

DUKE ENERGY®

台灣電力公司
Taiwan Power Company

AccuWeather

First Solar®

NEOEN

AEMO
AUSTRALIAN ENERGY MARKET OPERATOR

mc | meteo control

Featured in:

PVTECH

Solar Industry

aws

UTILITY
Engineering, Construction & Maintenance

T&DWorld™

ENERGY

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."*

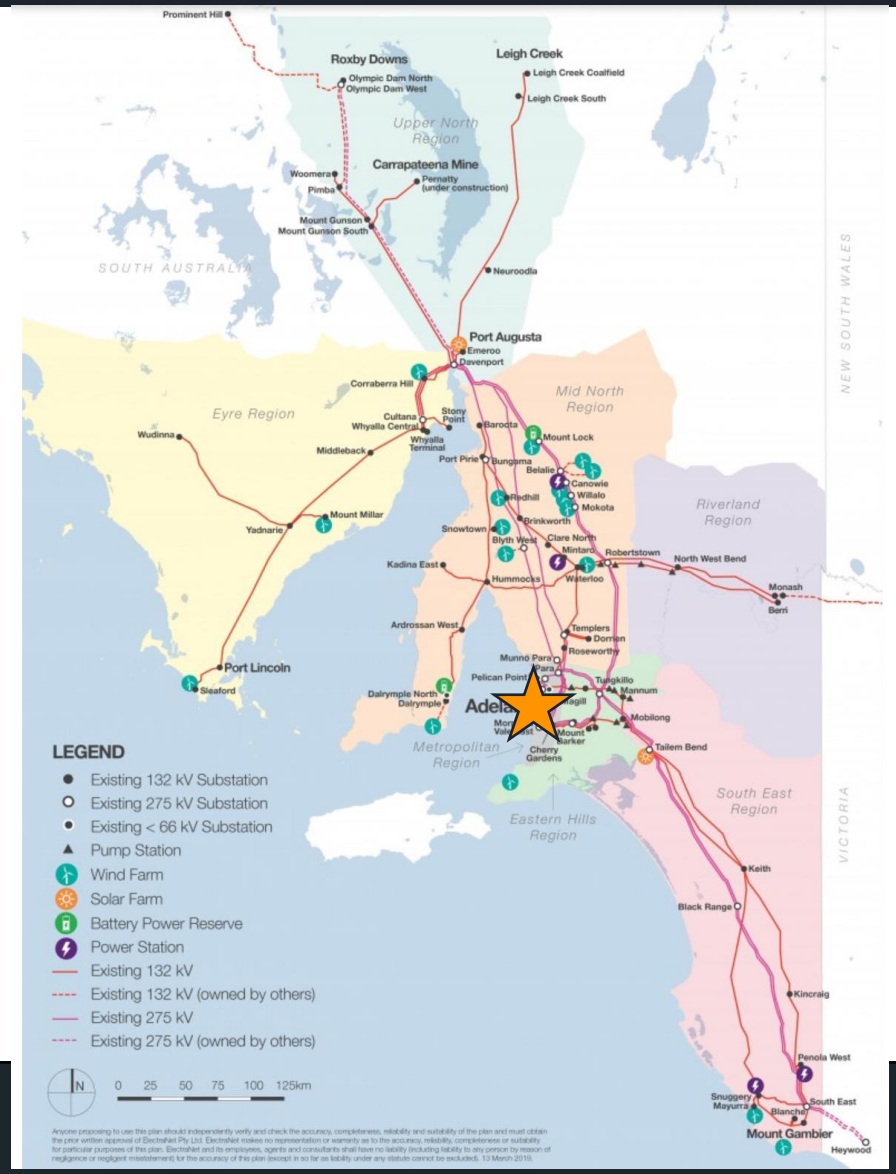
AEMO Chief Operations Officer
Michael Gatt

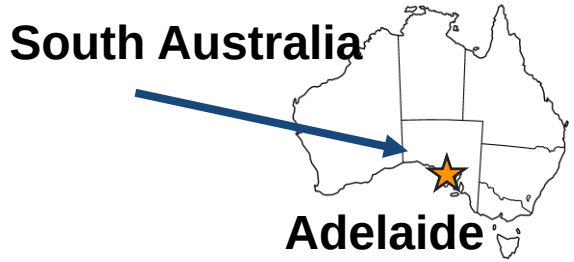
Context: High Penetration Renewables, Network Challenges

2x interconnectors

Nat. gas plants, no ‘baseload’ coal

Majority of wind relatively concentrated





Credit: ElectraNet

SOLCAST

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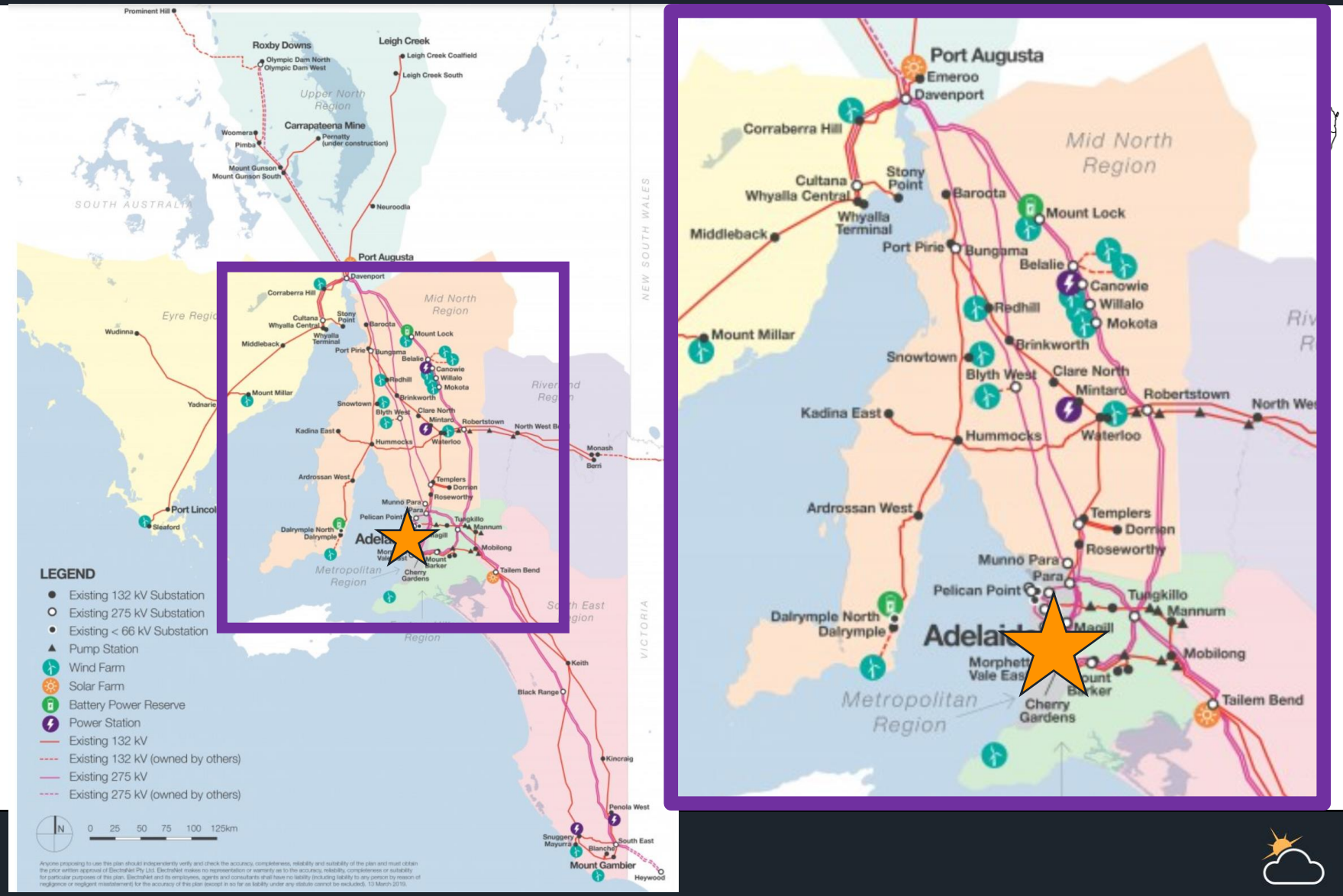
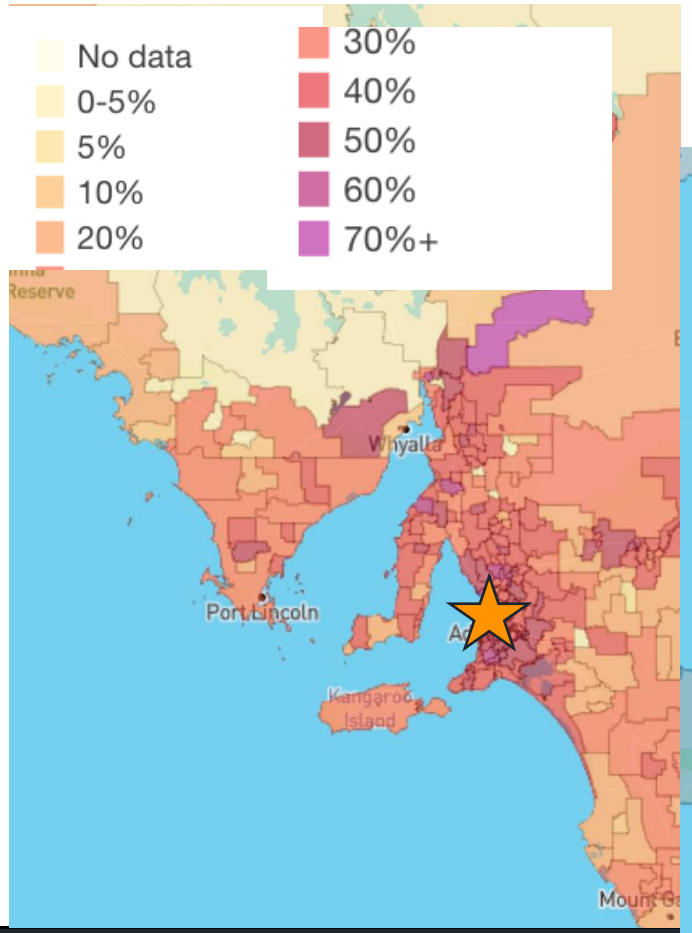


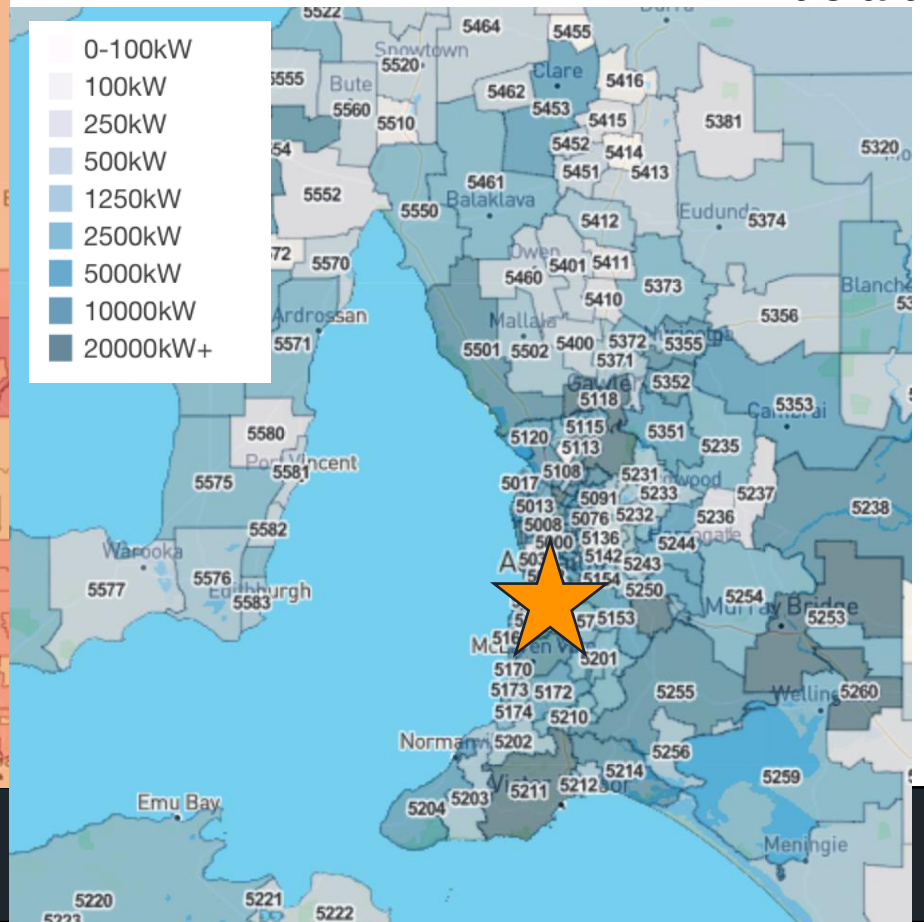
Context: High Penetration of Rooftop Solar in Australia

Rooftop Solar

- 1.16GW of <10kW$_p$ installations
- 979MW of >100kW$_p$
- 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

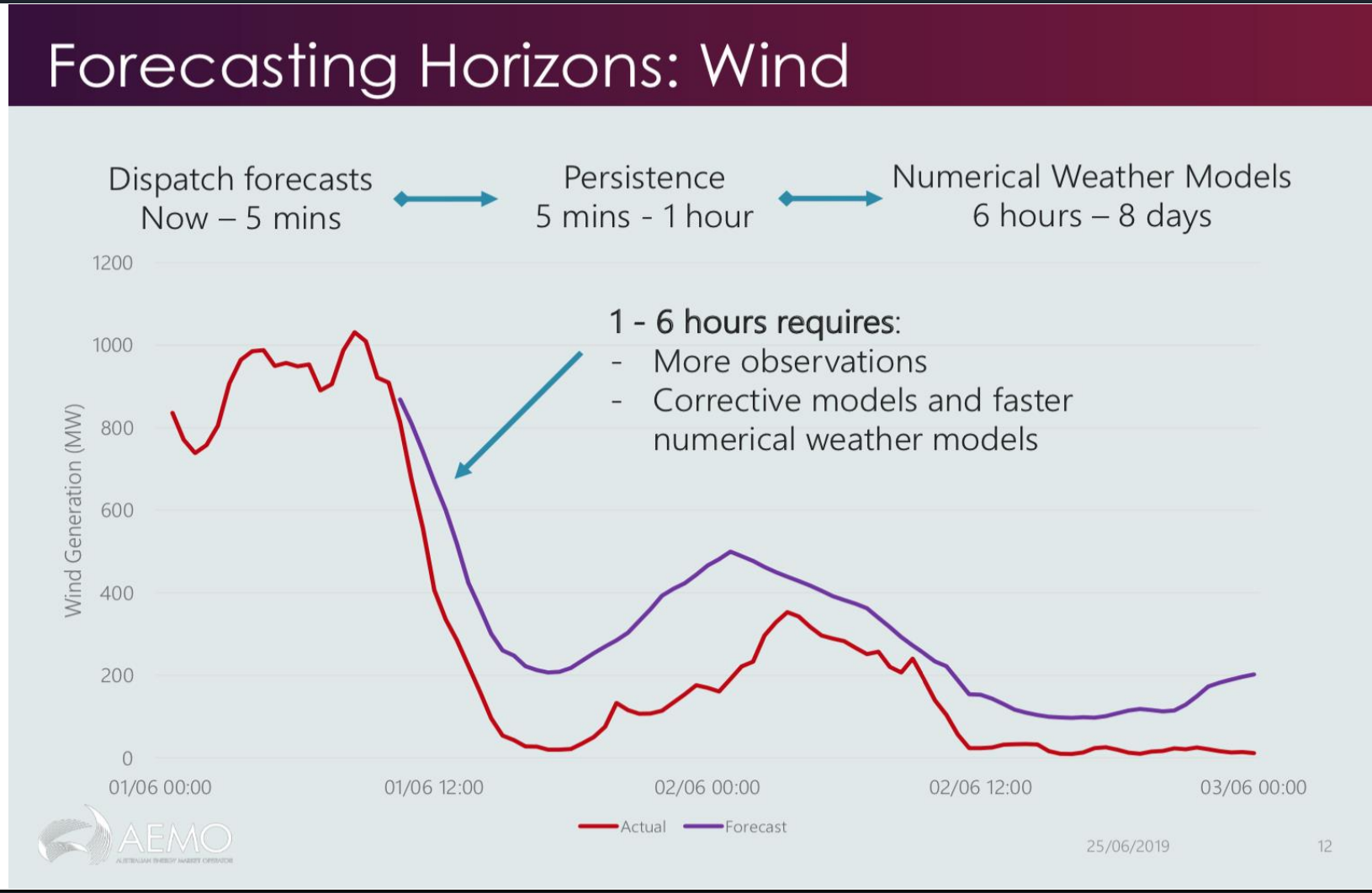


Image Credit: AEMO, Source: Project Document

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

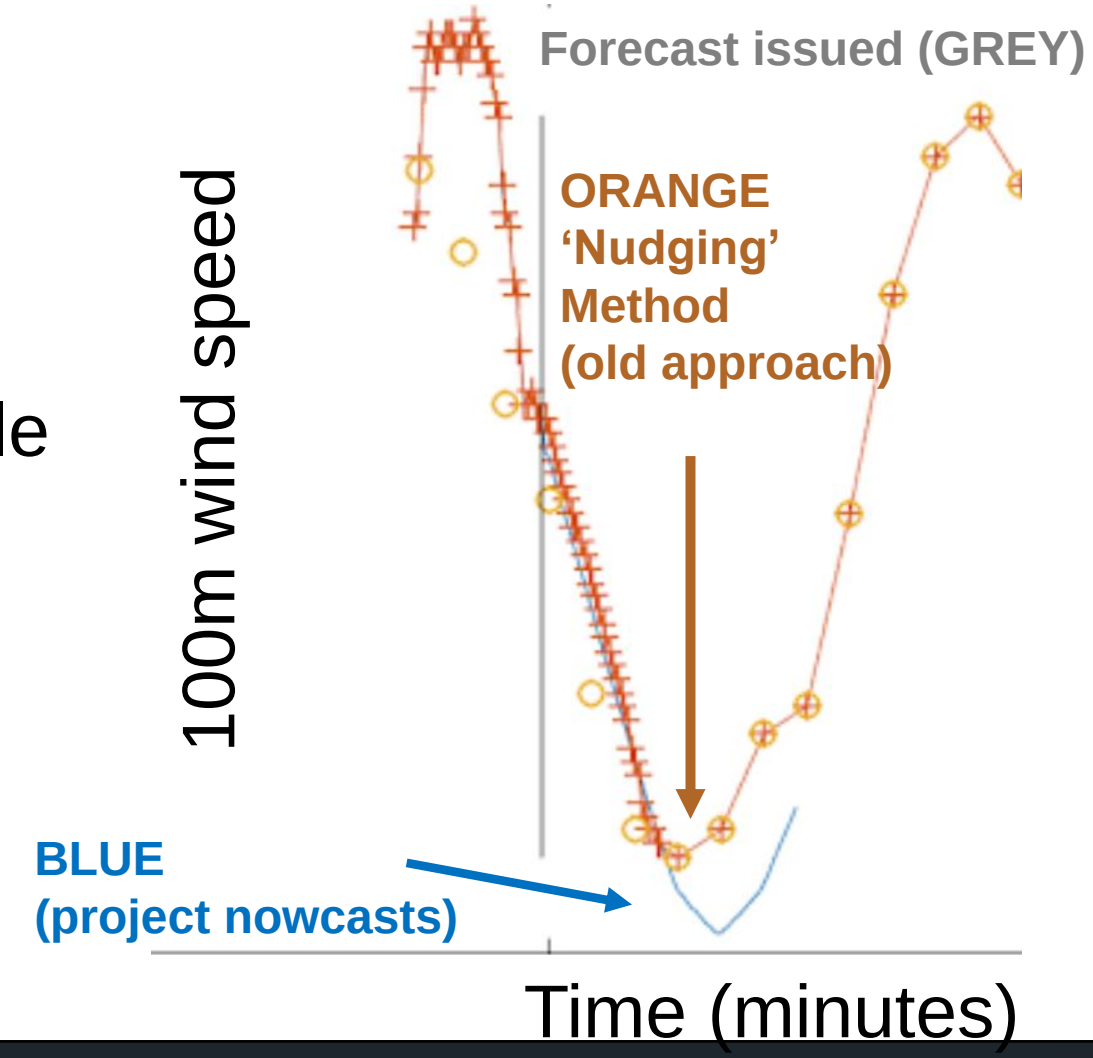
https://arena.gov.au/projects/gridded-renewables-nowcasting-demonstration-over-south-australia/

R&D Project: Partnerships

- **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 1km^2 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

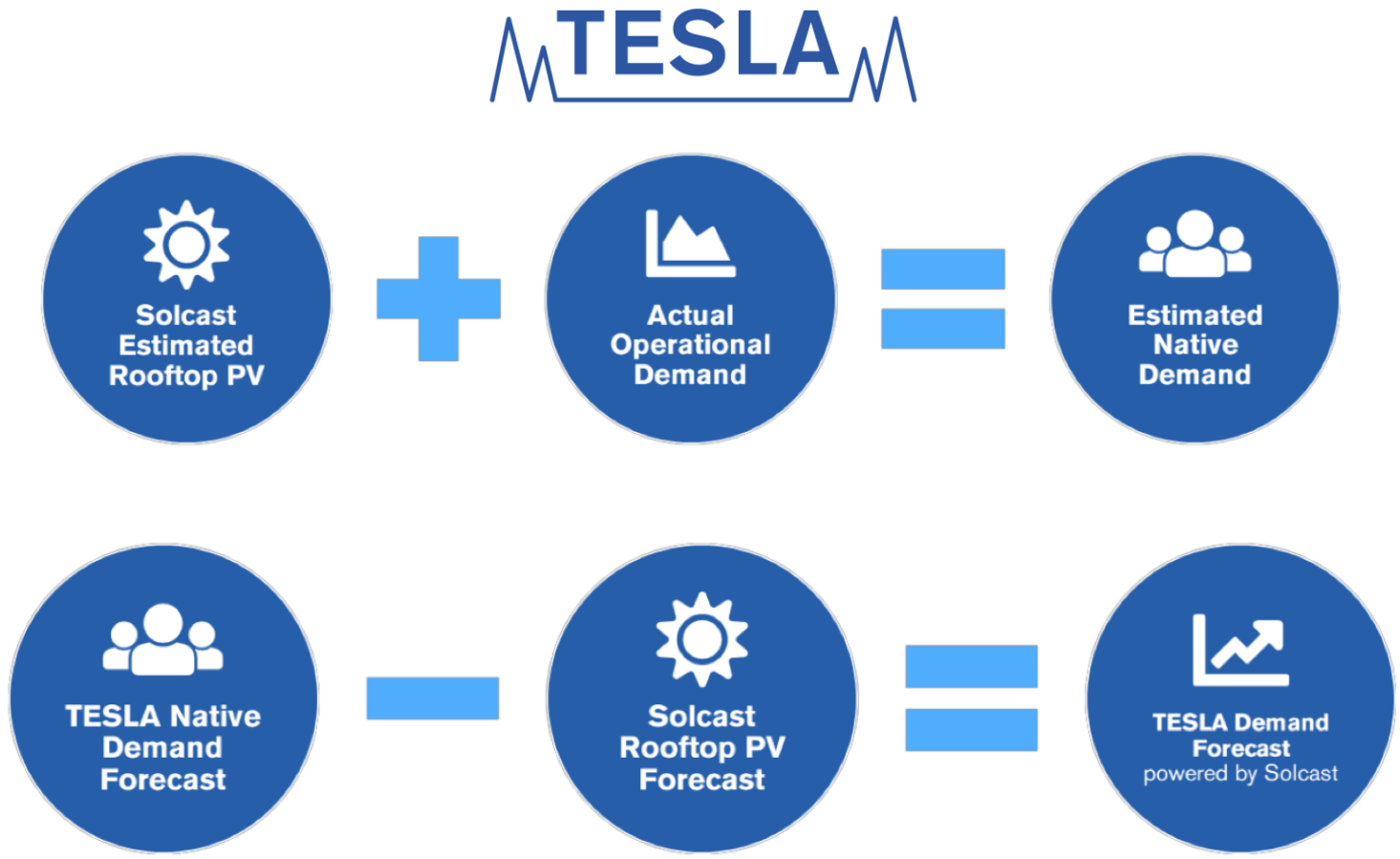
Solcast's BtM solar forecasting

Individual PV system modelling

Aggregation of key market/network regions

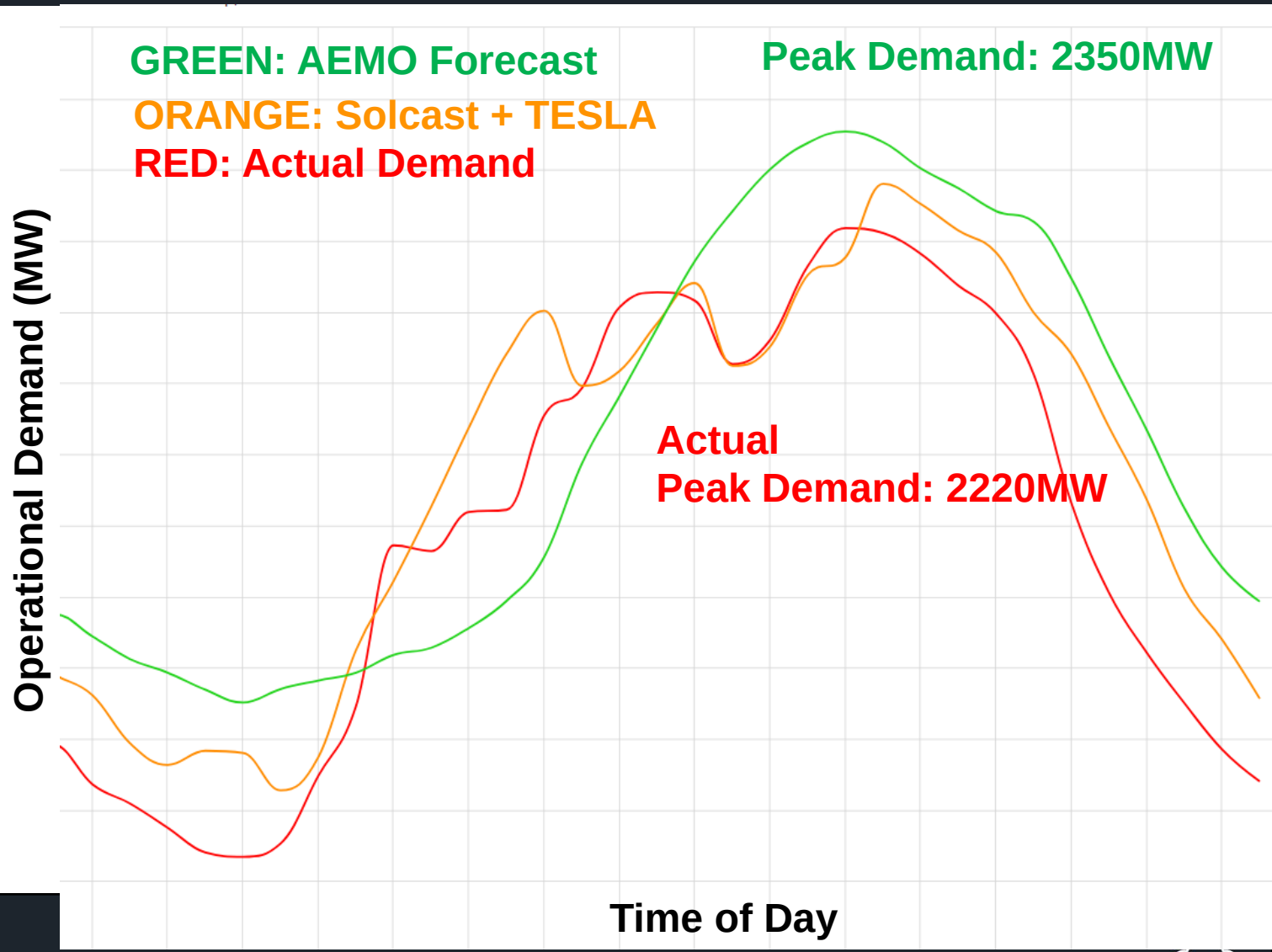
Demand Forecasting - Approach

- 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

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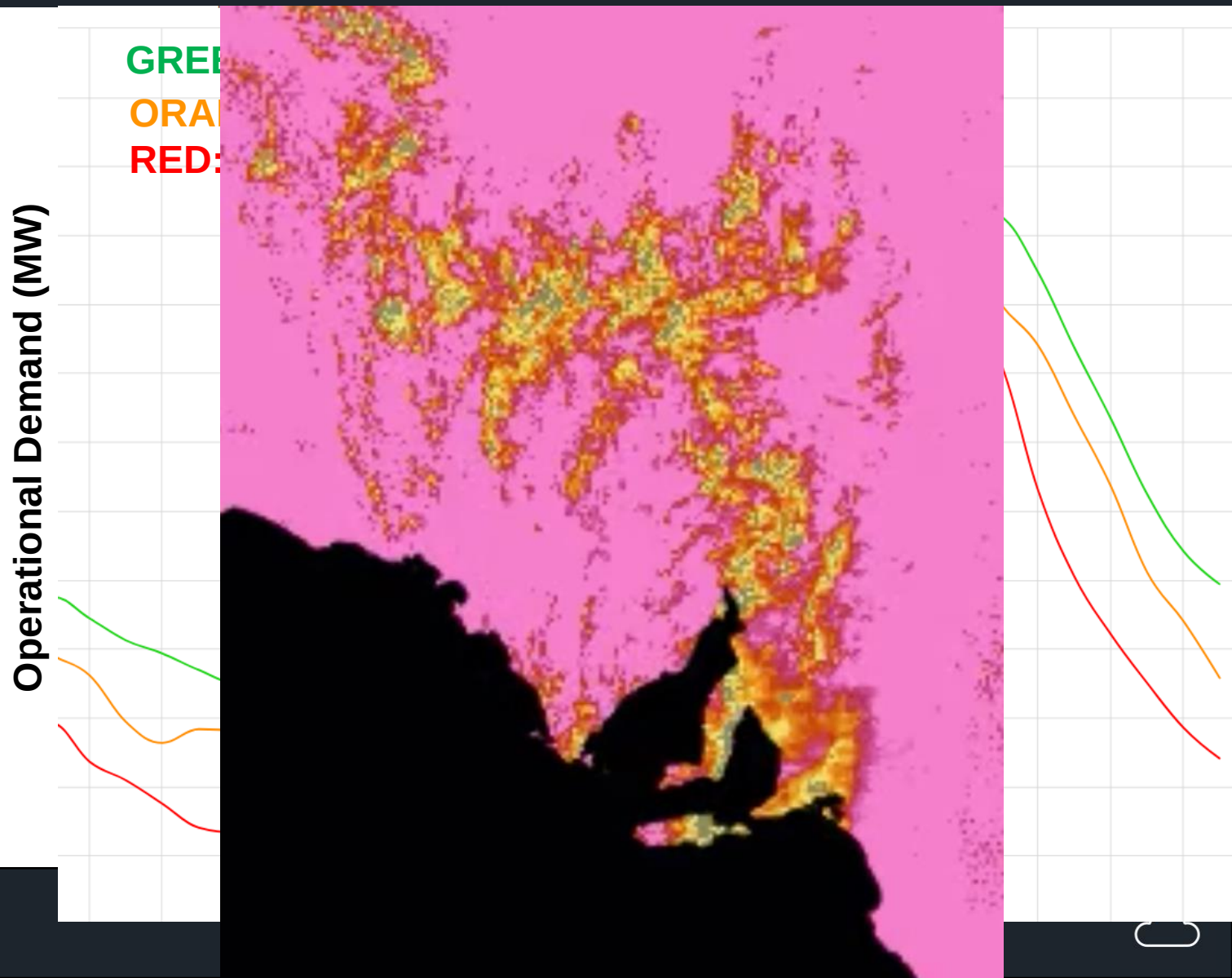
- AEMO model over-forecasts demand
- **Why? Pre-frontal convection**



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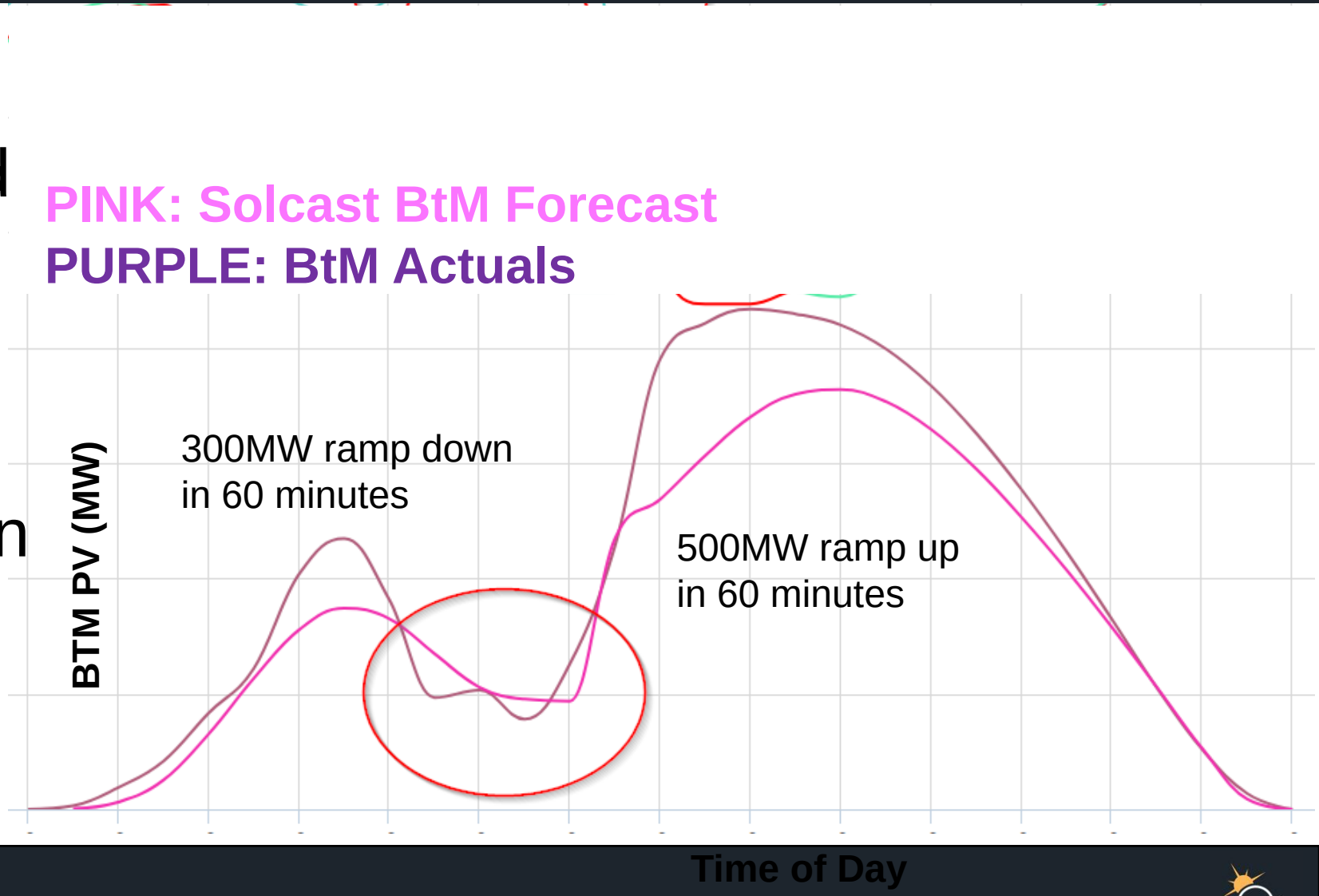
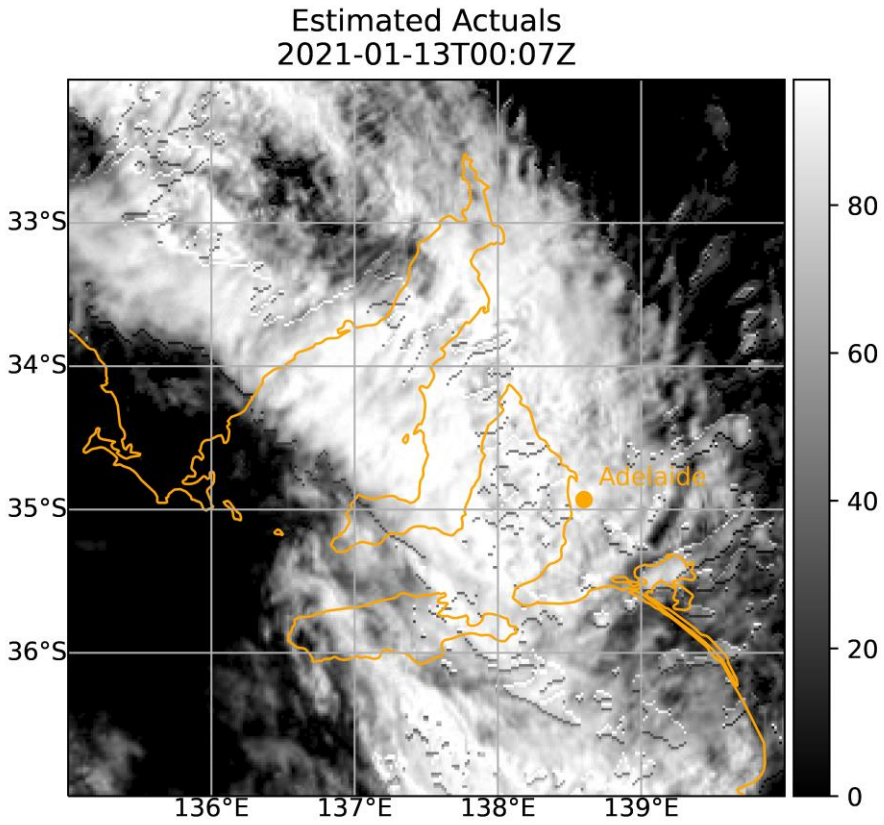
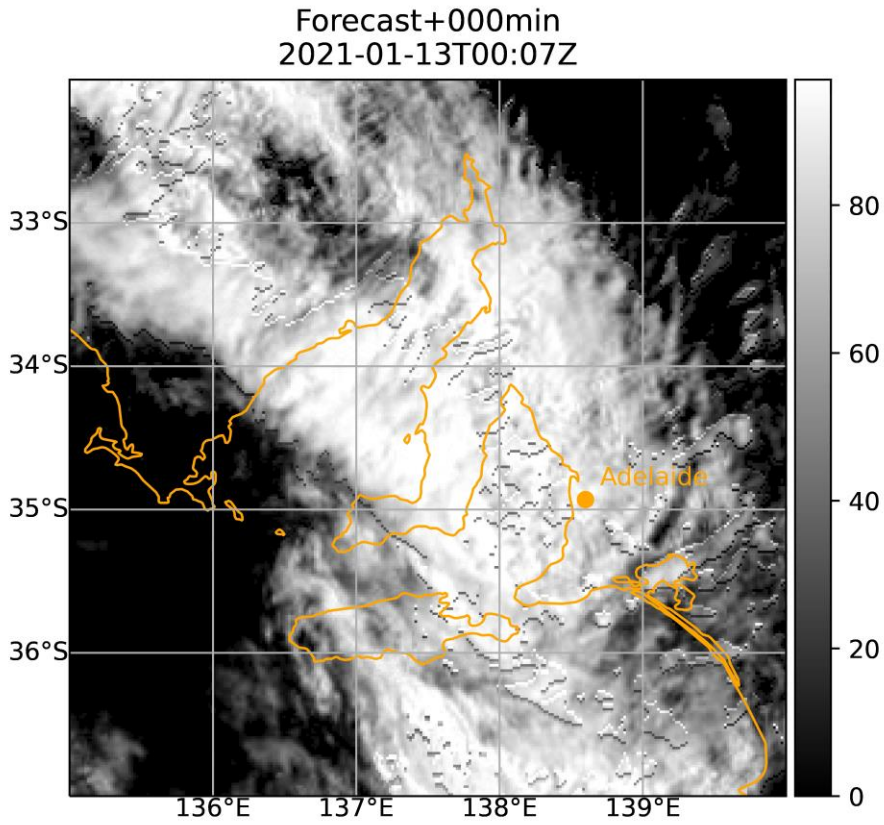
- Fast-moving cold front, extensive cloud cover
- Large, fast ramps in rooftop PV generation



Demand Forecast: Case Study - 13 January 2021



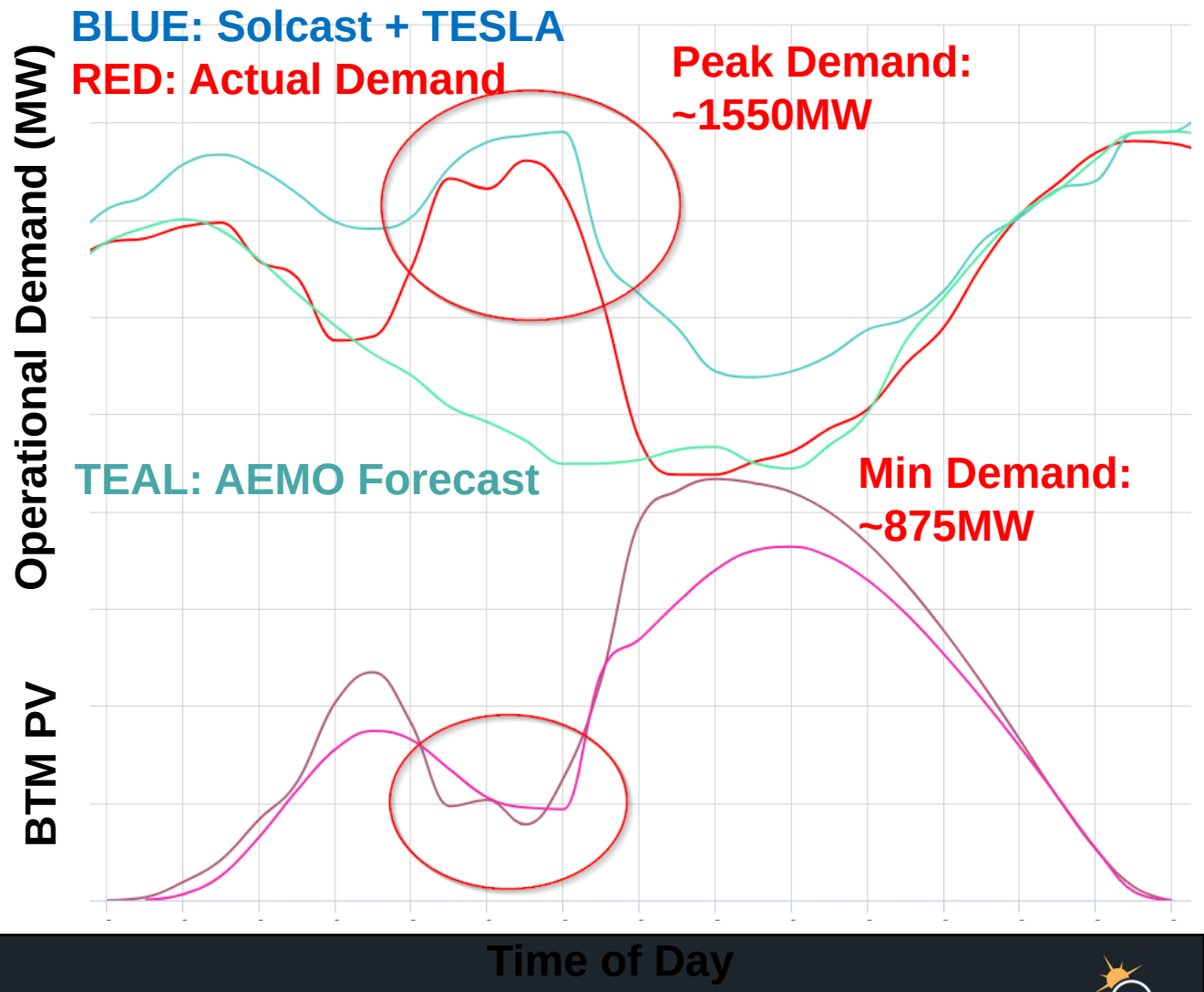


Cloud Observations

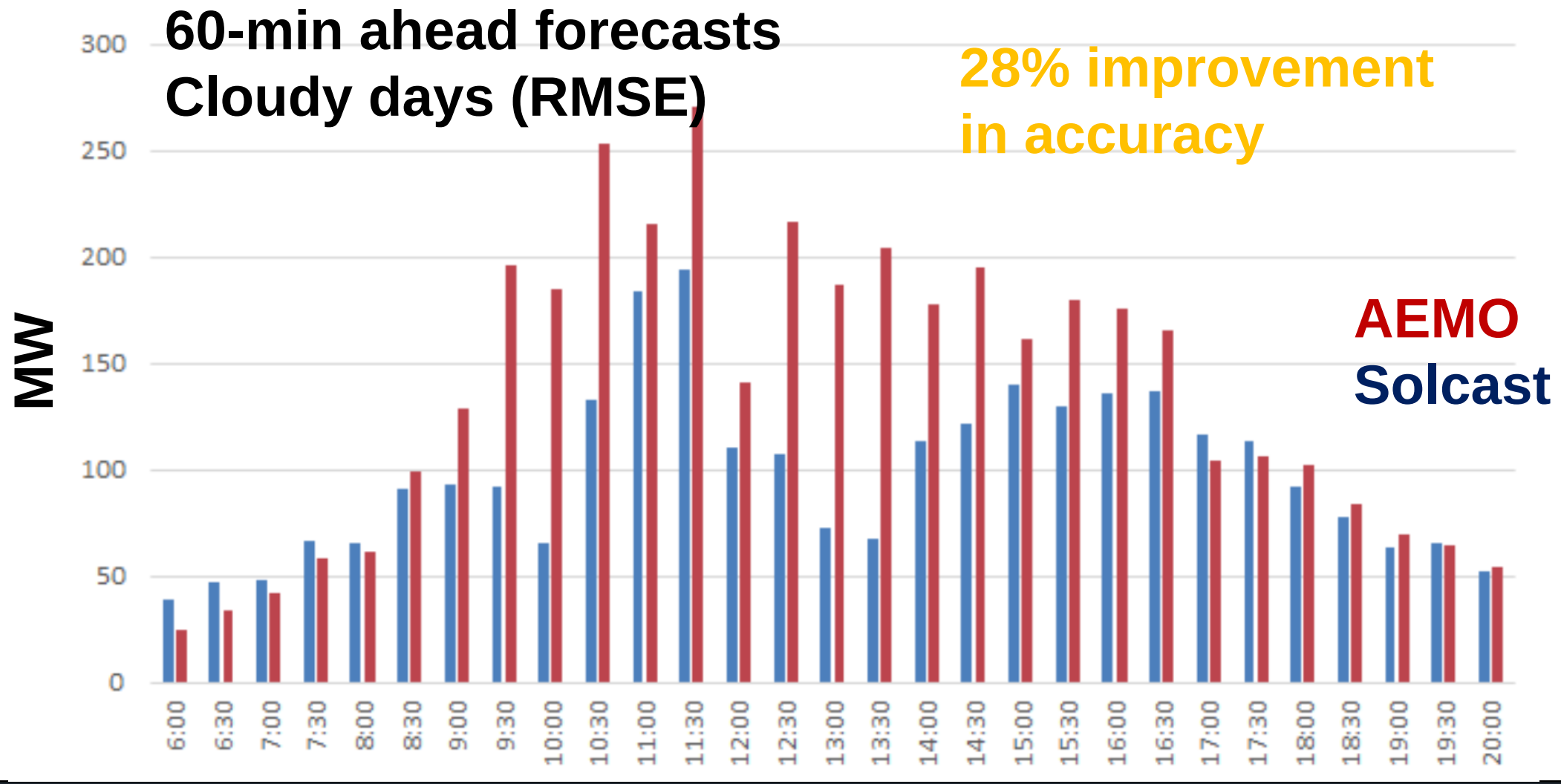
Forecast

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



Free access for Students & Researchers!

Direct questions to
nick@solcast.com

API Toolkit

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)