

Demand traces for the 2022 ISP

29 September 2021 FRG Meeting

Energy.forecasting@aemo.com.au

Background and Purpose

This presentation describes the execution of Demand Traces in the 2022 ISP. This serves as a background for a subsequent discussion on improved methodology.

Engagement timeline

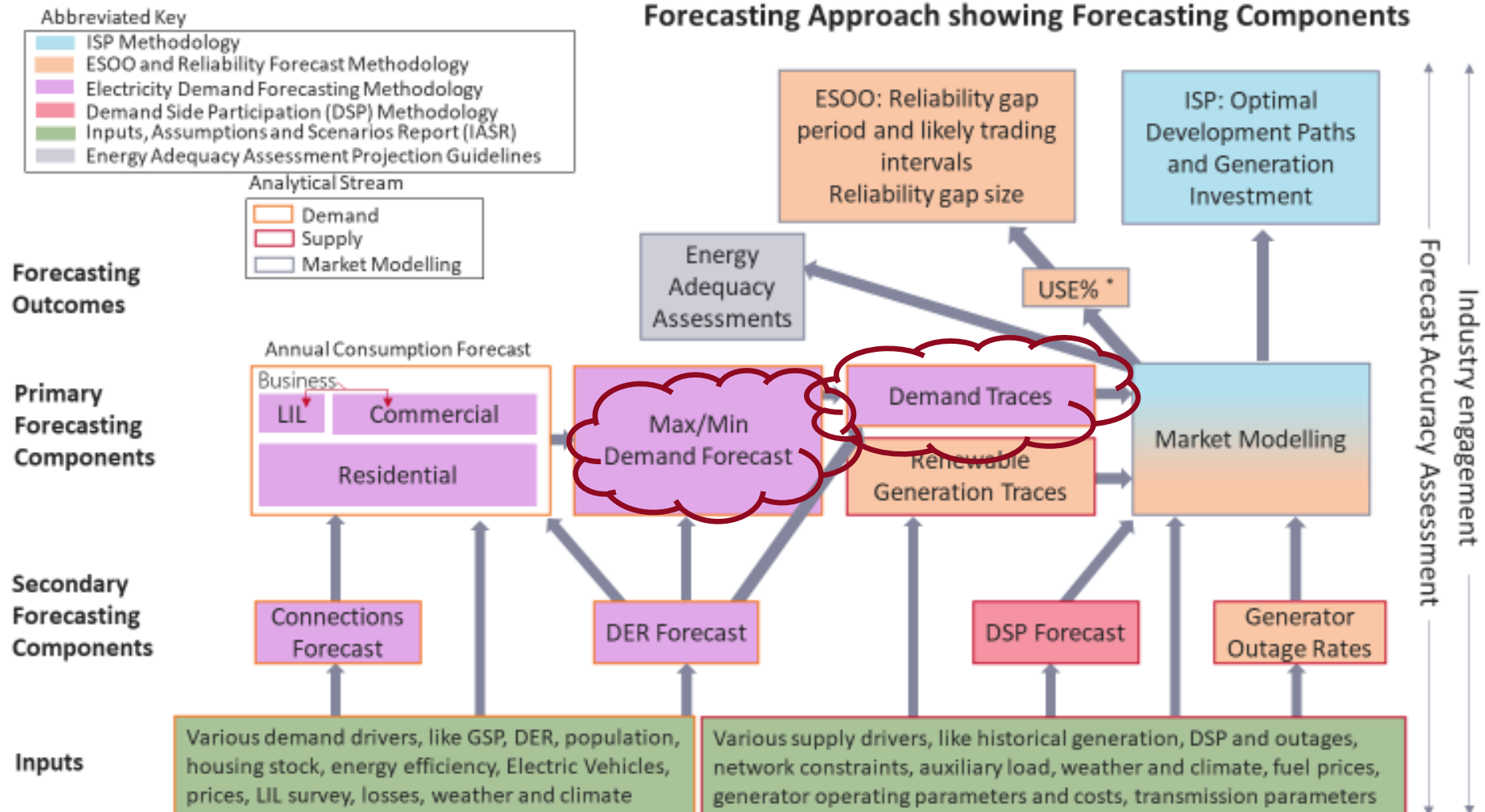
FRG Timing	Details
May 2021	Draft Consumption Forecasts
June 2021	Draft Maximum and Minimum Demand Forecasts
Today	Demand Traces in 2022 ISP
Today	Demand Traces – why change?
Oct 2021	2021 Forecast Accuracy Report with draft Forecast Improvement Plan

Today's agenda:

- Recap –demand traces in the Forecast Approach
- Demand Traces – prior year overview
- Demand Traces – 2022 ISP overview
- Building up demand traces in 5 steps:
 - Consumption forecast
 - Demand simulation
 - Meeting joint consumption and demand targets
 - Electrification
 - EV

Parking lot – what are AEMO and stakeholders looking for from Demand Traces?

Demand traces connect consumption forecasts with market modelling

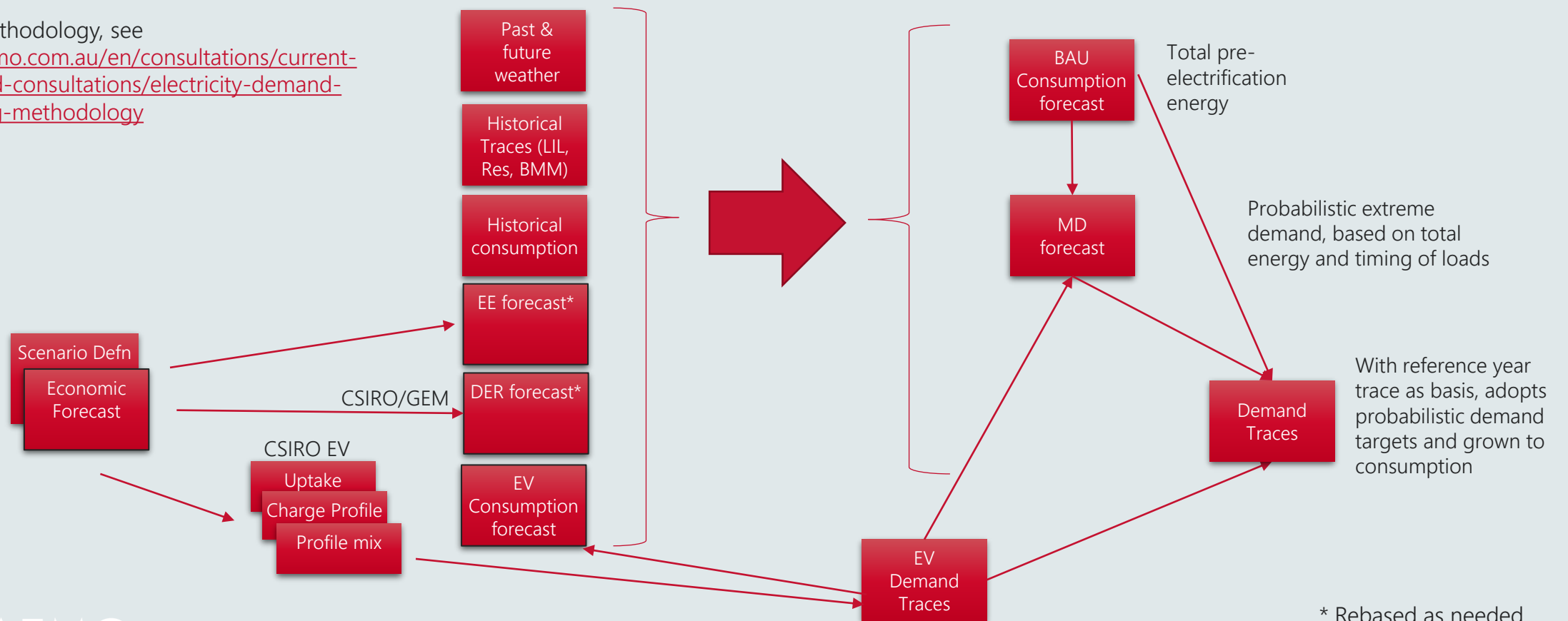


Recap

Demand Traces: prior year process

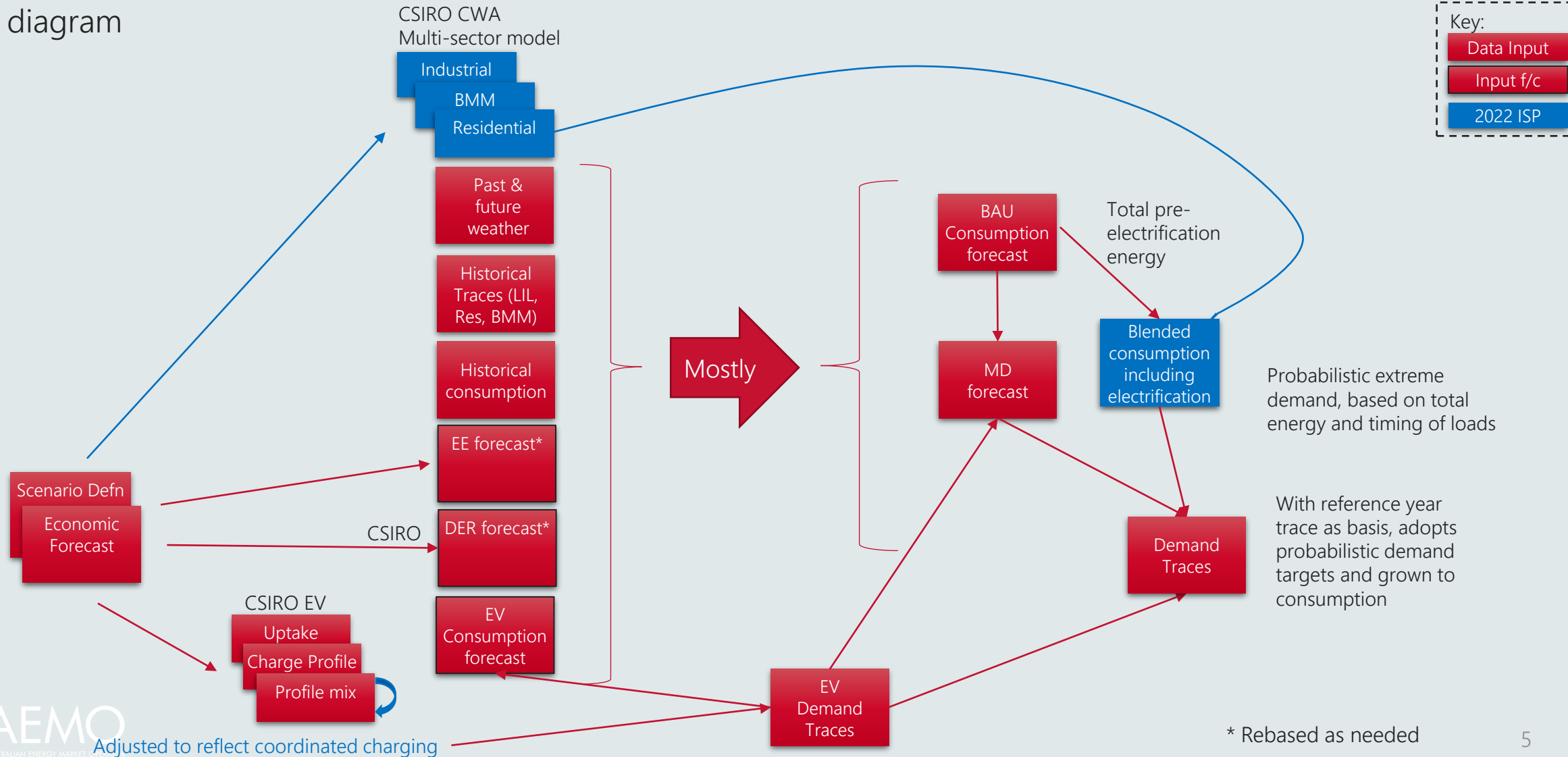
Data flow diagram

For full methodology, see
<https://aemo.com.au/en/consultations/current-and-closed-consultations/electricity-demand-forecasting-methodology>



Demand Traces: what we did this year

Data flow diagram



Demand traces have their total energy ('area under the curve') set by consumption forecasts (1/5)

① Consumption forecast

Objective: Estimate annual consumption as a function of technology, electrification and economy.



The extreme demand simulation sets seasonal and annual maximum and minimum points of the demand traces (2/5)

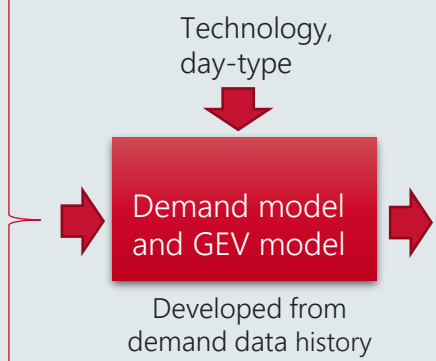
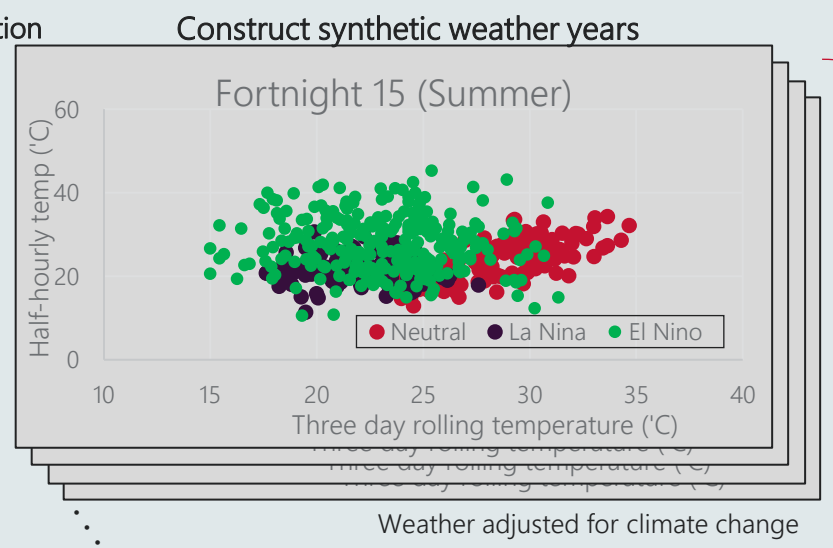
1 Consumption forecast

Objective: Estimate annual consumption as a function of technology, electrification and economy.

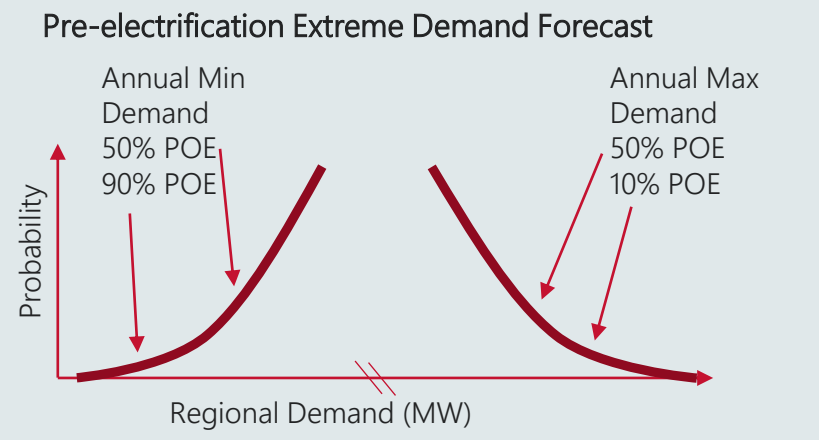


2 Extreme Demand Simulation

Objective: generate probabilistic minimum and maximum demand forecasts from weather years



3000 simulations
Of 48 half hours
Grouped by 26 fortnights



Extreme demand values scale the reference trace, then energy consumption 'fills out' the shape (3/5)

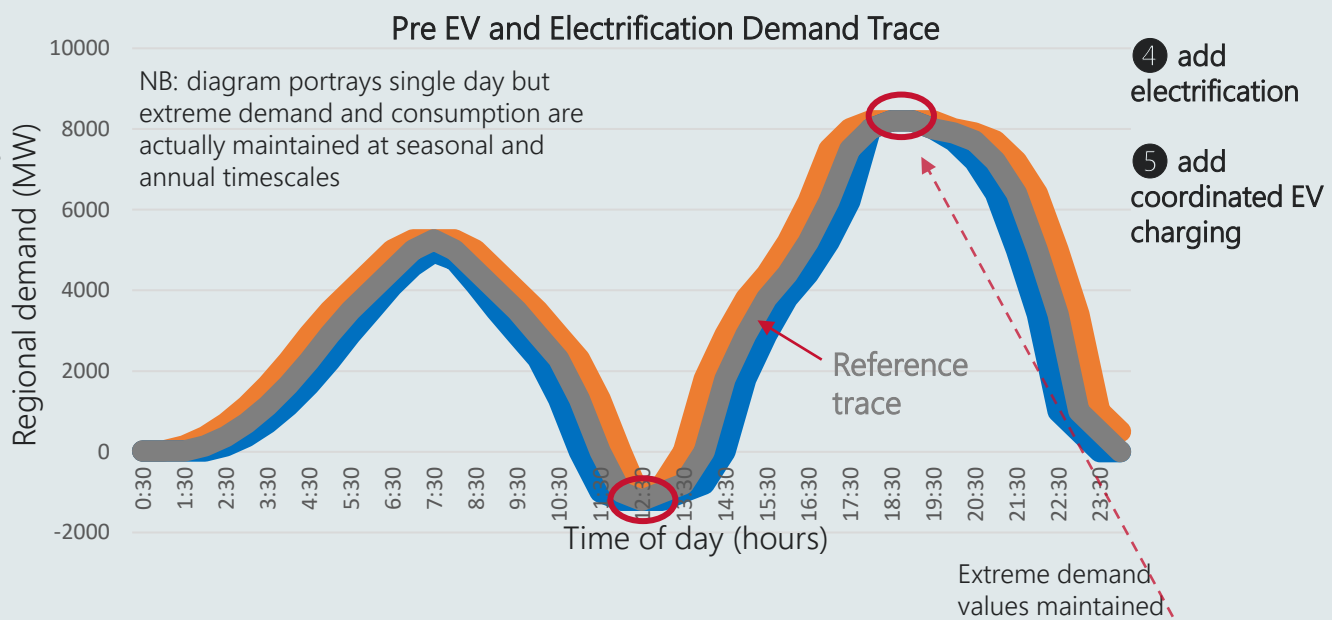
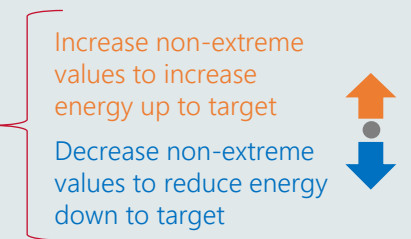
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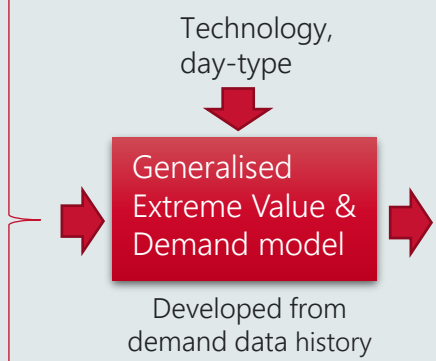
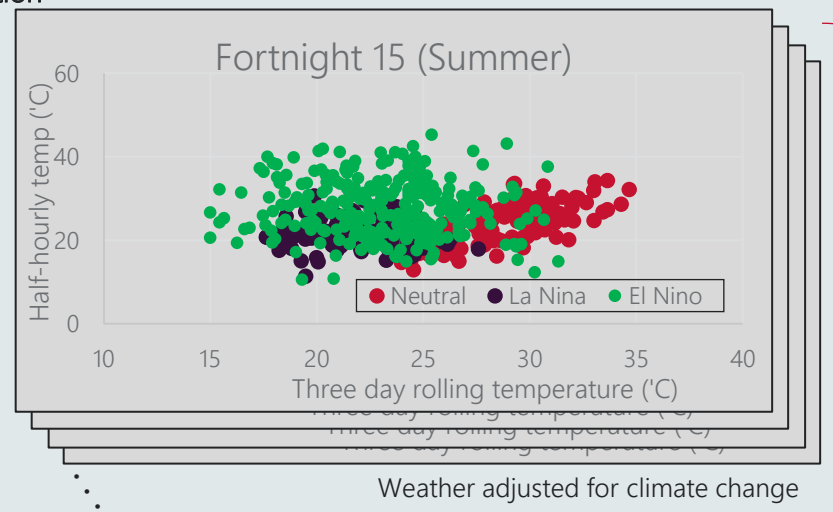
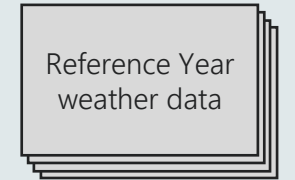
3 Demand trace formation

Objective: Scale trace to match the consumption forecast while maintaining extreme demand values



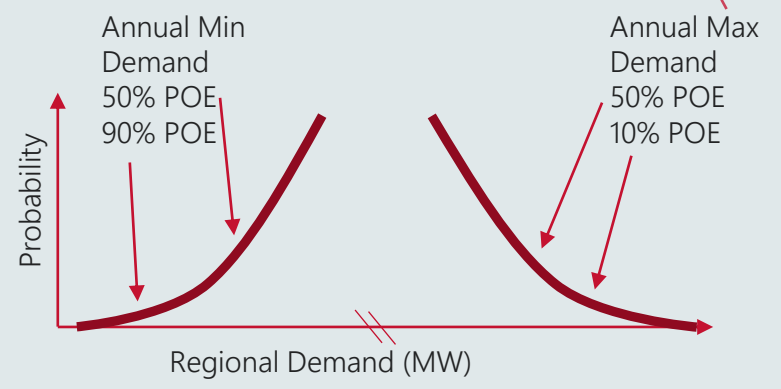
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Pre-electrification Extreme Demand Forecast

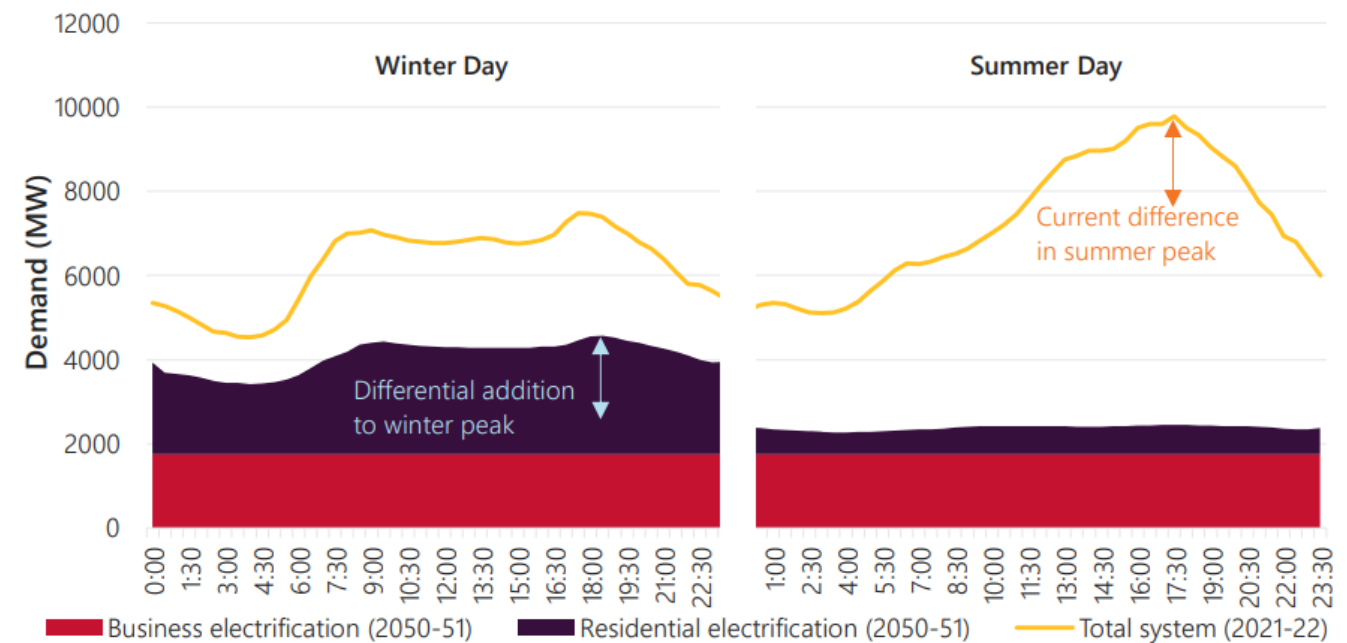


Electrification is included by capturing time of day and seasonality (4/5)

Electrification consumption forecasts are transformed into traces by splitting:

- Industrial consumption into flat demand across the year
- Residential consumption into shaped demand reflecting seasonality and time of day. This incorporates region-specific technology, for example, expected rates of gas for heating in Victoria

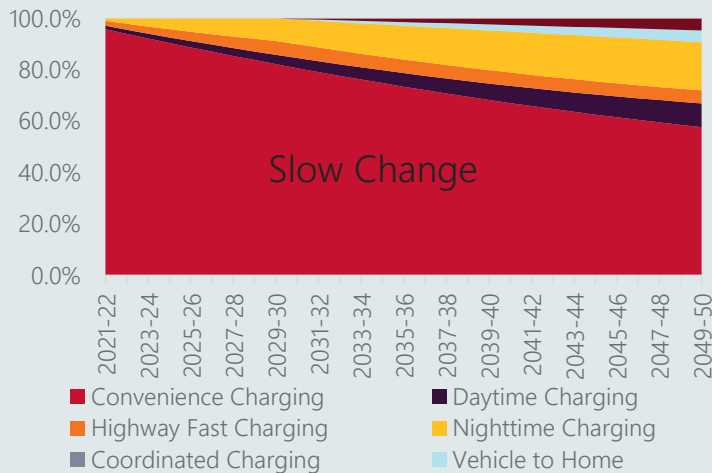
Figure 29 Example daily traces showing peak seasonal conditions for Victoria contrasting current system demand against the forecast additional demand due to electrification, Net Zero 2050, 10% POE conditions



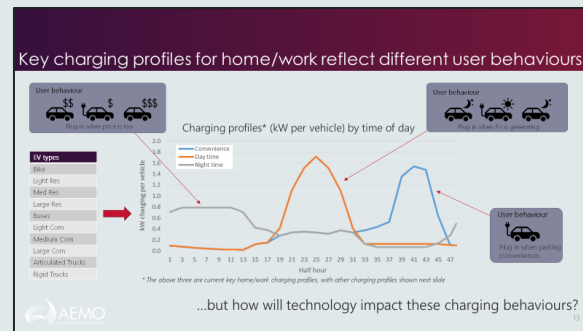
2021 ESOO

EV charge profile weightings were adjusted to reflect scenario narratives moving away from convenience charging (5/5)

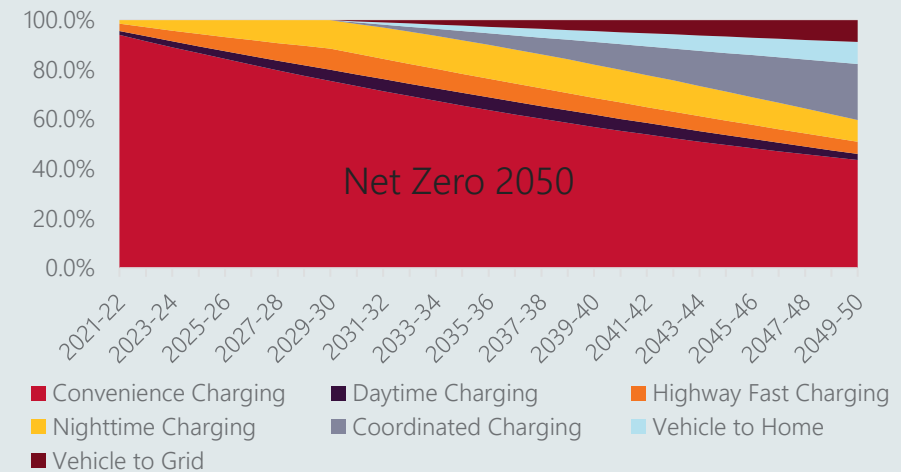
1 The original EV charge profile weightings had all scenarios slowly transitioning from convenience charging, resulting in unrealistic maximum demand towards the end of the forecast horizon



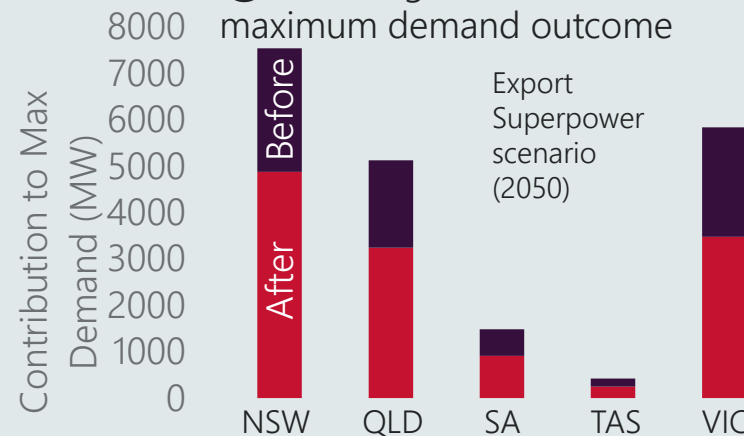
2 So, in consideration of the likely development and deployment of coordinated charging...



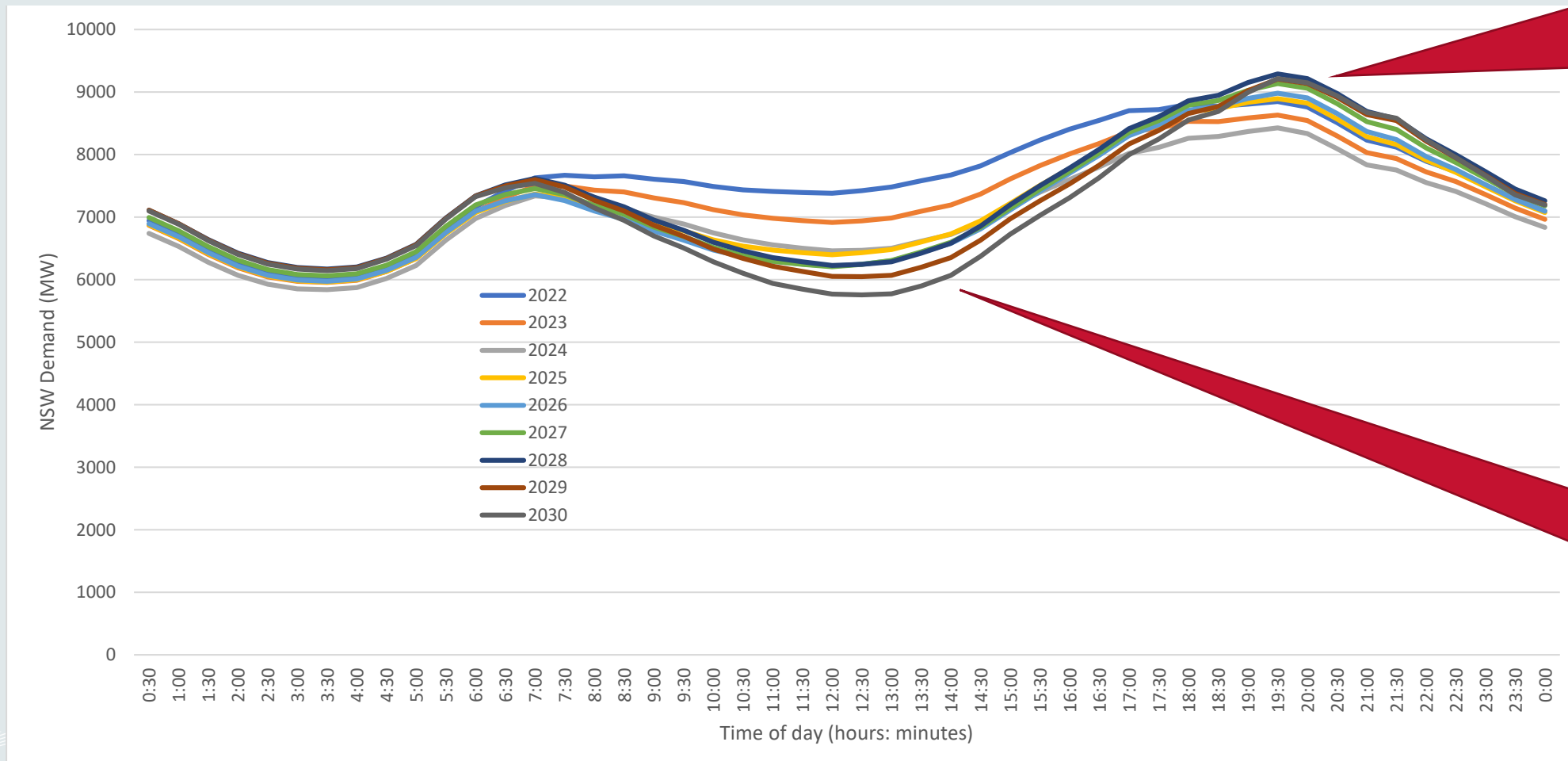
3 ...for faster changing scenarios, convenience charging was transitioned to increased levels of daytime, nighttime and coordinated charging



4 Resulting in a more realistic maximum demand outcome



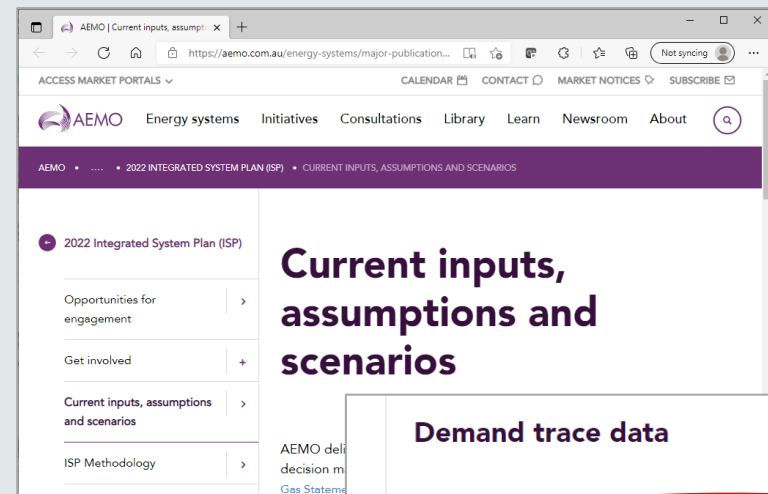
Sample Traces: NSW average February traces show Rooftop PV and EV growth (Net Zero scenario)



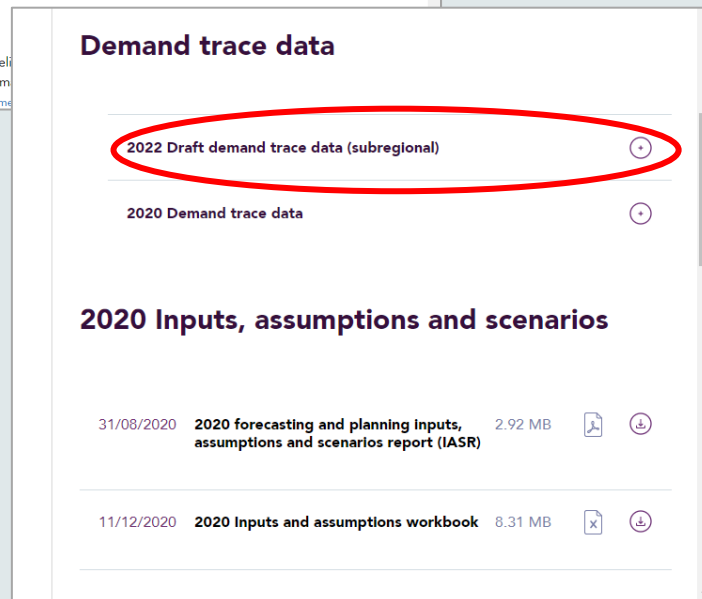
Upward pressure on evening peak due to EV convenience charging

Downward pressure on midday trough due to Rooftop PV

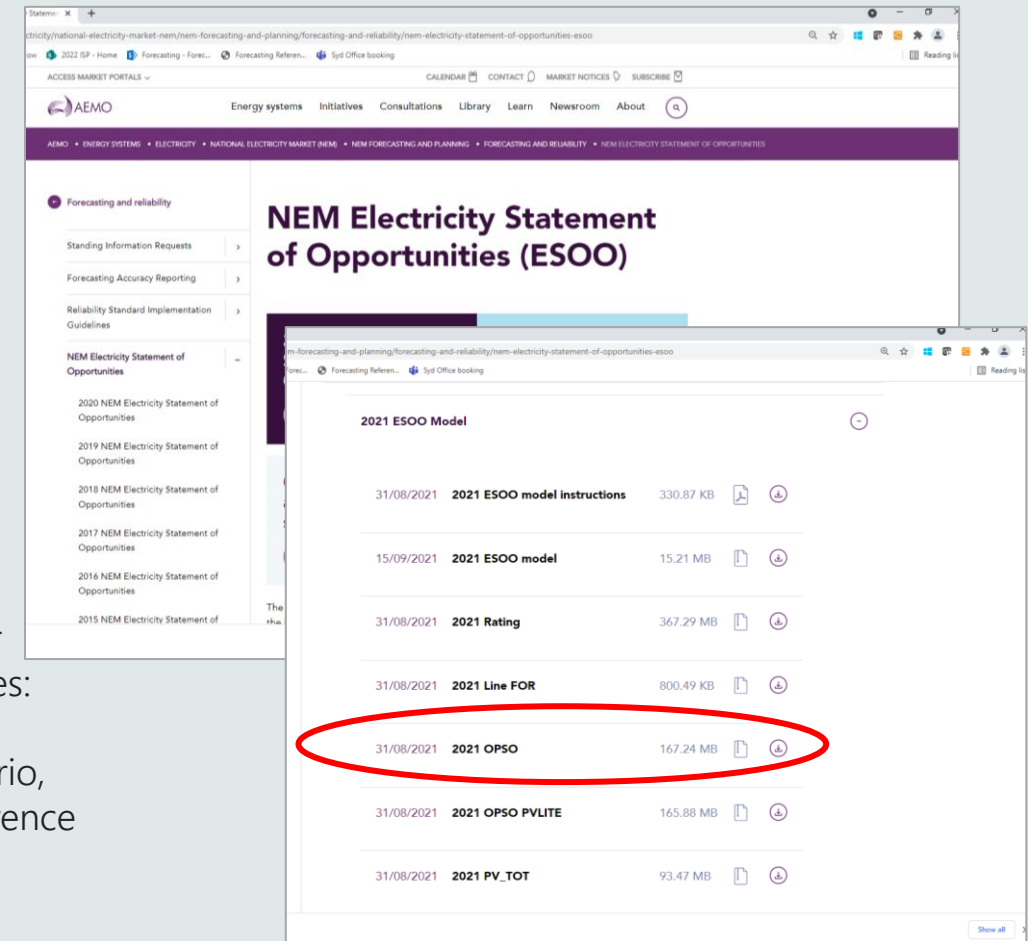
Demand traces are available for download



ISP 30 year demand traces: sub-regional for each scenario



<https://aemo.com.au/en/energy-systems/major-publications/integrated-system-plan-isp/2022-integrated-system-plan-isp/current-inputs-assumptions-and-scenarios>




ESOO 10 year demand traces: regional for central scenario, for each reference year

<https://aemo.com.au/en/energy-systems/electricity/national-electricity-market-nem/nem-forecasting-and-planning/forecasting-and-reliability/nem-electricity-statement-of-opportunities-esoo>

Appendix: Recap slides from 28 July 2021 FRG

Key charging profiles for home/work reflect different user behaviours

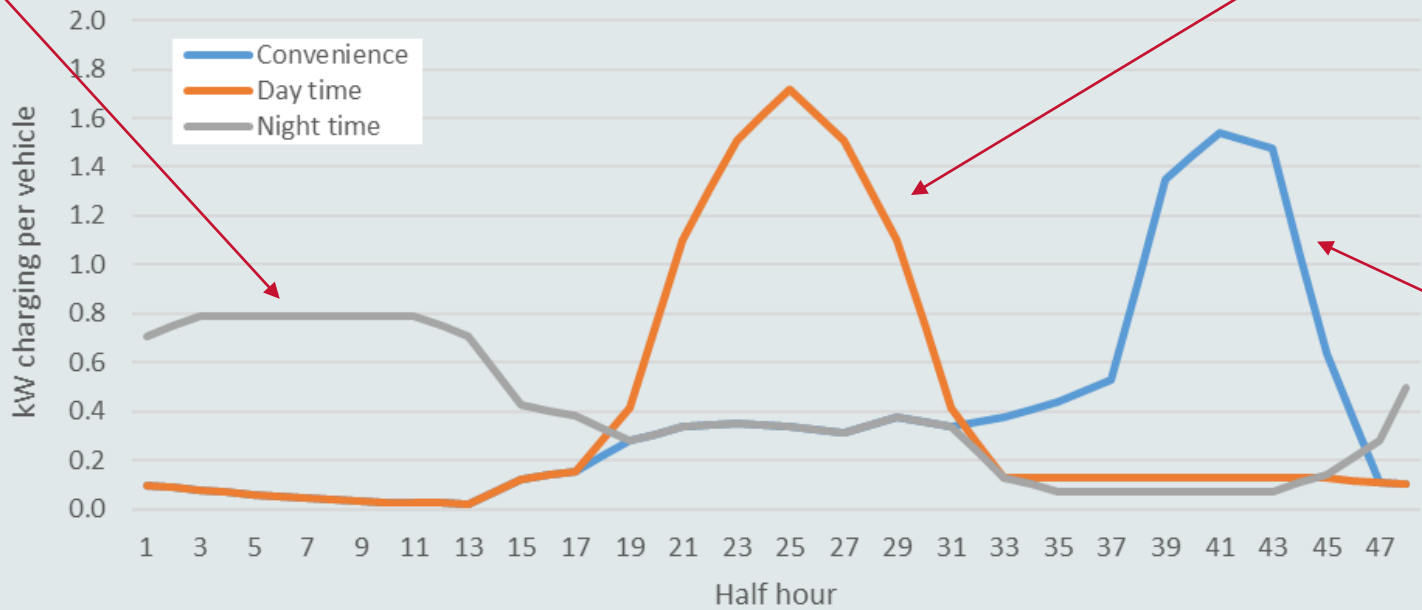
User behaviour




Plug in when price is low

EV types
Bike
Light Res
Med Res
Large Res
Buses
Light Com
Medium Com
Large Com
Articulated Trucks
Rigid Trucks

Charging profiles* (kW per vehicle) by time of day



User behaviour



Plug in when PV is generating

User behaviour



Plug in when parking (convenience)

* The above three are current key home/work charging profiles, with other charging profiles shown next slide

...but how will technology impact these charging behaviours?

AEMO will refine models and profiles of smart/coordinated charging as it evolves

