Draft Maximum and Minimum Demand forecasts 2022

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Forecasting Reference Group Meeting

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The presentation seeks feedback on draft unconstrained, non-coincident maximum and minimum demand forecasts

Today's presentation contains:

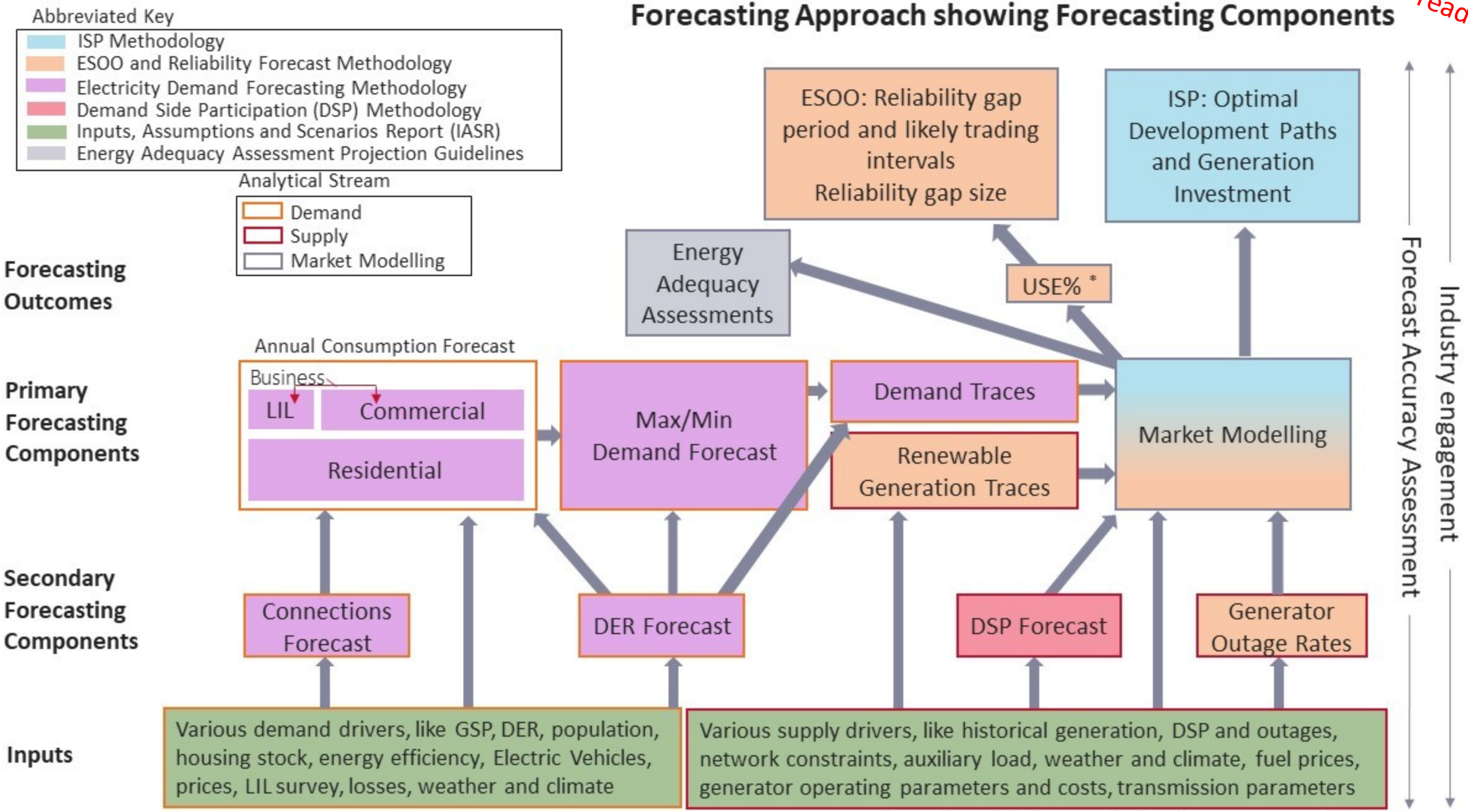
- Unconstrained maximum and minimum demand forecast.
  - No market mechanisms or interventions included, such as RERT, Load Shedding, DSP, Battery VPP or EV VPP (Virtual Power Plant).
  - Ignores system stability, network specifications and generation constraints.
- Non-coincident maximum and minimum regional demands.
- Forecast inputs previously presented at past FRGs.

The forecasts do not contain the impacts of Electrification and Hydrogen.

2022	ESOO related discussion
May FRG	Draft consumption forecasts
Today	**• Draft DSP forecasts** **• Draft maximum and minimum forecasts** **• Transmission and generation forced outage rates**
August	ESOO publication

Pre-reading

Forecasting Approach showing Forecasting Components



* See also Reliability Standard Implementation Guidelines

See AEMO's Forecasting Approach

Understanding the language of forecasting electricity consumption

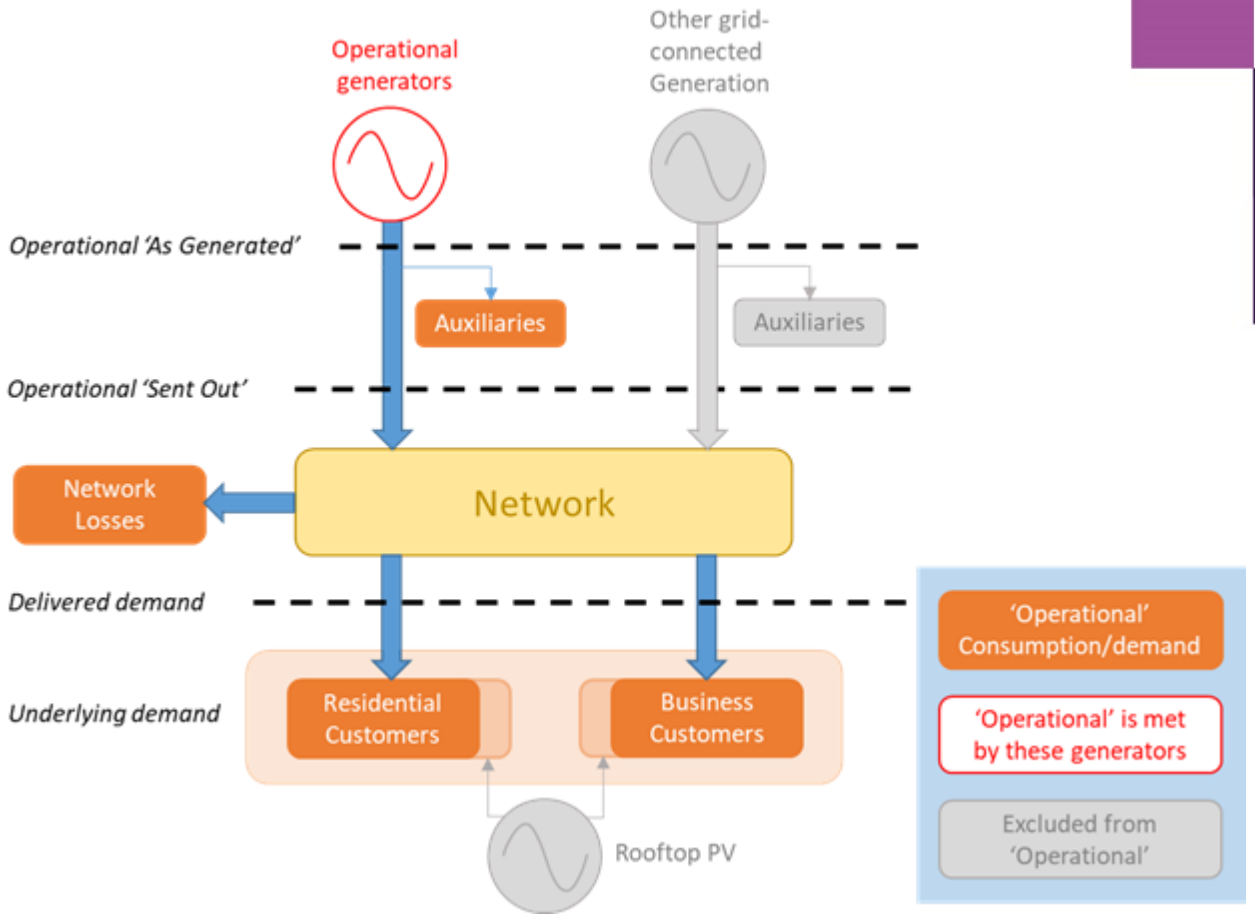
Pre-reading

Key forecasting definitions in use today:

- **Underlying Demand:**
  - Underlying demand is the "power point" demand of consumers, irrespective of where that power is generated (from the grid or within the home).
- **Delivered Demand:**
  - Delivered demand is the demand that is met from the transmission grid, net of any distribution-generated energy such as rooftop PV
- **Operational Demand**
  - What is consumed by consumers, as supplied by scheduled, semi-scheduled and significant non-scheduled generating units >= 30MW (with some exceptions).

Key demand measurement points:

- **"Sent Out"**
  - Electricity supplied to the grid by scheduled, semi-scheduled and significant non-scheduled generators (excluding auxiliary loads)
- **"As Generated"**
  - As per Sent Out, but including auxiliary loads (that load which is used within a power station)



For detailed definitions, see: demand-terms-in-emms-data-model.pdf (aemo.com.au)

Overview: solar PV, Electric Vehicle (EV) and battery forecasts are important drivers of maximum and minimum demand

- **2021-22 summary:**
  - 2021 had the highest Distributed PV capacity installed, breaking 2020's record.
  - La Niña (mild weather summer).
- **DER forecasts:**
  - PV, Batteries and EV forecasts are similar to 2021 ESOO.
  - Batteries and EV uptake forecasts remain low in the first years of forecast but take off from 2025-2030.
- **Scenarios:**
  - 2022 ESOO reliability forecast scenario is Step Change compared to Net Zero (ESOO Central) in the 2021 ESOO.

Maximum demand:

- Short term (0-3 years)
  - Generally flat growth across the regions with the exception of South Australia and Tasmania where it is growing
  - Low PV contribution at time of maximum (late afternoon)
- Long term
  - Moderate growth in the tail in most regions with the exception of Tasmania
  - Low PV contribution at time of maximum (evening)

Minimum demand:

- Short term (0-3 years)
  - Starting slightly higher compared to 2021 ESOO due to LIL increase
  - A 1 MW increase in PV results in around a 0.7 MW decrease in minimum demand (all else being equal)
- Long term
  - Driven by faster growth in distributed PV (DPV) compared to underlying demand drivers
  - SA, VIC and QLD experience negative demand within the next 10 years

Regional overview

Step Change forecasts to 2042

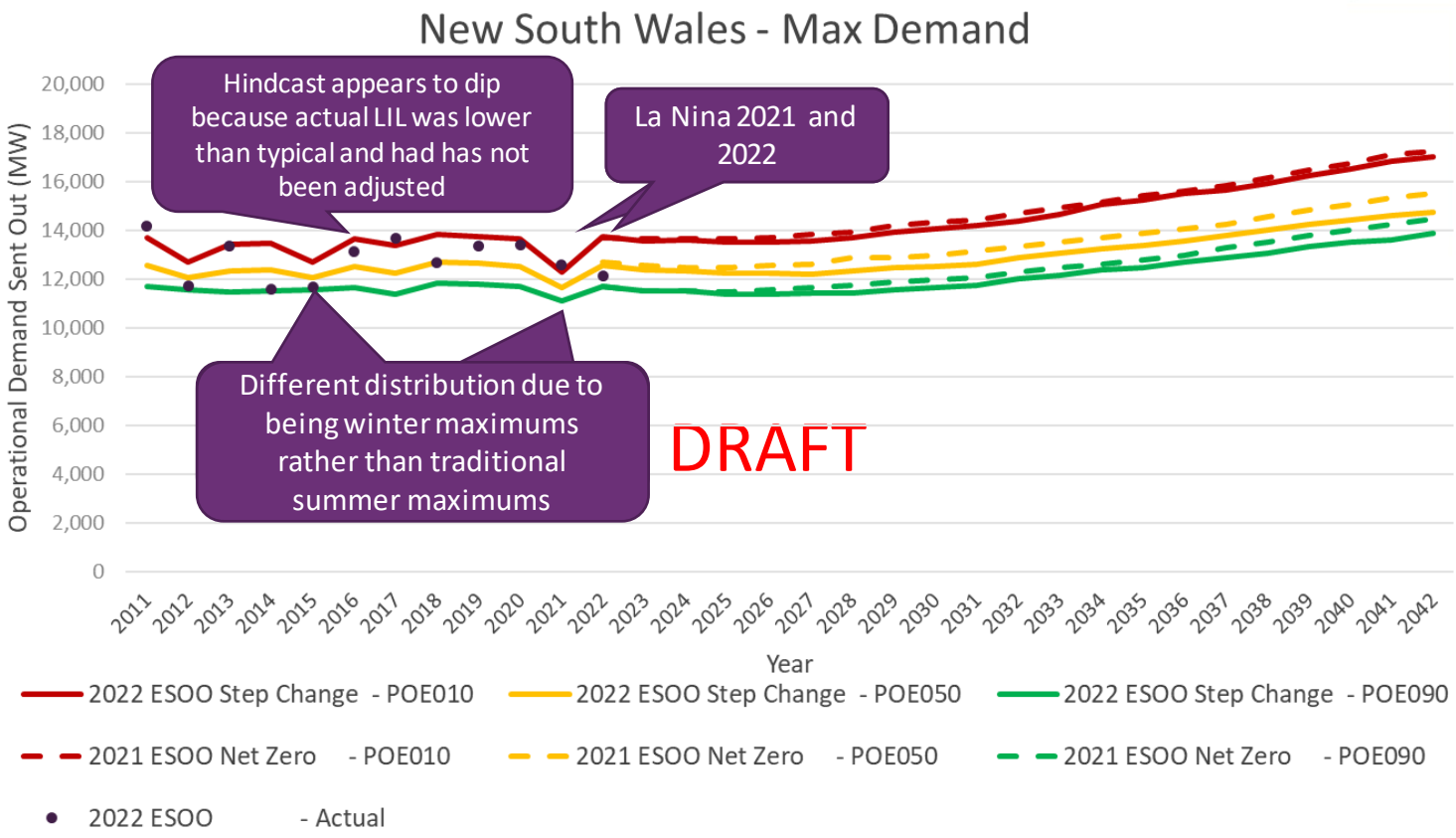
New South Wales maximum

Short term (0-3 years):

- Time of maximum, 5:30pm-7:00pm
- Relatively flat trend.
- **Slightly lower compared to ESOO 2021; slightly higher LIL offset more by lower base load (mostly BUS).**

Long term:

- Time shifts 7:00-8:30pm; DPV contribution negligible.
- **Forecast to grow steadily post 2027; declining LIL offset more by growth in base and cooling loads.**
- EV demand expected to reach over 1 GW in 2033.
- **Slightly lower forecast compared to ESOO 2021; slightly higher cooling load offset more by lower base load and lower EV.**



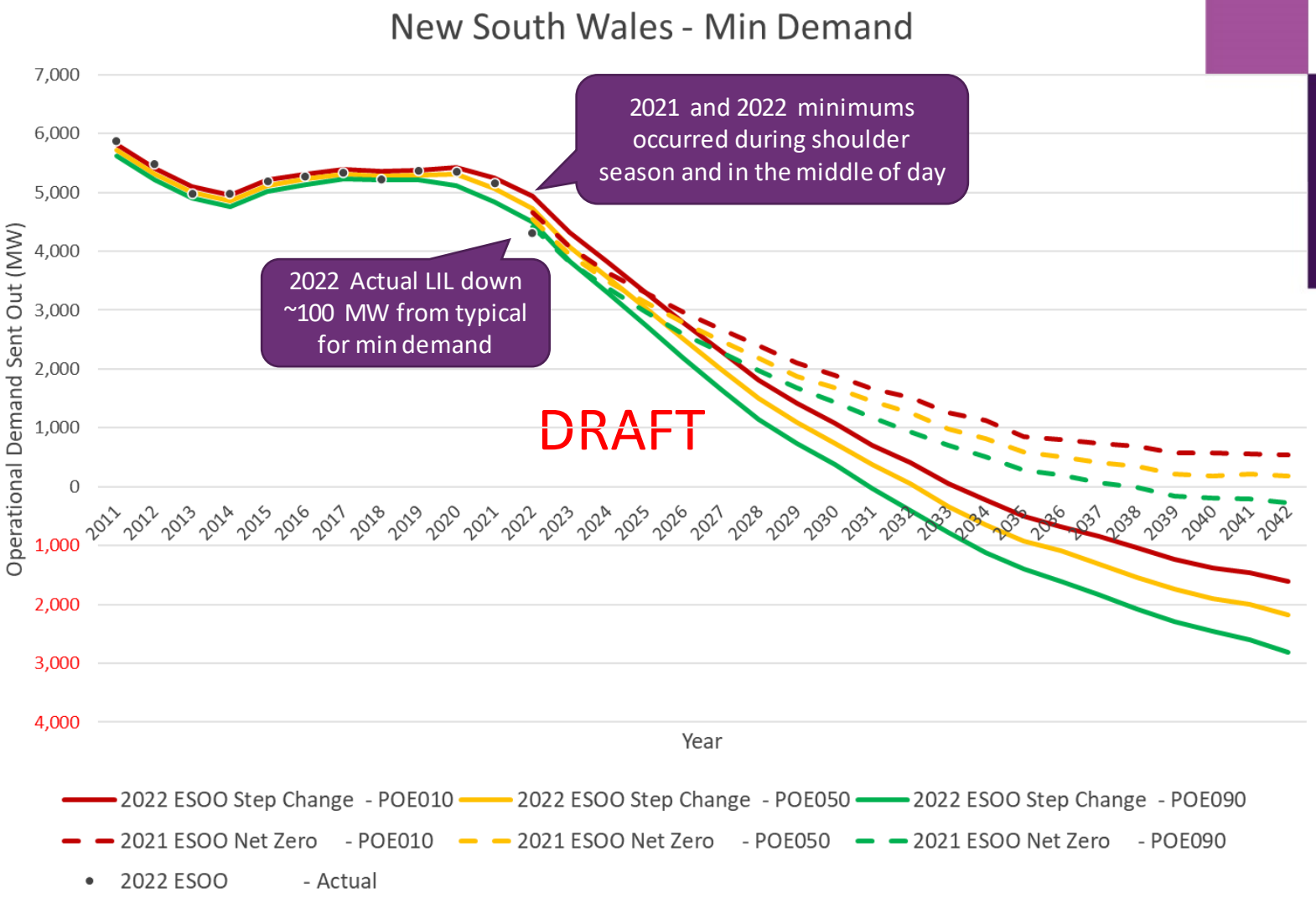
New South Wales minimum

Short term (0-3 years):

- 2022 minimum demand occurred during the middle of the day in Shoulder and is forecast to continue.
- **Forecast to start slightly higher compared to 2021 ESOO; slightly higher LIL and base load.**

Long term:

- DPV contribution to minimum demand continues to grow.
- **POE50 becomes negative in 2033.**
- **Lower compared to 2021 ESOO; slightly higher EVs offset more by increase in DPV forecast.**



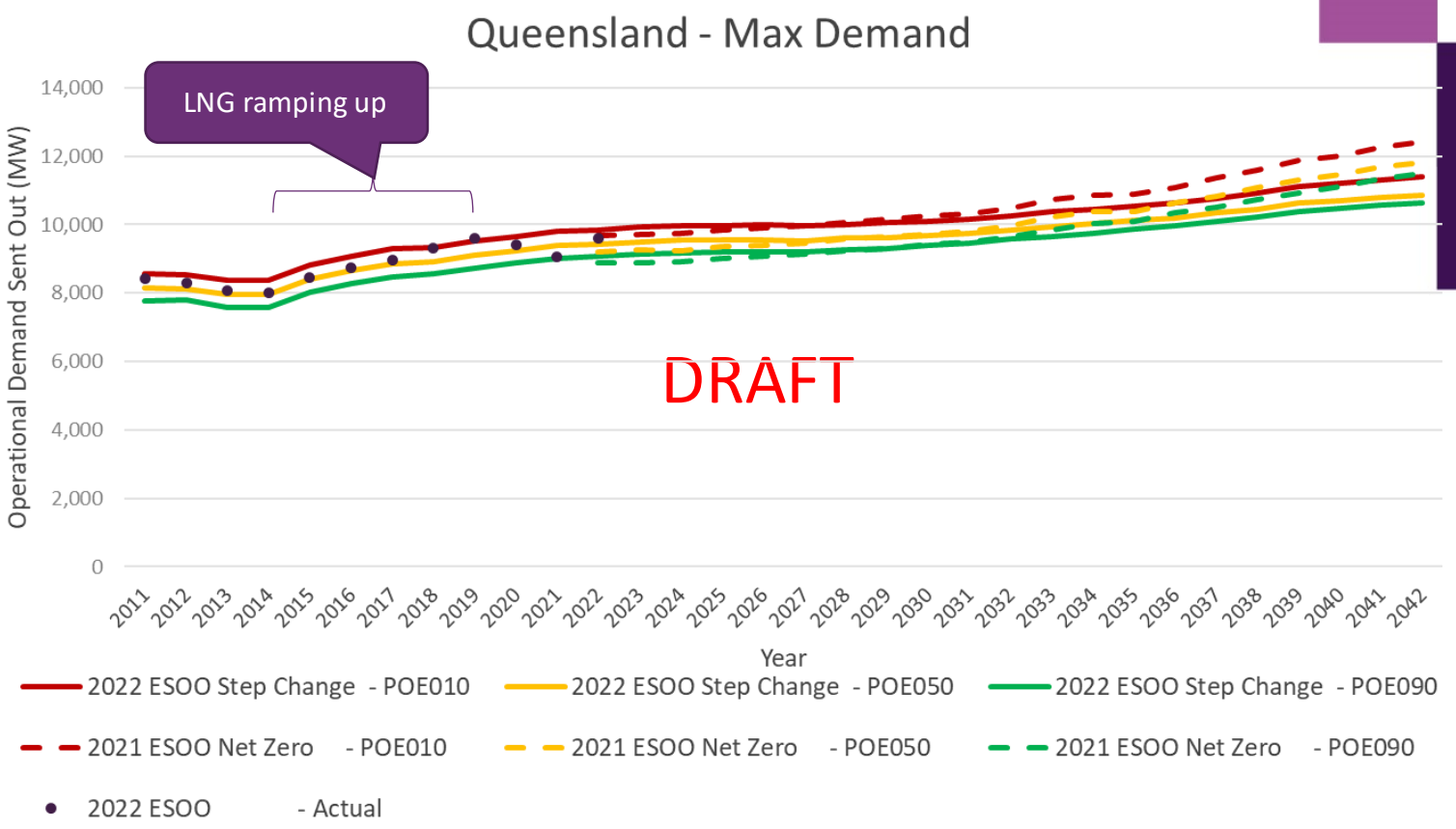
Queensland maximum

Short term (0-3 years):

- Time of maximum forecast to shift further into the evening between 6:00pm-7:30pm; higher DPV uptake.
- **Forecast to start slightly higher compared to 2021 ESOO; higher cooling load (RES).**
- Forecast to remain relatively flat.

Long term:

- Time of maximum is forecast to occur between 7:00pm-8:00pm following 2028.
- **Forecast to grow; continued growth in residential load.**
- **Lower forecast compared to 2021 ESOO post 2028; slightly higher cooling load offset more by lower base load and lower LIL (post 2033).**



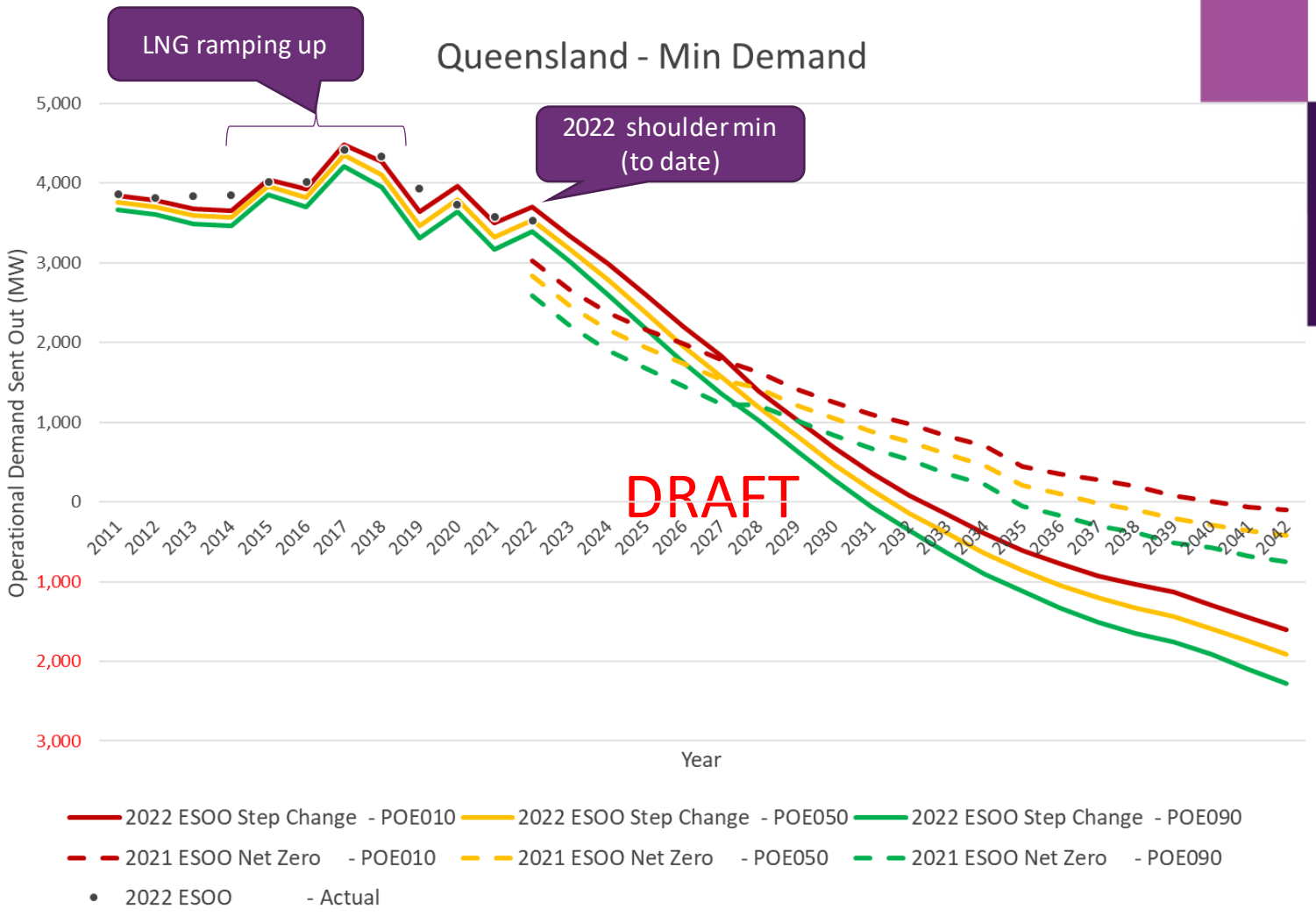
Queensland minimum

Short term (0-3 years):

- Minimum has occurred in middle of the day in winter for the past five years and is forecast to stay so. LIL can potentially lead to a shoulder minimum.
- **Starting higher compared to 2021 ESOO; higher base load (coming from GEV model improvements) and higher LIL with slightly less DPV.**

Long term:

- Forecast to switch from winter to shoulder from 2028.
- **POE50 becomes negative in 2032, 5 years earlier than 2021 ESOO; increase in DPV uptake.**
- **From 2027, lower compared to 2021 ESOO; higher base load and higher LIL until 2033 (then lower) offset more by DPV.**



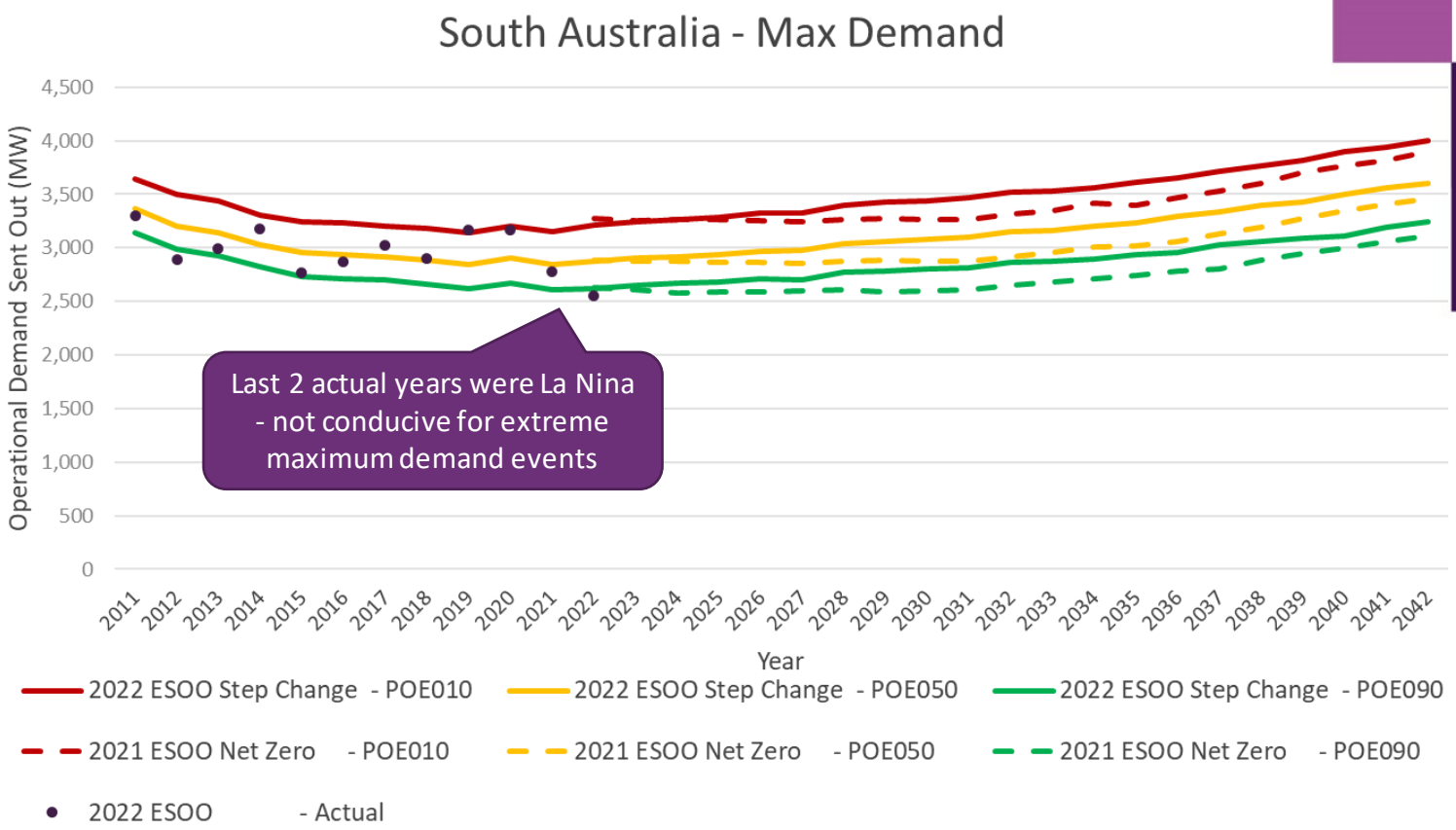
South Australia maximum

Short term (0-3 years):

- Time of maximum to occur 7:00pm-7:30pm; DPV is having little impact at this time.
- **Increasing; increases in LIL and baseload (BUS).**

Long term:

- Time shifts to 8:00pm–9:00pm.
- **Continues to increase; growth in LIL until 2028 which then declines until 2035 and then remains flat, growth in base and cooling loads.**
- **Higher forecast compared to ESOO 2021, coming from cooling load, LIL and EVs.**



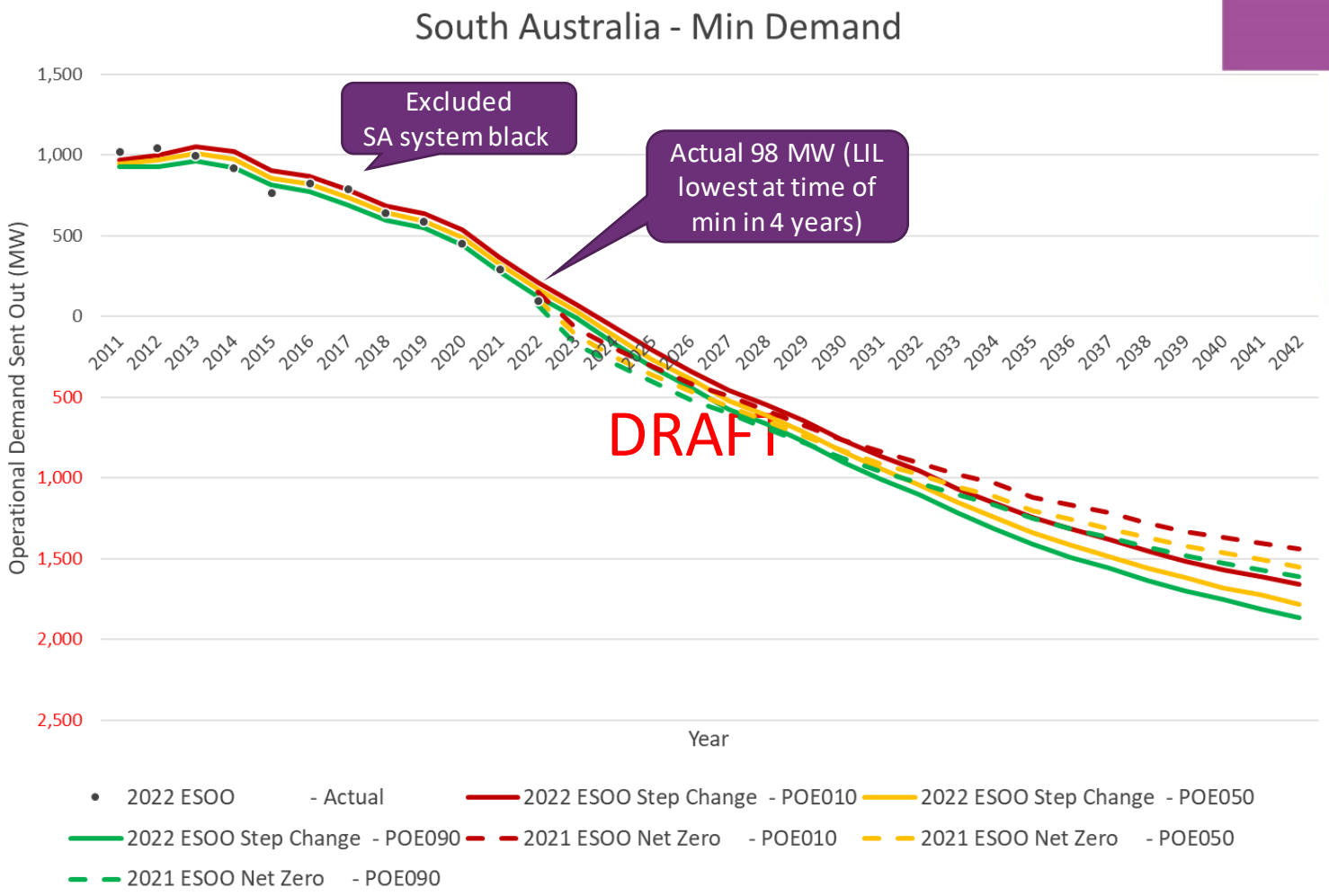
South Australia minimum

Short term (0-3 years):

- Continual decline following on from recent historical trend.
- **Forecast slightly higher compared to ESOO 2021; higher LIL and similar PV.**
- Negative POE50 minimum demands from 2024, 1 year later than ESOO 2021.

Long term:

- DPV contribution to minimum demand continues to grow.
- Growth in battery installations and EVs helping to absorb some DPV generation.
- **Compared to ESOO 2021, net differences between higher LIL and higher DPV result in slightly lower forecasts.**



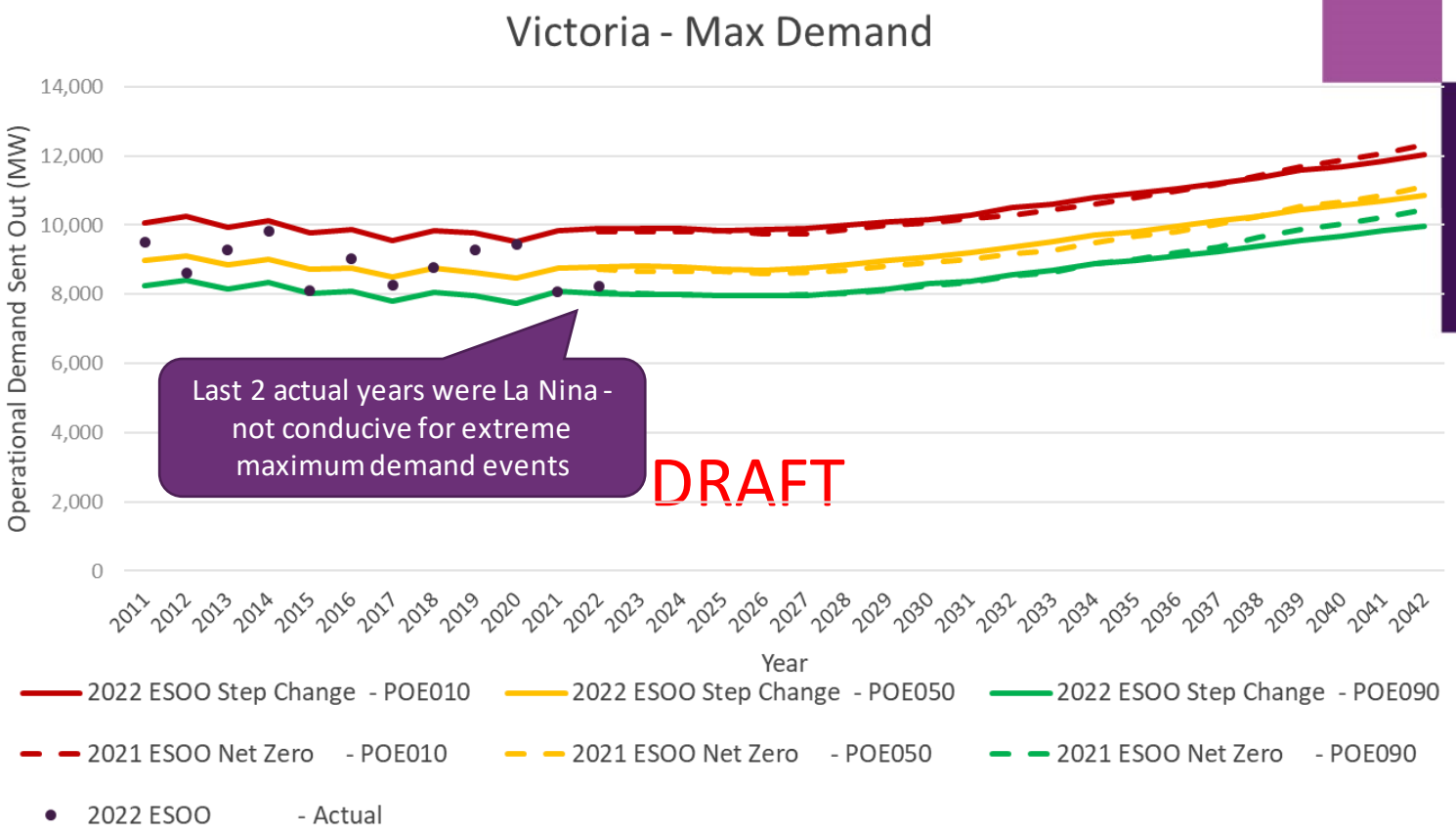
Victoria maximum

Short term (0-3 years):

- Maximum demand occurs 7:00pm-8:00pm.
- Forecast trend is relatively flat.
- **Slightly higher forecast compared to 2021 ESOO; higher LIL.**

Long term:

- Time shifts to 8:00pm-9:00pm from 2031.
- **Forecasts start to slowly increase from 2027; slight decline in LIL offset more by growth in base and cooling loads (RES).**
- Slightly higher compared to 2021 ESOO until 2037, then lower driven by faster rate of decline in LIL and lower EVs.



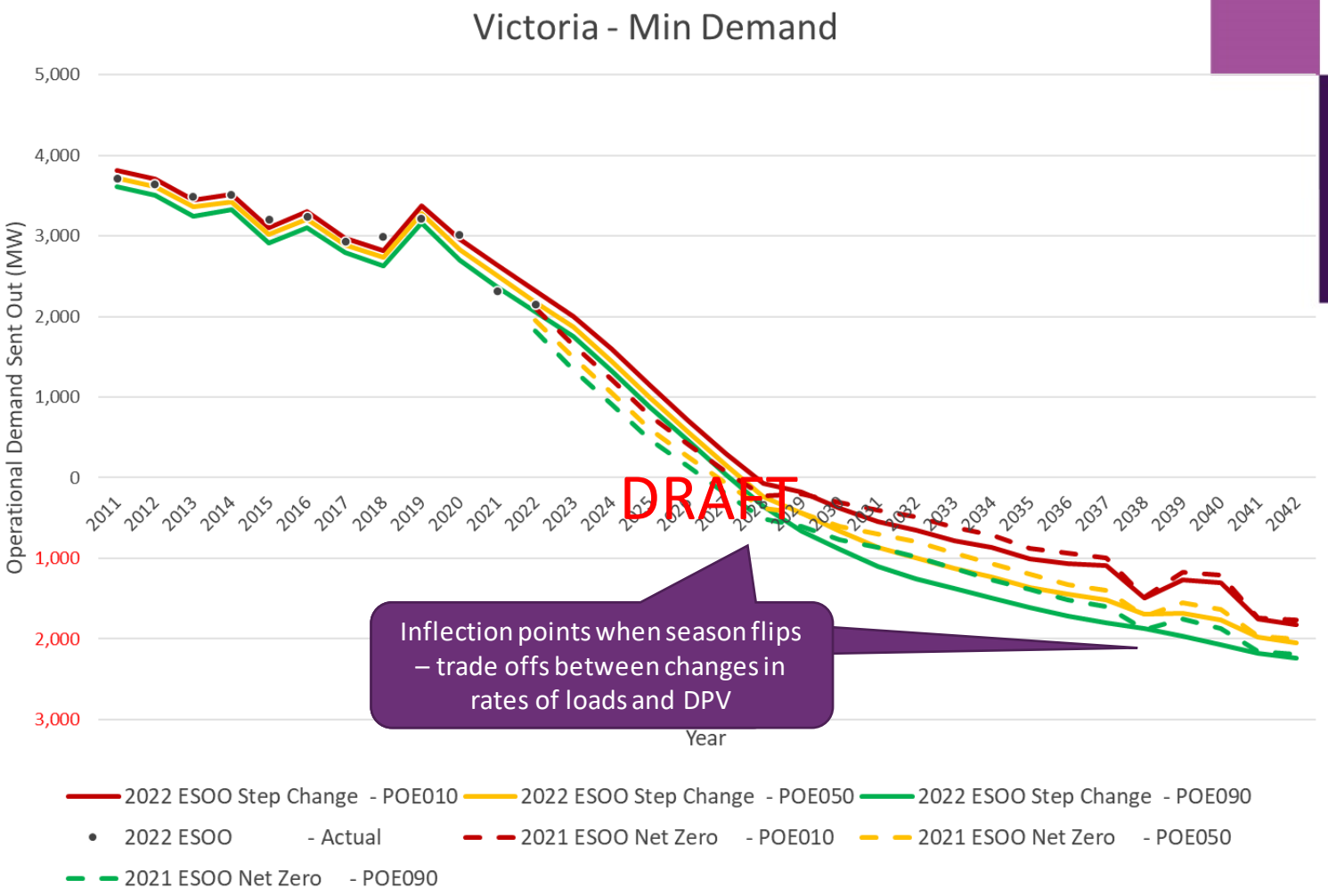
Victoria minimum

Short term (0-3 years):

- Minimum demand has occurred during the middle of the day in summer for the past 3 years and is forecast to stay so.
- DPV uptake cause minimum demand to continue to decline.
- **Forecast to start higher compared to 2021 ESOO; slightly higher base load and higher LIL.**

Long term:

- POE50 becomes negative in 2028, 1 year earlier than 2021 ESOO.
- Forecast to switch season from summer to shoulder in 2029, then flip between the two seasons from 2038.
- **Slightly higher until 2028 compared to 2021 ESOO, then slightly lower.**



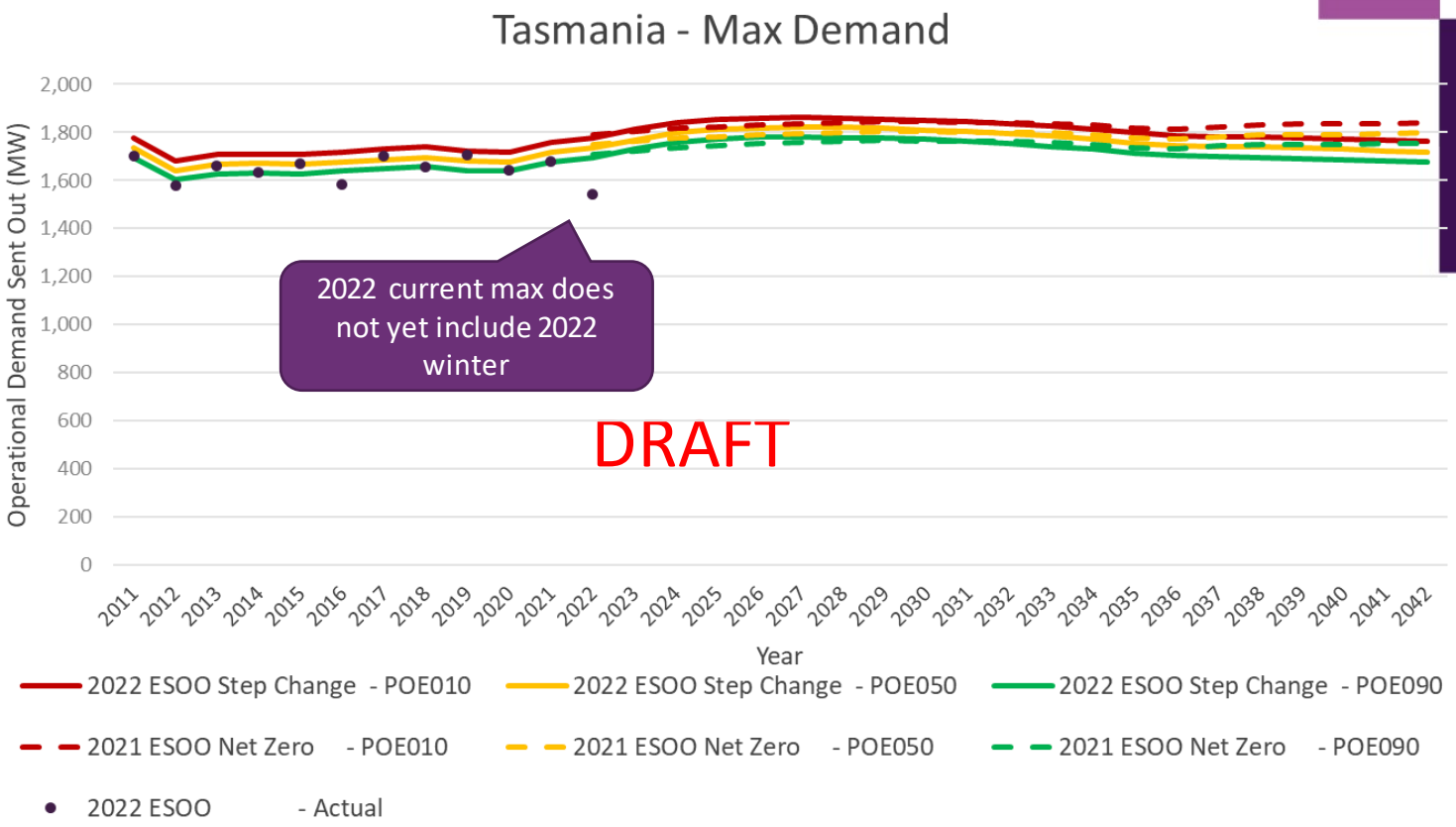
Tasmania maximum

Short term (0-3 years):

- Maximum demand in TAS occurs in winter and historically just before or after business hours and is forecast to stay so.
- **Forecast to slightly increase; slight increase in base load (RES).**
- Slightly lower compared to 2021 ESOO; higher heating load offset more by lower base load and lower LIL.

Long term:

- Time of maximum demand to settle to early evening from 2029.
- Declines from 2027; mostly from LIL.
- **Lower compared to 2021 ESOO from 2032; faster rate of decline in LIL.**



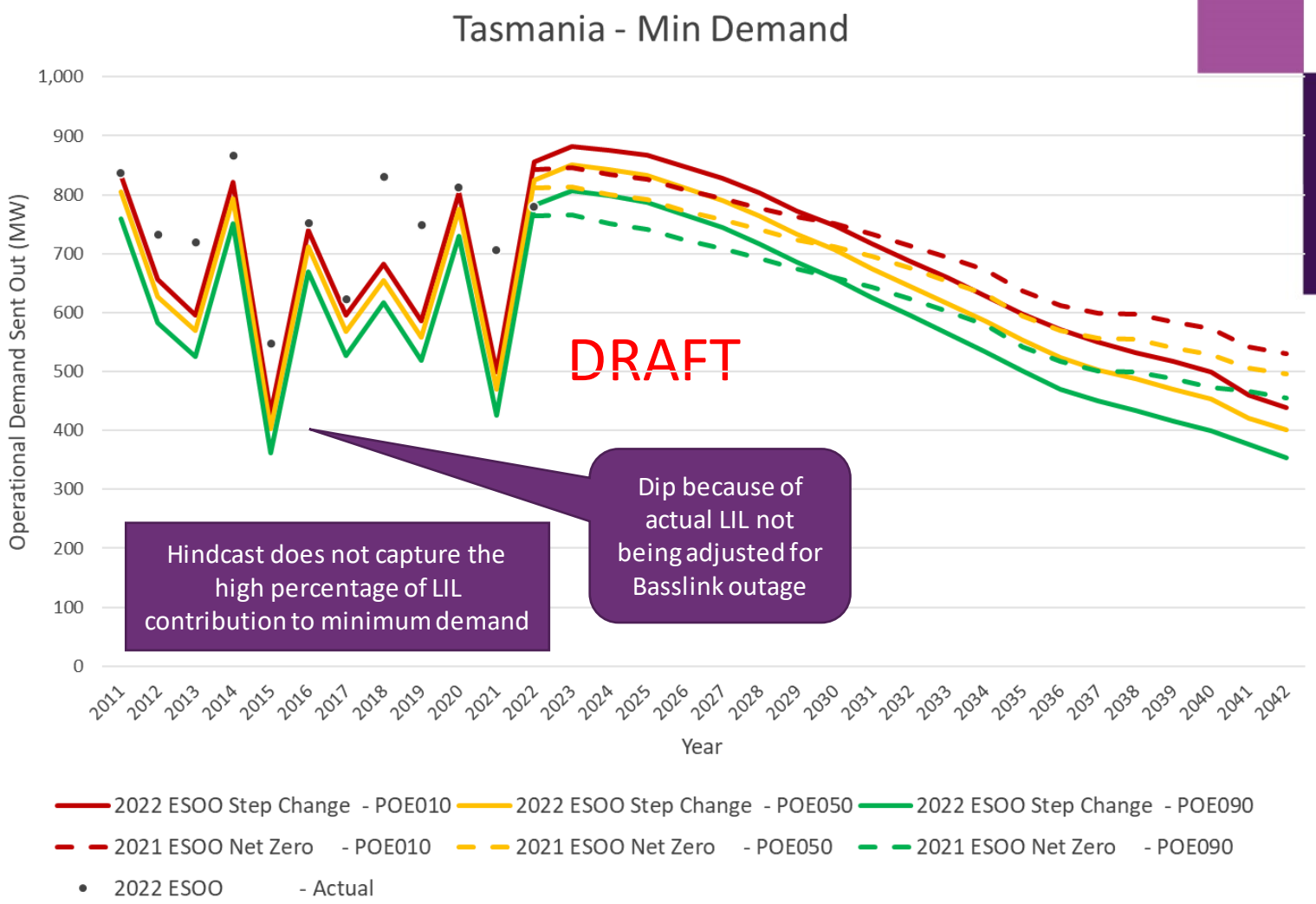
Tasmania minimum

Short term (0-3 years):

- Very sensitive to LIL behaviour.
- 2022 minimum occurred during the middle of the day in the shoulder season and is forecast to stay so.
- Slight increase in first year; increase in LIL.
- **Slightly higher compared to 201 ESOO; slight increase in DPV offset more by increase in base load and increase in LIL.**

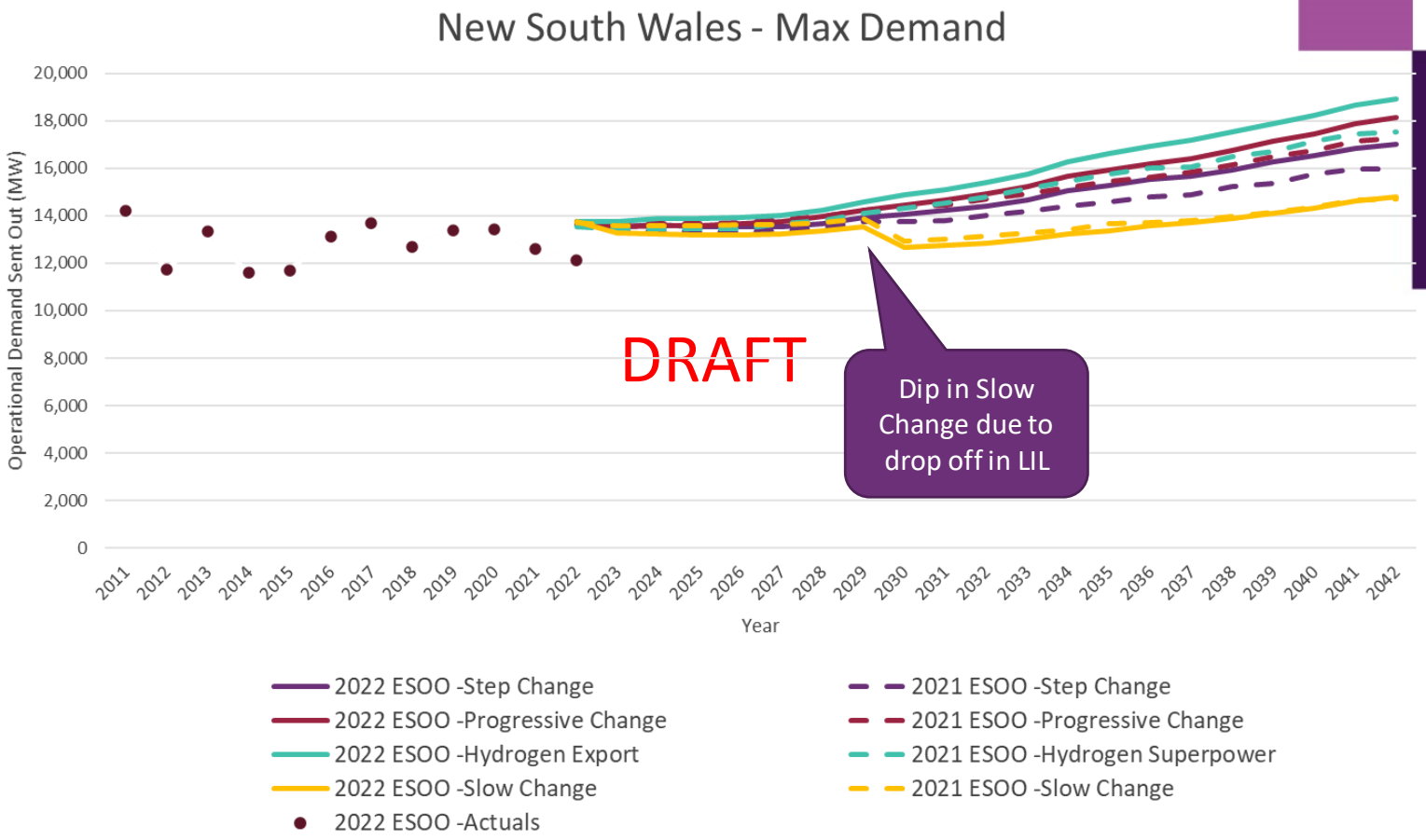
Long term:

- Forecast to decline due to DPV uptake and flat trend in underlying demand.
- Growth in battery installations and EVs helping to absorb some DPV generation.
- **Forecast to decline faster and be lower from 2030 compared to 2021 ESOO; higher rate of DPV uptake.**



New South Wales – All Scenarios – POE10 maximum demand

- Generally showing similar trend compared to 2021 ESOO.
- **Higher compared to 2021 ESOO for all scenarios other than Slow Change; higher cooling load (BUS) and LIL.**
- Wider spread between scenarios.



Stakeholder discussion

Do you think these demand forecasts are reasonable?

Are there any other material inputs for demand that we have not taken into consideration?

What other considerations should we include in the future?

Appendix

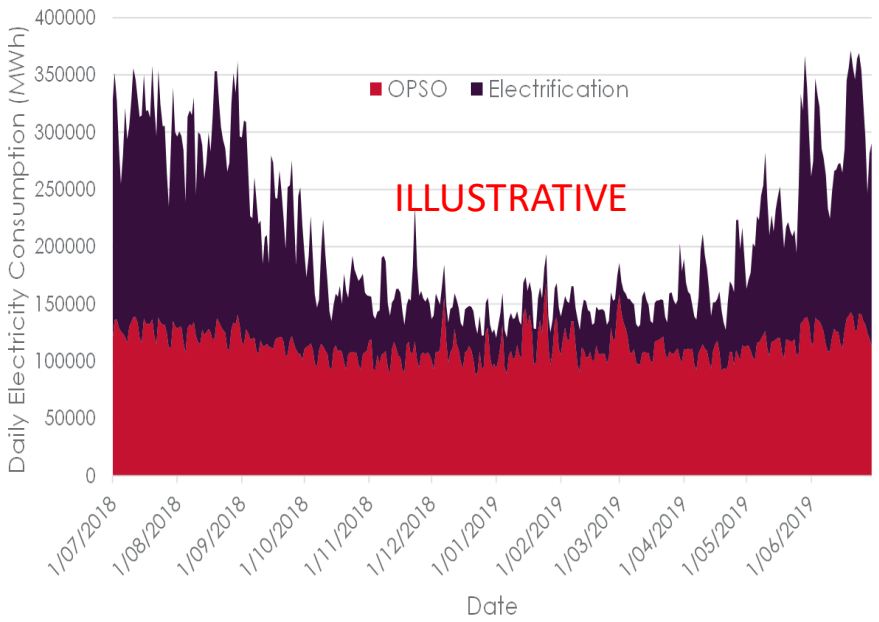
AEMO
AUSTRALIAN ENERGY MARKET OPERATOR

Annual electrification energy is allocated to Residential and Business/Industrial according to assumed profiles

Pre-reading

Electrification is developed at an annual level by the multi-sector model, and then allocated:

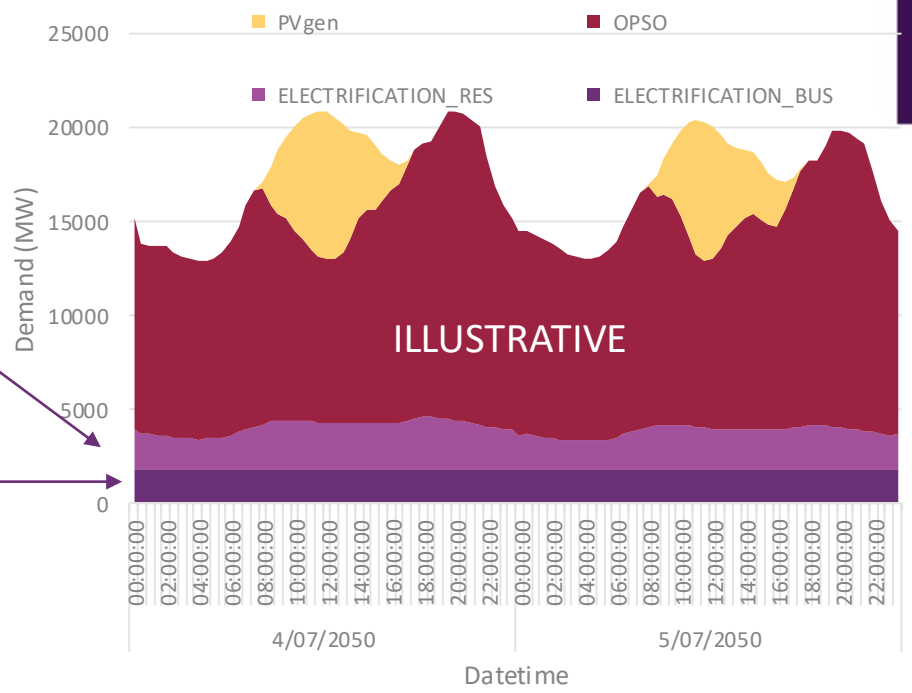
Seasonally, across the year



Residential electrification demand reflects heating use, within day and seasonally.

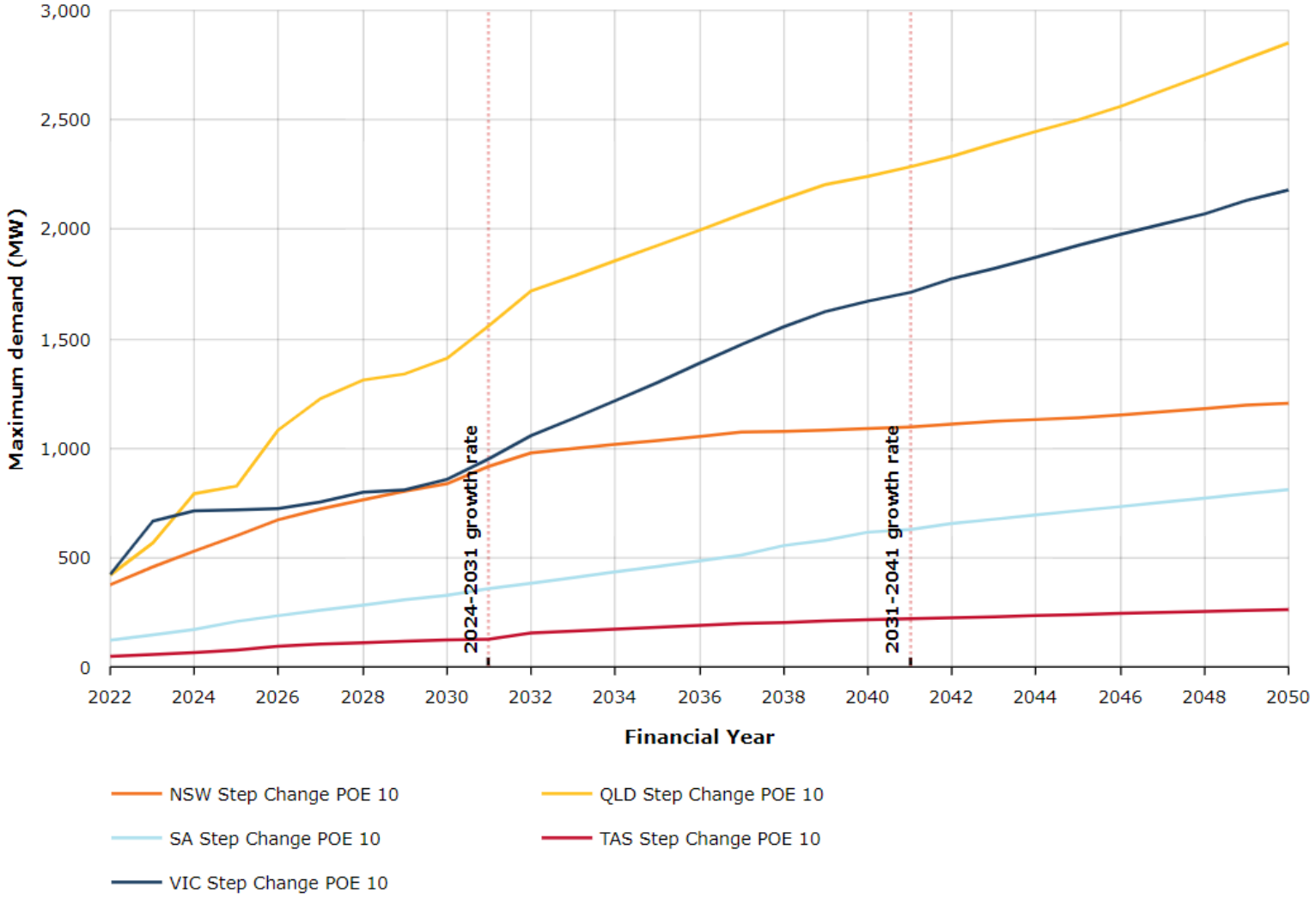
Business and industrial electrification is assumed to flat load across day and season.

Across each day



Electrification at min and max demand times is discussed in each regional slide.

2021 Electrification forecasts, still relevant, show a large increase to maximum summer demand



http://forecasting.aemo.com.au/Electricity/MaximumDemand/Operational