Draft Maximum and Minimum Demand forecasts 2021

Energy.forecasting@aemo.com.au

www.Sli.do #FRG

Purpose and context

2021	ESOO related discussion	Presenter
Feb FRG	Draft economic forecasts	BIS OE
	Future treatment of COVID-19	AEMO
	Electric Vehicle (EV) numbers and charging	AEMO
March	Energy Efficiency (EE) workshop	SPR, AEMO
Mar FRG	2020-21 summer maximum demand review	AEMO
	DER & connections – Assumptions, methodologies and inputs	GEM, CSIRO, AEMO
April FRG	DER Update, EE, Industrial Loads, Appliance Index, Fuel switching and Multi-sector modelling	AEMO
May FRG	Draft annual electricity consumption forecasts	AEMO
30-June FRG	Multi-sector modelling	AEMO, CSIRO
Today	**Draft maximum and minimum demand forecasts**	**AEMO**

The forecasts presented do not contain the impact of Hydrogen

Purpose:

- Present draft ESOO 2021 NEM maximum and minimum demand regional forecasts
- Discuss FRG feedback

Pre-reading:

- This presentation uses unconstrained, non-coincident operational demand definition
- Forecast inputs and 2021 summer maximum and minimum demand review have already been covered and engaged on.
  - Min/max demand is largely a data driven process. The inputs and assumption and the methodology already consulted on largely drives the min/max demand output we are seeing today
- COVID-19 adjustments removed due to lack of evidence of materiality
- Electrification in max/min demand

Pre-reading

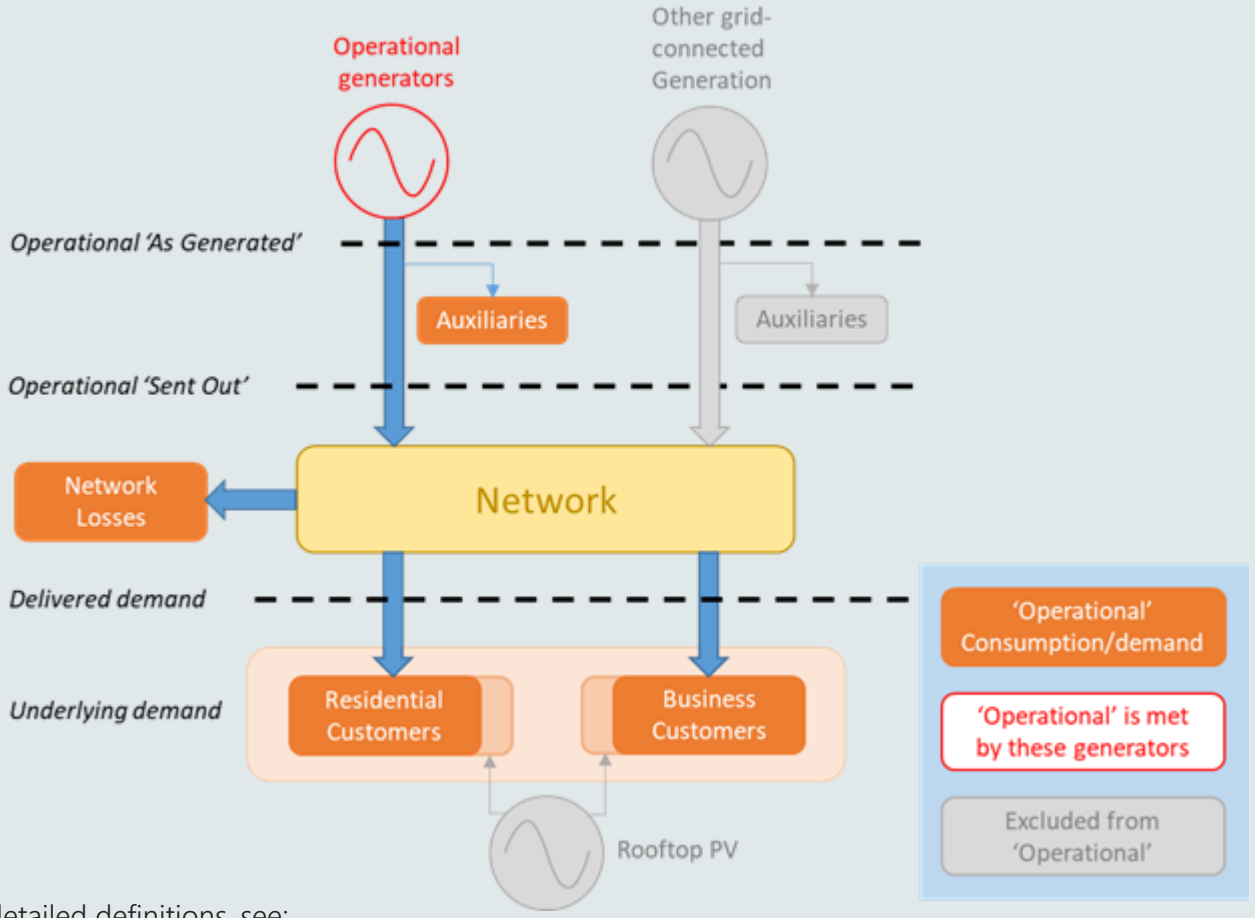
Today's presentation uses Operational Demand as Sent Out

Key forecasting definitions:

- 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 distributed PV
- Operational Demand
  - What is consumed by consumers, as supplied by scheduled, semi-scheduled and significant non-scheduled generating units >= 30 MW (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: https://www.aemo.com.au/-/media/files/electricity/nem/security_and_reliability/dispatch/policy_and_process/2020/demand-terms-in-emms-data-model.pdf?la=en

This presentation covers unconstrained, non-coincident demands

Today's presentation contains:

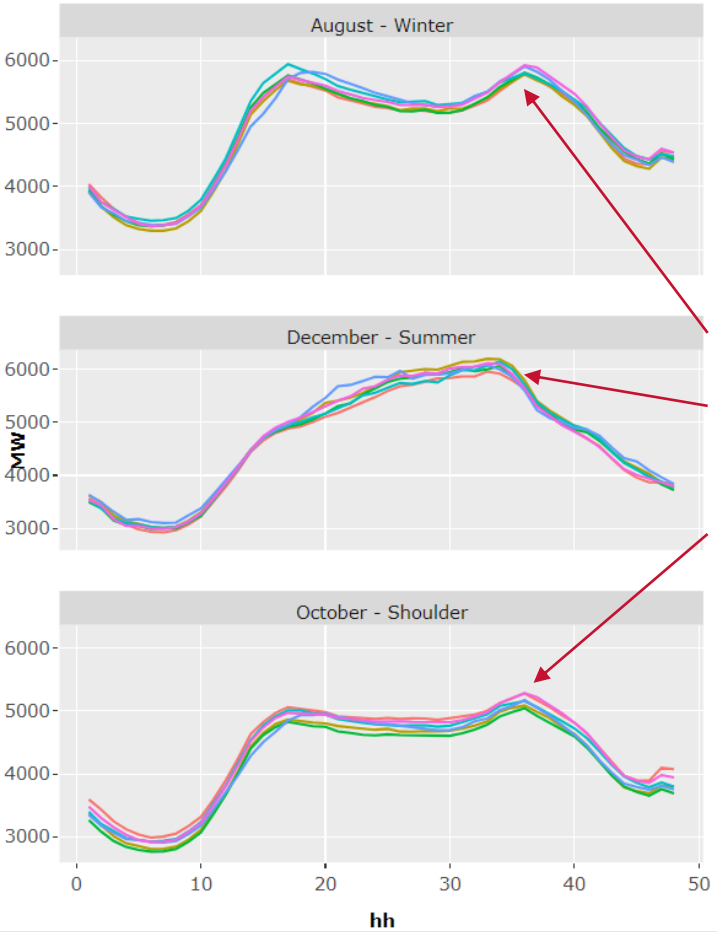
- Unconstrained maximum and minimum demand forecast.
  - No market mechanisms or interventions included.
    - E.g.: RERT, Load Shedding, DSP, Batteries or EV VPP (Virtual Power Plant).
  - Ignores system stability, network specifications and generation constraints
- Non-coincident maximum and minimum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

2021	ESOO related discussion	Presenter
Feb FRG	Draft economic forecasts	BIS OE
	Future treatment of COVID-19	AEMO
	Electric Vehicle (EV) numbers and charging	AEMO
March	Energy Efficiency (EE) workshop	SPR, AEMO
Mar FRG	2020-21 summer maximum demand review	AEMO
	DER & connections – Assumptions, methodologies and inputs	GEM, CSIRO, AEMO
April FRG	DER Update, EE, Industrial Loads, Appliance Index, Fuel switching and Multi-sector modelling	AEMO
May FRG	Draft annual electricity consumption forecasts	AEMO
30-June FRG	Multi-sector modelling	AEMO, CSIRO
Today	Draft maximum and minimum demand forecasts	AEMO

No evidence of a COVID-19 impact at times of maximum and minimum demand

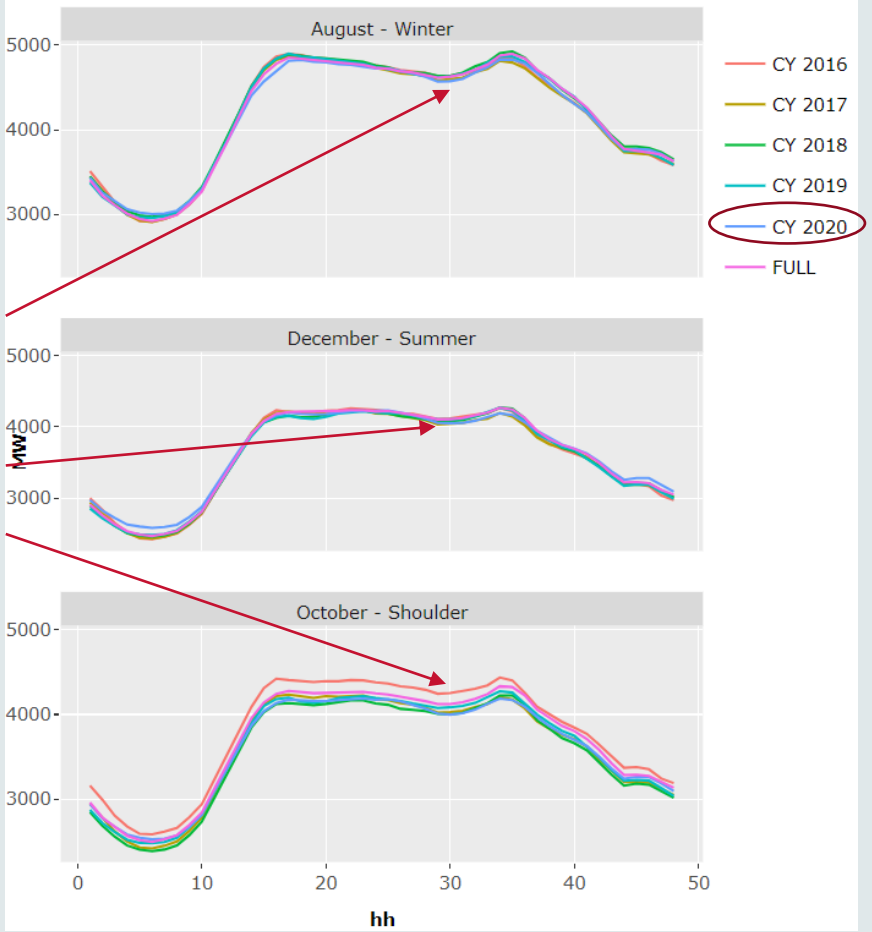
- In the March FRG agreed to: "No special treatment of COVID-19 for ESOO 2021 maximum and minimum demand forecasts"
- Subsequent analysis supports this conclusion.
- Therefore, the ESOO 2020 COVID-19 adjustment during time of max/min demand is removed in the ESOO 2021.
- Further, in the February FRG we discussed dropping the 2020 reference year trace. Based on the further analysis this is no longer justified.

Maximum demand



No empirical evidence found of a COVID-19 impact at max/min demand times

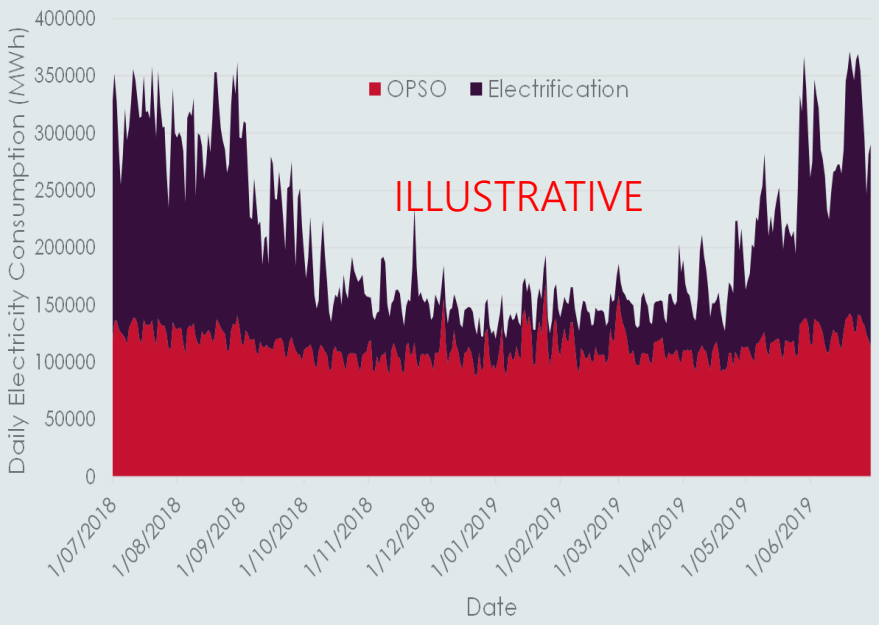
Minimum demand



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

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

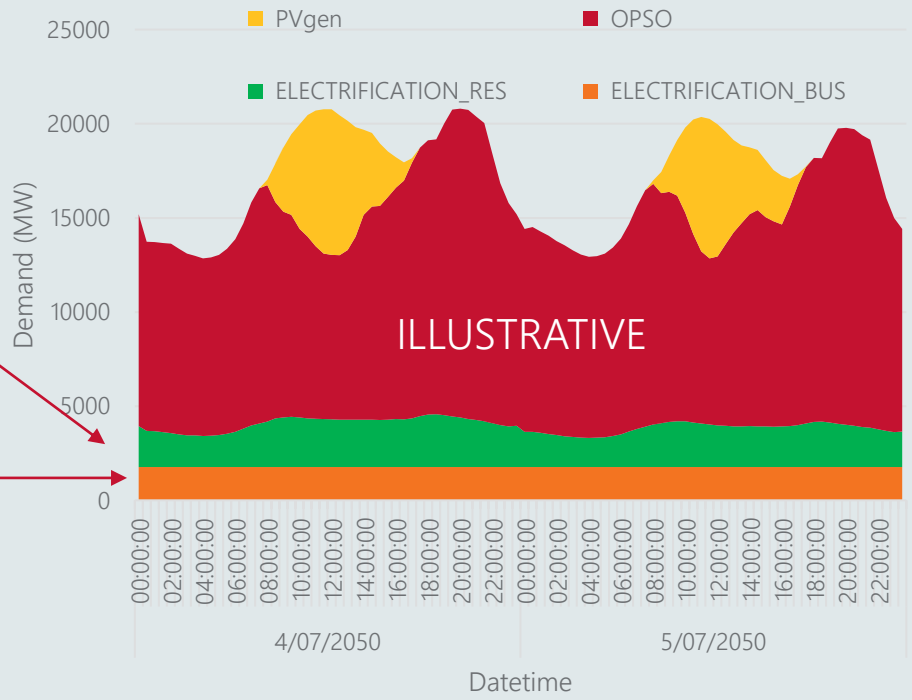
Seasonally, across the year



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.

Solar PV, Electric Vehicle and battery forecasts are important drivers of maximum and minimum demand

- 2020-2021 was a record year
  - 2020 had the highest number of Distributed PV capacity installed, which broke 2019's record.
  - La Niña (mild summer) - it was one of the coolest years on record since 2000 and the coldest in the last 10 years.
- DER forecasts:
  - PV, Batteries and EV forecasts are significantly higher than forecasts in ESOO 2020 .
  - Batteries and EV uptake forecasts remain low in the first years of forecast but take off from 2025-2030.

Maximum demand:

- Short term (0-3 years)
  - ESOO 2020 COVID-19 adjustment removed
  - Generally flat growth across the regions with the exception of Tasmania
  - Low PV contribution at time of maximum (late afternoon)
- Long term
  - Moderate growth in the tail end from 2025 to 2030 in most regions
  - Slight growth from moderate electrification
  - Low PV contribution at time of maximum (evening)

Minimum demand:

- Short term (0-3 years)
  - ESOO 2020 COVID-19 adjustment removed
  - Higher PV contribution to minimum demand, starting from base year, compared to ESOO 2020
  - For 1 MW increase in PV results in around a 0.7-0.8 MW decrease in minimum demand (all else being equal)
- Long term
  - Driven by PV and long-term underlying demand drivers
  - Slightly slower decline due to electrification of some industrial loads
  - SA and Victoria experience negative demand within the next 10 years

Regional overview

Net Zero 2050 forecasts FYE 2021 to FYE 2050

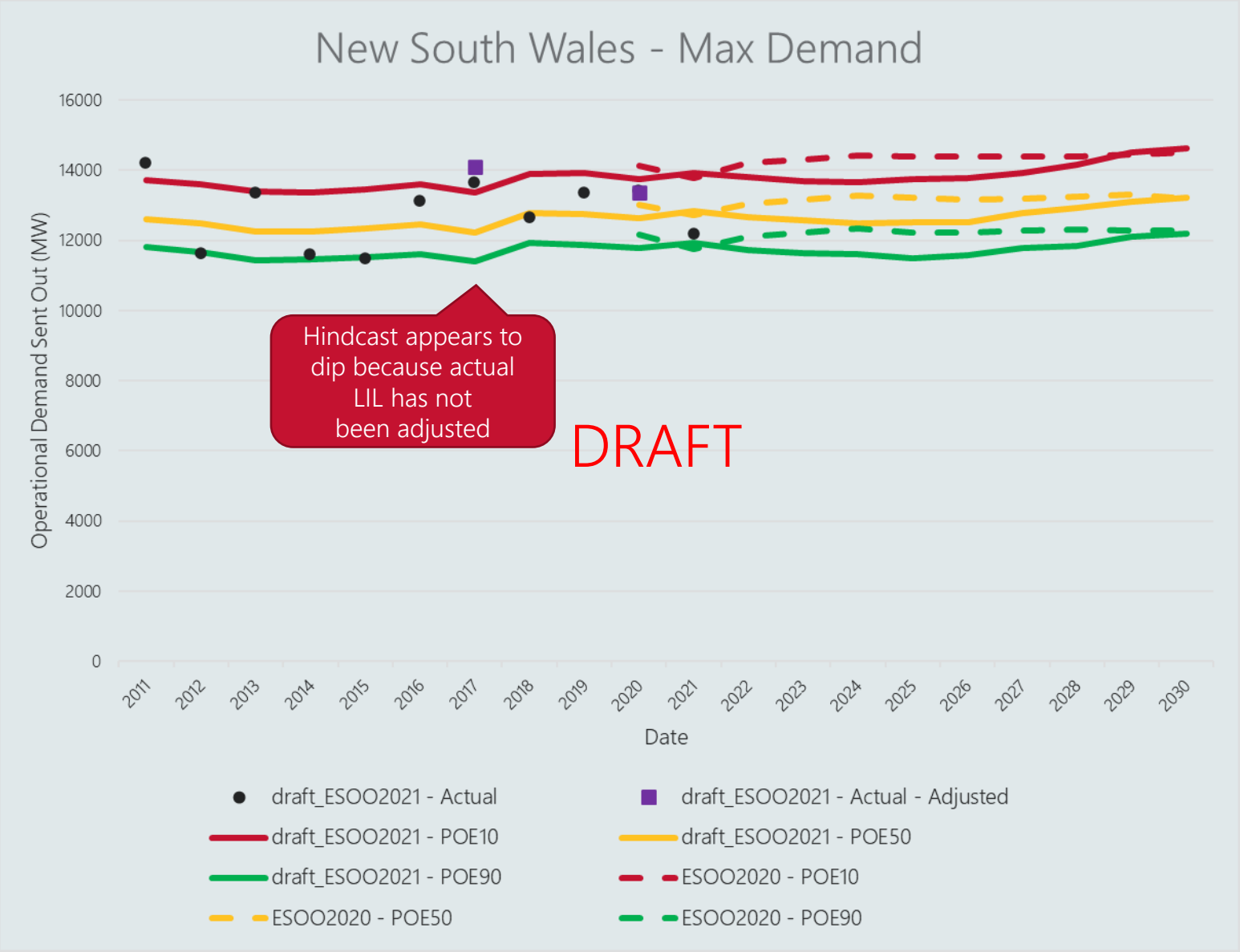
New South Wales maximum

Short term (0-3 years):

- Occurring late afternoon around 5:00pm-6:30pm
- Decrease in operational max demand. This is driven by the net impact of growth in residential demand which is more than offset by lower business demand from recent trends. Growth in PV is also having some minor impact.

Long term:

- Max demand timing shifts into the evening (7:00-8:00pm). This leads low contribution of PV at time of max.
- The forecast grows from 2025 onwards due to continued growth in residential load coming from appliance uptake and connections growth as well as business load starting to grow.
- In 2030 there is roughly 200 MW of electrification, driven by business and industrials



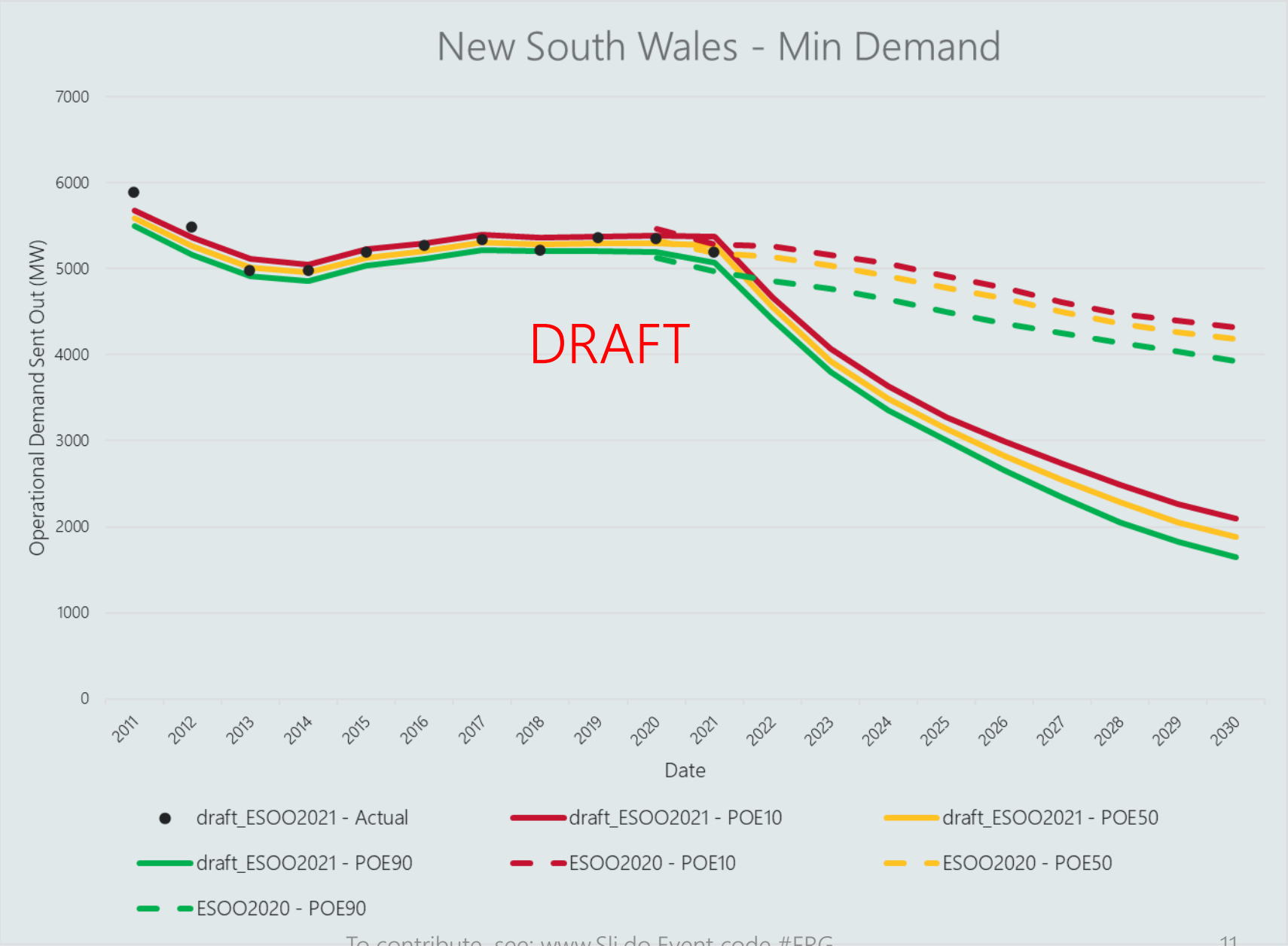
New South Wales minimum

Short term (0-3 years):

- 2021 minimum demand occurred in summer (Christmas) – La Niña.
- Minimum demand shifts from early morning, 4:00am-5:00am, to midday, 11:00am-2:00pm.
- Underlying demand drivers are relatively flat, while operational minimums decline rapidly (approx. 1500 MW from 2021 to 2024).

Long term:

- Downward trend continued toward 2030 due to continued uptake of PV capacity.
- About 250 MW of electrification being added to demand in 2030



AEMO
AUSTRALIAN ENERGY MARKET OPERATOR

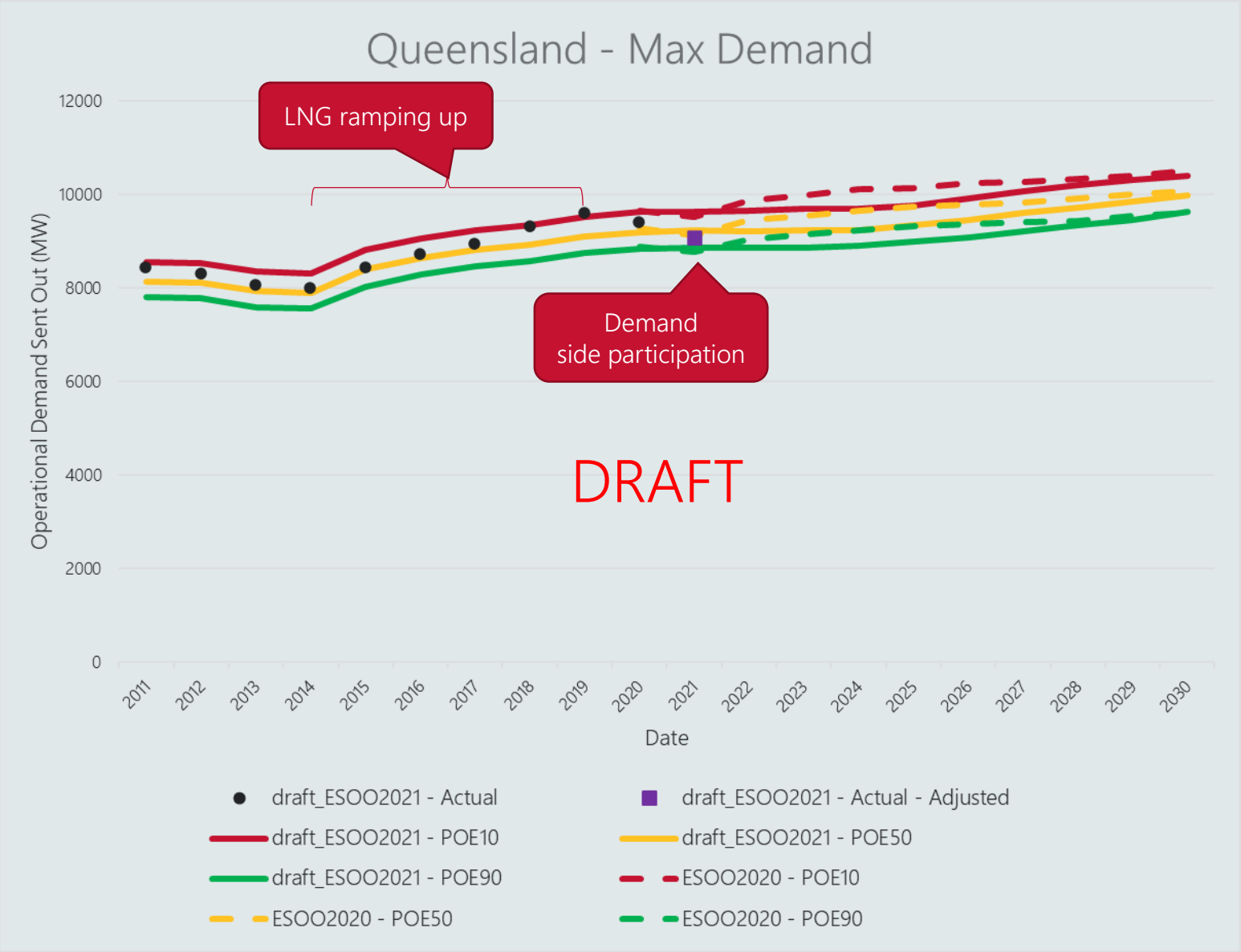
Queensland maximum

Short term (0-3 years):

- 2021 maximum demand event condition was in line with POE90, 52 MW of demand side participation.
- Time of max shifts from late afternoon to 7:00pm-7:30pm (one hour later than ESOO 2020) – due to higher PV uptake.
- Lower short term growth rate compared to ESOO 2020. This is due to less pronounced business growth from the business mass market sector when aligned with recent consumption trends.

Long term:

- Strong growth from 2025 onwards by continued residential load growth and stronger business load.
- Around 220 MW of load due to electrification of industrials.



AEMO
AUSTRALIAN ENERGY MARKET OPERATOR

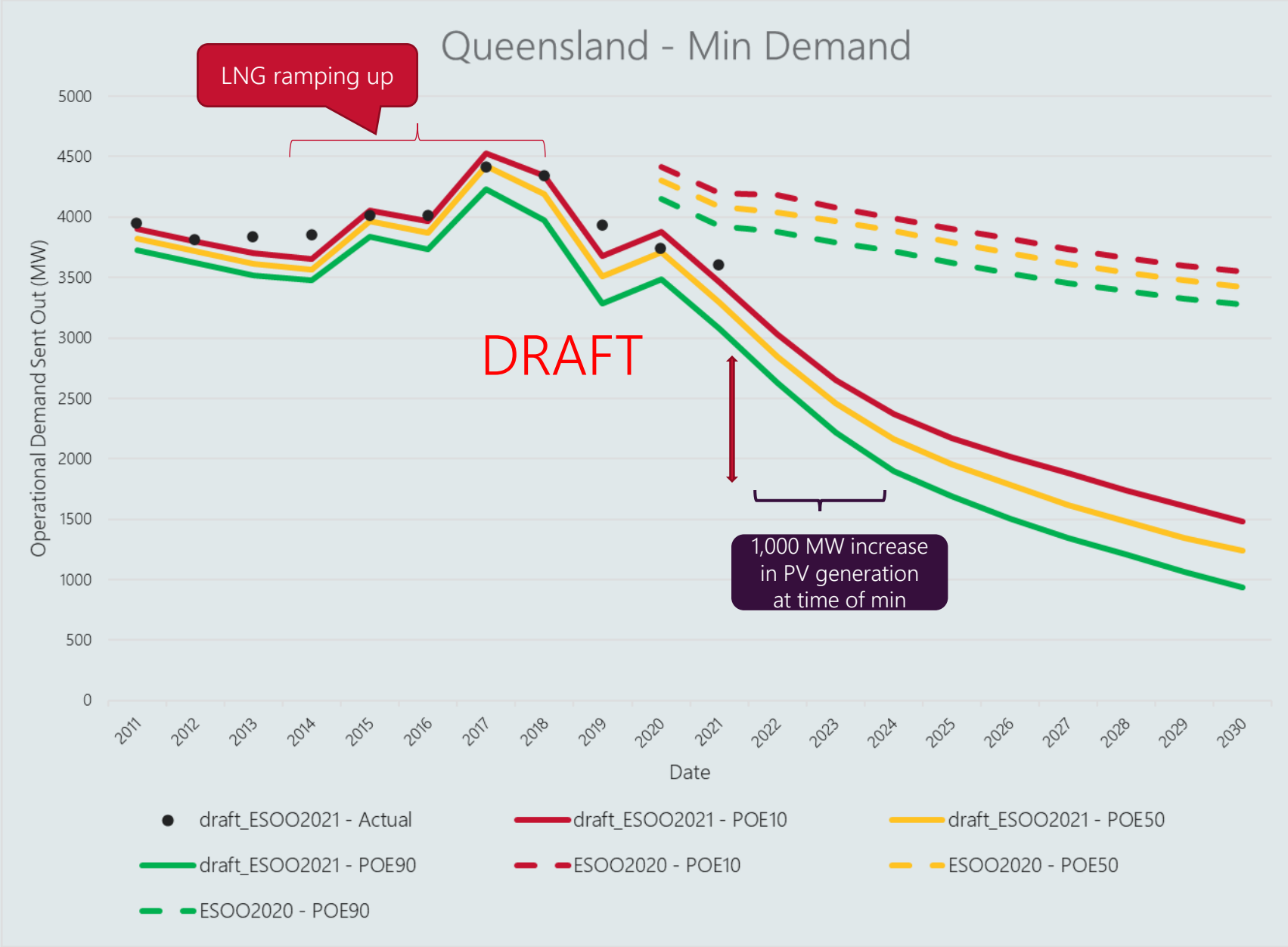
Queensland minimum

Short term (0-3 years):

- Daytime minimum; 11:00am – 1:00pm.
- PV actual in 2021 was much higher than forecast in ESOO 2020, causing ESOO 2021 forecast to start lower.

Long term:

- Continued decline due to PV uptake despite strong underlying growth drivers and electrification from industry.



AEMO
AUSTRALIAN ENERGY MARKET OPERATOR

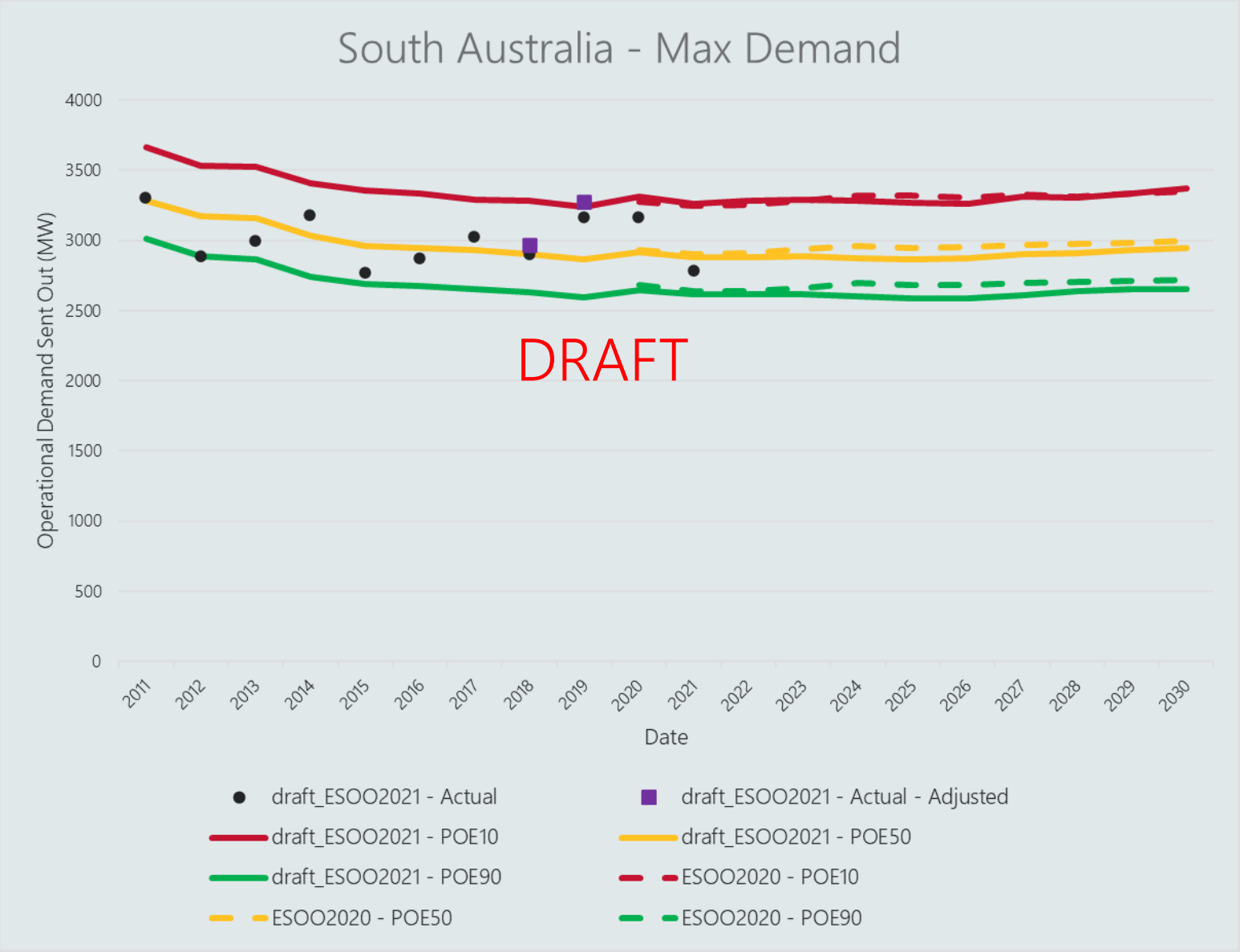
South Australia maximum

Short term (0-3 years):

- Evening time of maximum, 7:00pm-7:30pm. PV is having little impact at this time.
- LIL flat: some COVID recovery while some ramping down of production.

Long term:

- Time shifts to night, 8:00pm – 9:00pm; PV contribution negligible.
- Slightly declining forecast from 2024 to 2026 due to revised LIL forecast showing moderate ramp down from surveys indicating lower production/mining activity.
- Max demands pick up and rise from 2027, driven by increasing electrification. Approx. 80MW of electrification at time of max by 2030.



AEMO
AUSTRALIAN ENERGY MARKET OPERATOR

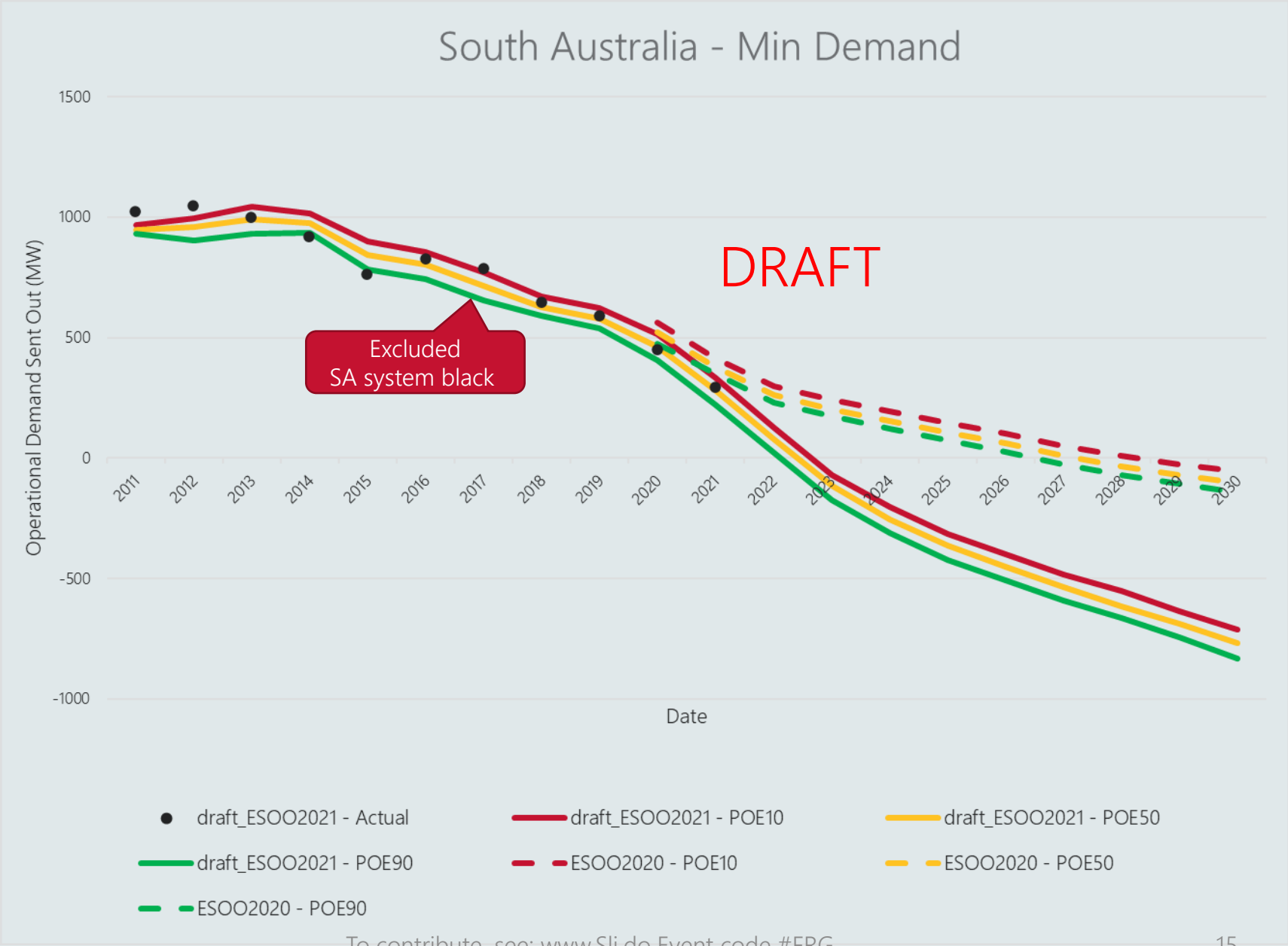
South Australia minimum

Short term (0-3 years):

- Continuing decline in minimum demands from recent historical trend.
- Negative POE50 minimum demands from 2023, 6 years earlier than ESOO 2020.

Long term:

- PV contribution to minimum demand continues to grow – 10% pa vs 4% pa in ESOO 2020.
- Growth in battery installations, helping to absorb some PV generation.
- Moderate amount of electrification in 2030 lifting up the minimum.



AEMO
AUSTRALIAN ENERGY MARKET OPERATOR

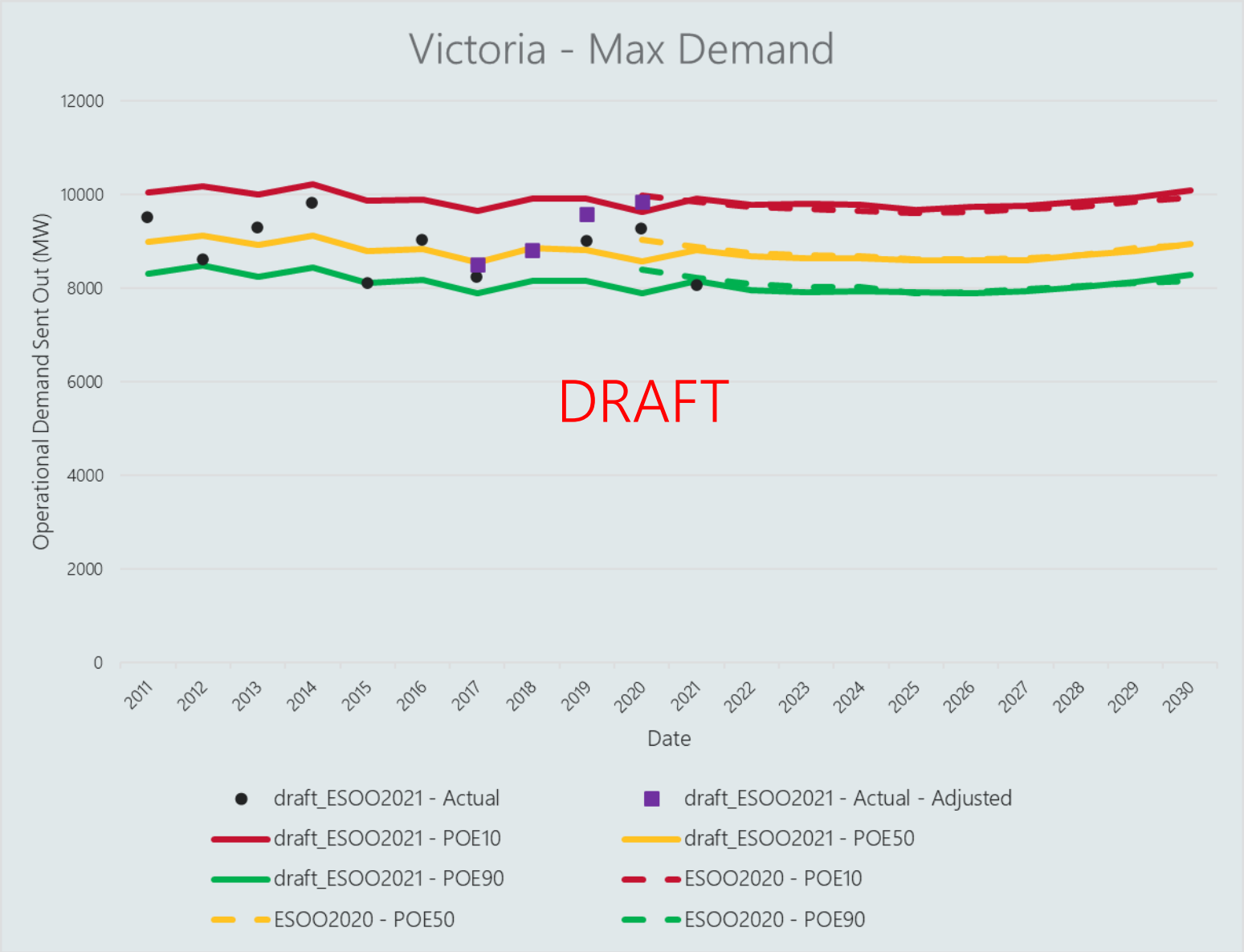
Victoria maximum

Short term (0-3 years):

- 2021 maximum demand was the lowest event since 2015, similar to POE90 weather conditions.
- Slight decrease in operational max demand, in line with ESOO 2020. This reduction is due to decreases in business mass market consumption and growth in PV uptake.

Long term:

- Medium-term growth in maximum demand starts to rise slightly from 2026. This is driven by moderate growth in business and residential load from driven by increases in residential connections.
- Approximately 25 MW of Electrification in 2030. As it is summer, there is no electrification from heating. Instead, all is from industry.



AEMO
AUSTRALIAN ENERGY MARKET OPERATOR

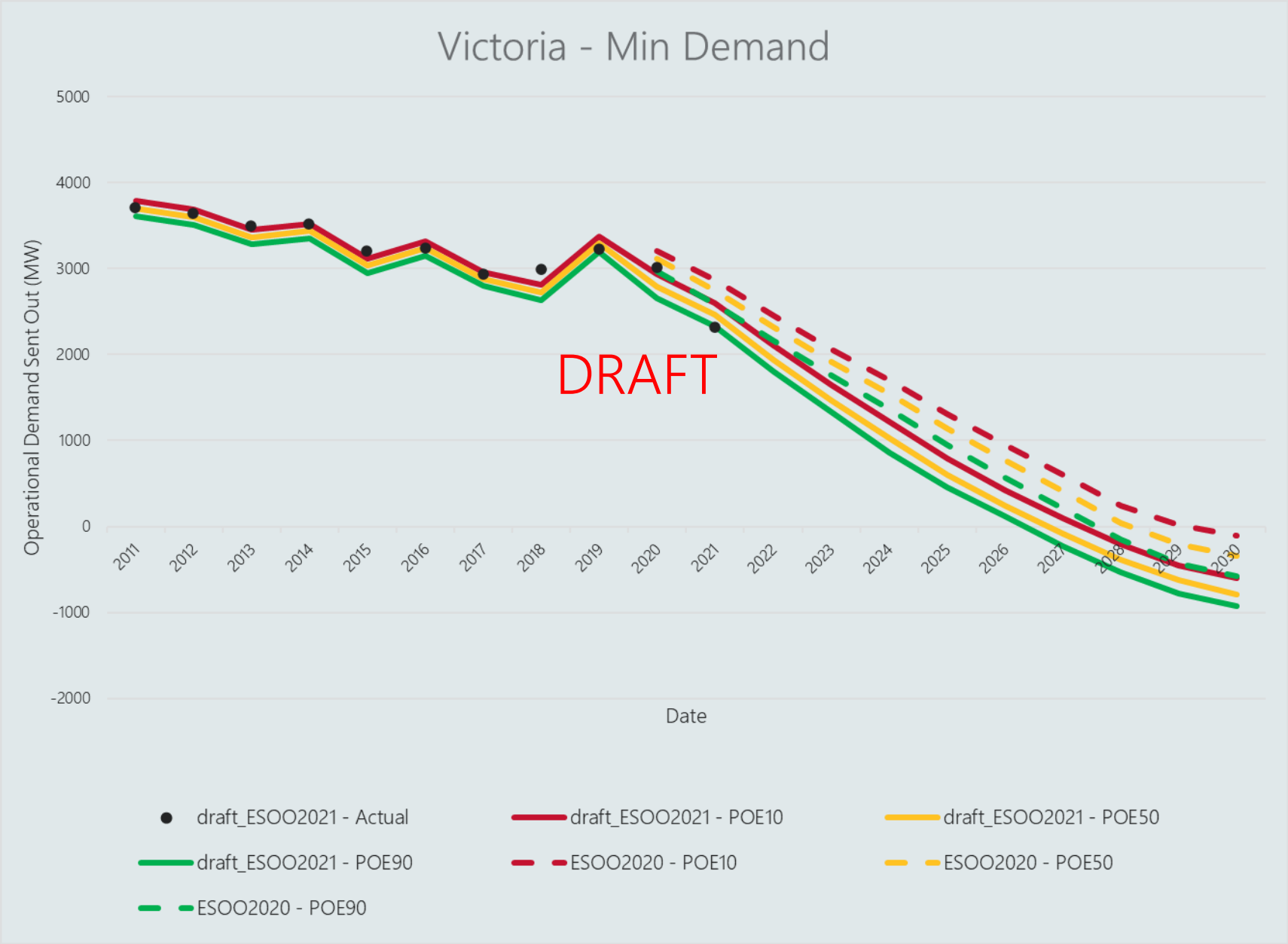
Victoria minimum

Short term (0-3 years):

- Min demand occurs during daytime, 11:00am-3:00pm, when PV generation is high.
- Strong PV uptake causes minimum demands to decline rapidly.
- PV actual in 2021 was higher than forecast in ESOO 2020, causing ESOO 2021 forecast to start lower.

Long term:

- Declining trend to 2030 is driven by PV uptake forecast.
- Negative POE50 min demand from 2027, 2 years earlier than ESOO 2020.
- Moderate amount of electrification in 2030 lifting up the minimum.



AEMO
AUSTRALIAN ENERGY MARKET OPERATOR

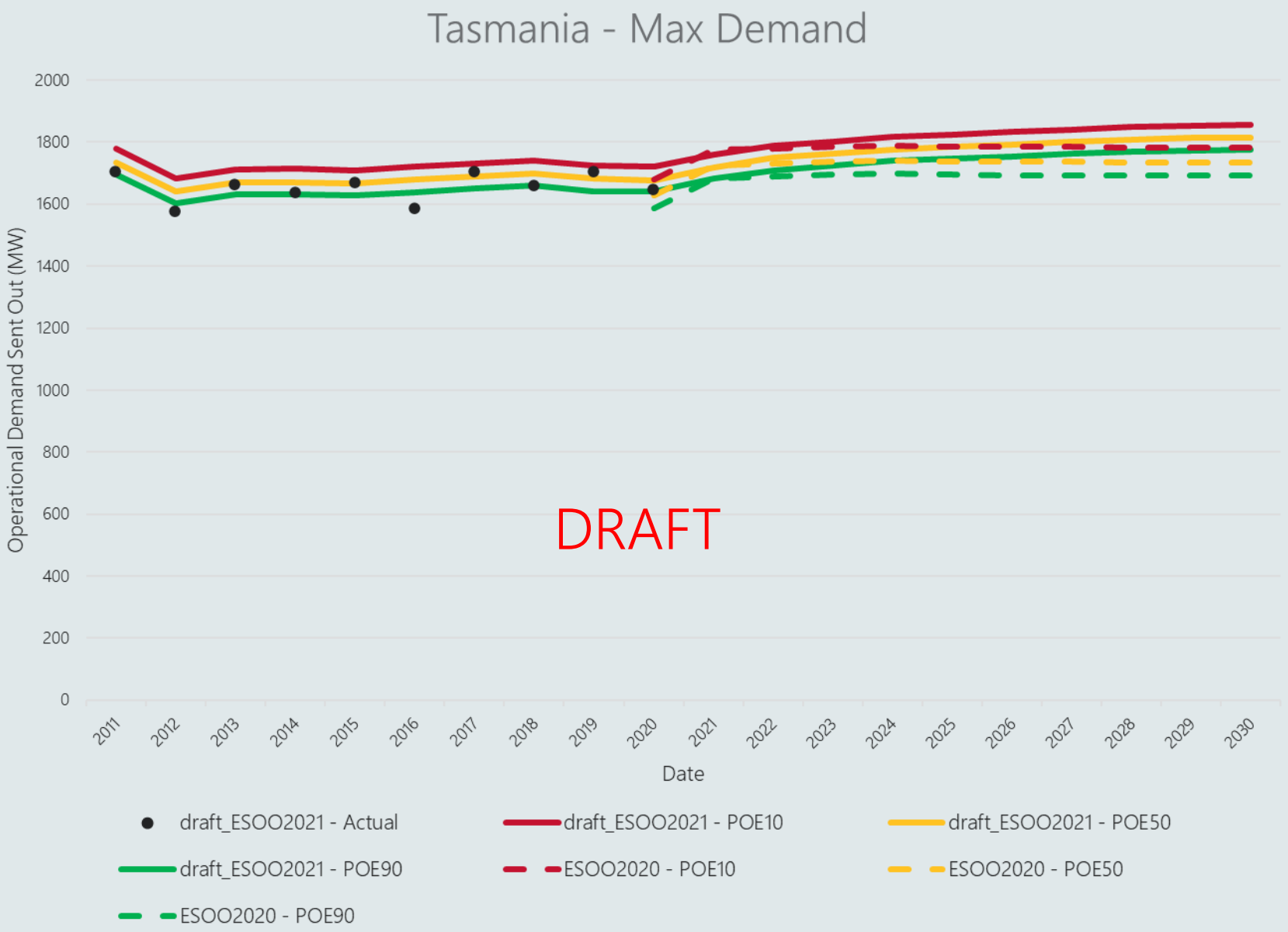
Tasmania maximum

Short term (0-3 years):

- Maximum occurs just before or after business hours, driven by heating load.
- No PV at time of maximum due to shorter winter days
- Increase in maximum demands, driven by residential consumption along with increased output in some LILs.

Long term:

- Times of maximum shifts to 6:00pm-7:00pm, some likelihood of 8:00am, due to EV convenience charging.
- Continuing moderate increase of maximum demand in 2025-2030 from continual growth in new residential connections moderated slightly by flattening in the business sector.



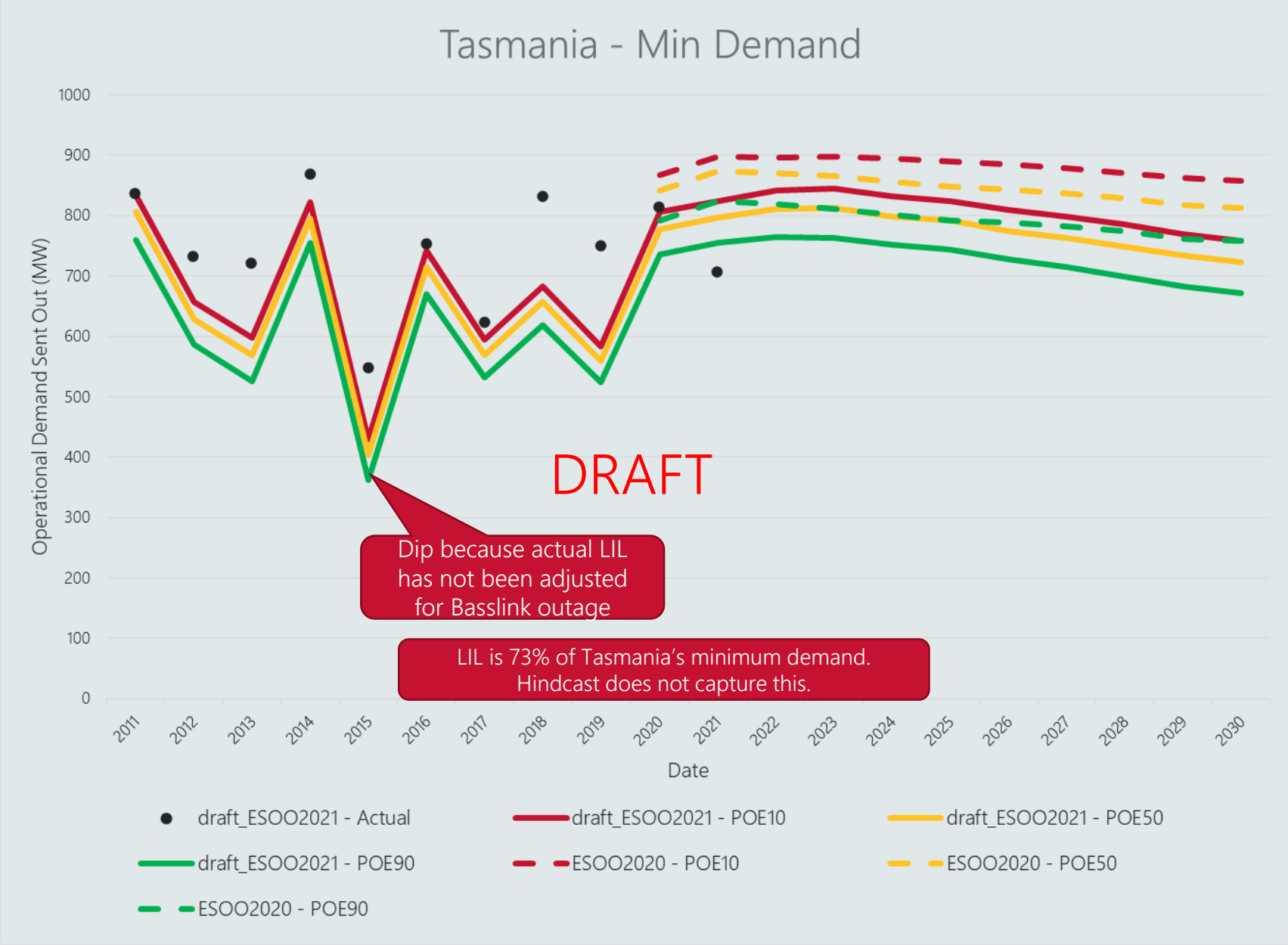
Tasmania minimum

Short term (0-3 years):

- 2021 minimum demand was in the morning, at 7:30am.
- Times of minimum demand start to shift to the middle of the day.
- Time shifting is driven by the rise in distributed PV, supressing operational demand during the day.

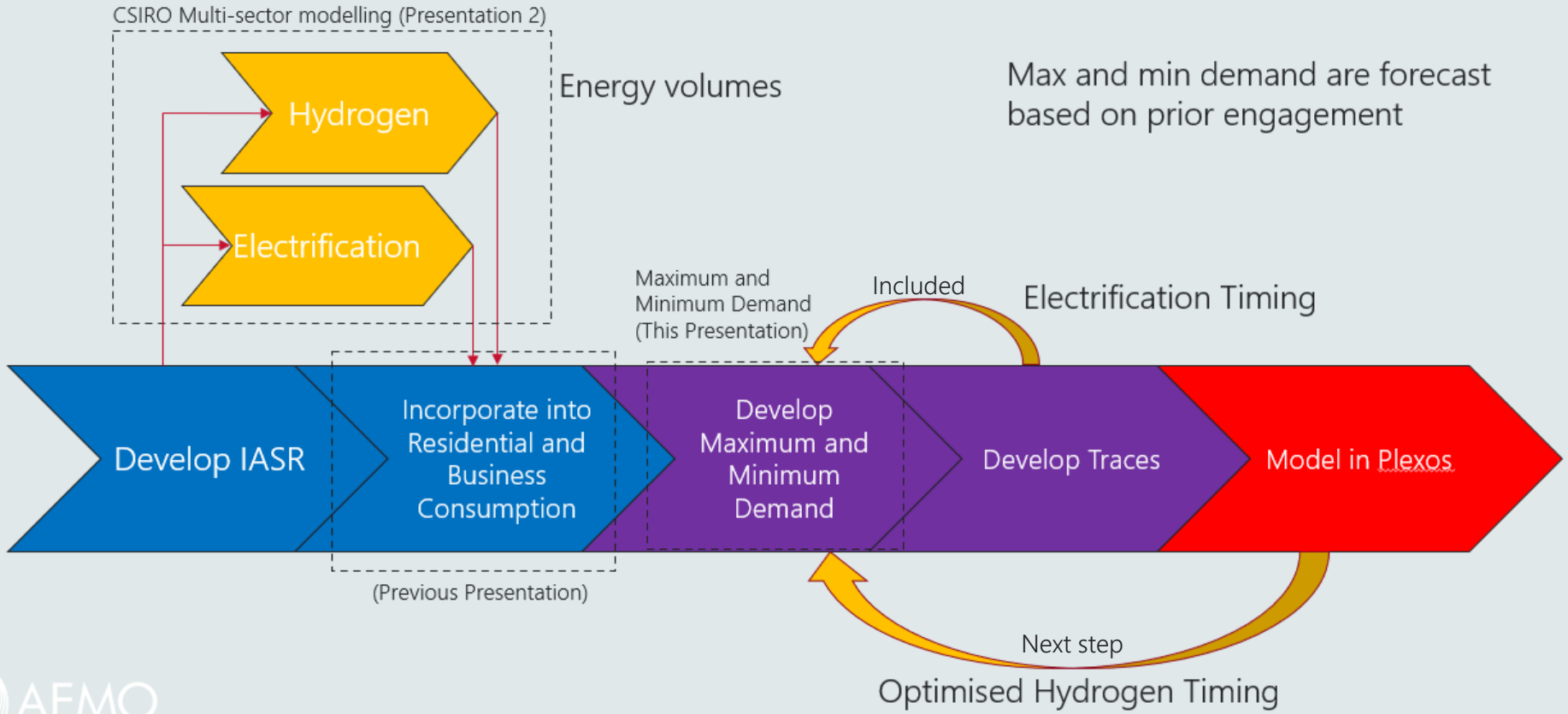
Long term:

- Minimum demands start to decline from 2025 to 2035 due to high PV uptake growth and flat trend in underlying demand.



Next step

- Hydrogen impact to be incorporated into maximum and minimum demand forecasts



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?