2019 Consumption and Maximum Demand Draft Results

Summary of key drivers and model outcomes

Background

Scenario settings

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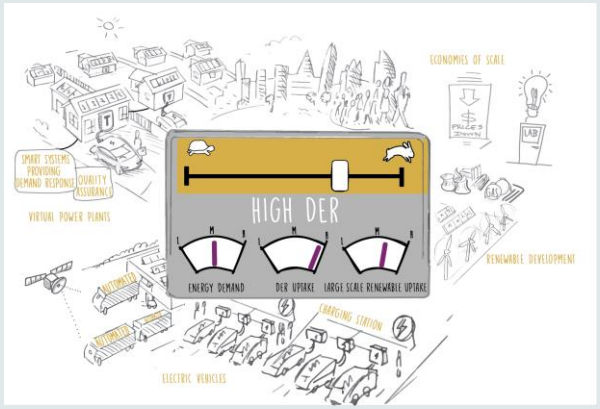
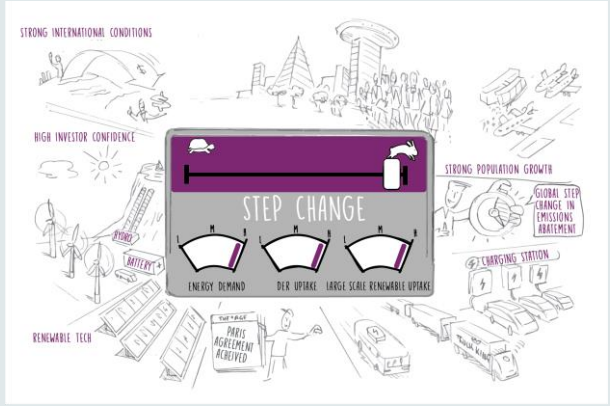
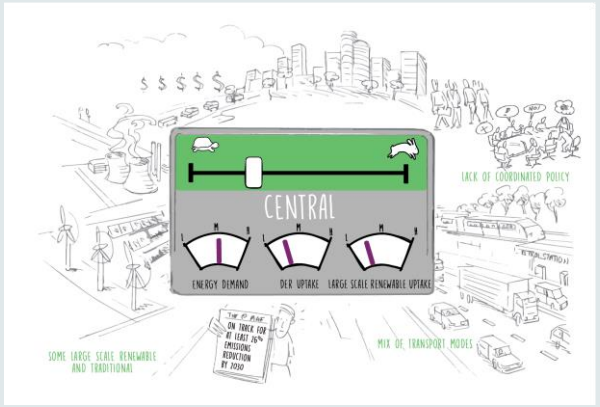
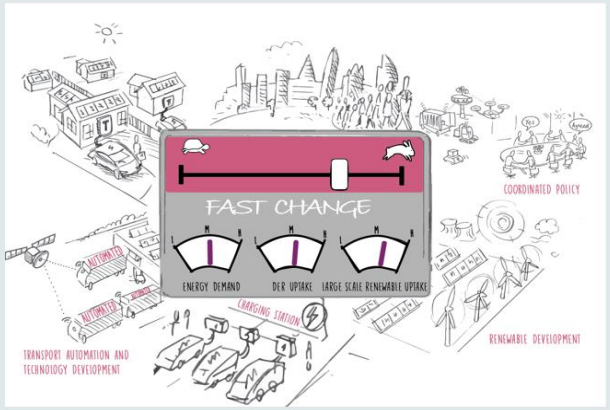
2019-20 Integrated System Plan scenarios

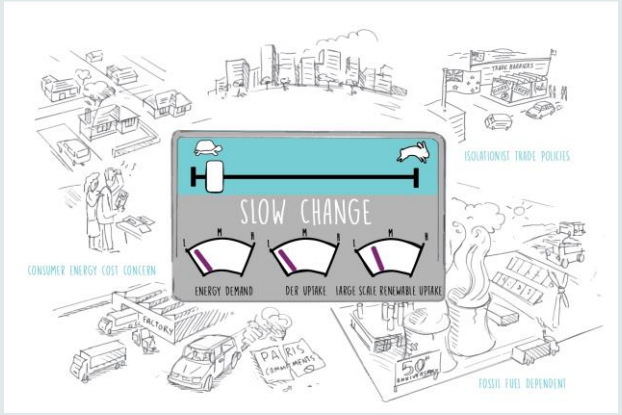
Decentralisation











Decarbonisation

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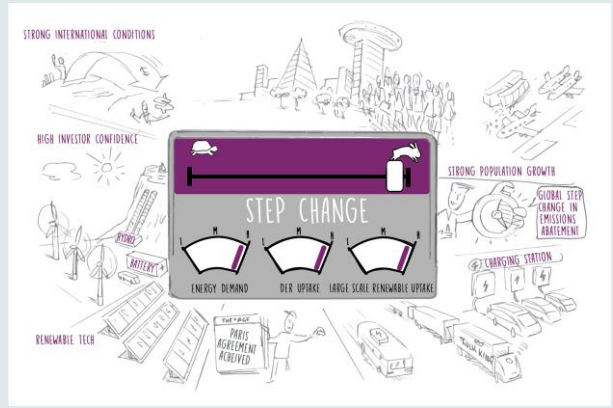
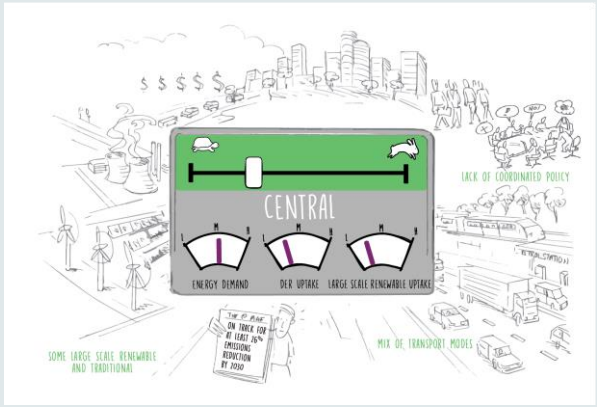
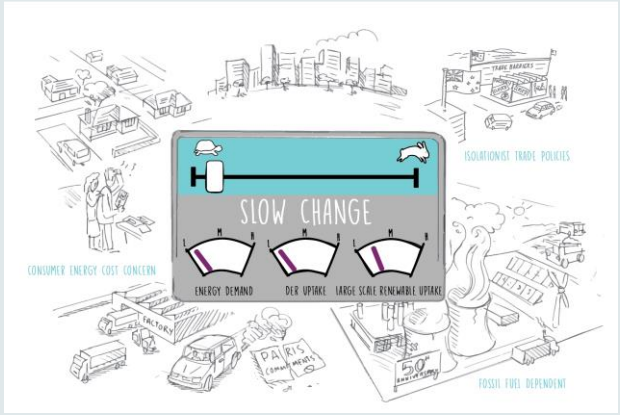
Electricity Statement of Opportunities scenarios

Decentralisation







Decarbonisation

Scenarios: 2019 versus 2018 ESOO

The ESOO will continue to focus on three scenarios.

	2018 ESOO scenario name	2019 ESOO scenario name
Weak Population and Economic Growth	Slow Change	**Slow Change**
Neutral Population and Economic Growth	Neutral	**Central**
Strong Population and Economic Growth	Fast Change	**Step Change**

The ISP will examine the additional two scenarios.

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Demand forecasting methodology updates since 2018

- Business sector segmentation
  - Previously Manufacturing and Other Business segments
  - This year Large Industrial Loads (LILs) and Small to Medium Enterprises (SMEs)
  - Better reflects different drivers affecting LILs and SMEs

- Max/min demand forecasting methodology
  - Previously Half Hourly (HH) demand model per region. This year, a hybrid approach: generalised extreme value (GEV) models to estimate intervals of max/min demand in first year; HH model to grow demand out 20 years.
  - Implementing effect of energy efficiency saturation during max demand events

- Non-scheduled generation (NSG) forecasts
  - PVNSG (100kW to 30MW): adopting use profiles that better reflect generation characteristics

Key Forecast Inputs

Spread of drivers and components for each scenario

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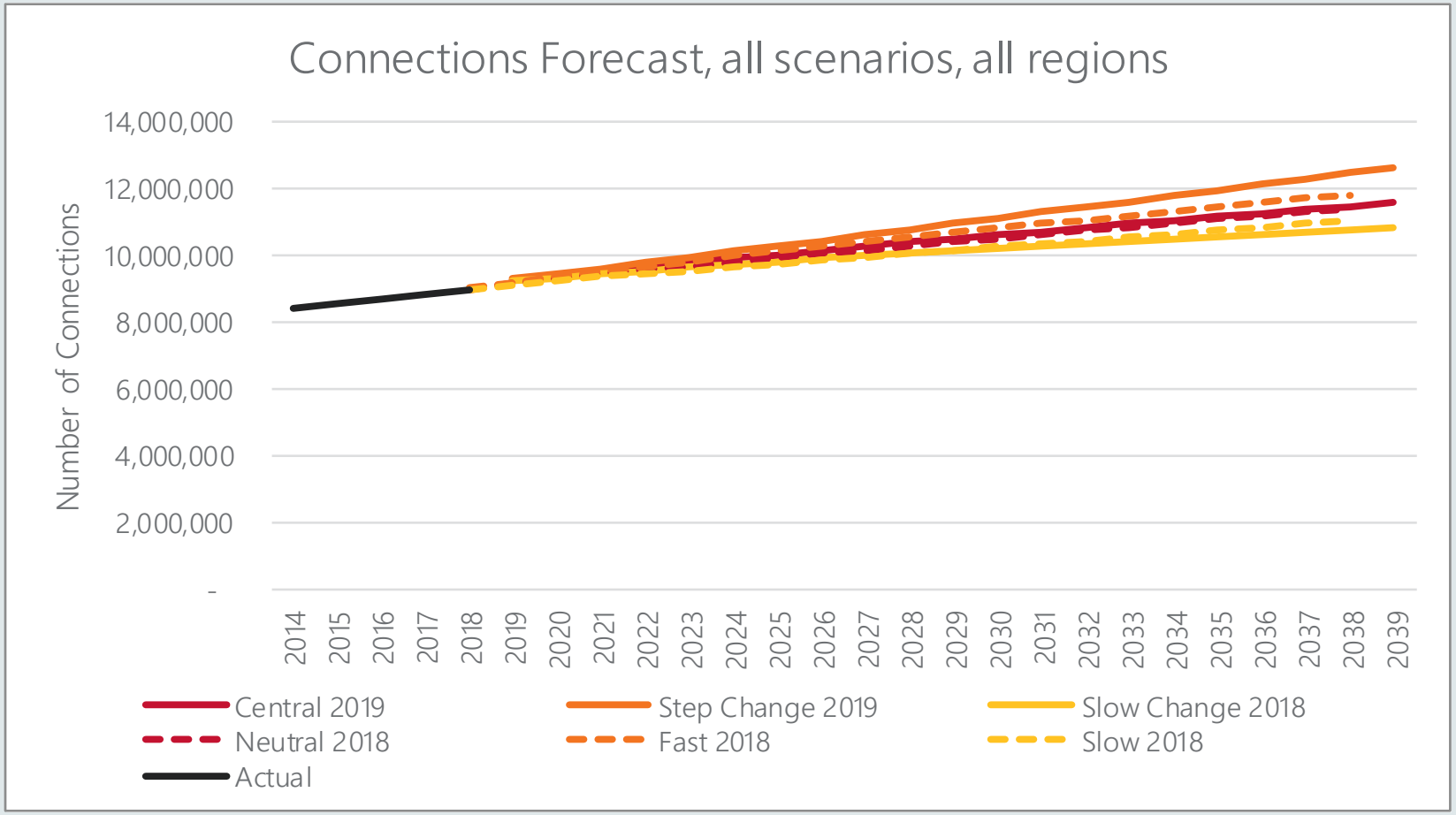
Connections Forecast

The range of the forecasts has widened due to the increase in the spread of input projections

- ABS Population projections Cat 3222.0 applied in the model has been updated to the 22 Nov 2018 version
- ABS Household and Family projections Cat 3236.0 applied in the model has also been updated to the 14 March 2019 version



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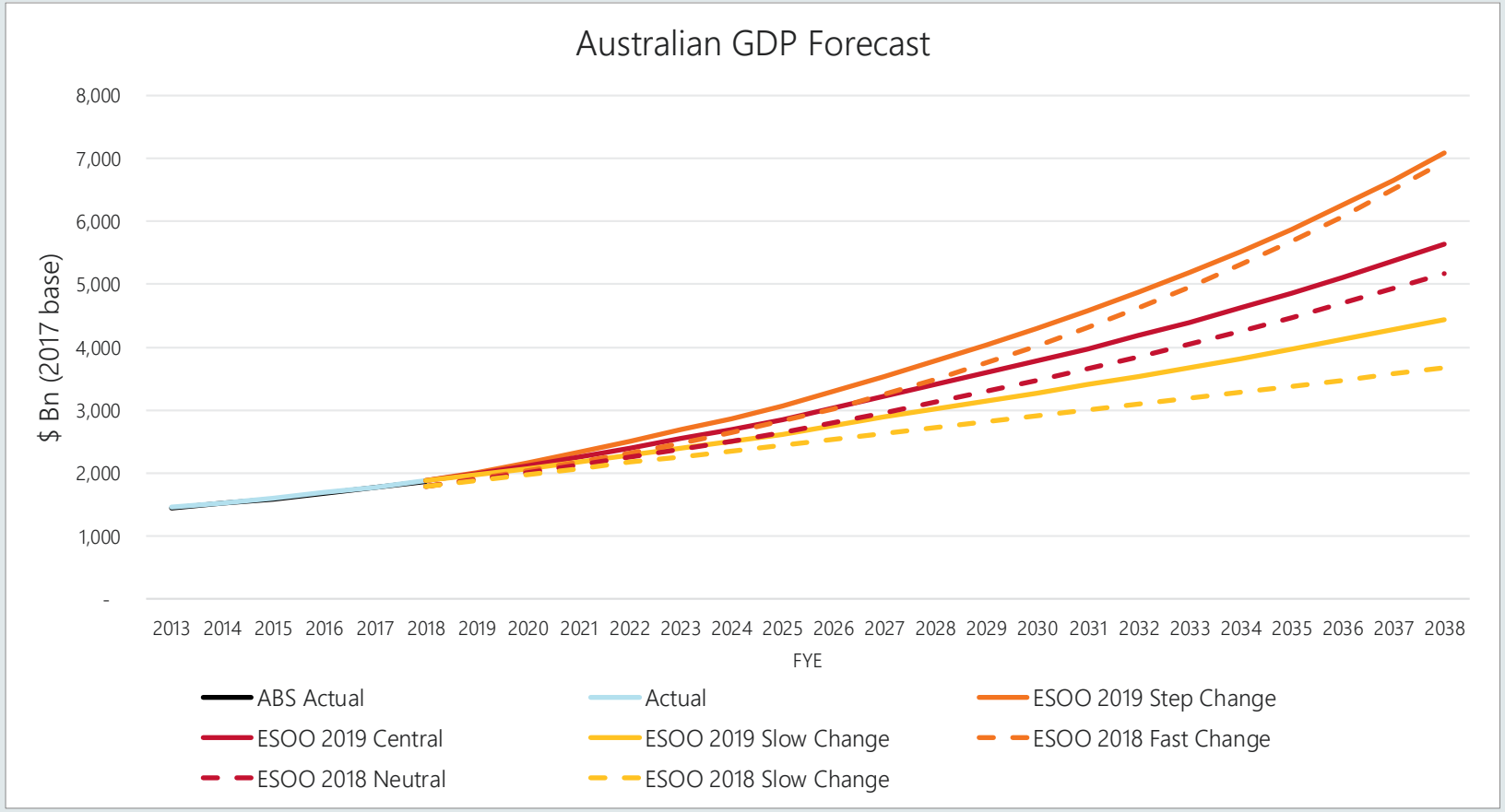
Gross Domestic Product

Underlying population forecasts are driving the differences between the 2018 and 2019 forecasts

- The 2018 forecasts were based on the ABS B Series projections from 2012
- The 2019 forecasts have been updated to reflect the most recent census data



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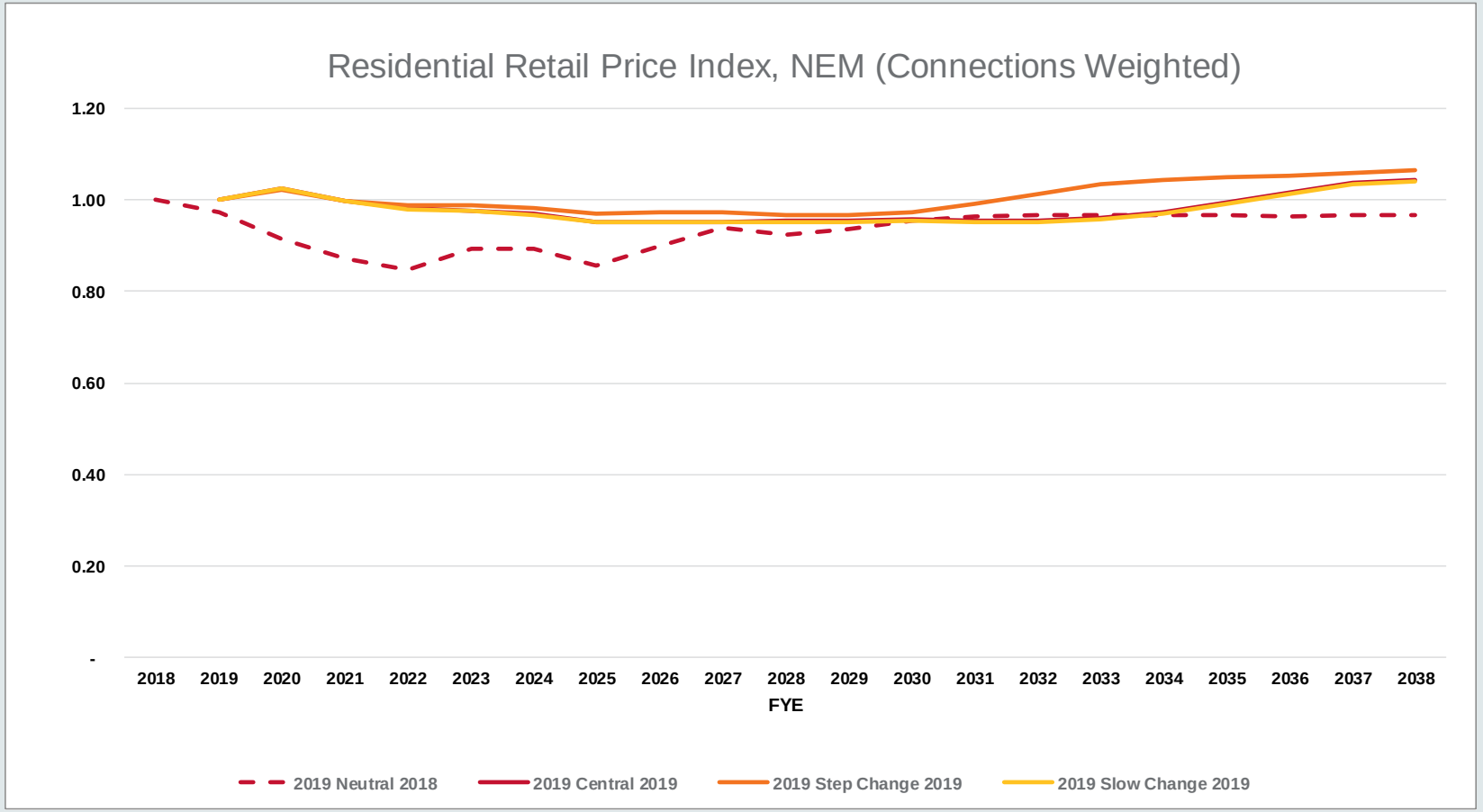
Residential Retail Price Index

- Medium term decline as more renewable generation comes online
- Long-term increase as aging coal fleet retires
- Transmission development costs associated with AEMO's ISP central development plan included in these forecasts



Wholesale price forecasts by Aurora Energy Research, available at:
https://www.aemo.com.au/Electricity/National-Electricity-Market-NEM/Planning-and-forecasting/Integrated-System-Plan

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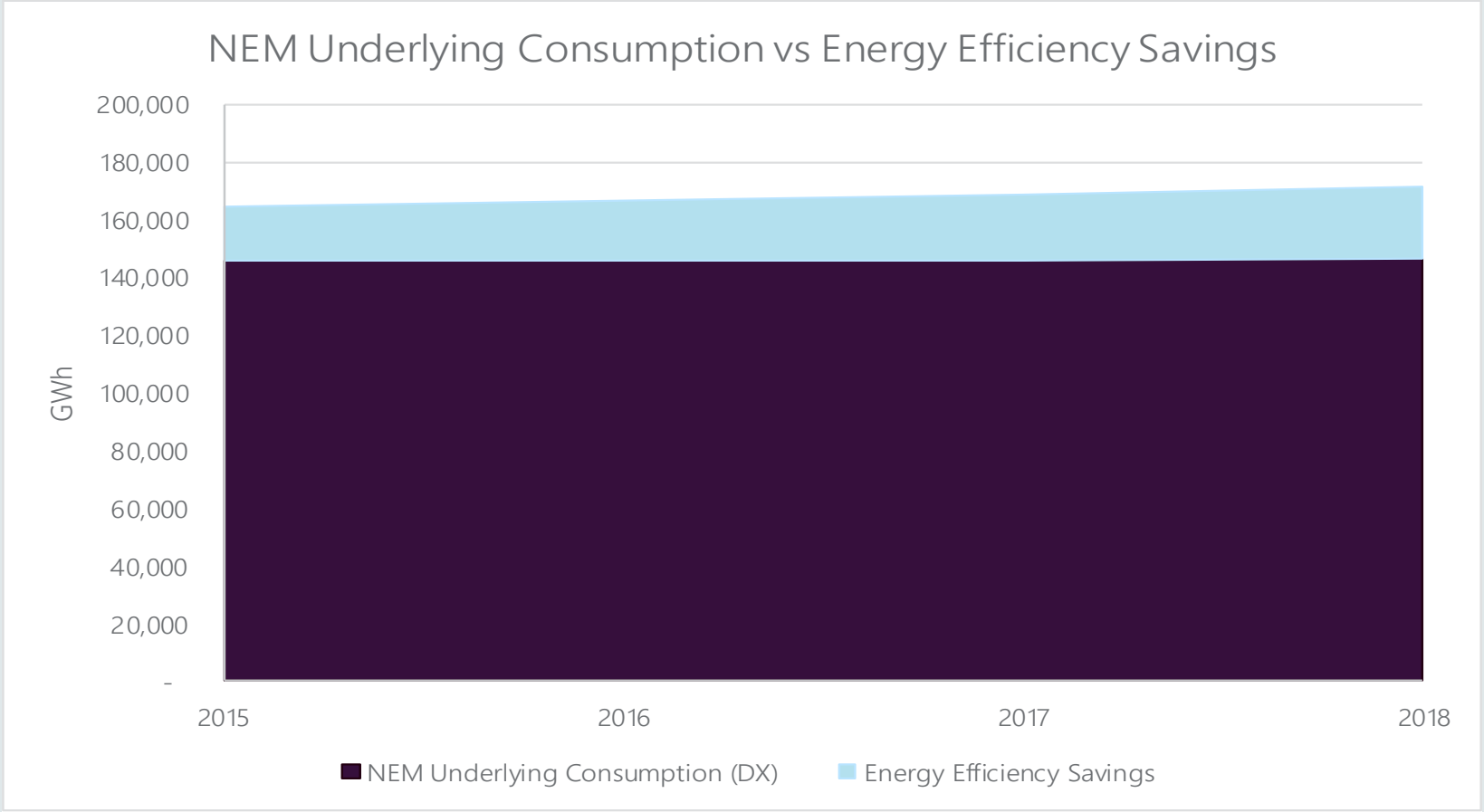
Energy Efficiency

- Historical savings from energy efficiency measures modelled by SPR, compared to underlying consumption in the NEM Distribution Connected (DX) Load



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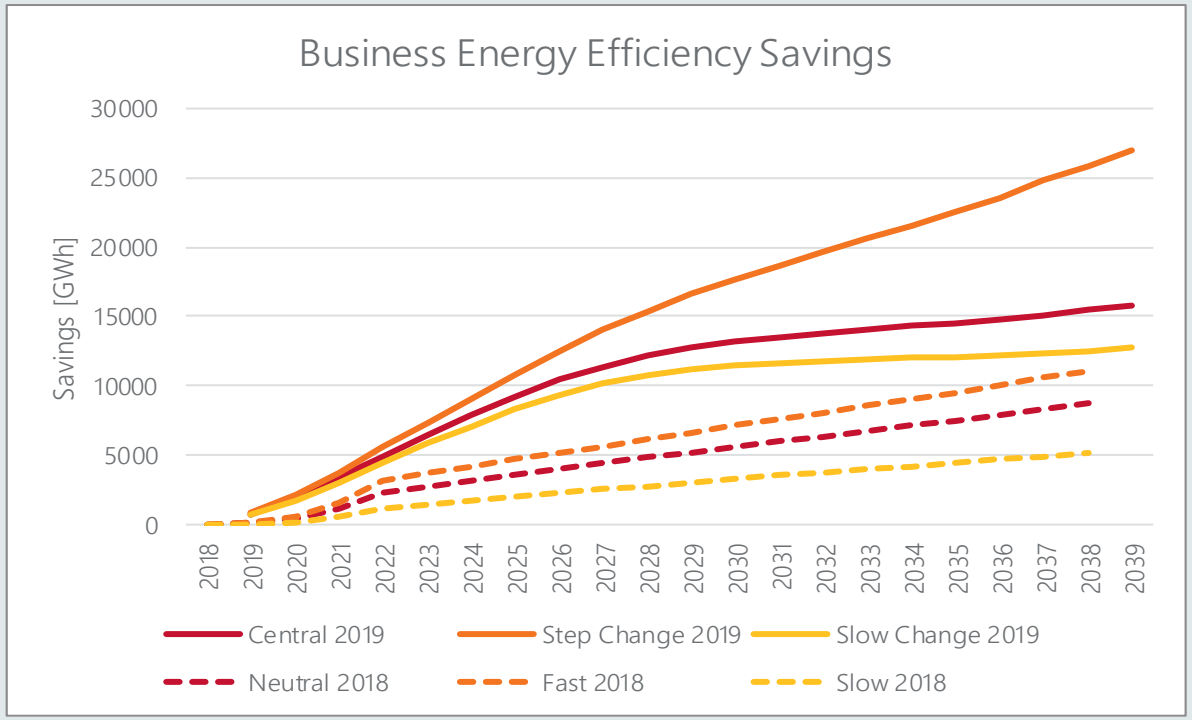
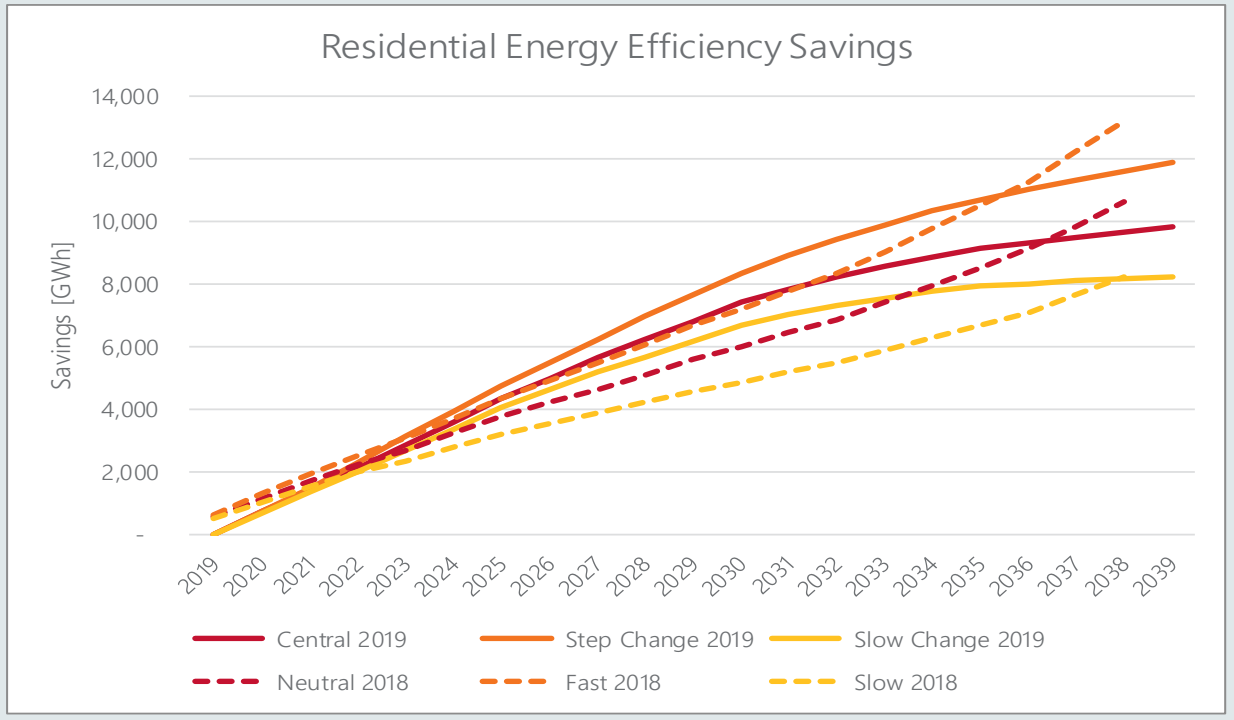
Energy Efficiency





- Business: 2019 Step change scenario models two additional measures not considered in the 2018 Fast scenario related to future building and equipment (Greenhouse and Energy Minimum Standards (GEMS)) standards; and better representation of state schemes in New South Wales, Victoria and South Australia.
- Residential: Revised dwelling stock model and improved approach to account for future savings from past activities

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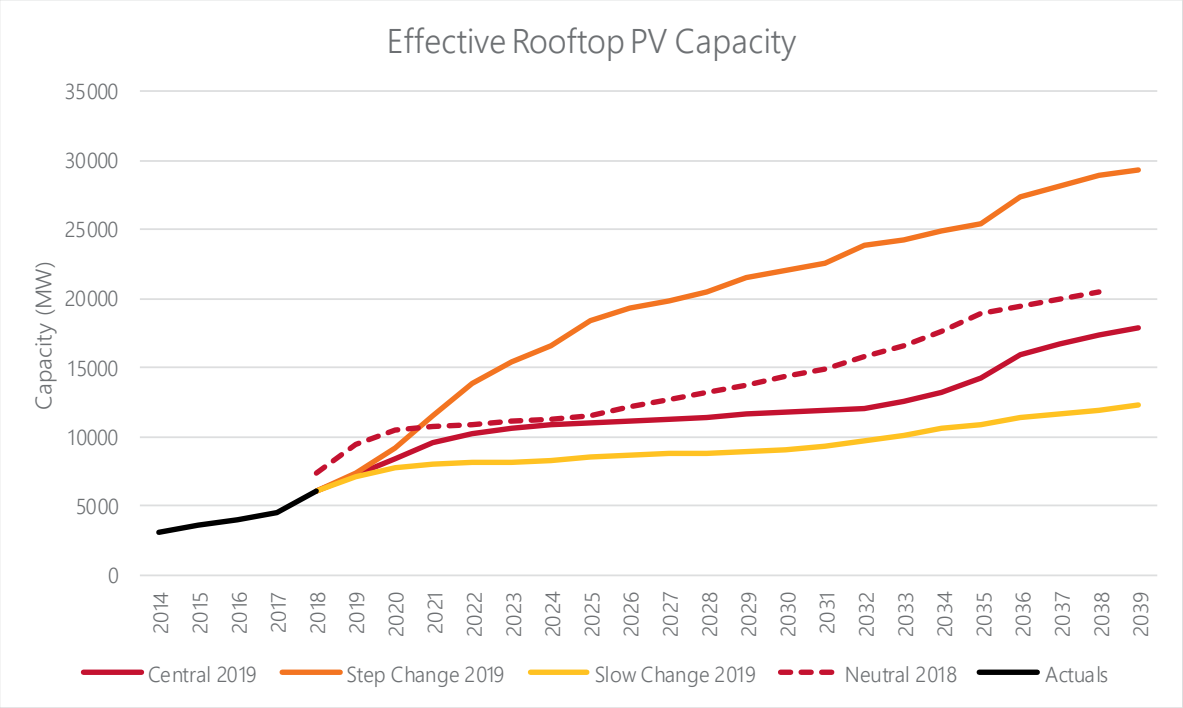
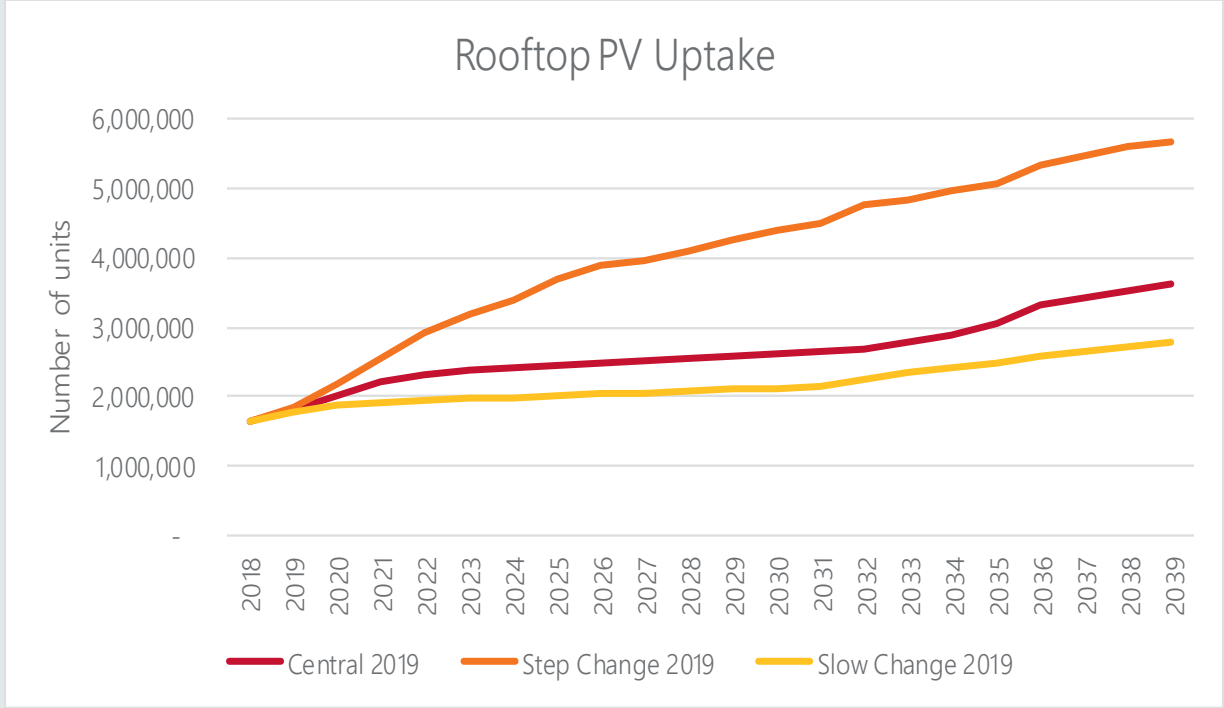
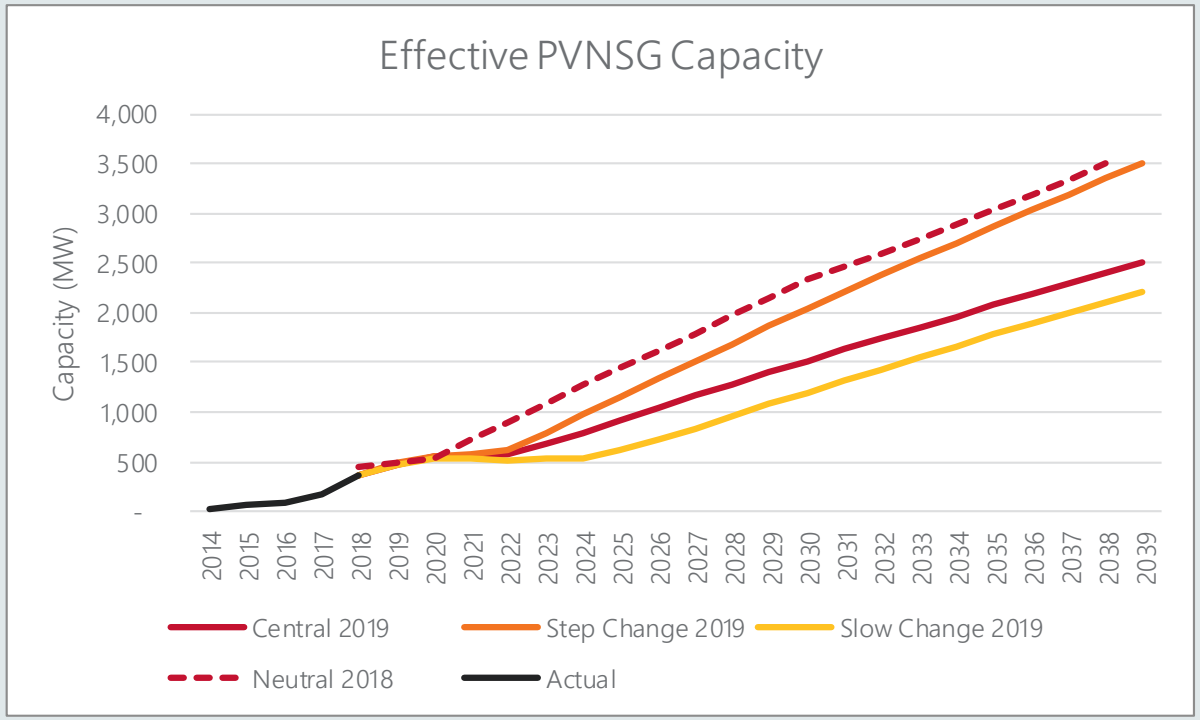
DER trajectories: Rooftop PV

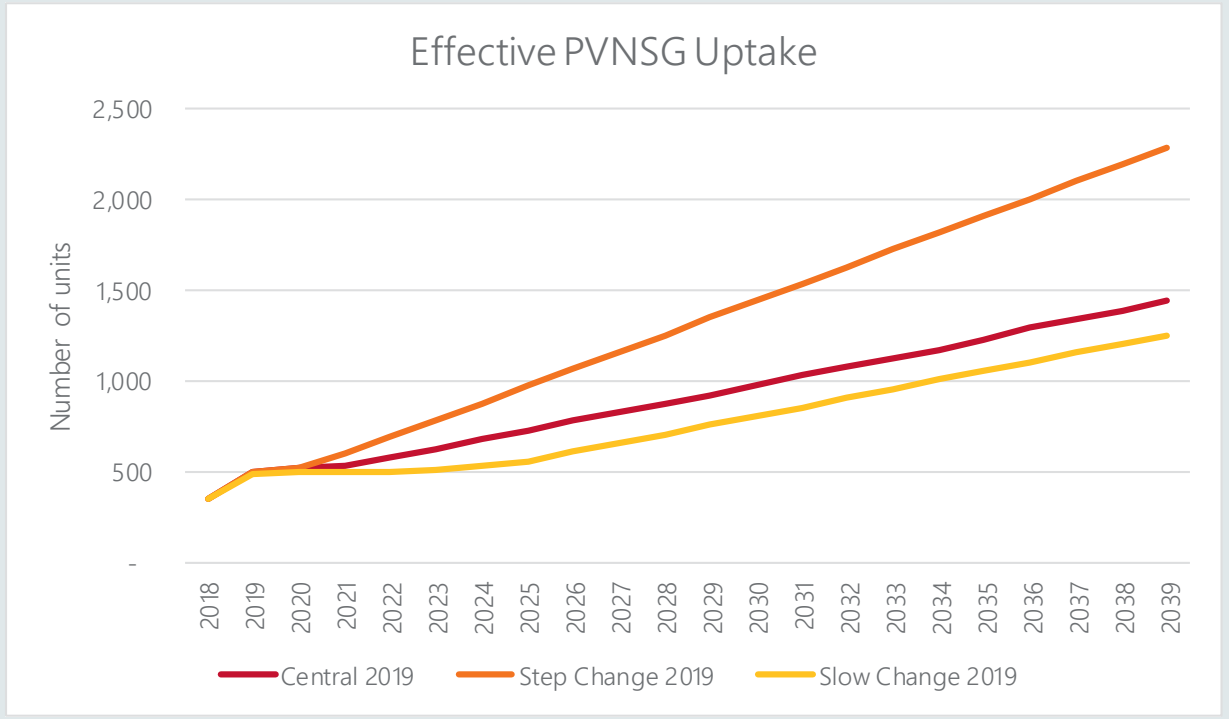




- AEMO now has the ability to track monthly PV installations, increasing the quantity of data informing our forecasts
- Assumed degradation rate of 0.5% per annum
- Slower increase in capacity in the short term reflects broad expectations that retail electricity prices will ease in most states, in the medium to long term this downward pressure is expected to rise leading to some acceleration of capacity (CSIRO)
- Total households in NEM regions by 2039 approximately 10-11 million

DER trajectories: PVNSG





- The price for large scale renewable electricity generation certificates (LGCs) has fallen to ~$34/MWh in 2019, with the reduced price resulting in slow deployment forecasts in the short term
  - 2018 projections did not account for such a steep decline in the short term (expected to fall to $0/MWh 2020-2030)
- Forecast increased rate of deployment in early to mid-2020s due to continued fall in technology cost and increased subsidies

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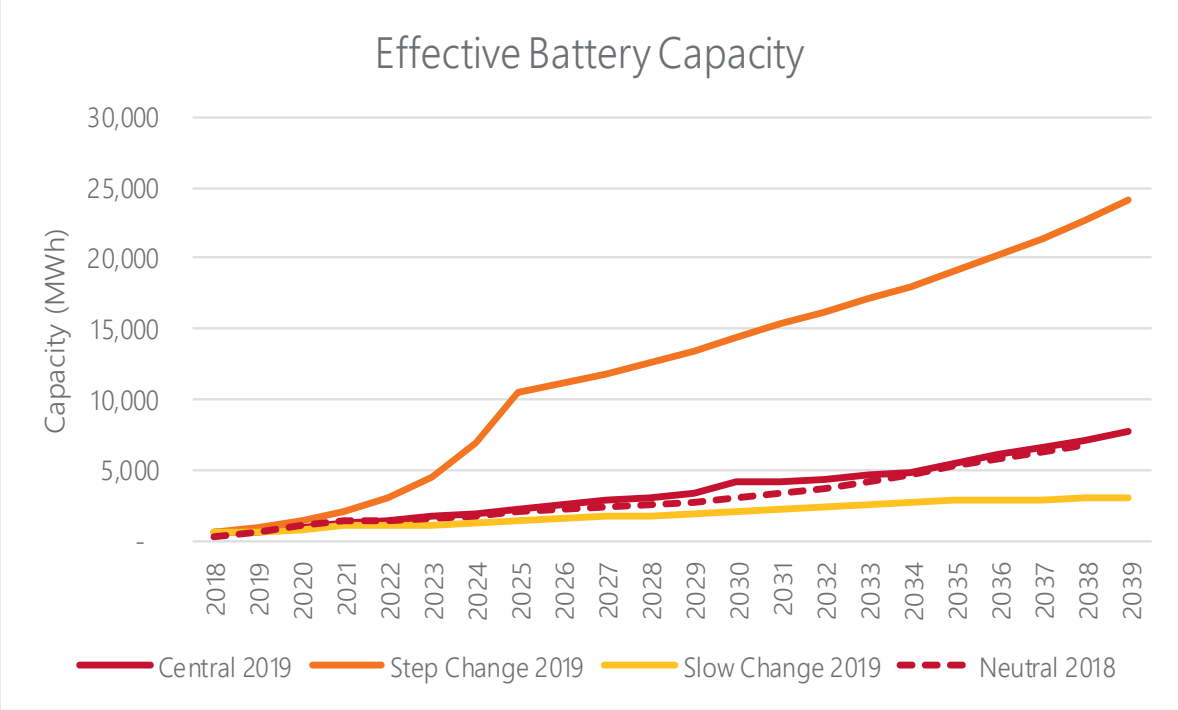
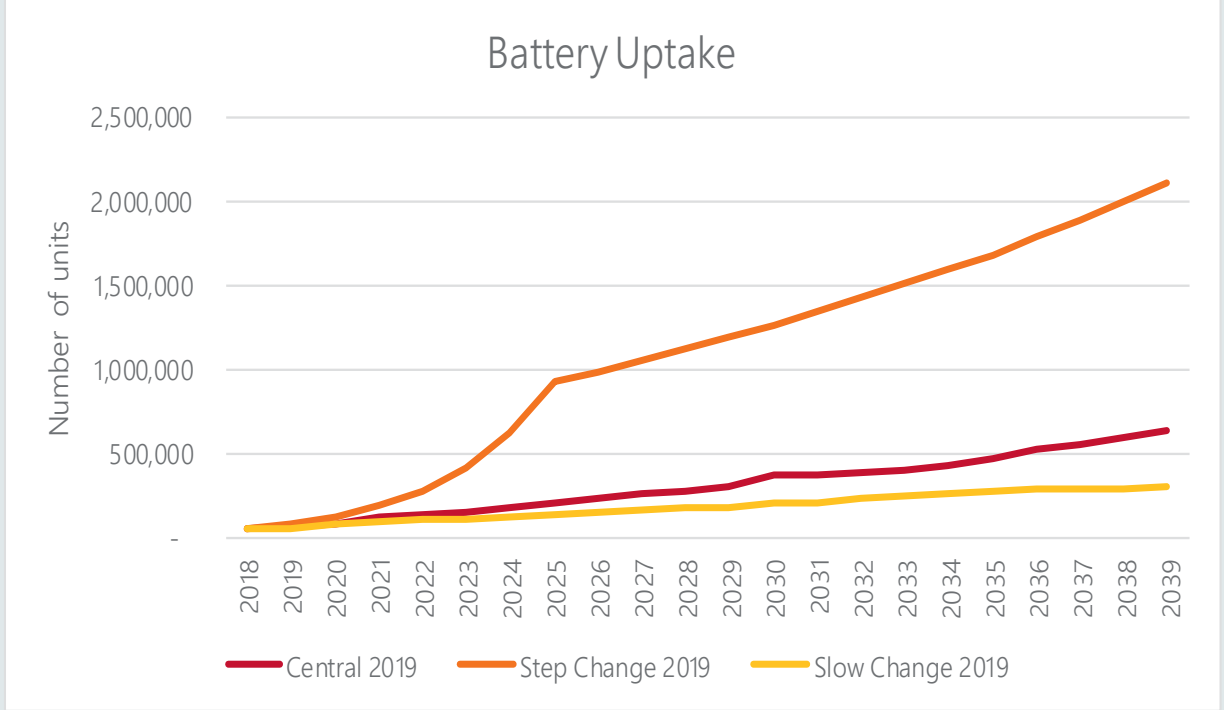
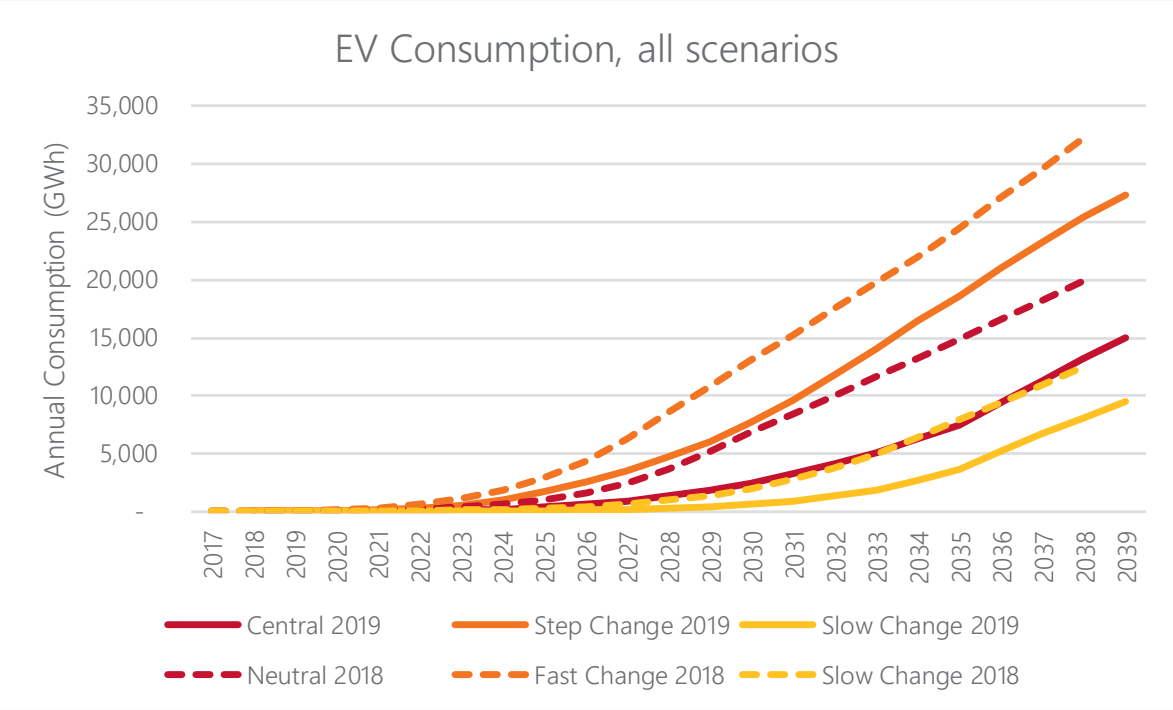
DER trajectories: Embedded Battery Systems

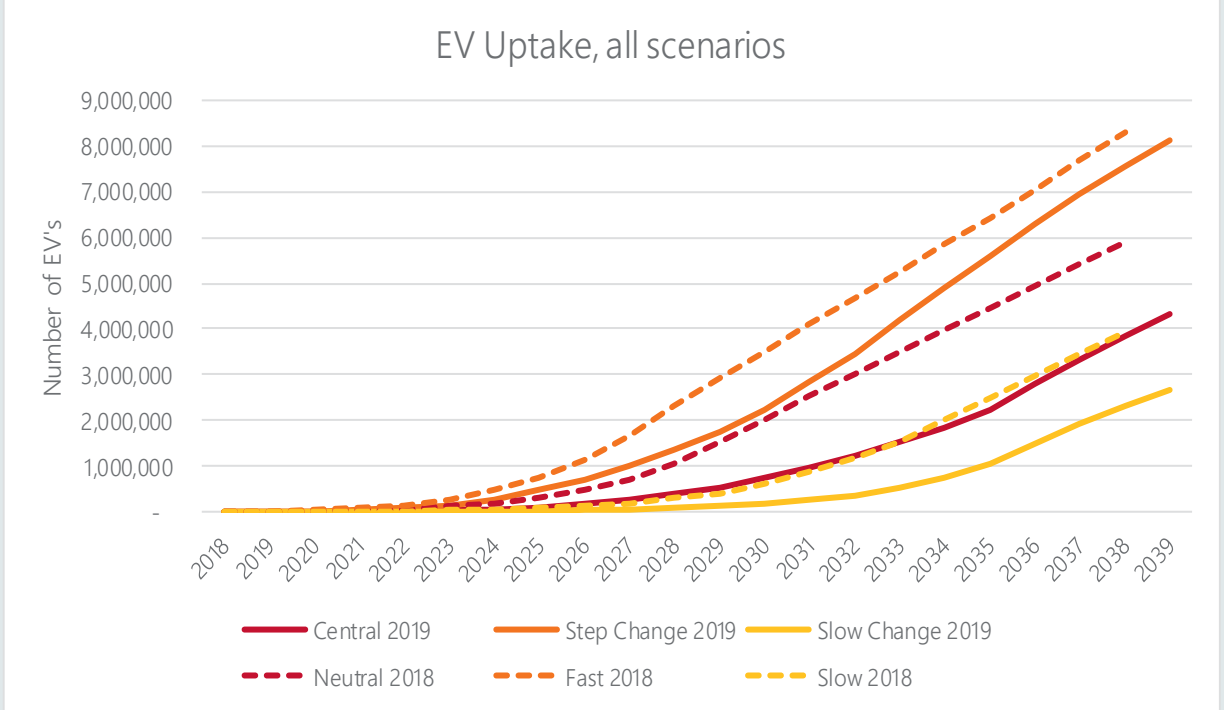




- Central and slow scenarios assume most customers are using batteries to shift solar, with a small percentage accessing tariffs which contribute to grid services
- Step change scenario assumes a broader subsidy scheme will be available, increasing the forecast deployment of batteries due to the reduction of the payback period
- Commercial sector forecast to establish growth later than residential sector
- Total households in NEM regions by 2039 approximately 10-11 million; the relative share of PV households that have battery storage is uncertain, depending on battery payback periods and tariff arrangement.

EV trajectories: by scenario





- Central scenario assumes cost parity with internal combustion vehicles late 2020s, allowing EV fleet share to increase to approximately 20% by 2040 (Slow Change approx. 10%, Step Change approx. 40%)
- Decrease on 2018 forecast due to lower national vehicle sales projections (includes greater depth of analysis on cost of travel and rideshare), changes in assumptions to market saturation levels, and the inclusion of fuel cell vehicles

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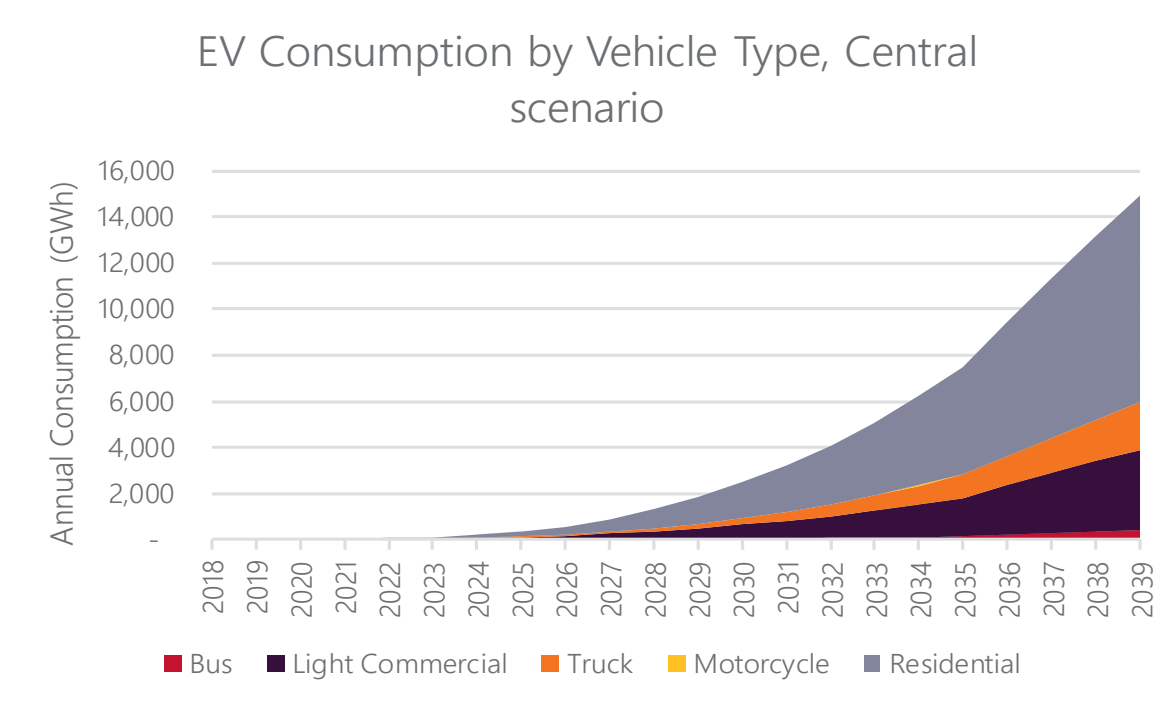
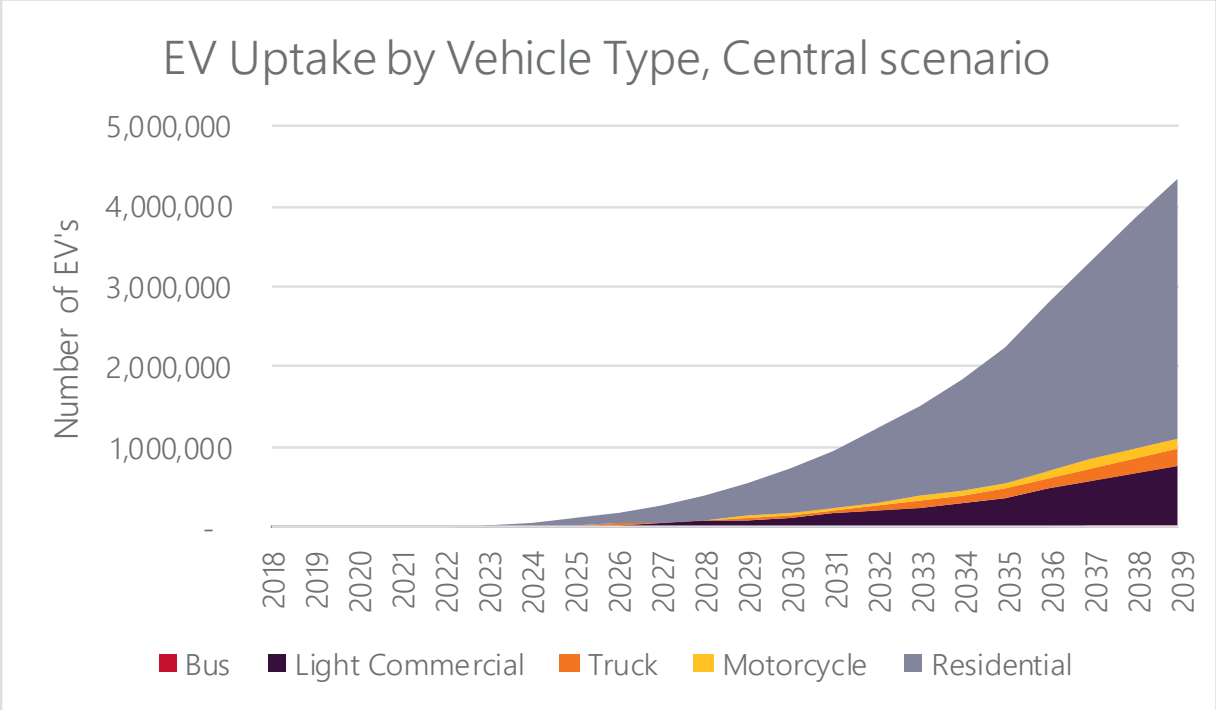
EV trajectories: by type





- EV adoption dominated by residential and commercial light vehicles
- Despite smaller fleet share for the truck sector, it does not require as many vehicles to reach a significant share of consumption
- Relative consumption by vehicle type:
  - Light commercial vehicles approx. 200% of residential vehicles by 2040
  - Trucks approx. 350% of residential vehicles by 2040
  - Motorcycles approx. 10% of residential vehicles by 2040
  - Buses approx. 1000% of residential vehicles by 2040

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Draft Residential Consumption Forecasts

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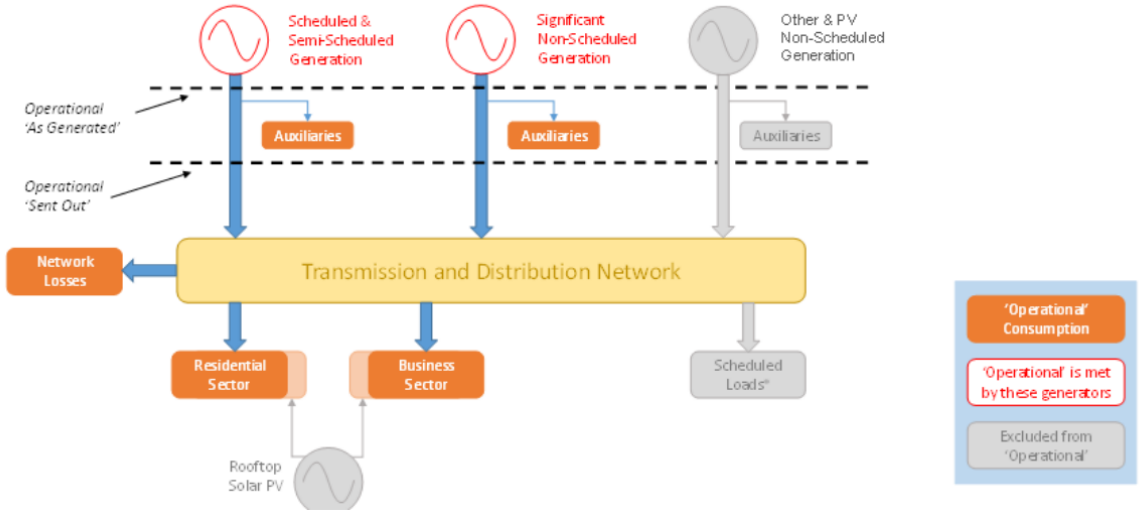
Forecast definitions used in today's session

Figure 1 Operational demand/consumption definition



Household batteries are included in Operational forecasts depending on categorisation:

- **Non-aggregated batteries**: netted off from OPSO (similar to rooftop PV), as consumption not supplied by scheduled, semi-scheduled and significant non-scheduled generators
- **Aggregated batteries (VPP):** included within the OPSO forecast, as the VPP aggregated batteries are treated as a dispatchable supply source.

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 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)

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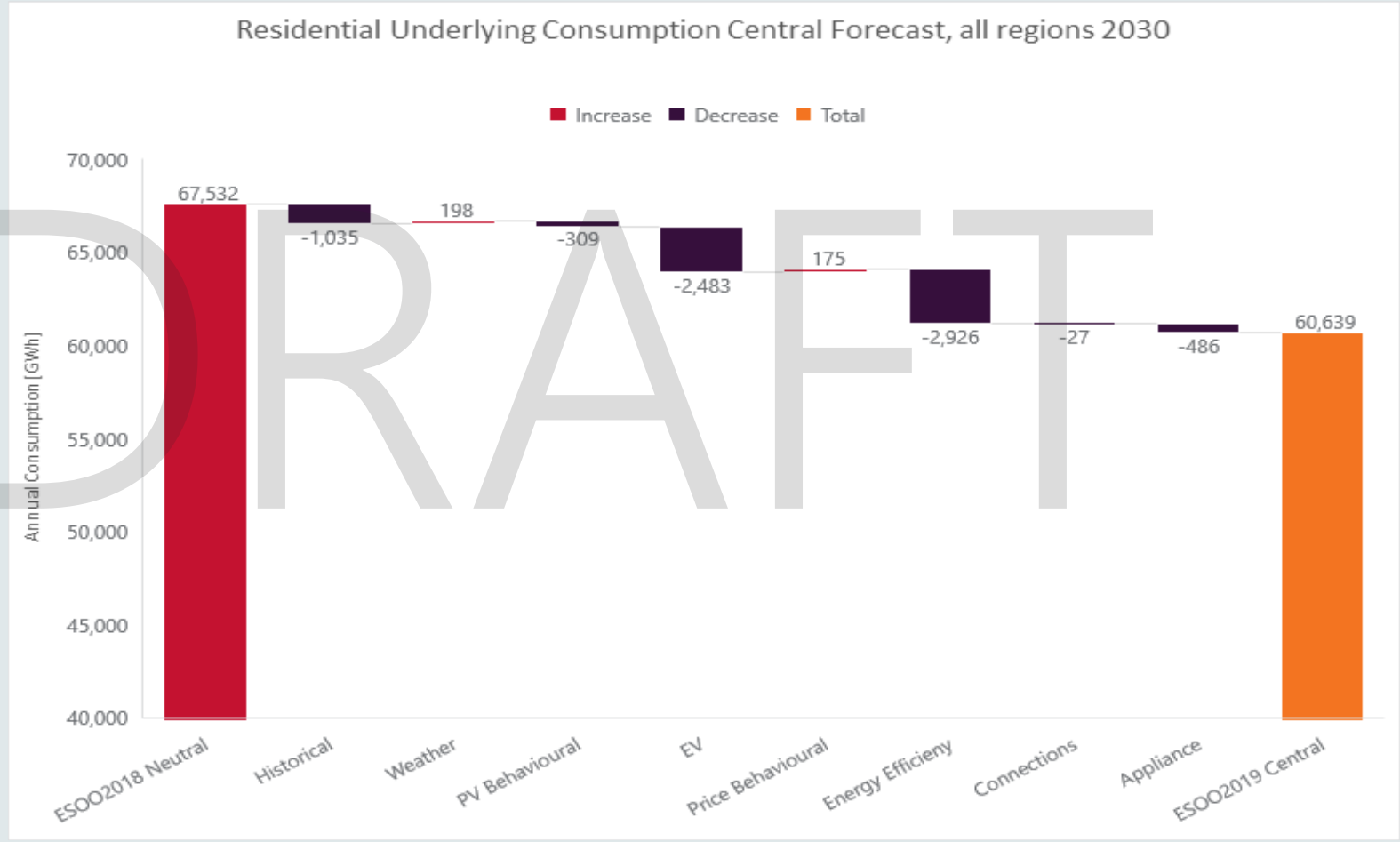
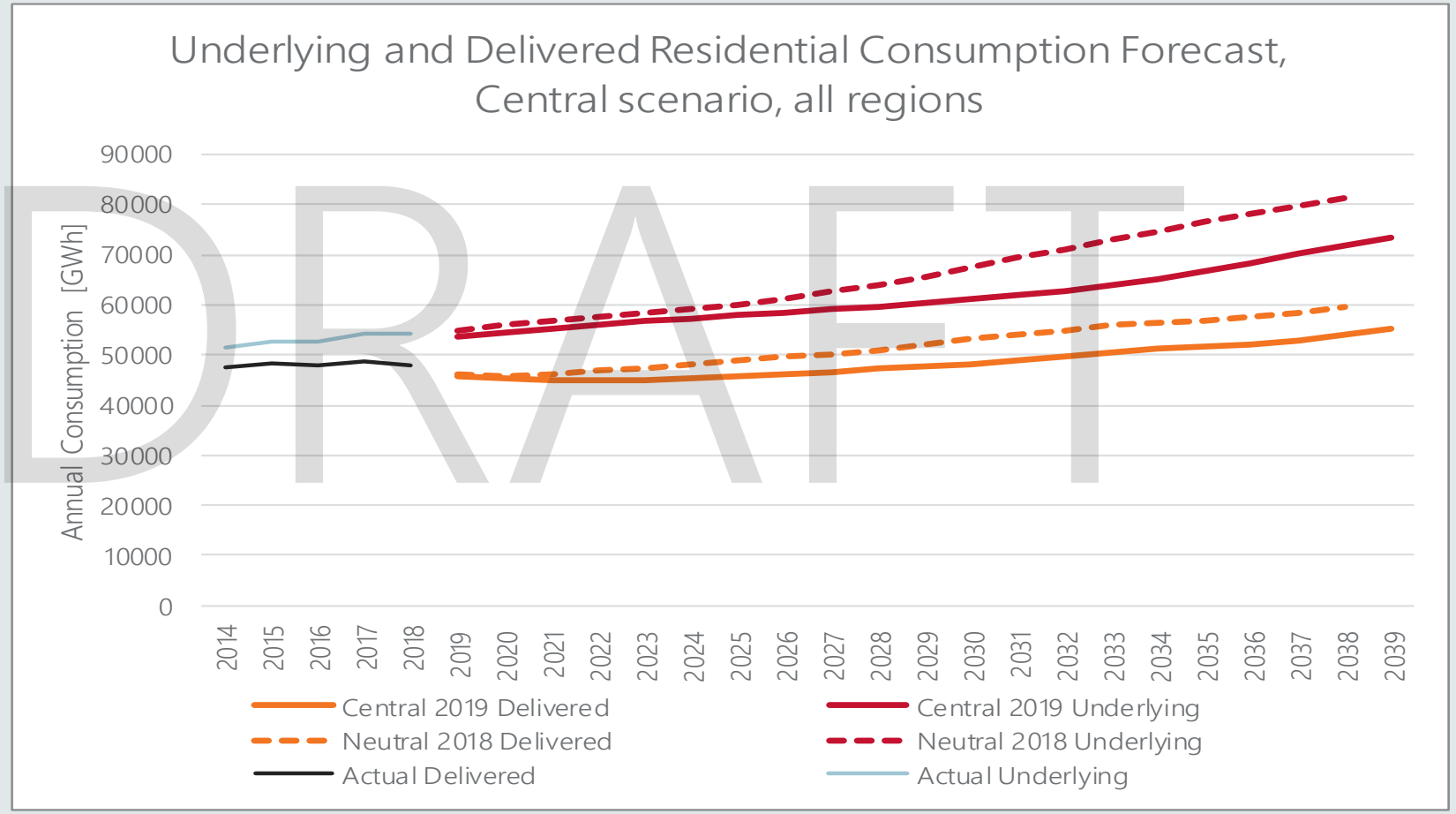
Underlying Residential Forecast With Key Drivers

- Updated historical PV estimation (moving to new provider - *Solcast*), revised EV forecasts and updated energy efficiency calculated impacts



Draft Residential Forecast



Draft Non-Residential Consumption Forecasts

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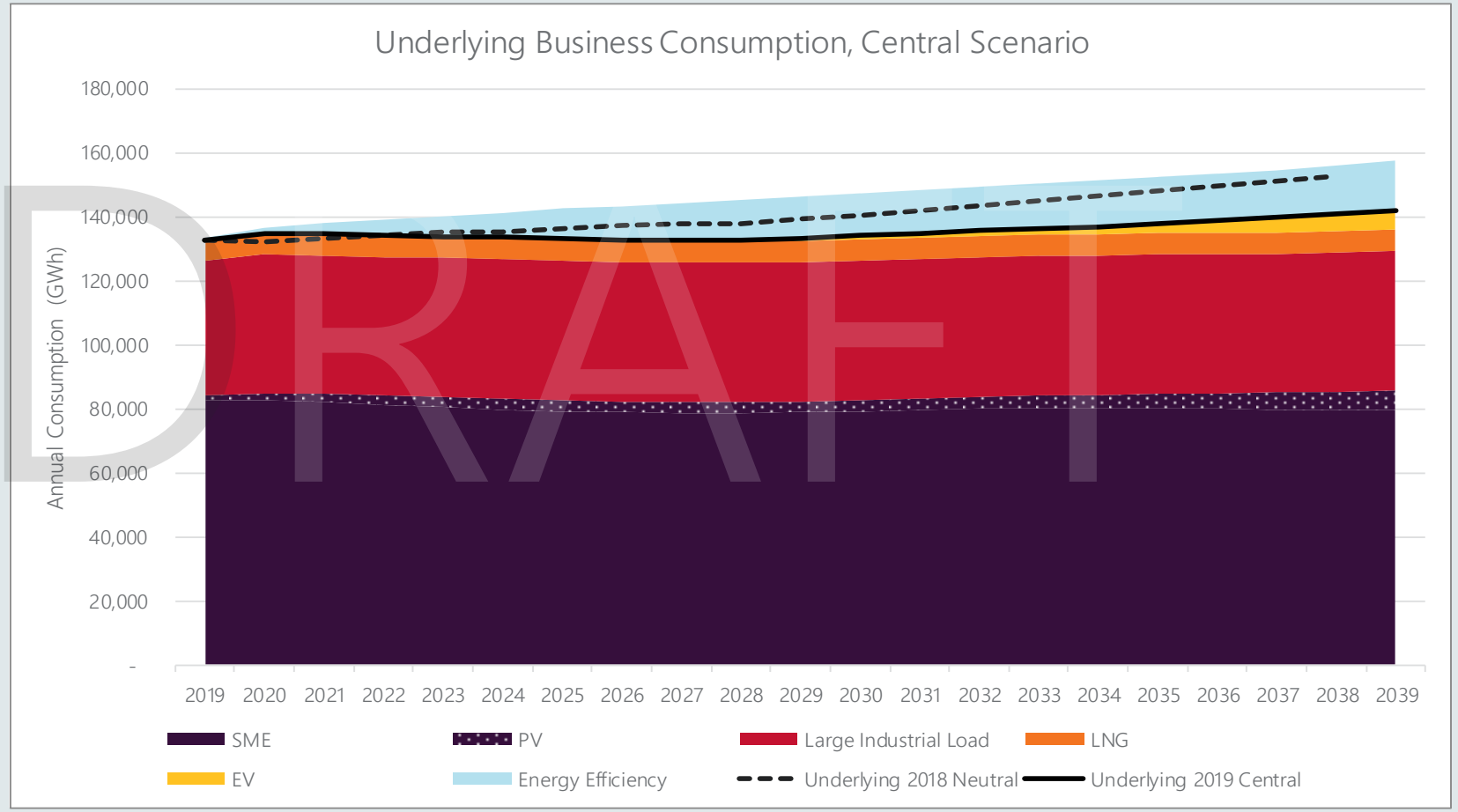
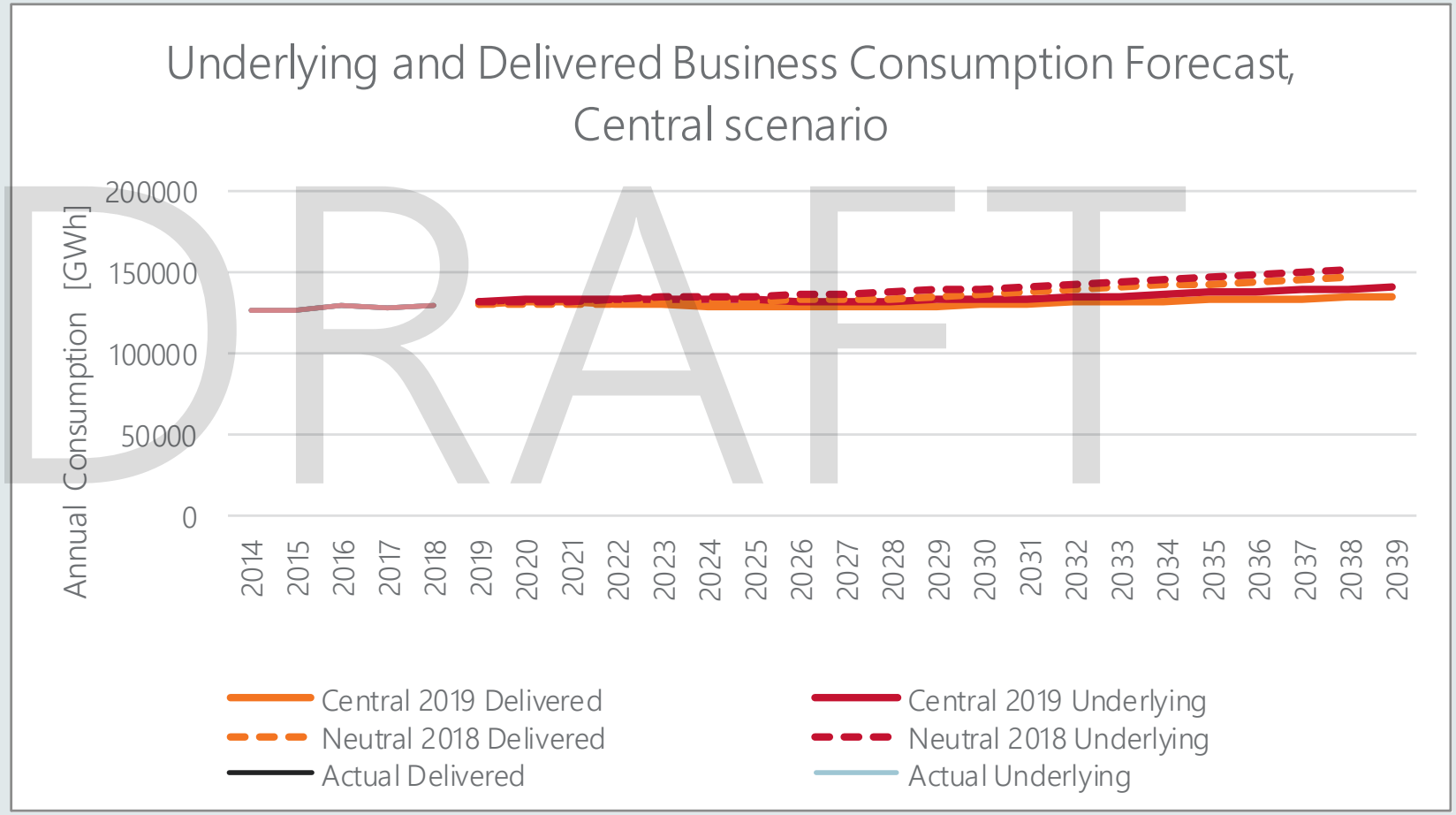
Underlying Business Forecast With Key Drivers

- Largest consumption sector, much larger than Residential
- Updated SME model better capturing the less-energy intensive industries contributing to economic growth
- Updated energy efficiency impacts over long-term



Draft Business Forecast



Draft Total Consumption Forecasts

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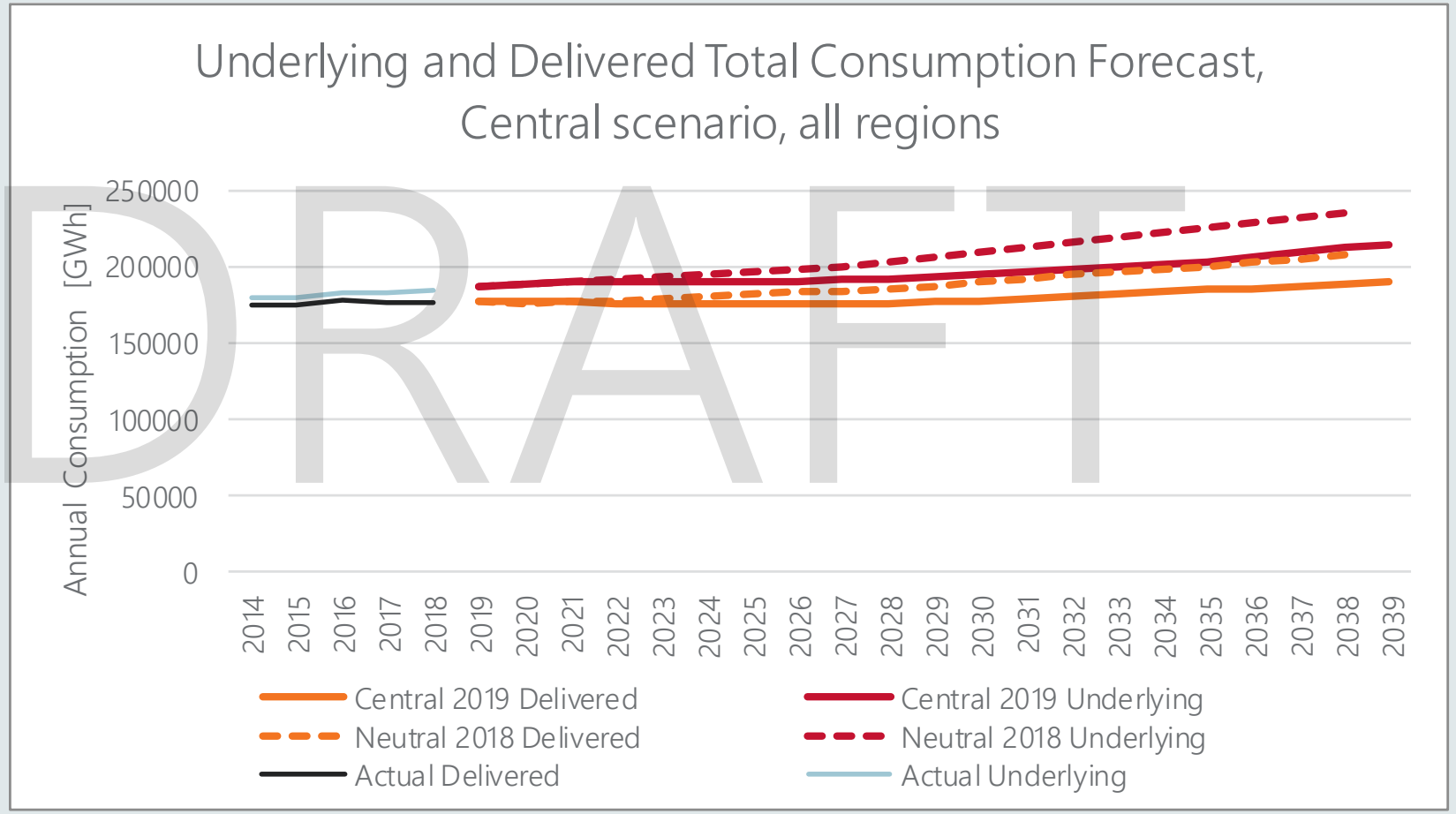
Draft Total Forecast



Draft Operational Forecast

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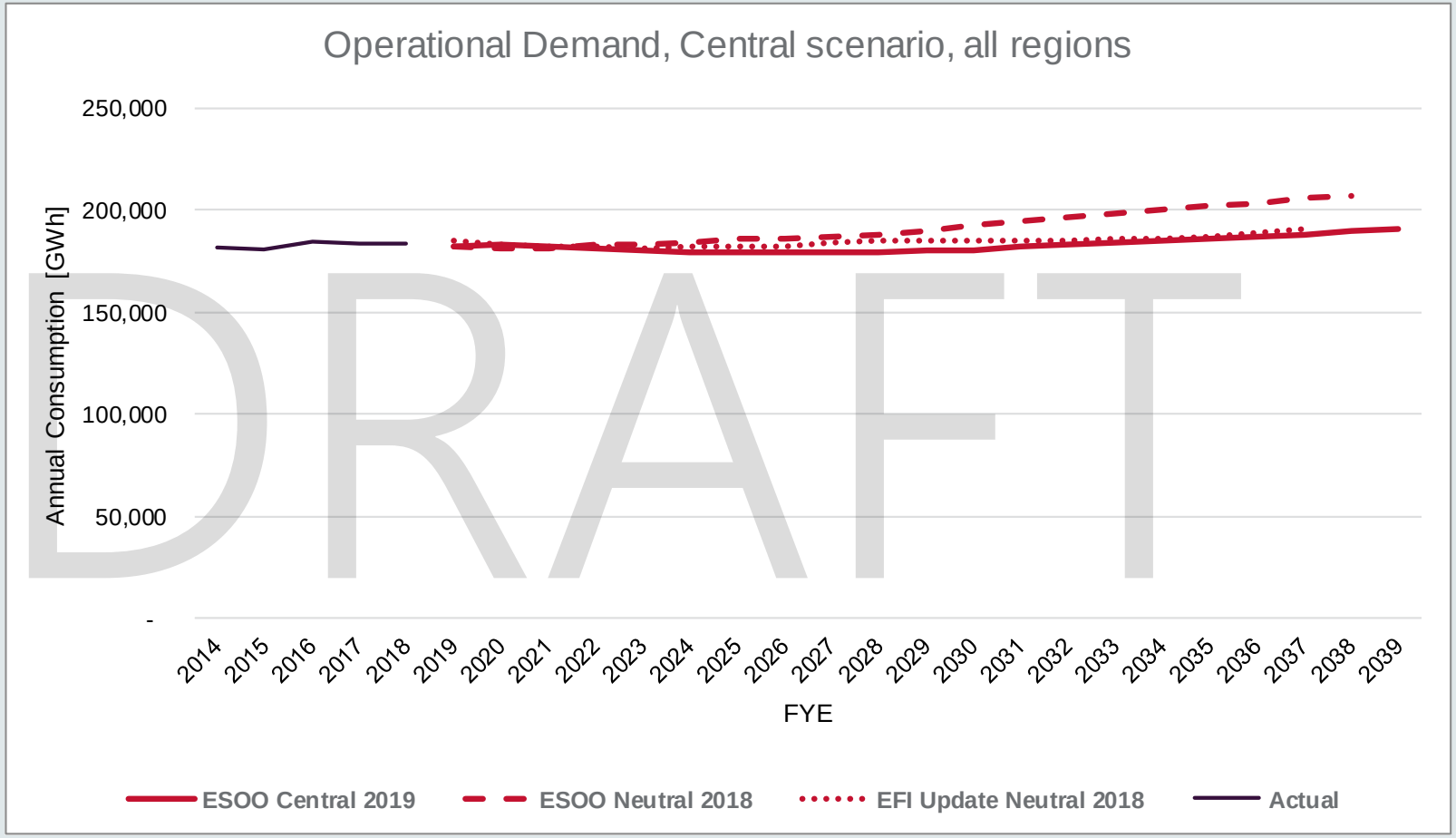
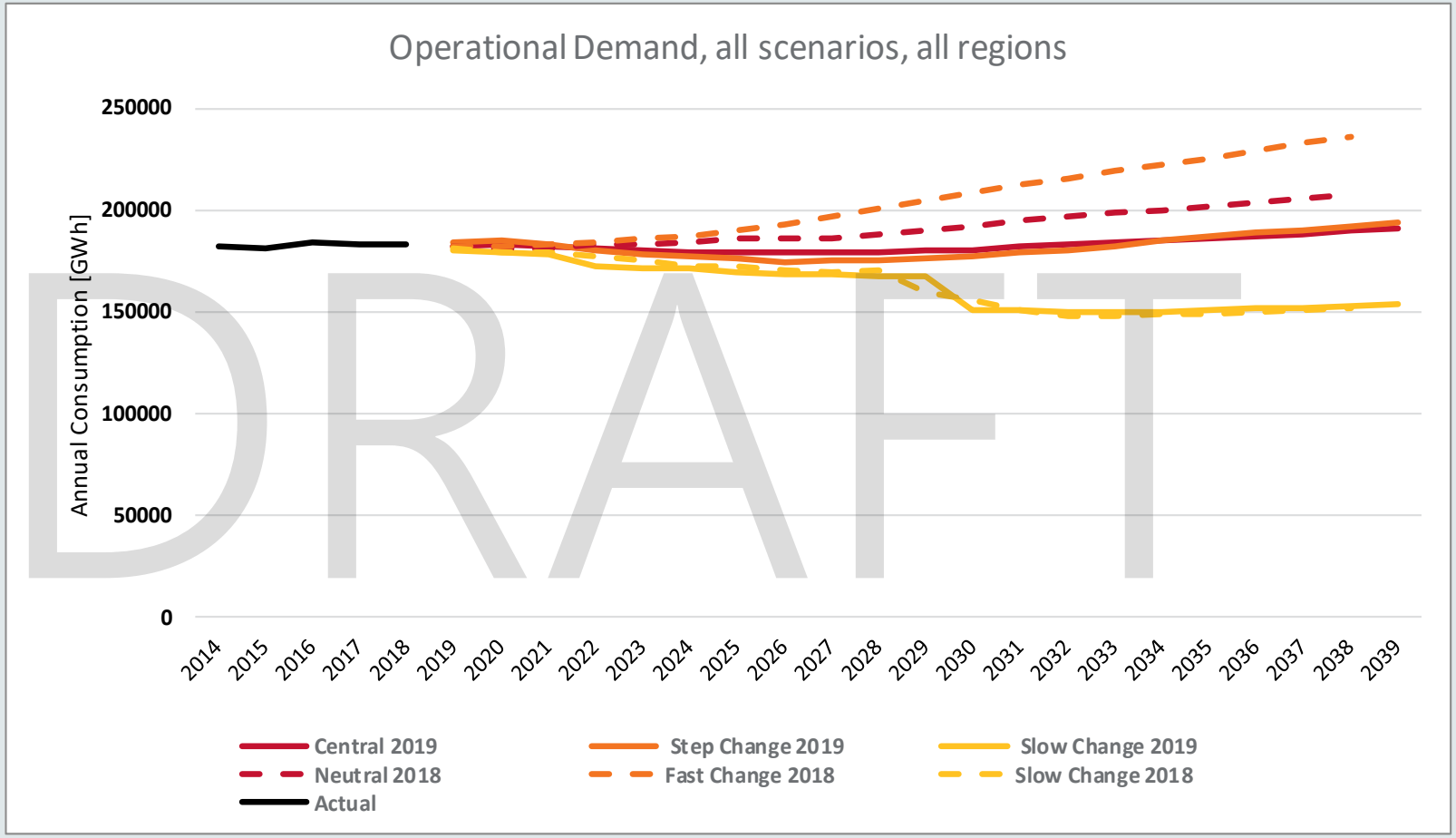
Annual Energy as Sent Out

- Combination of lower residential and business sector forecast drivers realised in the medium- to long-term



Annual Energy As Sent Out



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Supplementary Information

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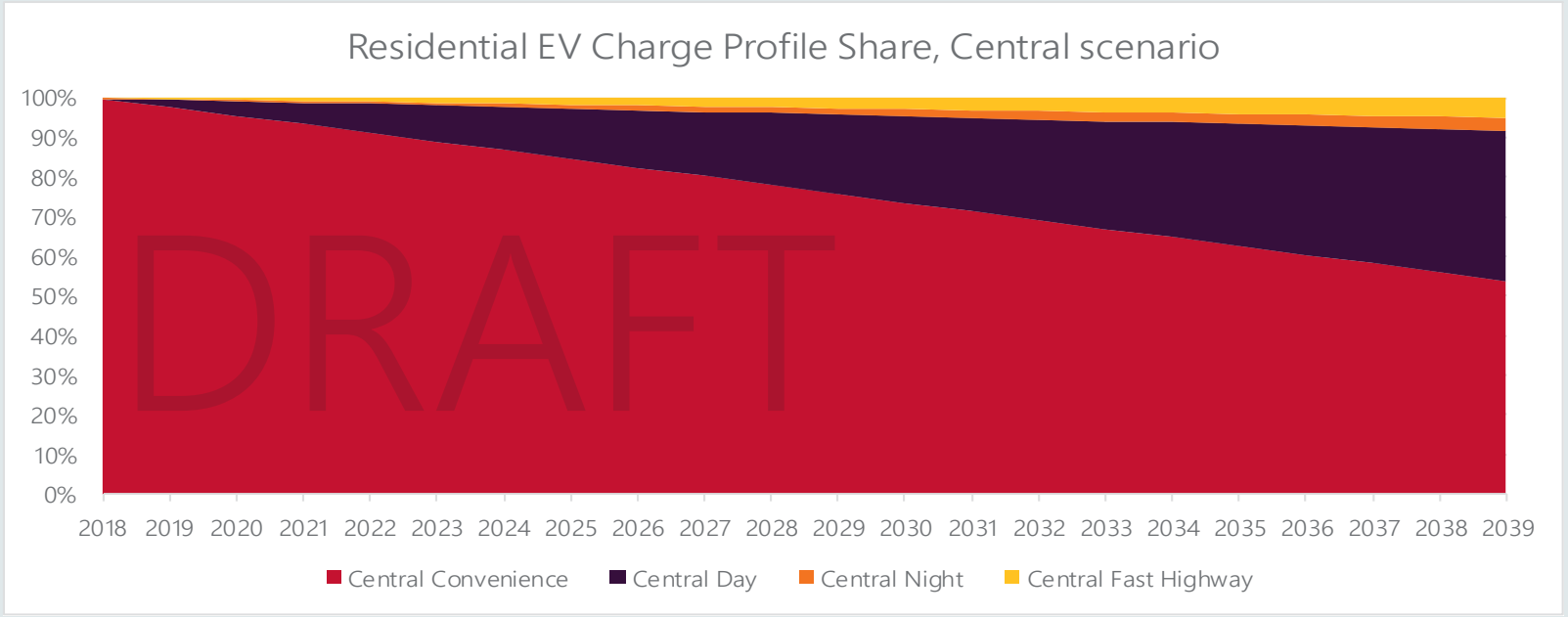
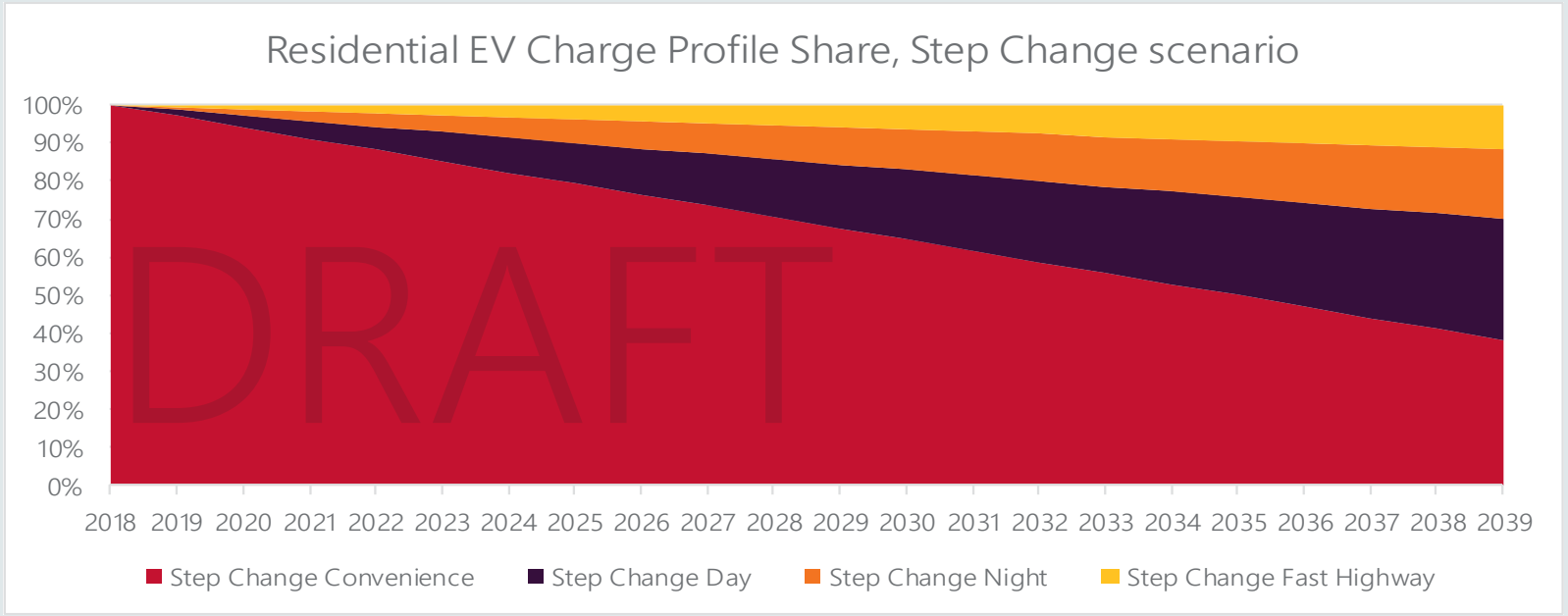
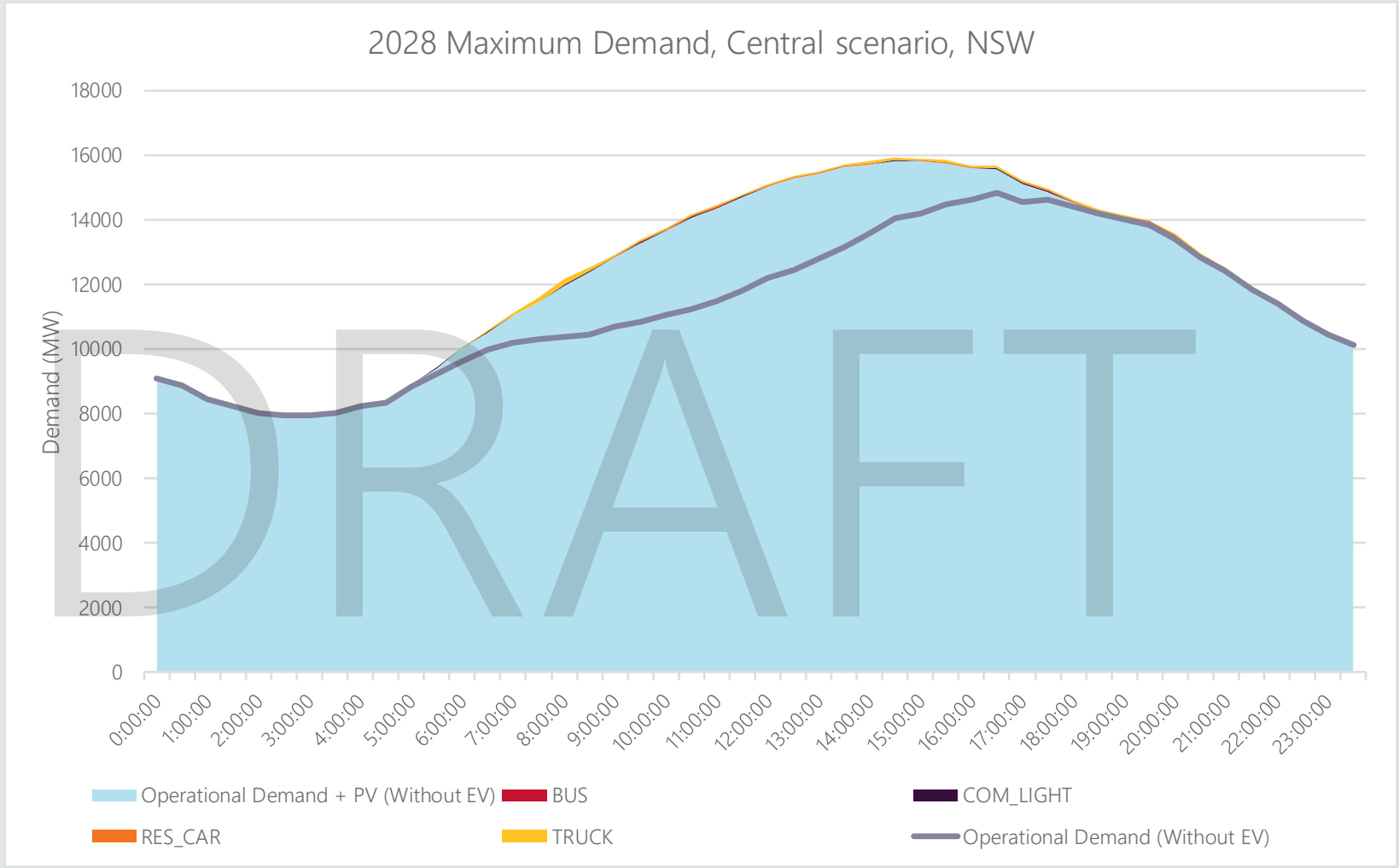
EV Charge Profile Mix

- Forecast shift from convenience charging behaviours to other behaviours due to increase access to public charging availability and tariff structure shifts

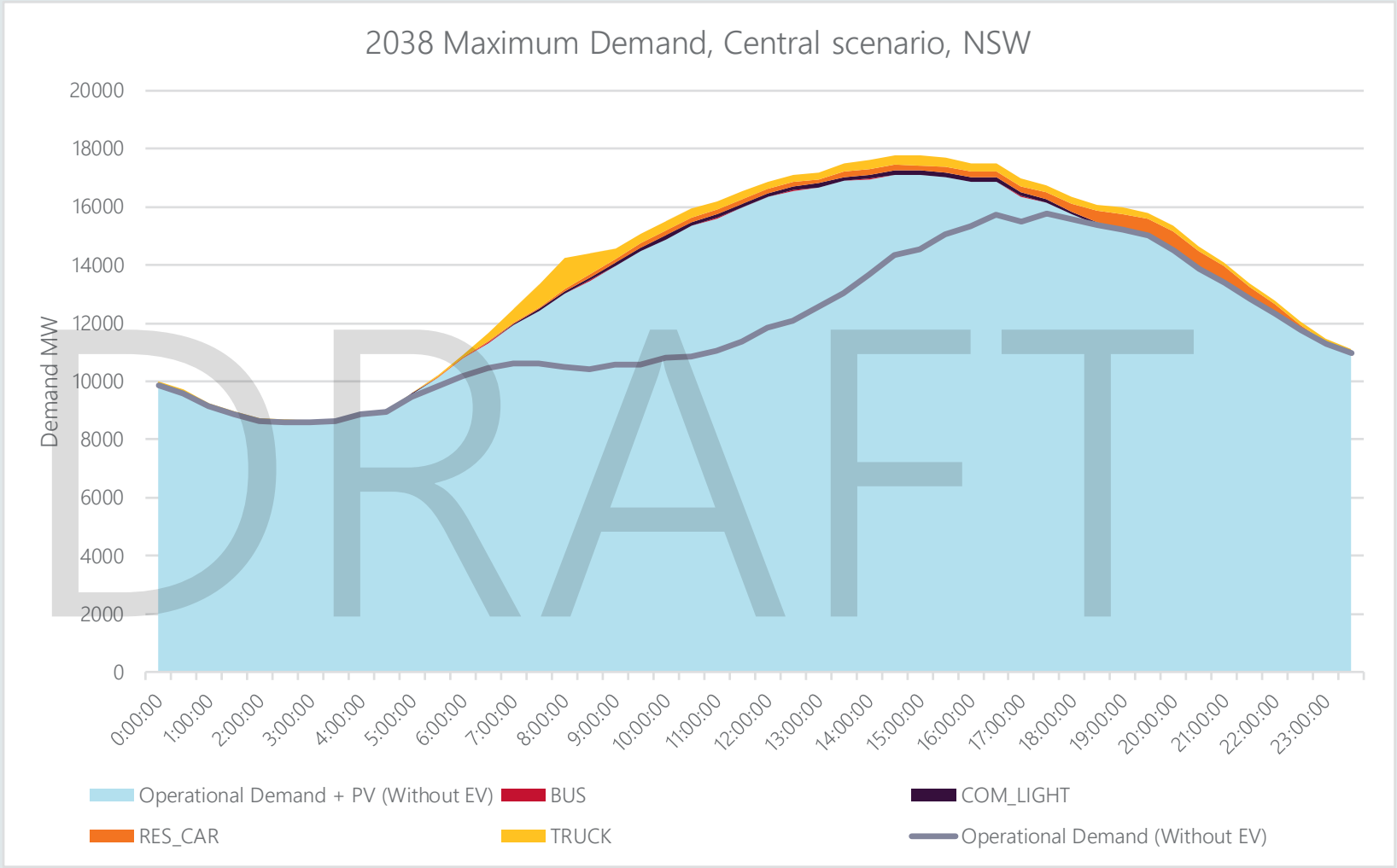




EV Charge Profile Application FYE 2028



EV Charge Profile Application FYE 2038

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