

# Regional Annual Consumption and Maximum Demand Forecasts ESOO 2019

June 2019 DRAFT

Presented By Greg Staib and Daniel Guppy

# Agenda

## Regions

1. New South Wales
2. Queensland
3. BREAK
4. South Australia
5. Victoria
6. Tasmania

## Per Region

1. DER & Draft Annual Consumption
2. Maximum Demand Forecasts

# Regional Maximum Demand – central scenario

- Maximum demand models were completely overhauled in 2019. Maximum demand models use an ensemble model approach with:
  - the Generalized Extreme Value (GEV) model used to estimate the “base year” distribution of demand and
  - the Half-Hourly Model used to forecast demand in the long-term
- Based on central scenario narratives:
  - Electricity vehicle demand is 25% lower across the NEM compared to ESOO2018 decreasing demand in the long term compared to last year
  - Rooftop PV capacity is forecast to be lower across the NEM meaning that maximum demand doesn’t shift later in the day as rapidly. Other than the time shift, the impact on maximum demand is only marginal
  - Battery installed capacity is roughly similar to the ESOO2018 but the new charge discharge profile has the effect of smoothing out demand across the day reducing maximum demand
  - Energy Efficiency forecast is higher compared to the ESOO2018 forecast decreasing maximum demand
- Residential and business cooling load is lower overall compared to the ESOO2018 forecast due to energy efficiency projections.
- Initial ramp up in business load in the first 2 years. After which business load is lower than the ESOO2018 forecast in the long-term.

# NEW SOUTH WALES

# NEW SOUTH WALES

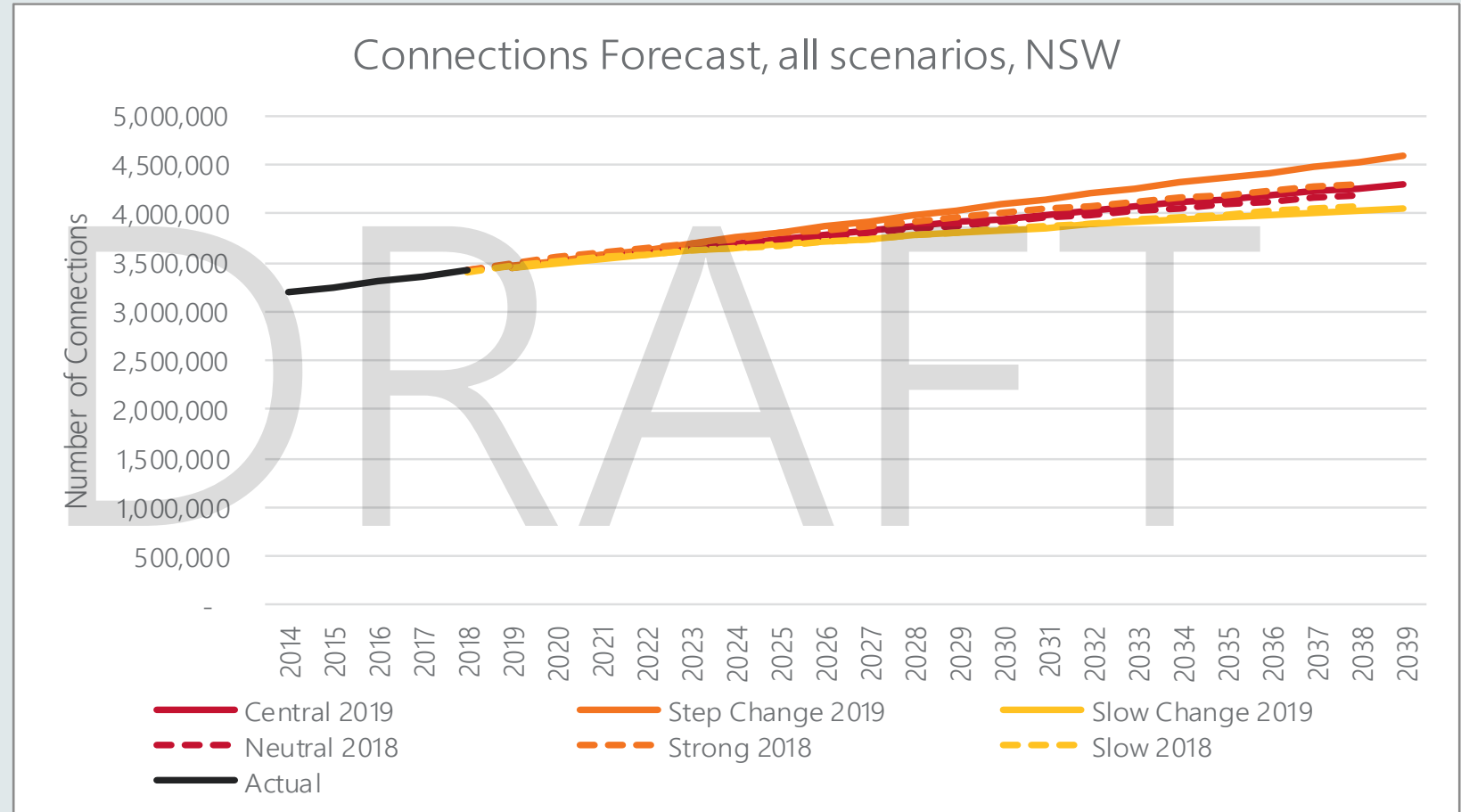
## Key Forecast Inputs

Spread of components for each scenario

# NSW Connections Forecast

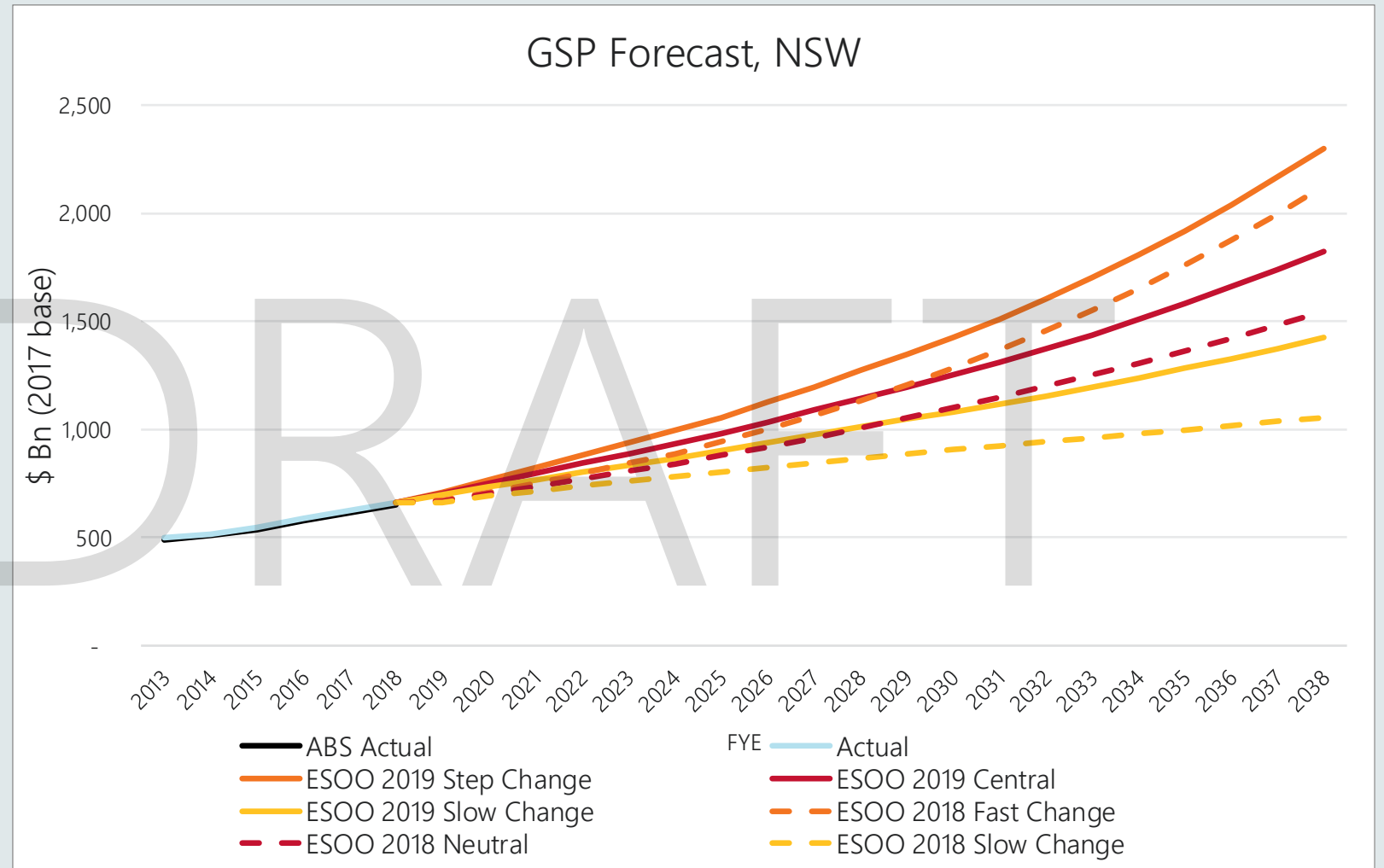
The range of the forecasts has widened due to the increase in the spread of input projections

- 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



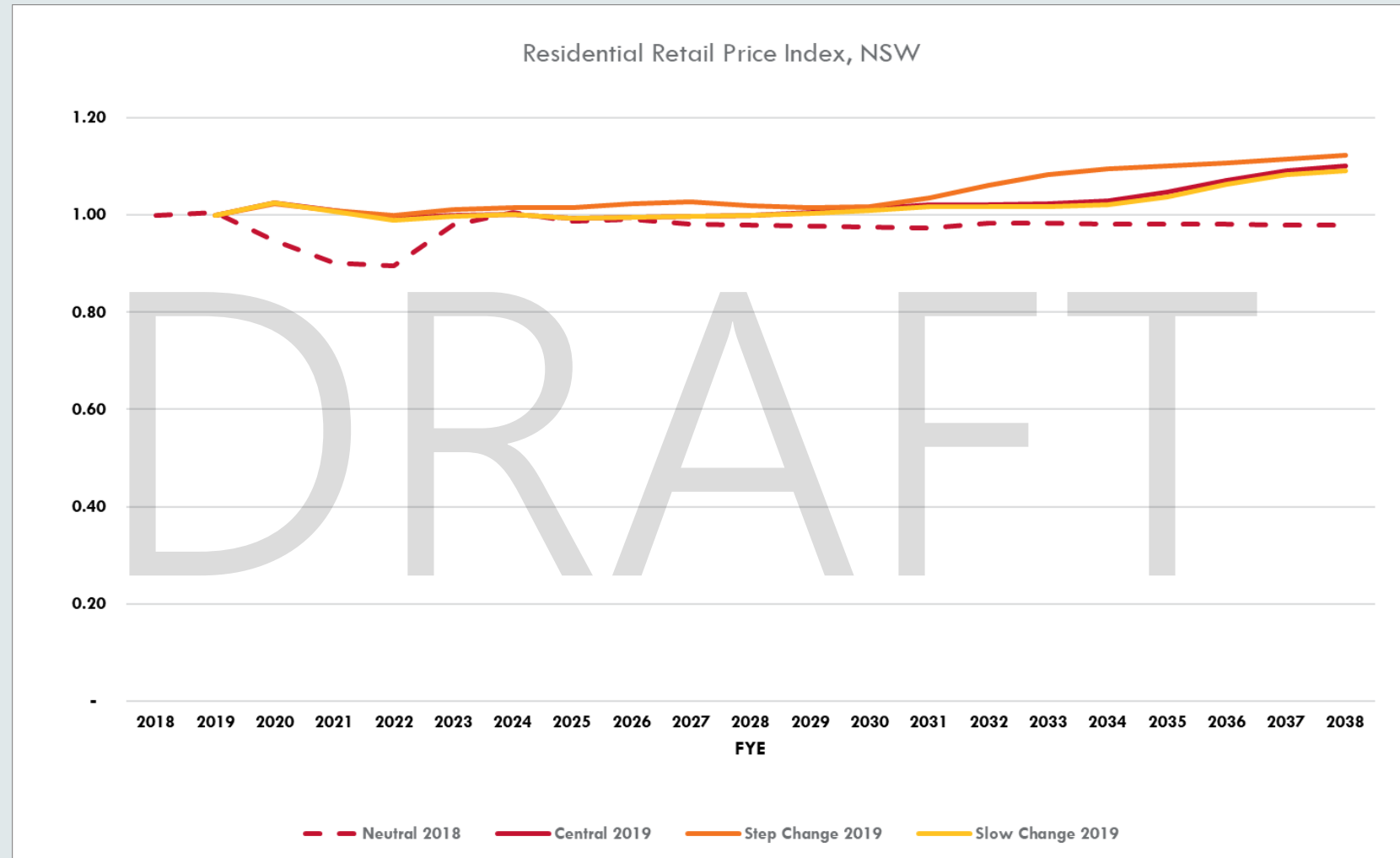
# NSW GSP

- Population growth rates in NSW have been revised upwards, pushing the state's GSP forecasts up throughout the outlook



# NSW Residential Retail Price Index

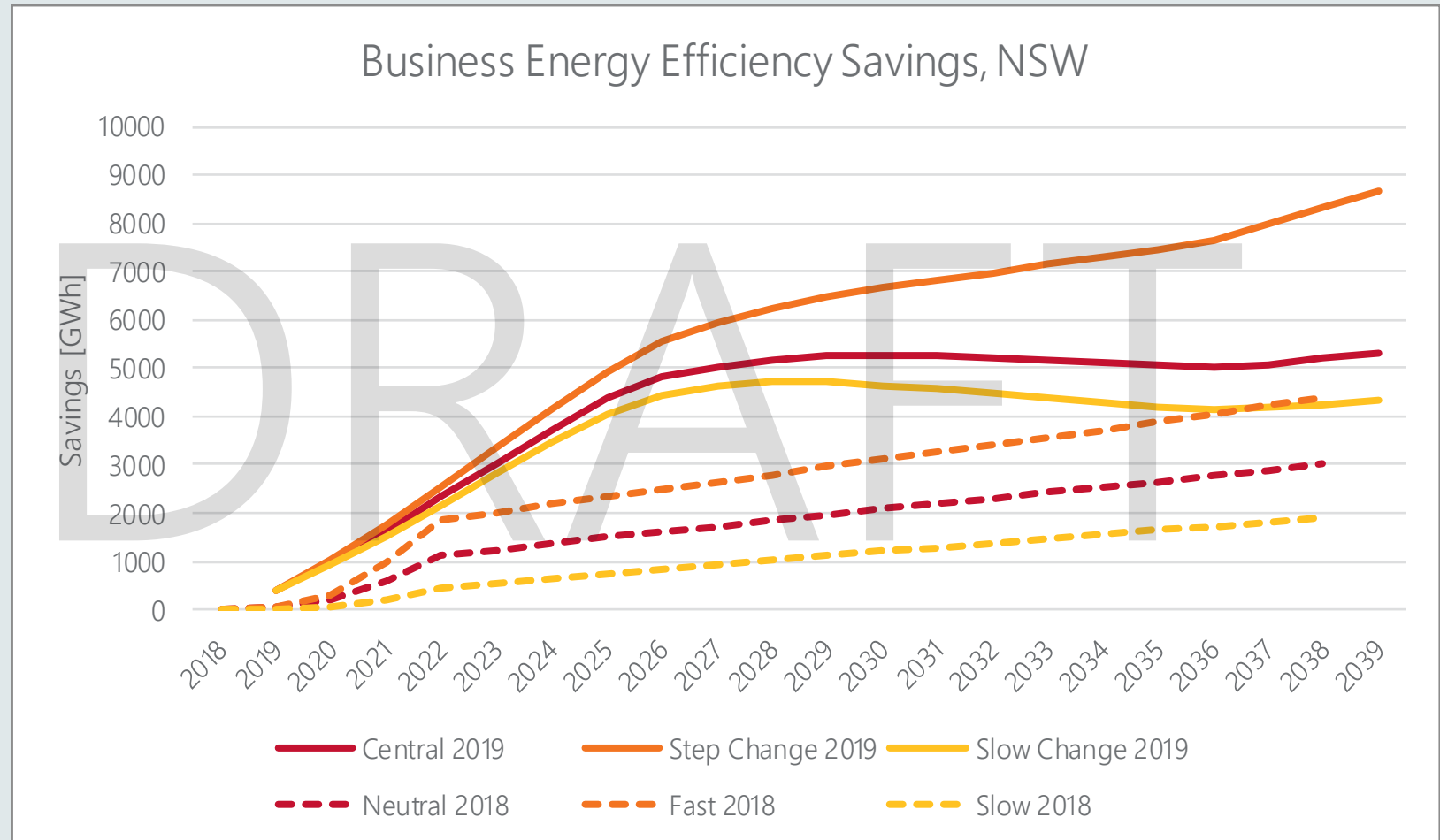
- Flat in short-to -medium term as more renewable generation comes online
- Moderate increase over long-term as aging coal fleet retires





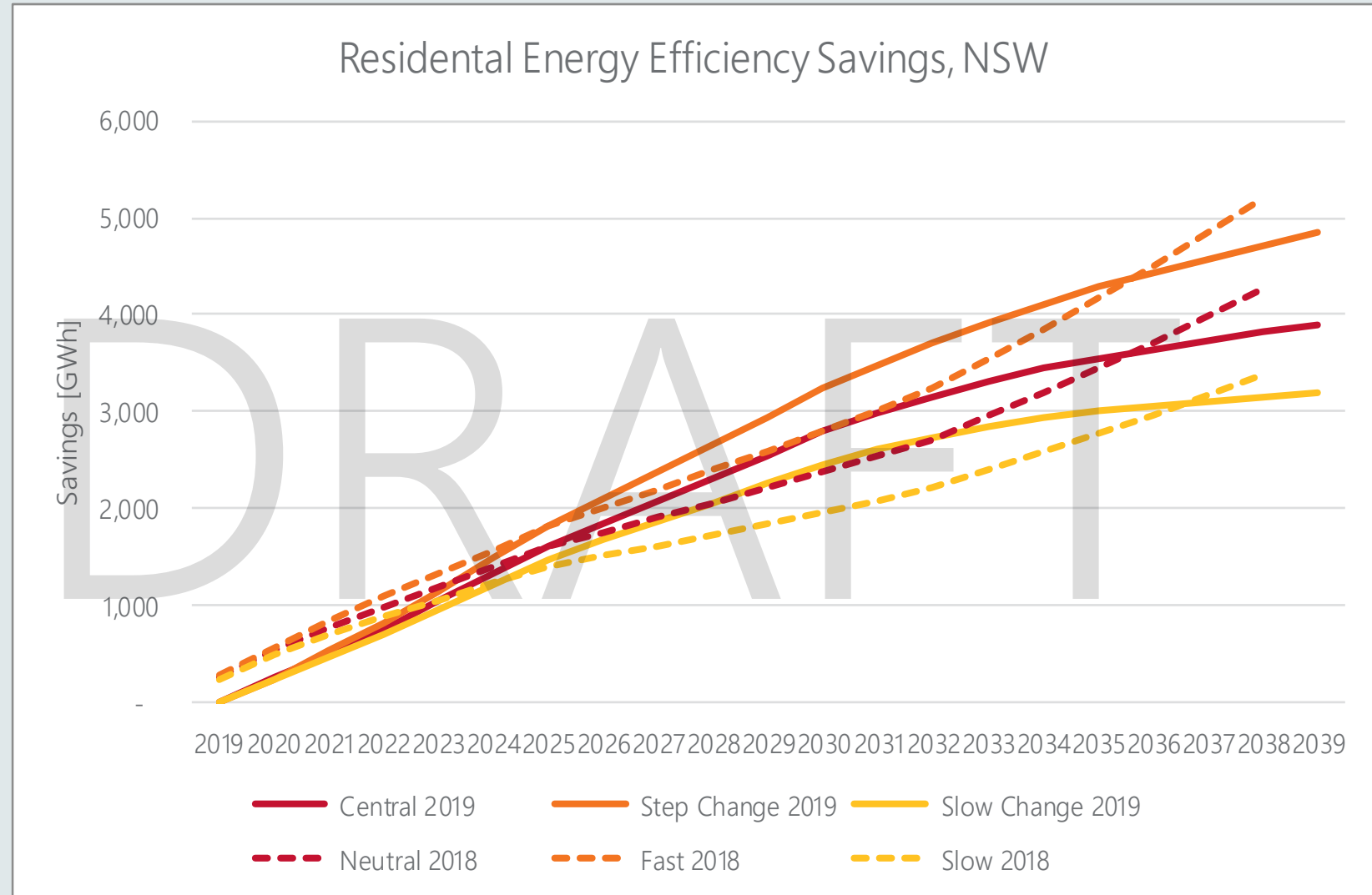
# NSW Energy Efficiency: Business

- Better representation of NSW Energy Savings Scheme (ESS) in 2019 forecasts
- From 2025 savings growth slows due to end of ESS, though 75% of accrued ESS savings expected to continue as BAU post-2025
- Step change scenario models two additional measures not considered in the 2018 Fast change scenario related to the future building code and equipment standards (Greenhouse and Energy Minimum Standards (GEMS))



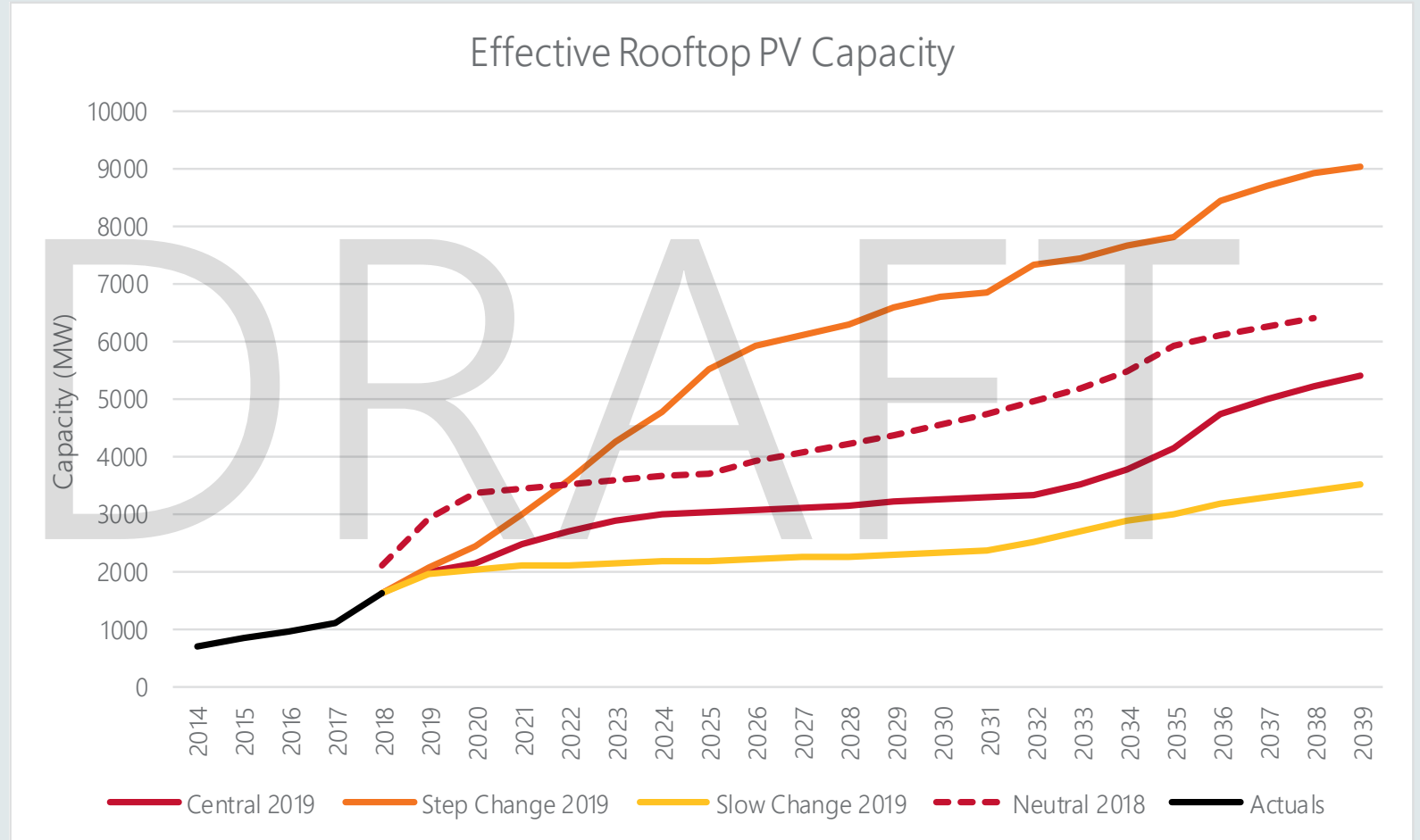
# NSW Energy Efficiency: Residential

- Revised dwelling stock model calibrated to AEMO's 2019 connection forecasts
- Improved approach to account for future savings from past activities
- Step change scenario models higher energy star ratings from 2022



# NSW PV Forecast

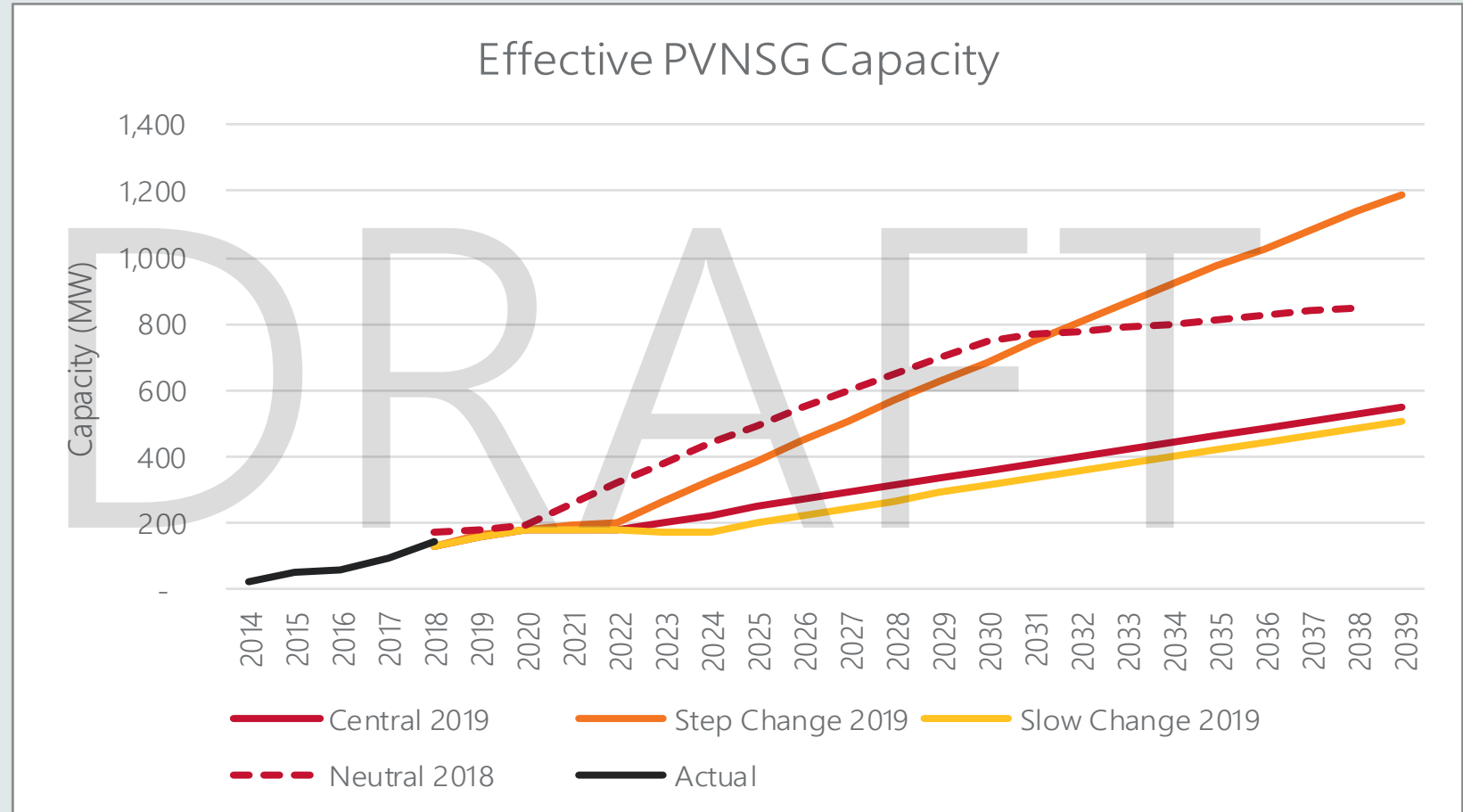
- Forecasts reflect more regular updates in actuals data
- Slowing uptake from 2022 reflects stable electricity prices, reducing purchasing drivers
- Assumed capacity factor of 15.4%



# NSW PVNSG Forecast

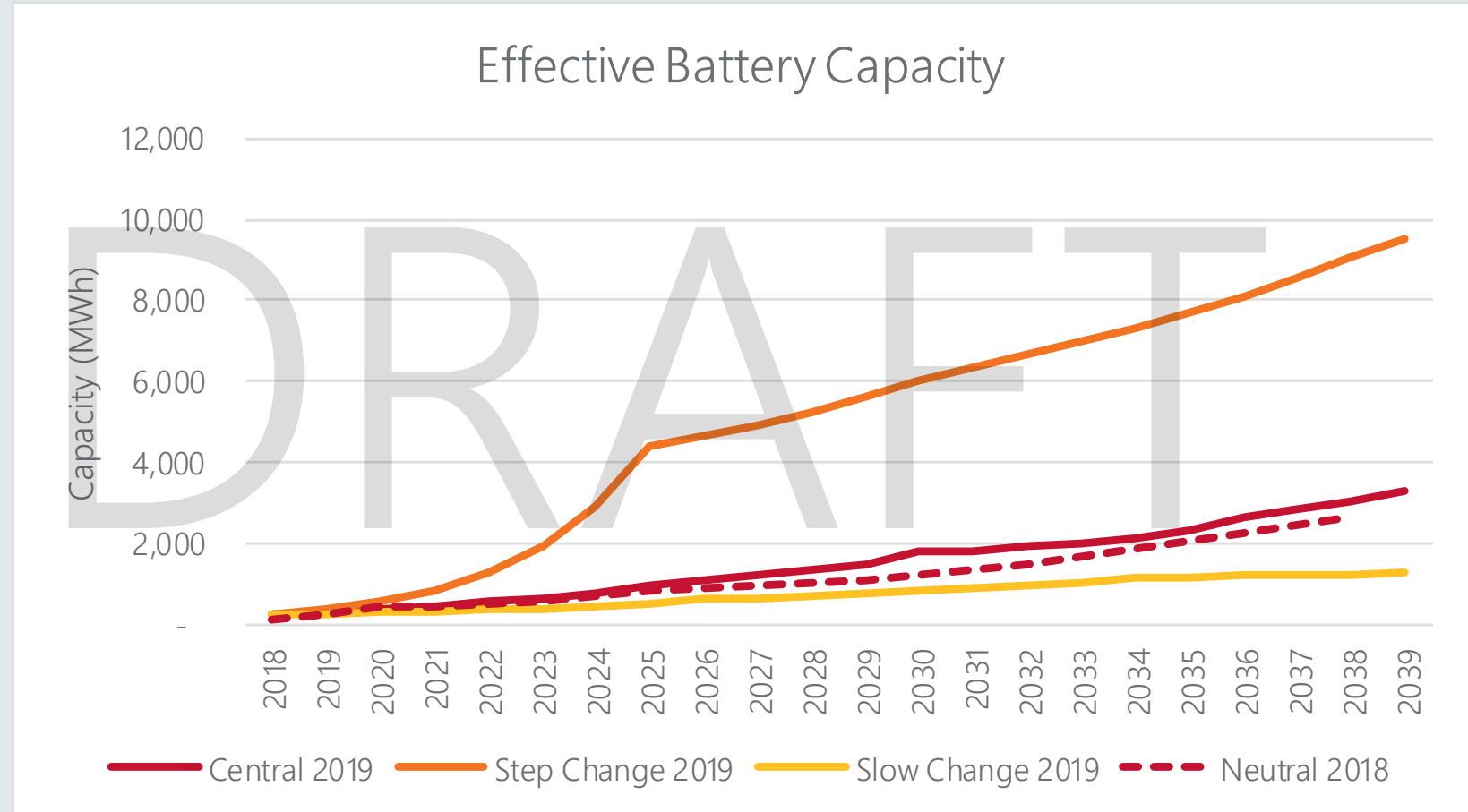
Size range: 100kW to 30 MW

- Slower short term deployment growth in 2019 account for a rapid decline in LGC value since 2018
- Medium term growth reflects reducing technology costs



# NSW Battery Forecast

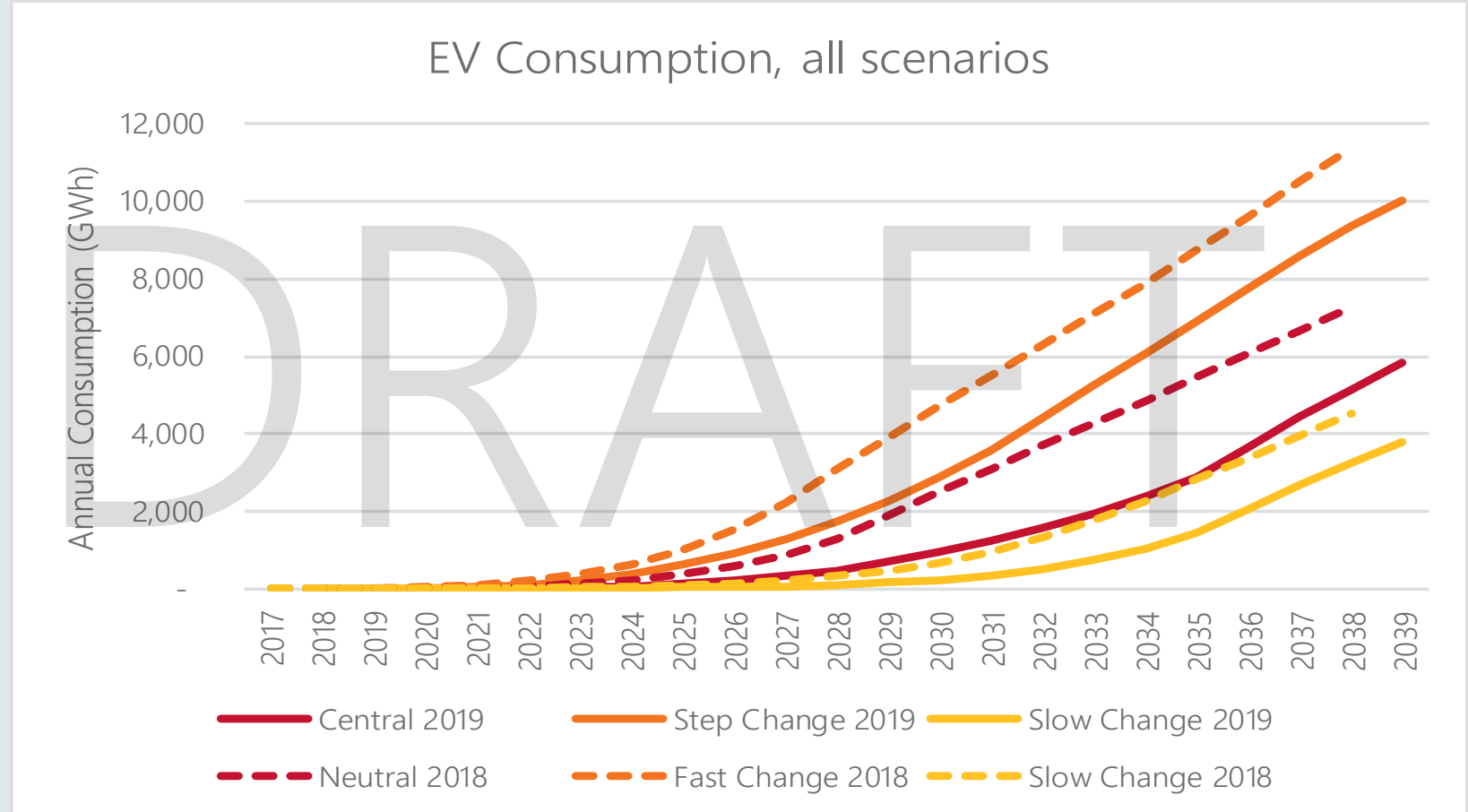
- Assumes large residential rated capacity 14kWh, otherwise 7kWh
- Central and slow scenarios assume a small percentage accessing tariffs which contribute to grid services, while Step change scenario assumes a broader subsidy scheme will be available



# NSW EV Capacity Forecast

## By Scenario

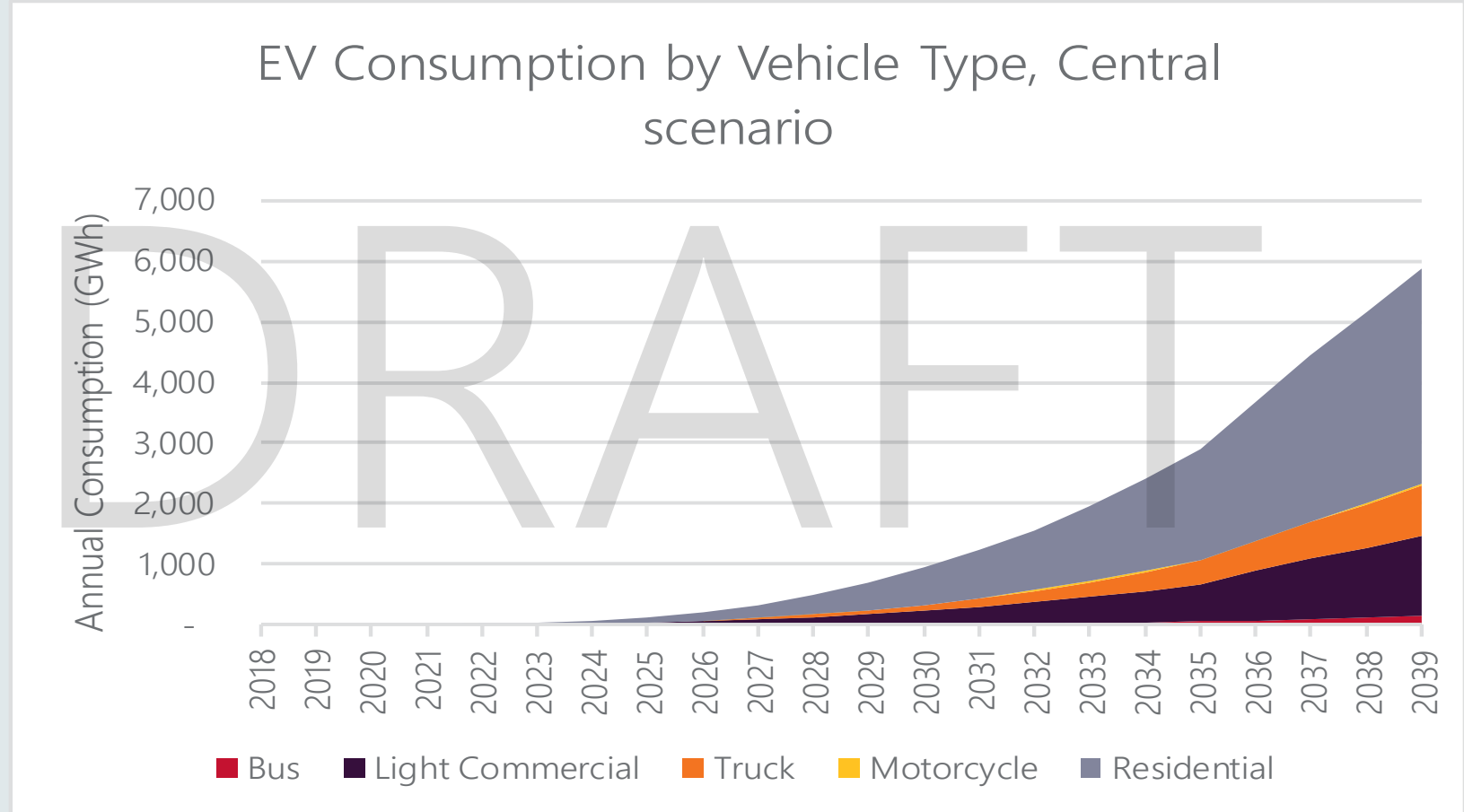
- Decrease on 2018 forecast due to lower national vehicle sales projections, ride share assumptions, market saturation level assumption changes, and the inclusion of fuel cell vehicles



# NSW EV Capacity Forecast

## By Vehicle Type

- EV adoption is projected to be dominated by residential and commercial light vehicles



# NEW SOUTH WALES

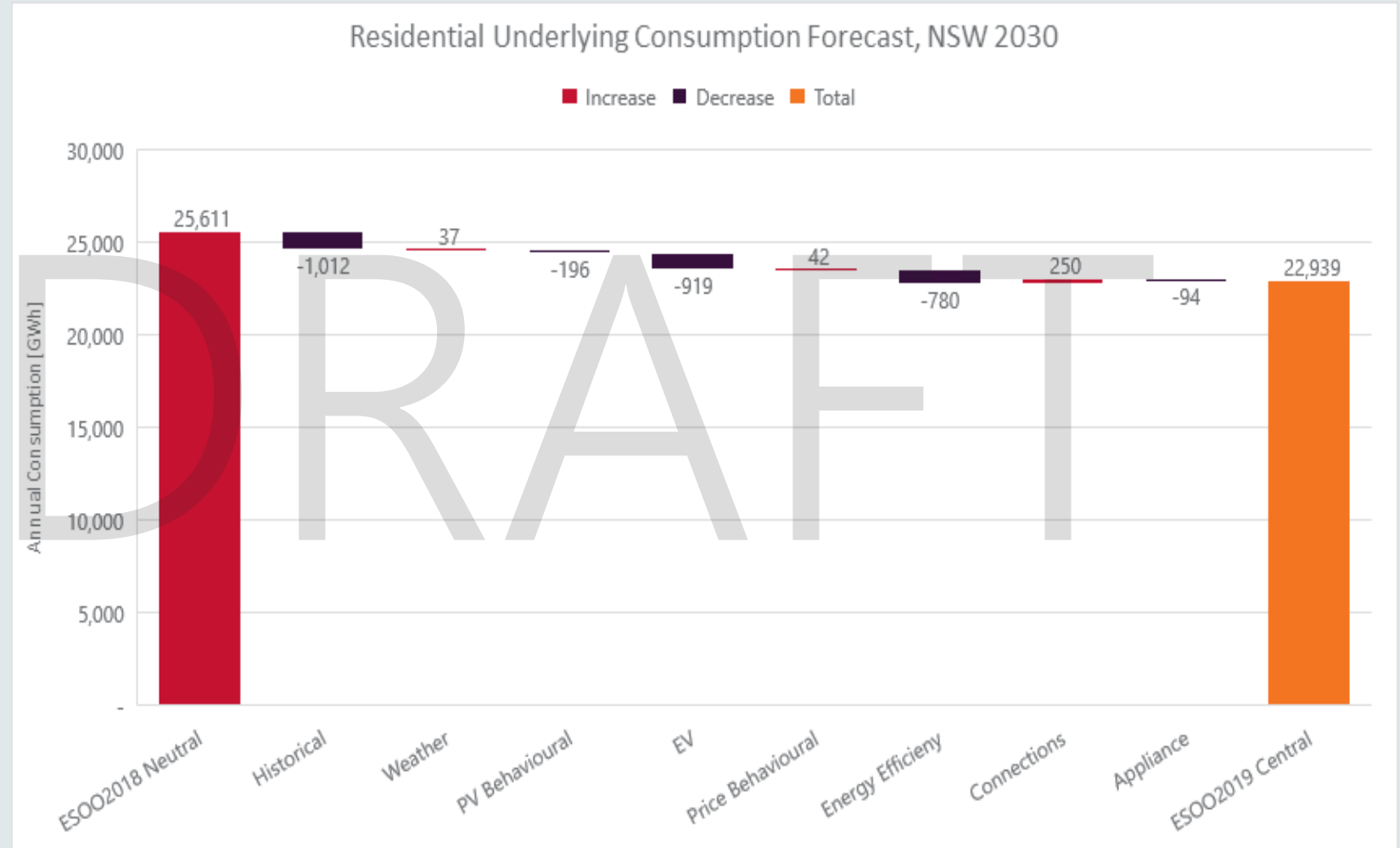
## Draft Annual Consumption Forecasts

ESOO 2019

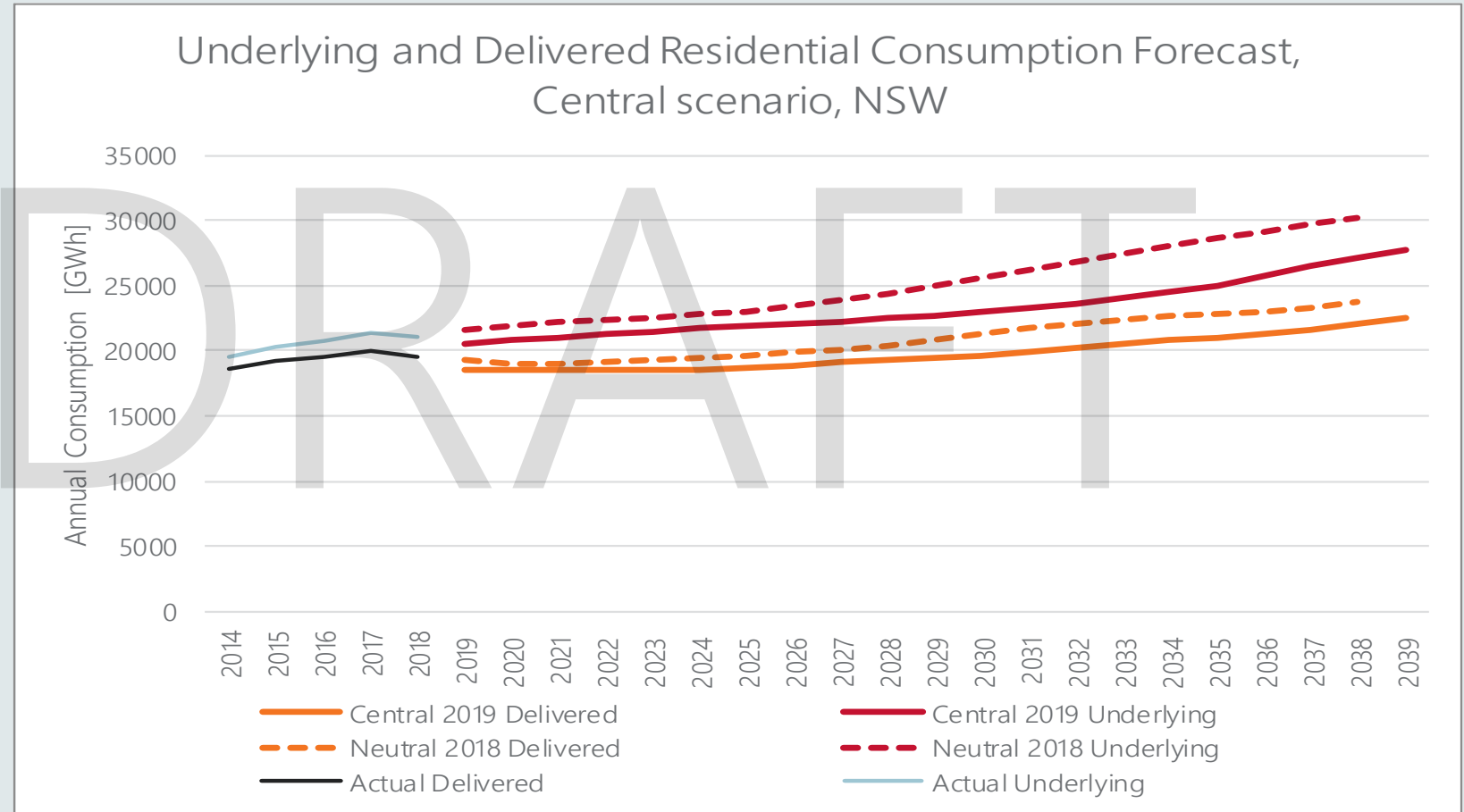


# NSW Underlying Residential Forecast With Key Components

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

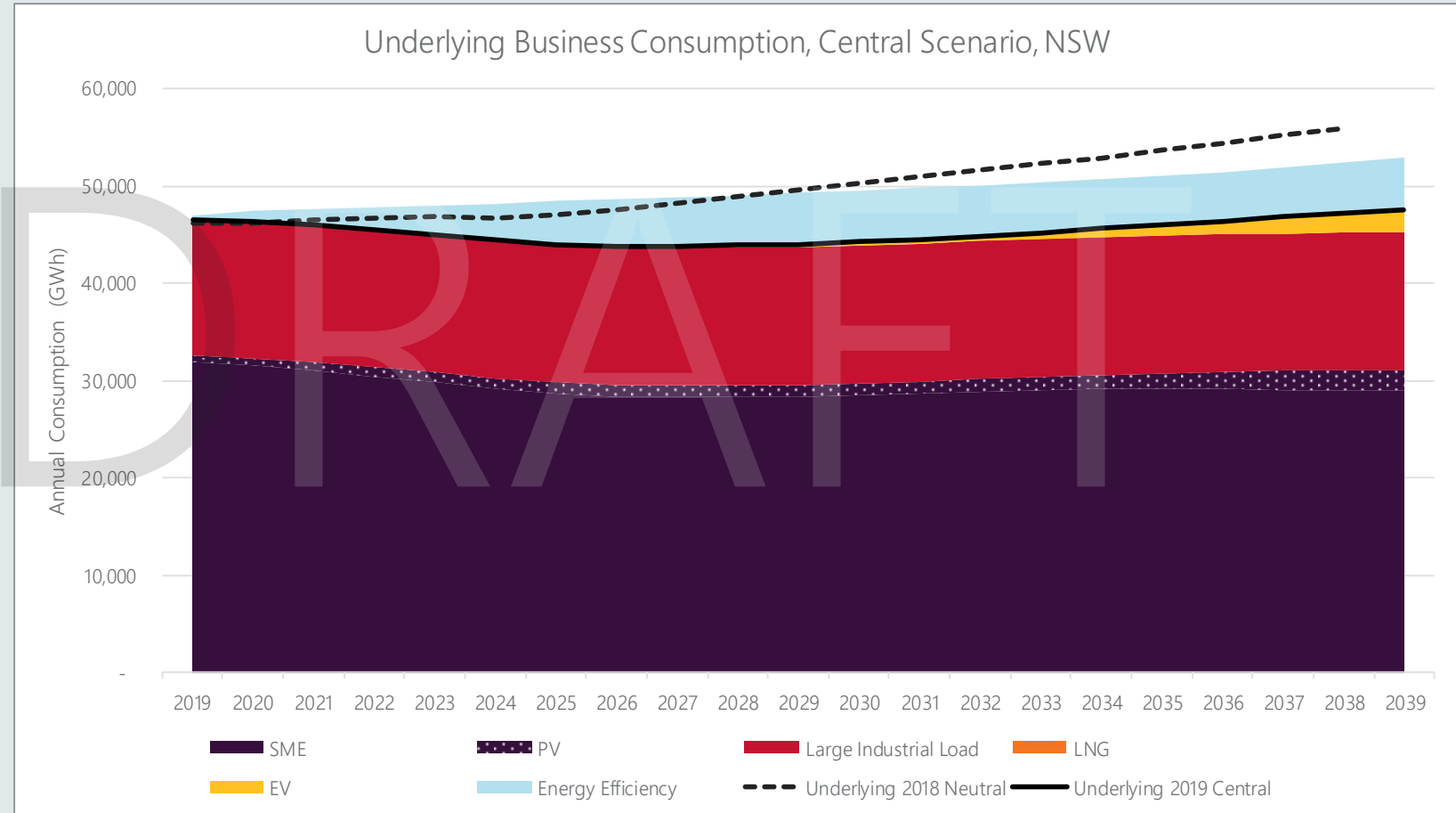


# NSW Residential Forecast

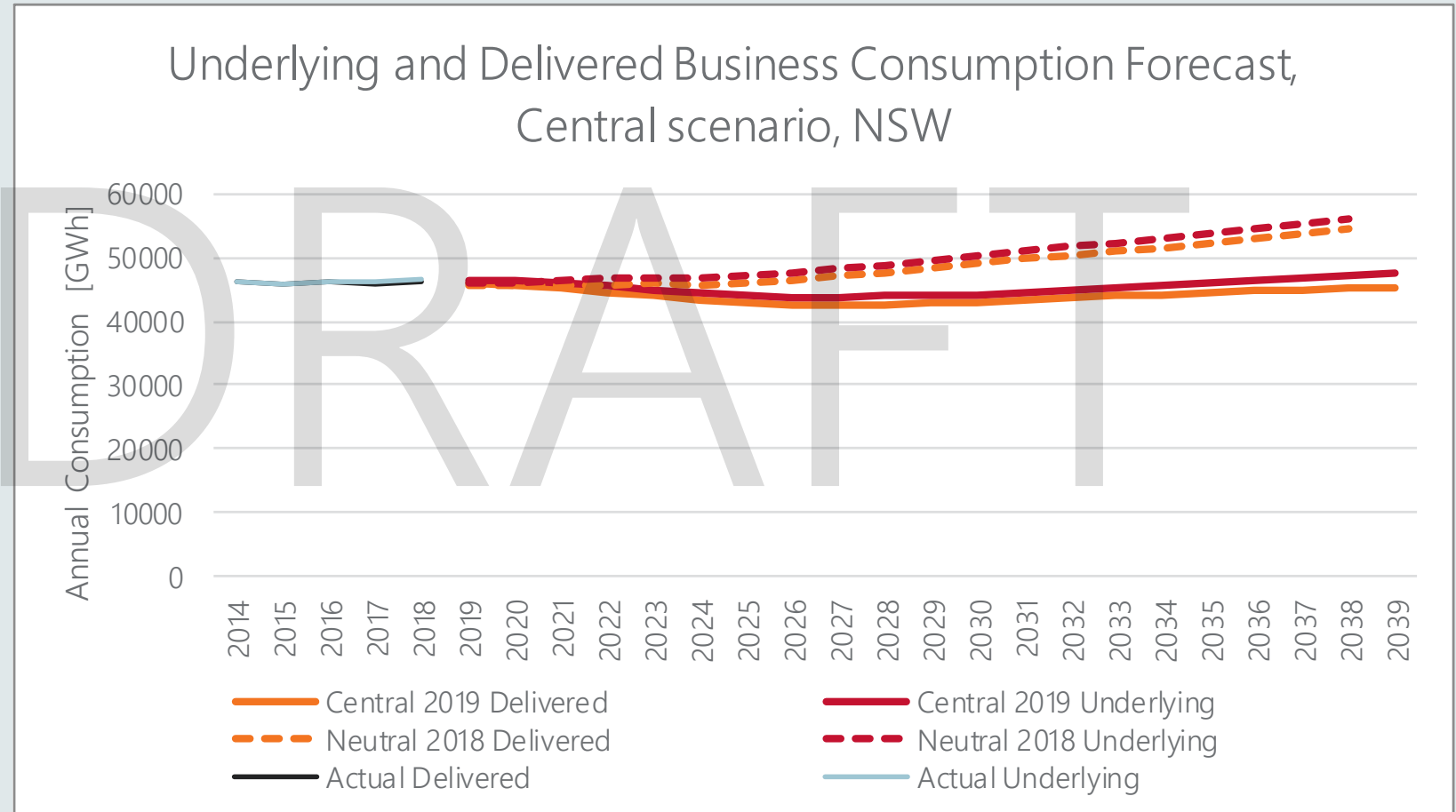


# NSW Underlying Business Forecast With Key Components

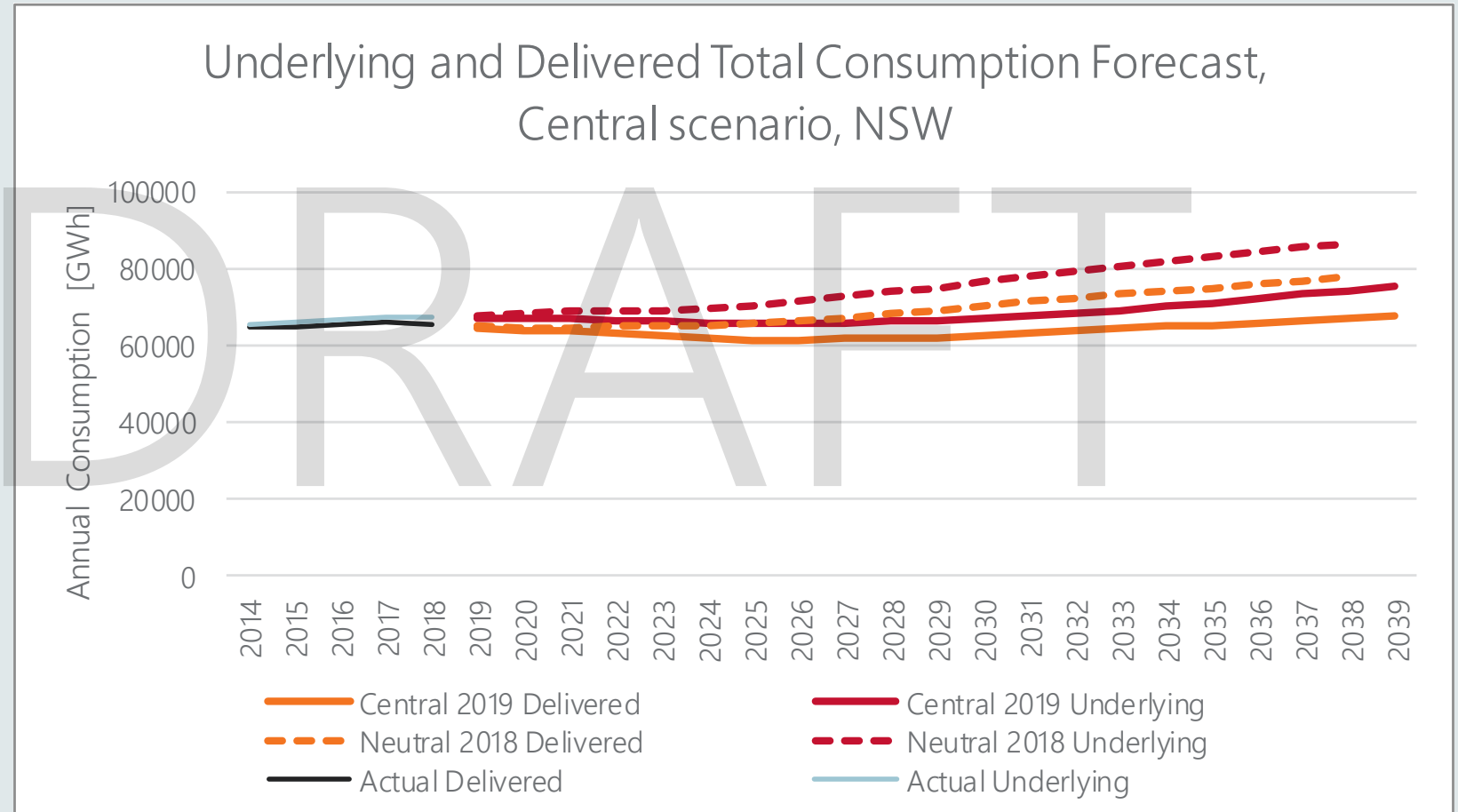
- Updated SME model better capturing the less-energy intensive industries contributing to economic growth
- Better representation of projected future energy efficiency savings in 2019 forecasts



# NSW Business Forecast

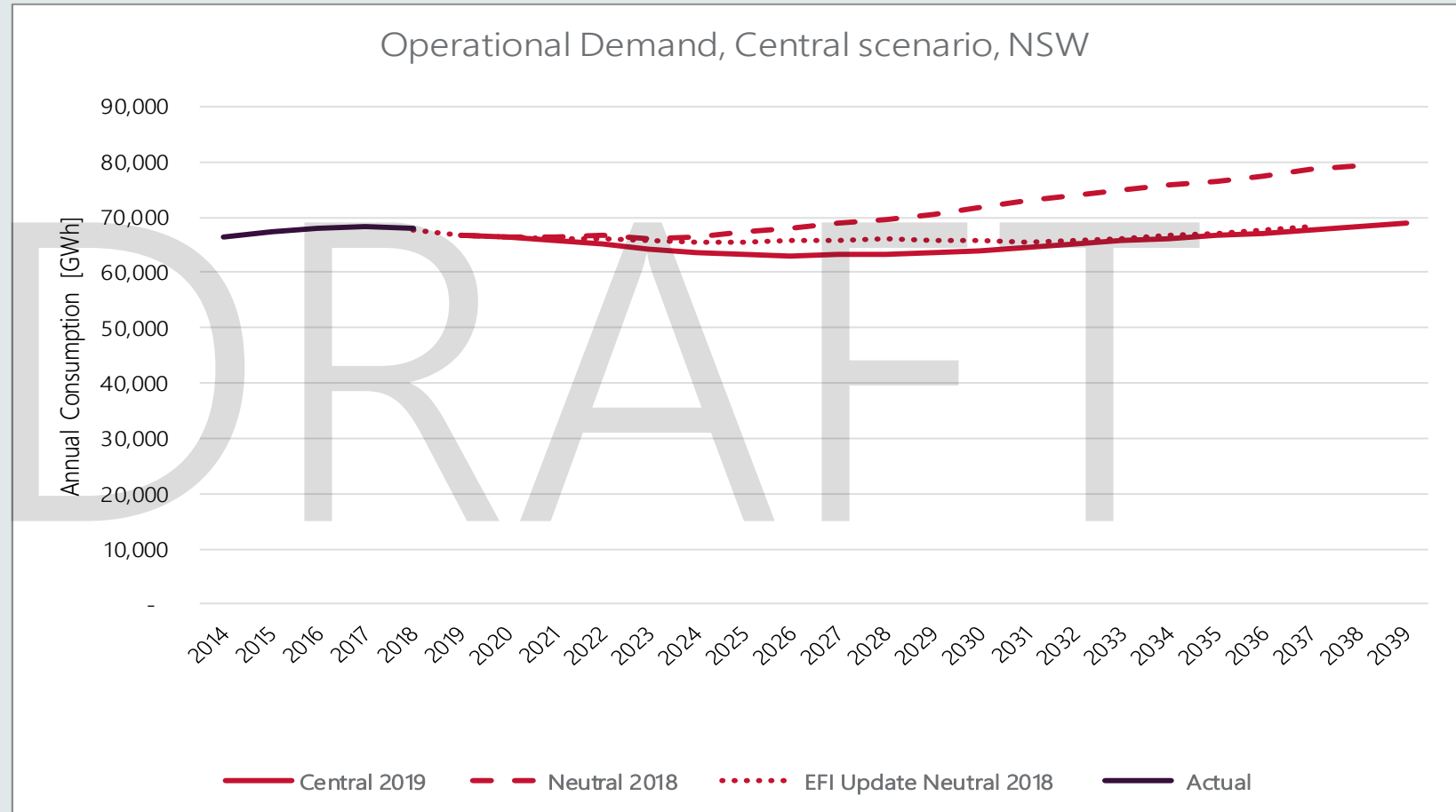


# NSW Total Forecast



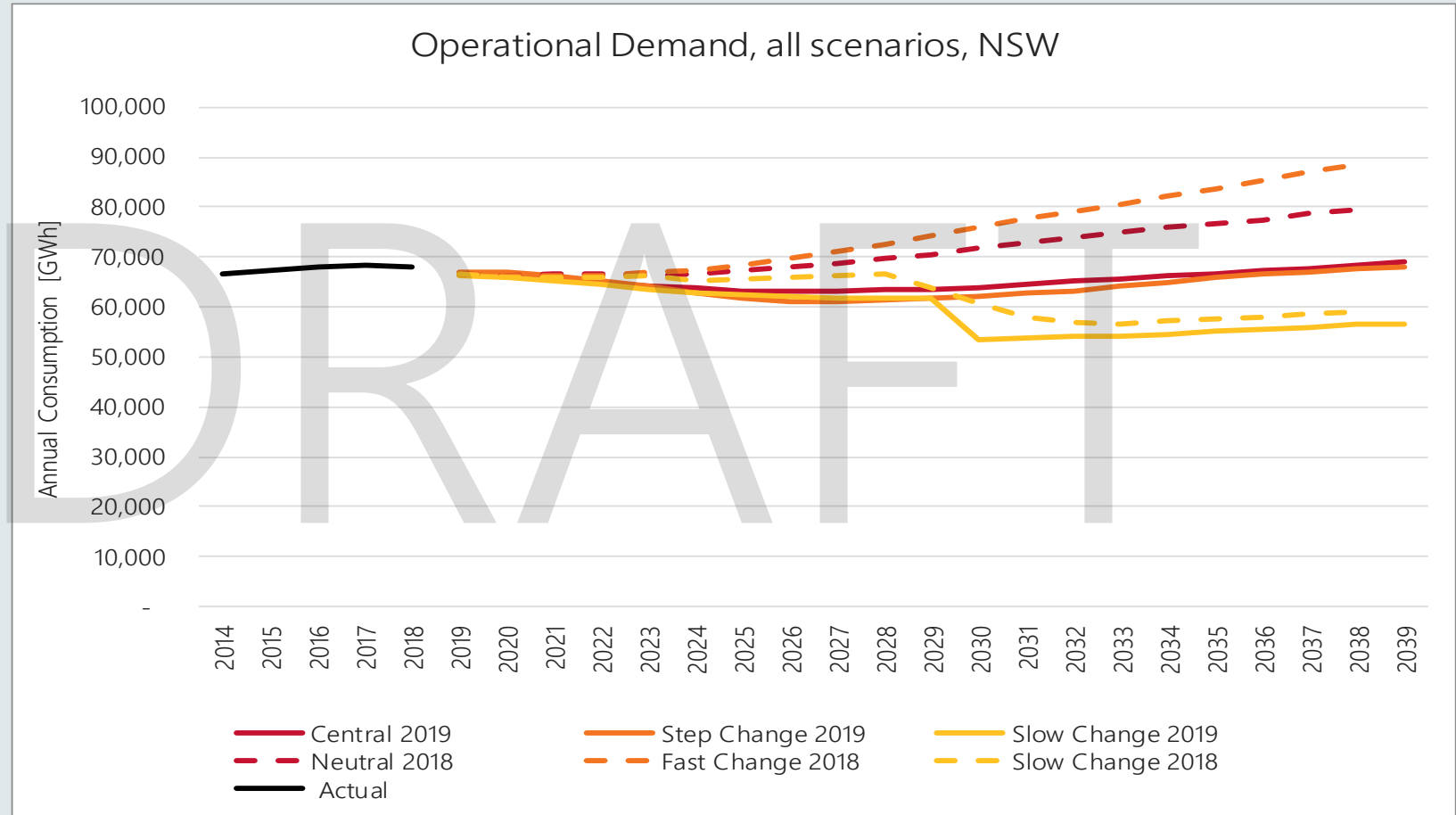
# NSW Annual Operational Energy as Sent Out

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



# NSW Annual Operational Energy as Sent Out

- All scenarios



# NEW SOUTH WALES

## Draft Maximum Demand Forecasts

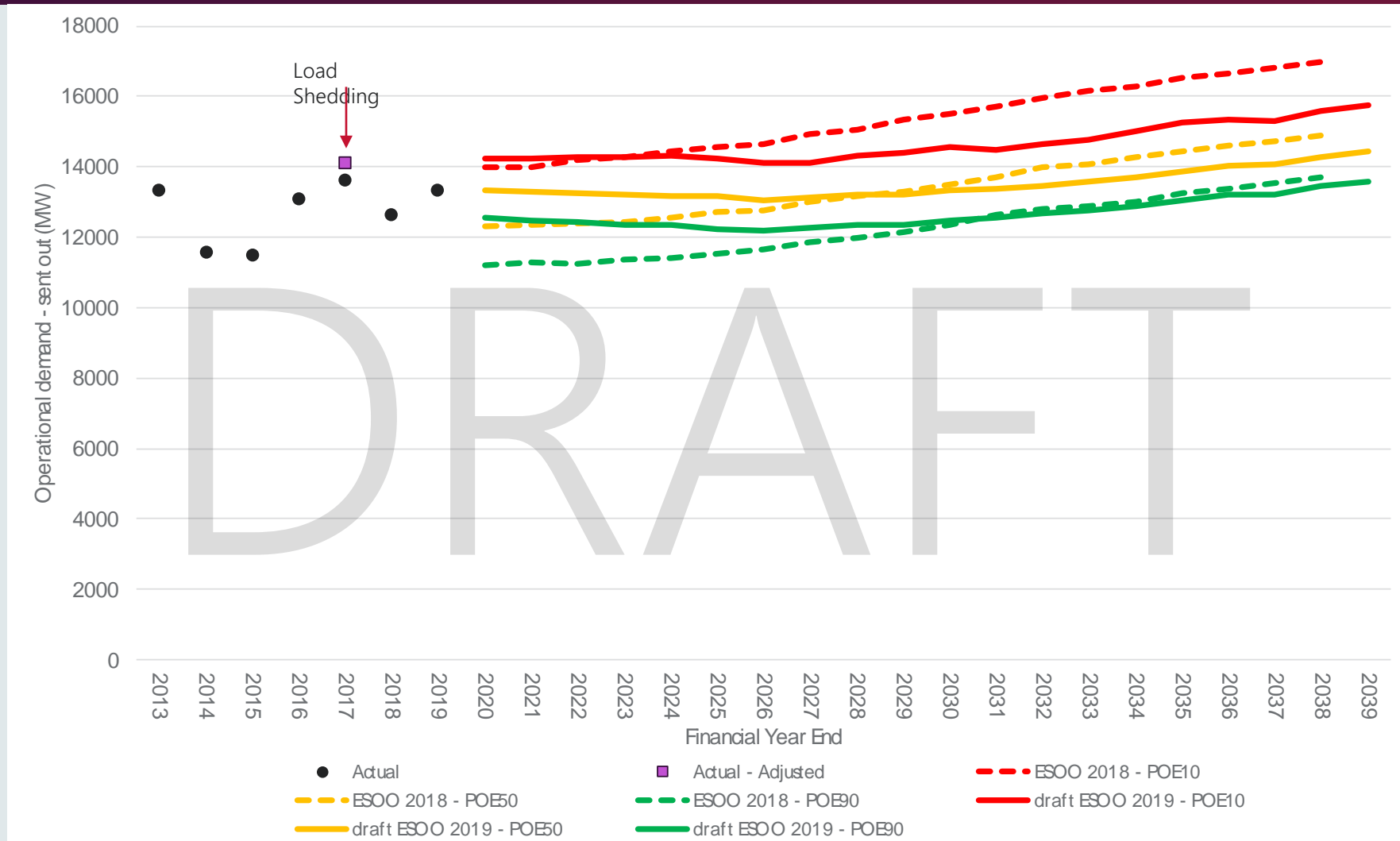
ESOO 2019



# NSW overview

- Narrower POE bands in NSW this year compared to the ESOO2018 with the POE90 and to a smaller extent the POE50 rising:
  - The ensemble model provided better diagnostic tools
  - These tools showed that the distribution of maximum demand moves over time so that the distribution is higher and narrower in 2019 compared to the demand distribution in 2015
- In the long term, demand is flatter compared to the ESOO2018 forecast:
  - Business load initially declines out to 2025 due to Small-Medium Enterprise demand
  - This is offset by growth in residential load making growth flat overall
  - The relatively larger contribution of the NSW energy savings scheme compared to the ESOO2018 results in a lower demand forecast out 20 years

# NSW summer maximum demand



# QUEENSLAND

# QUEENSLAND

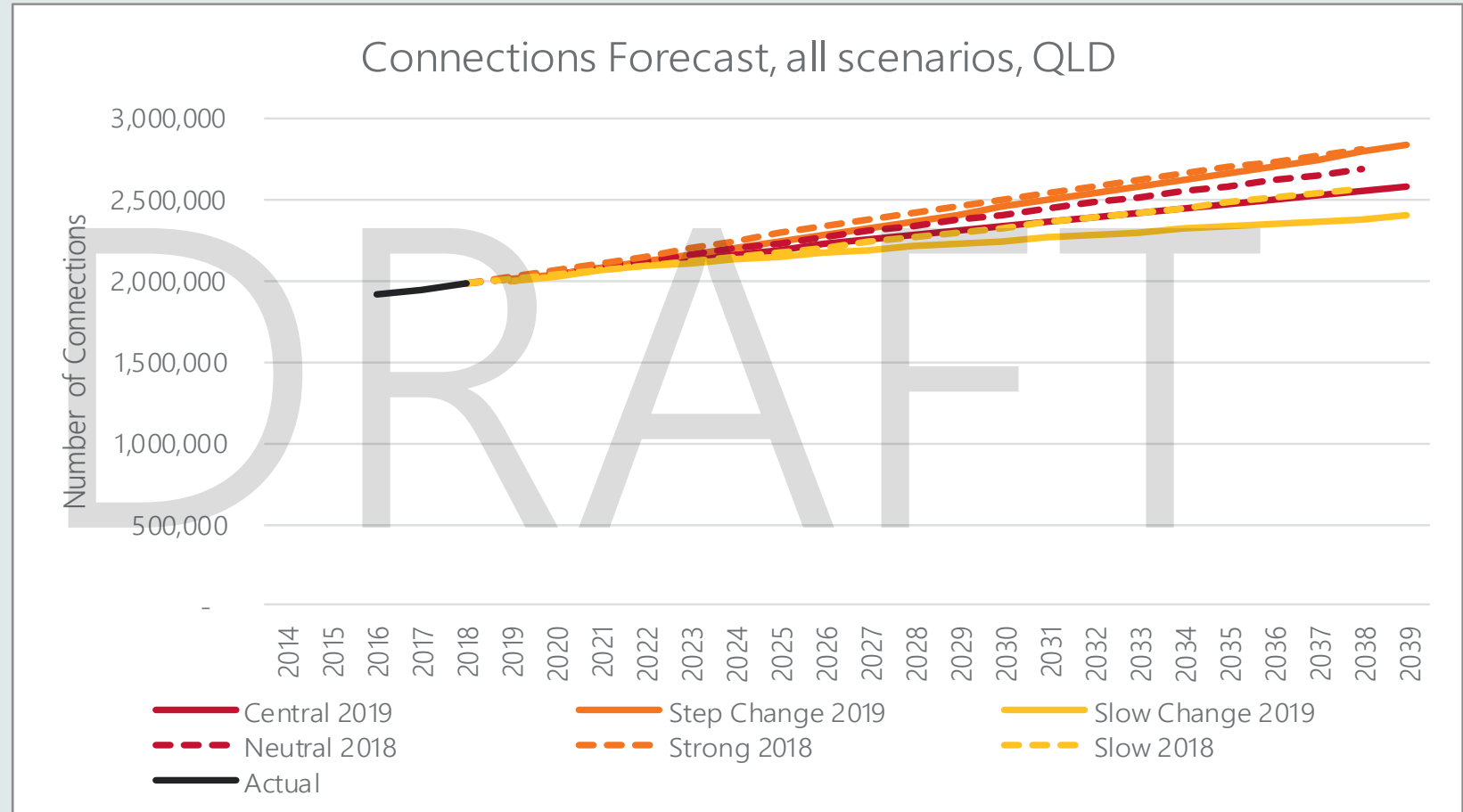
## Key Forecast Inputs

Spread of components for each scenario

# QLD Connections Forecast

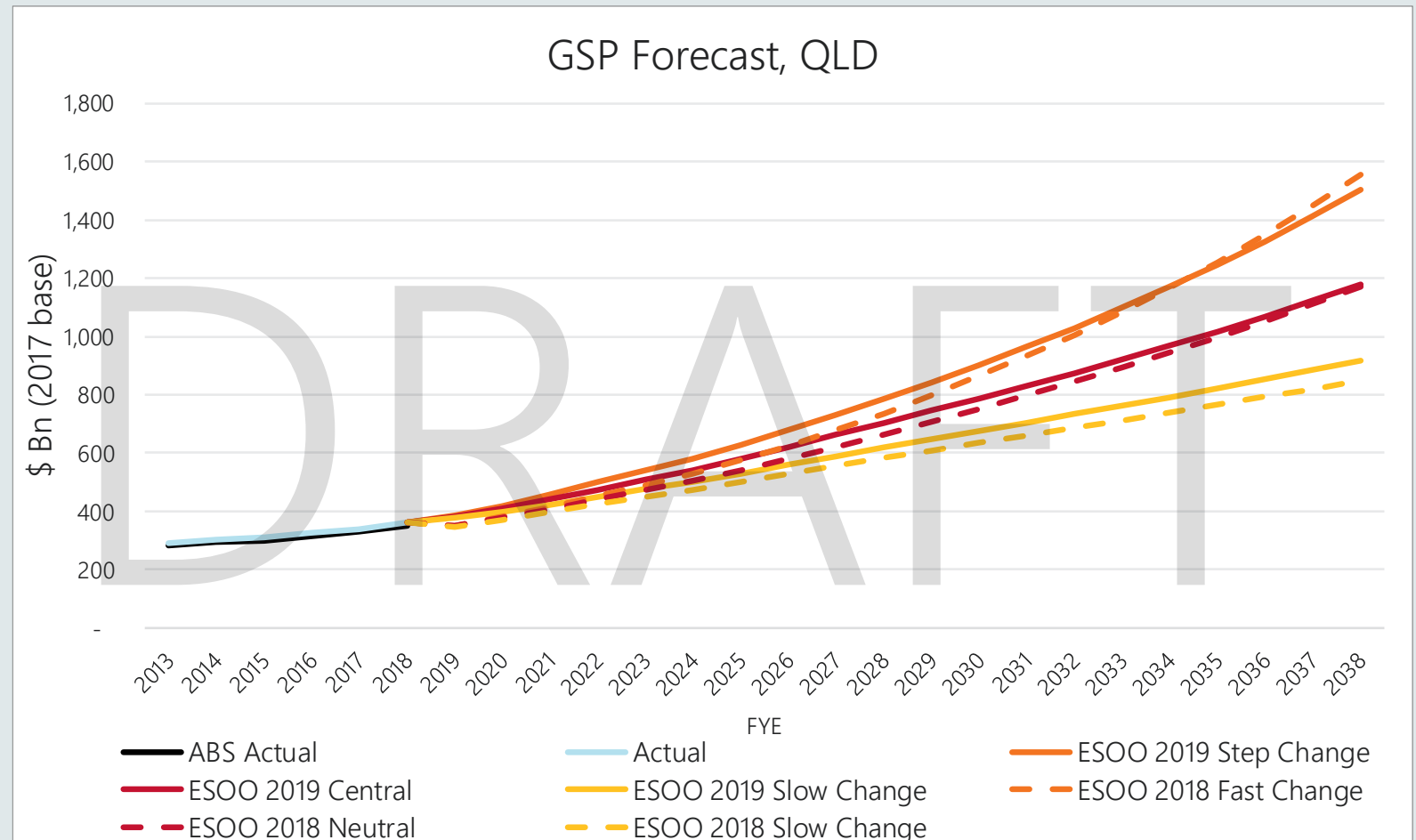
The range of the forecasts has widened due to the increase in the spread of input projections

- 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



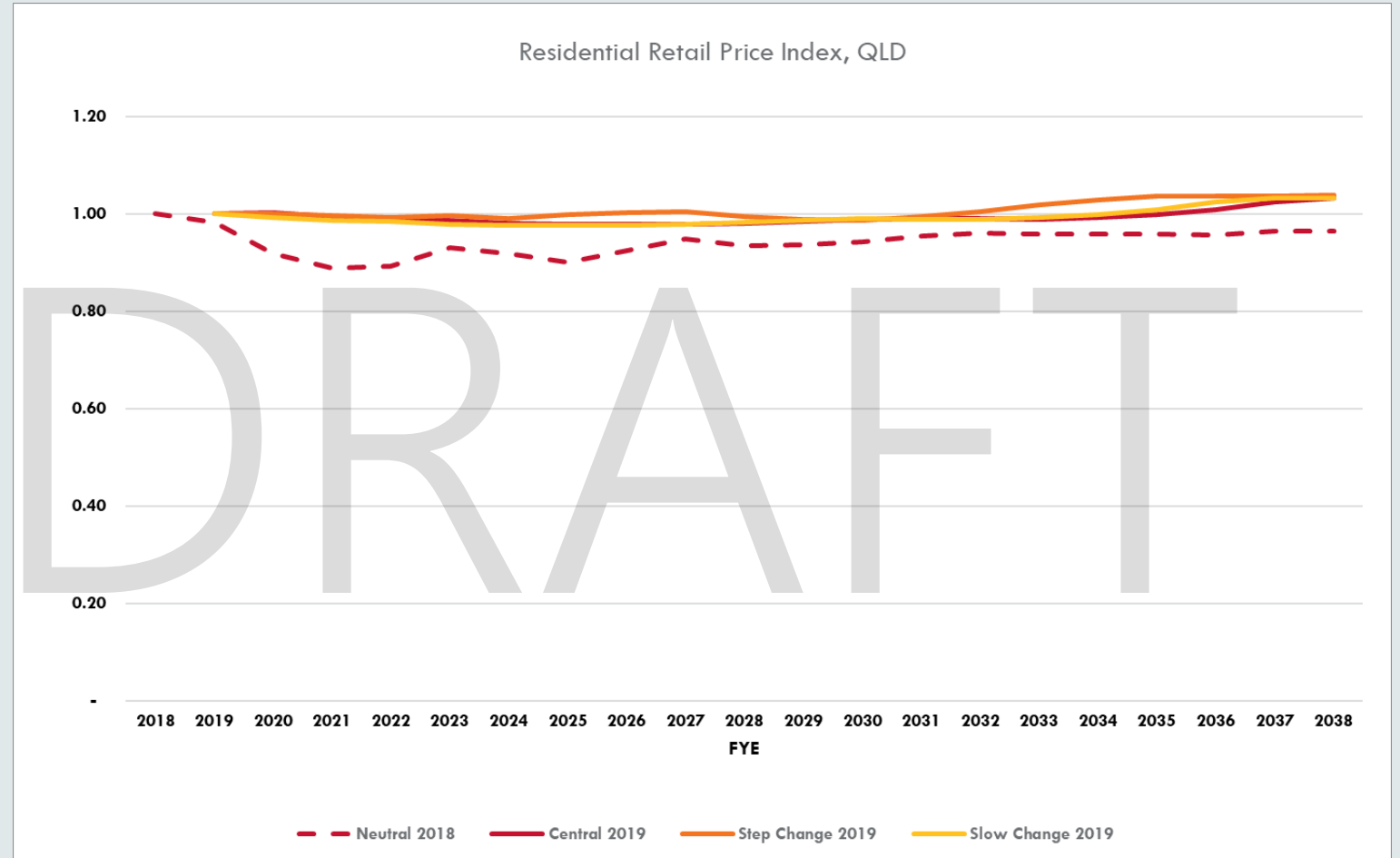
# QLD GSP

- QLD had downward revisions to population growth rates to reflect the most recent ABS census data, which lowered 2019 GSP forecasts relative to 2018



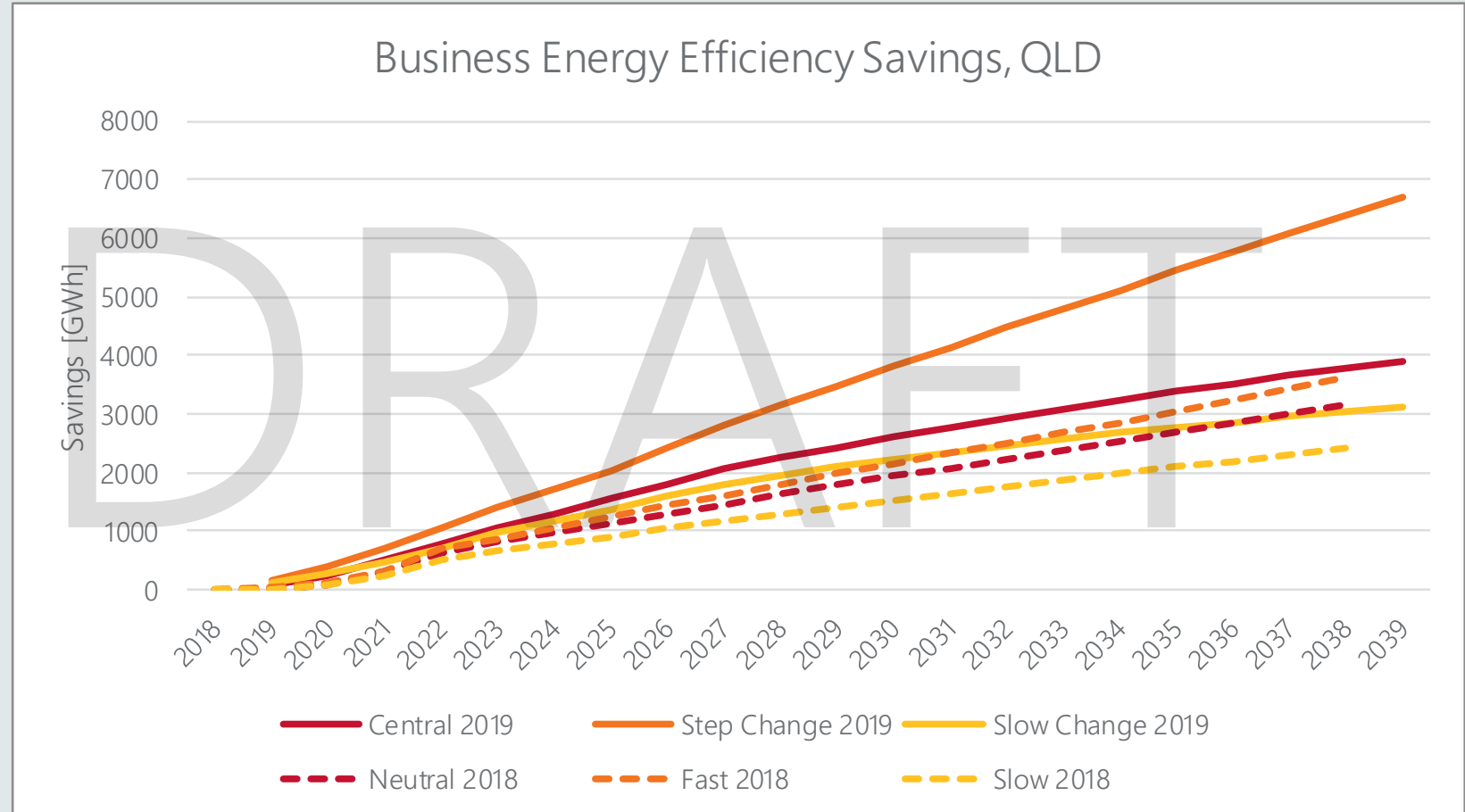
# QLD Residential Retail Price Index

- Relative stability in short- to medium-term with moderate increase over long-term as aging coal fleet retires



# QLD Energy Efficiency: Business

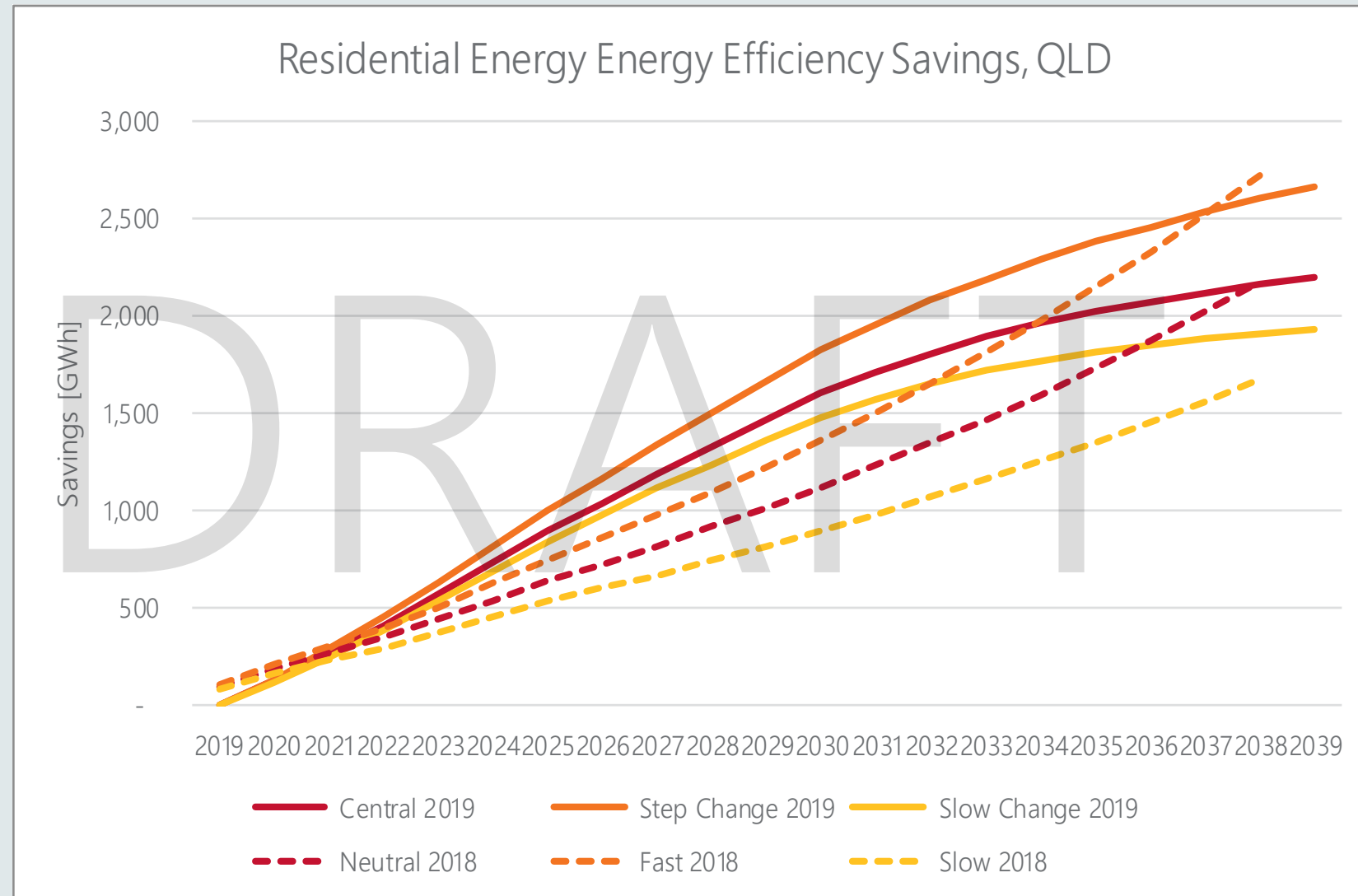
- Step change scenario models two additional measures not considered in the 2018 Fast change scenario, related to the future building code and equipment standards (GEMS)





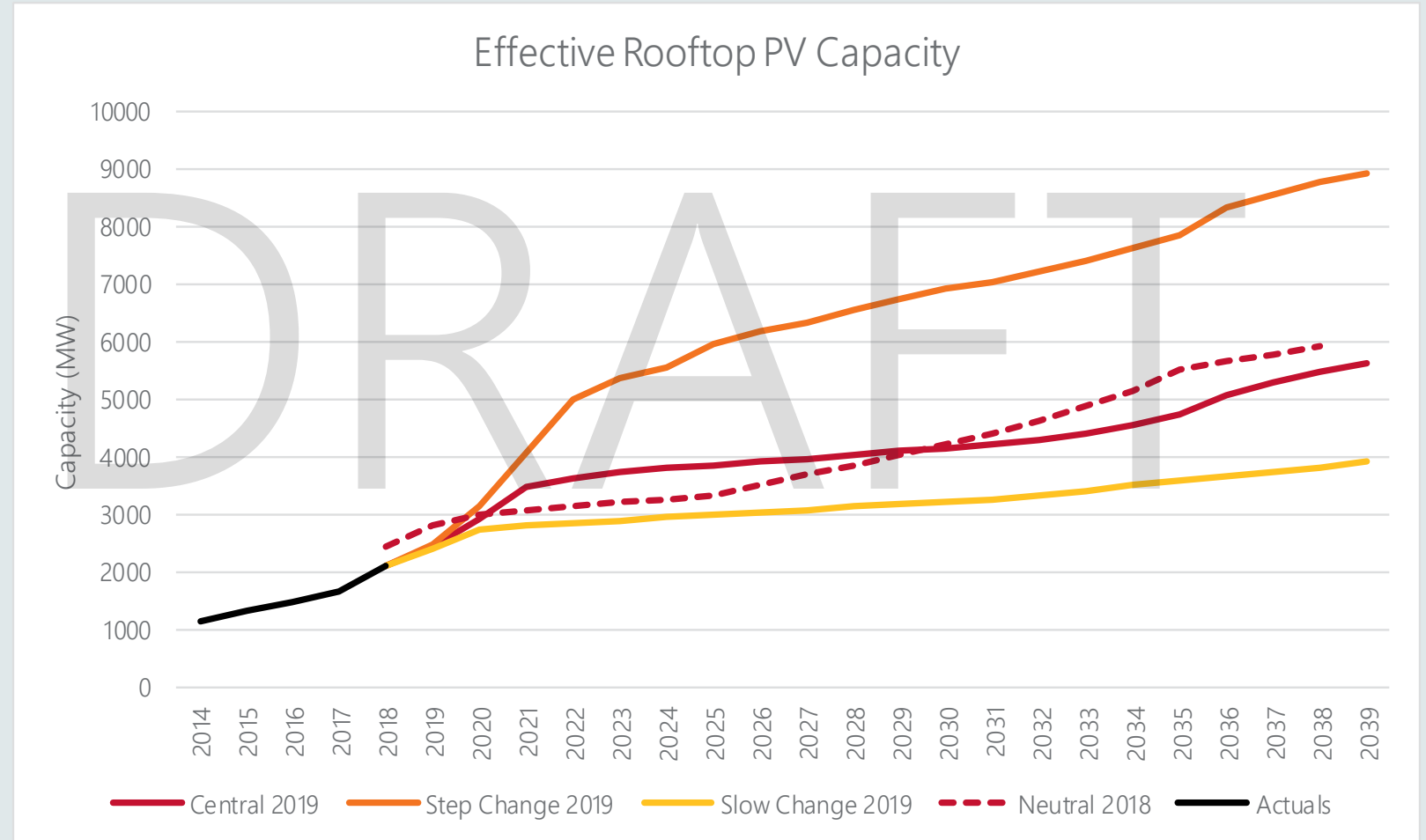
# QLD Energy Efficiency: Residential

- Revised dwelling stock model calibrated to AEMO's 2019 connection forecasts
- Improved approach to account for future savings from past activities
- Step change scenario models higher energy star ratings from 2022



# QLD PV Forecast

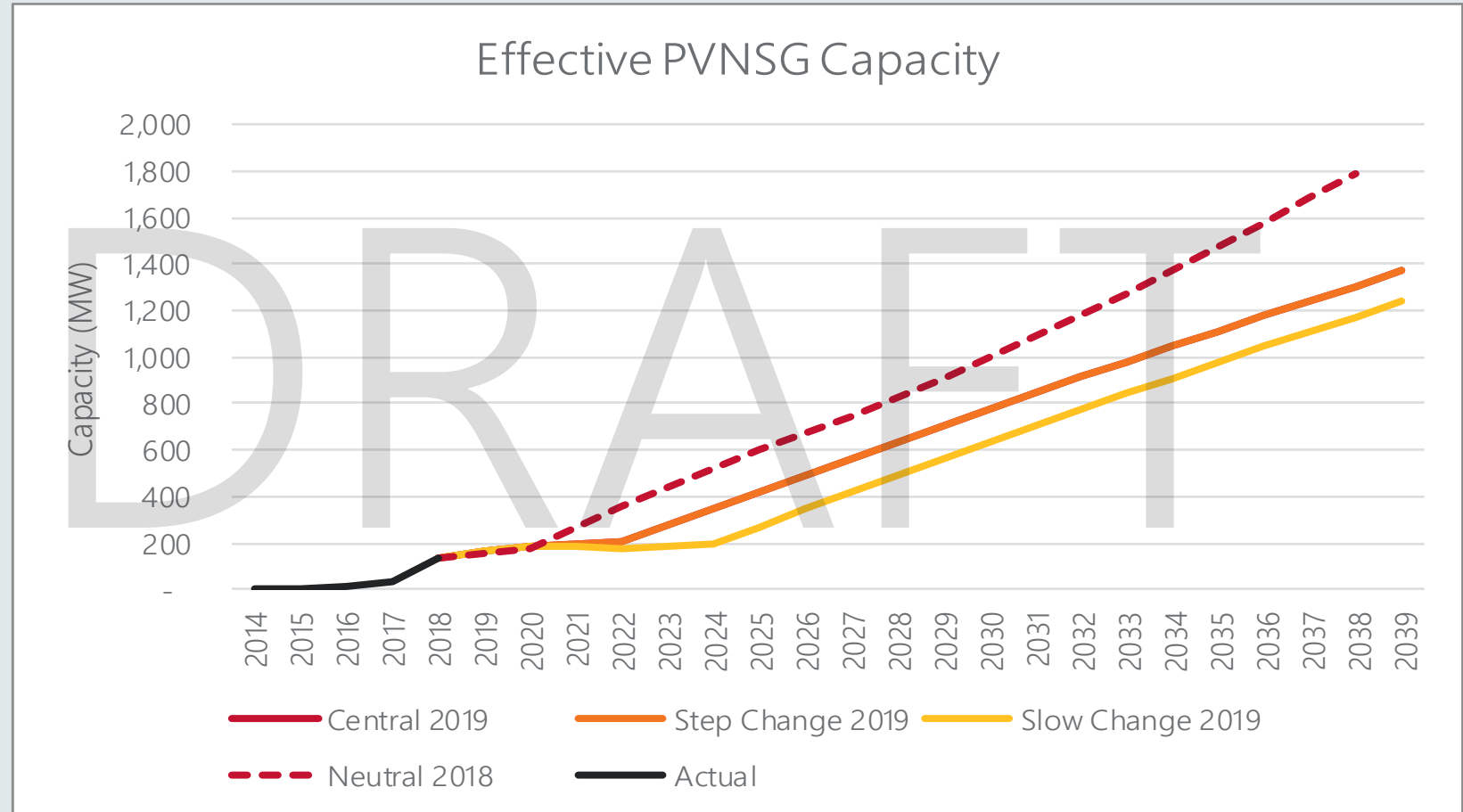
- Forecasts reflect more regular updates in actuals data
- Slowing uptake from 2020 reflects stable electricity prices, reducing purchasing drivers
- Assumed capacity factor of 16.2%



# QLD PVNSG Forecast

Size range: 100kW to 30 MW

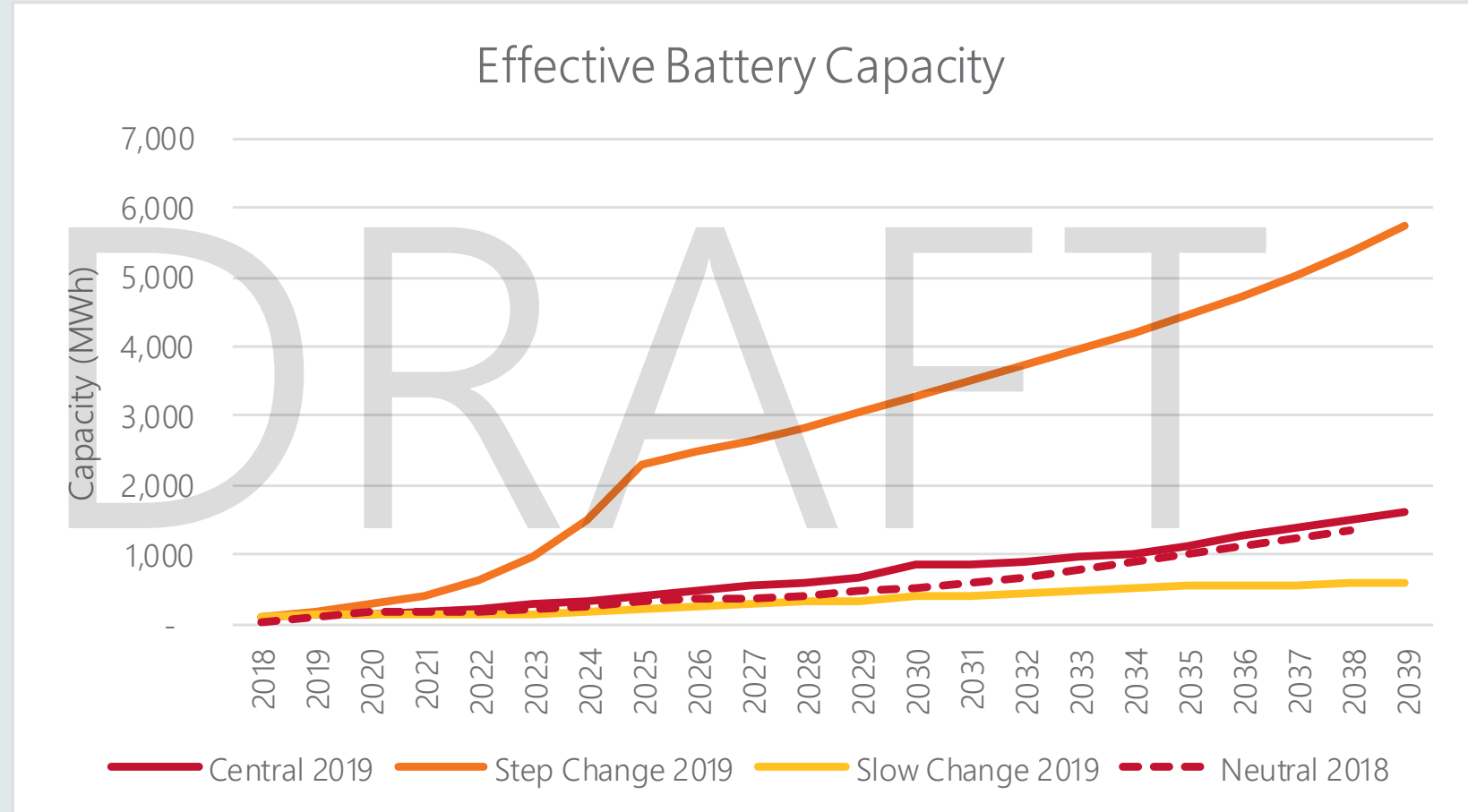
- QLD a major source of new solar capacity due to state-based renewable policies
- Slower short term deployment growth in 2019 account for a rapid decline in LGC value since 2018
- Stronger medium term growth reflects reducing technology costs



Note: The Central scenario forecast is equal to the Step Change projection, and therefore is hidden beneath the Step Change line.

# QLD Battery Forecast

- Assumes large residential rated capacity 14kWh, otherwise 7kWh
- Central and slow scenarios assume a small percentage accessing tariffs which contribute to grid services, while Step change scenario assumes a broader subsidy scheme will be available

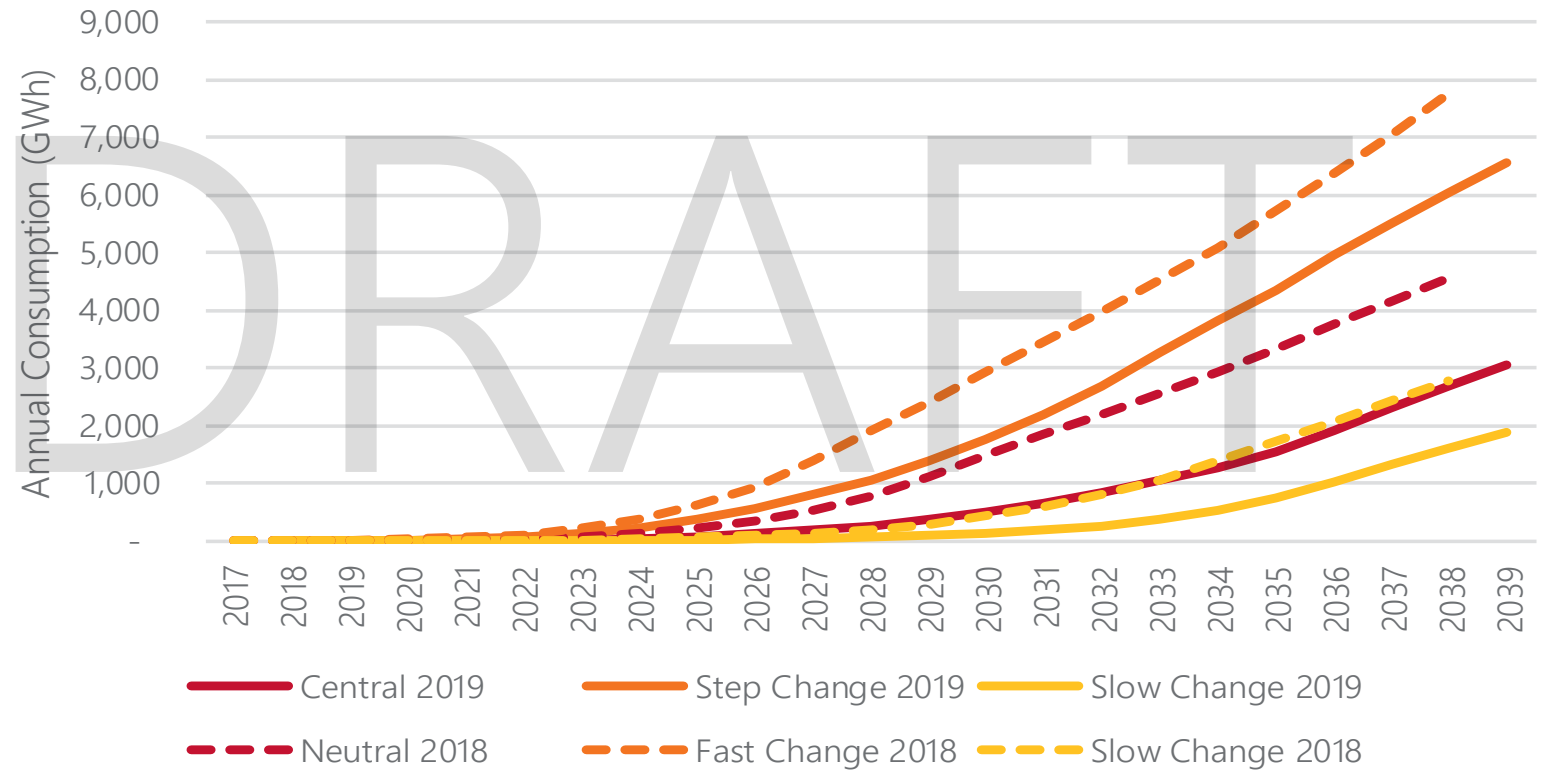


# QLD EV Capacity Forecast

## By Scenario

- Decrease on 2018 forecast due to lower national vehicle sales projections, ride share assumptions, market saturation level assumption changes, and the inclusion of fuel cell vehicles

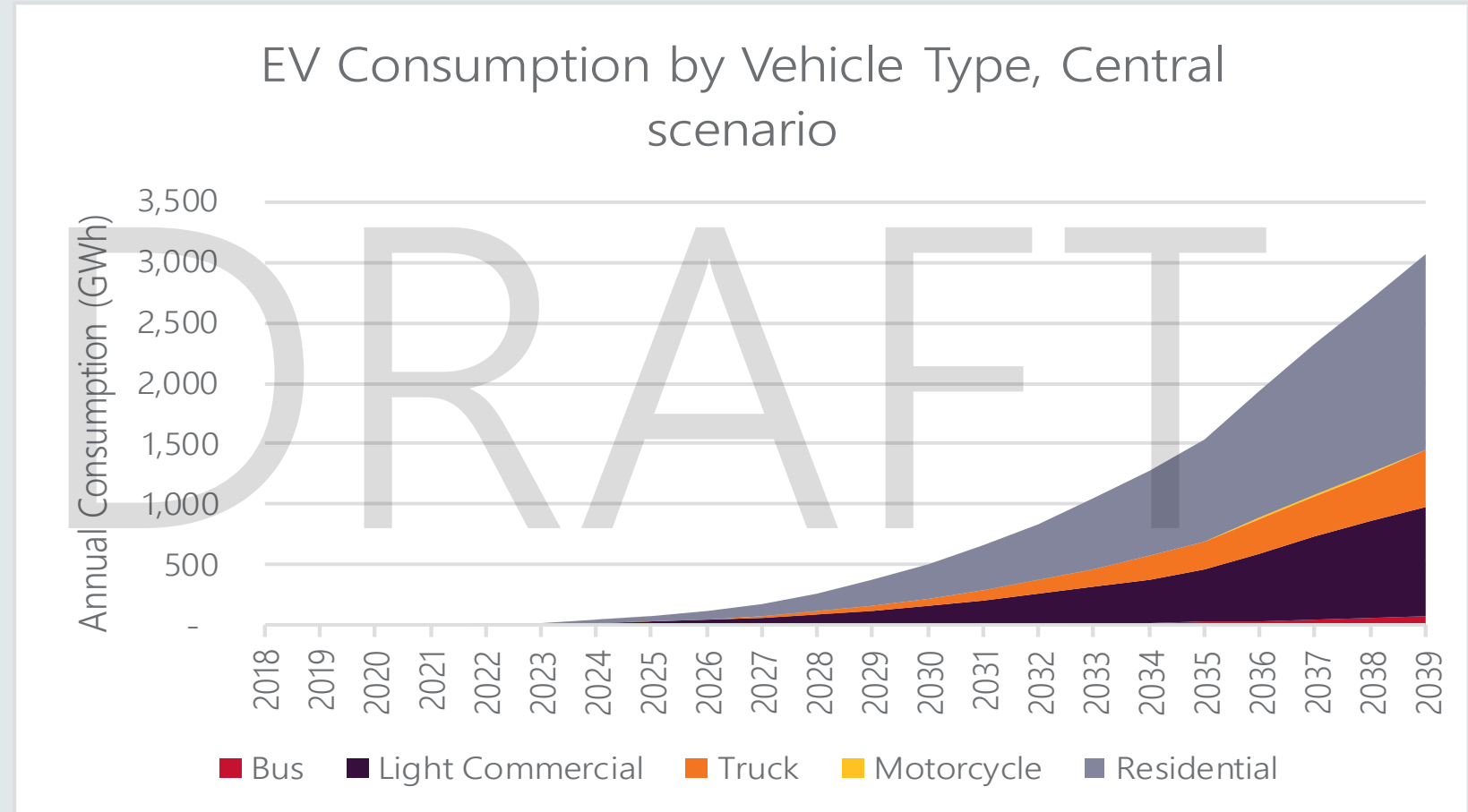
EV Consumption, all scenarios



# QLD EV Capacity Forecast

## By Vehicle Type

- EV adoption is projected to be dominated by residential and commercial light vehicles



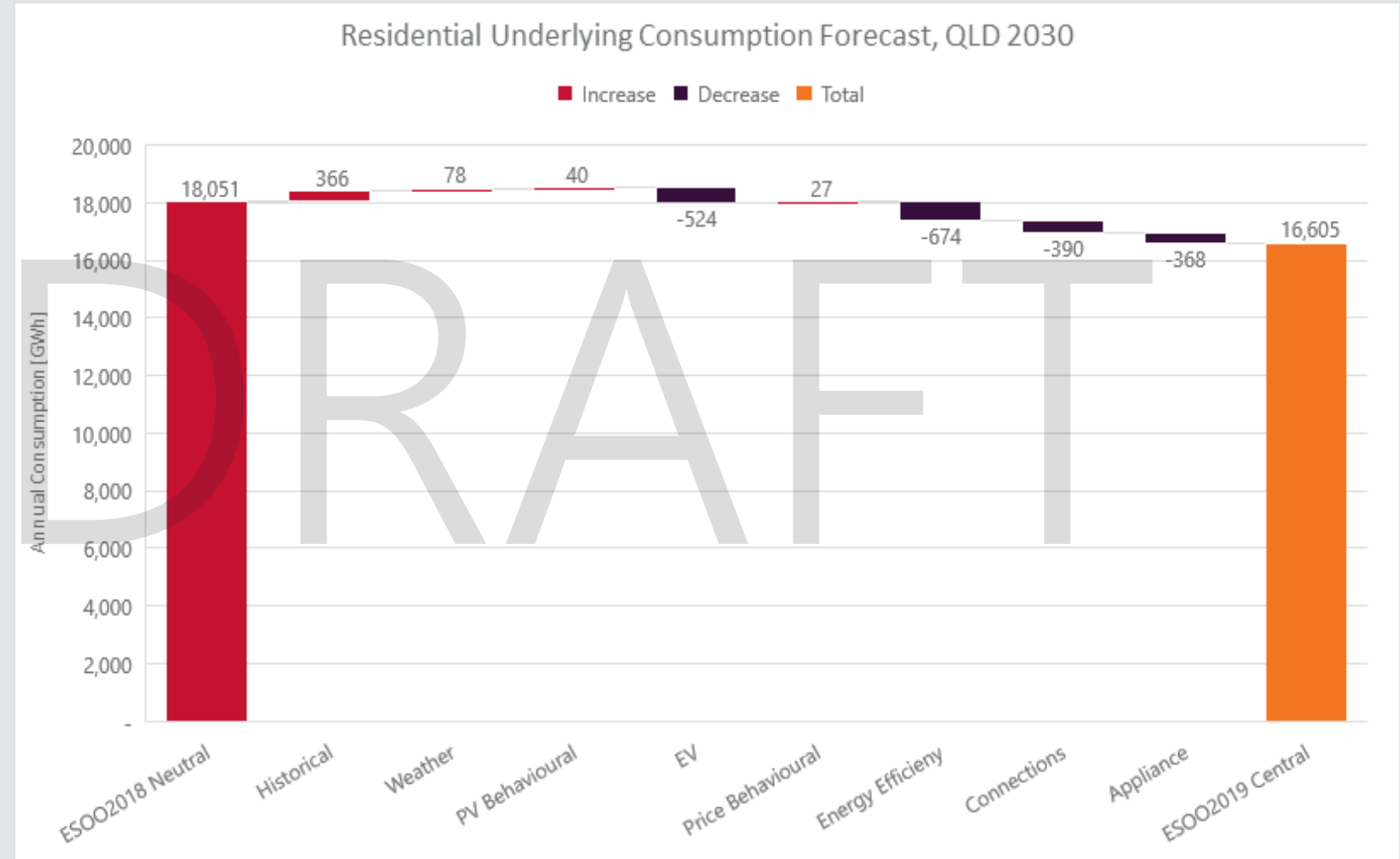
# QUEENSLAND

## Draft Annual Consumption Forecasts

ESOO 2019

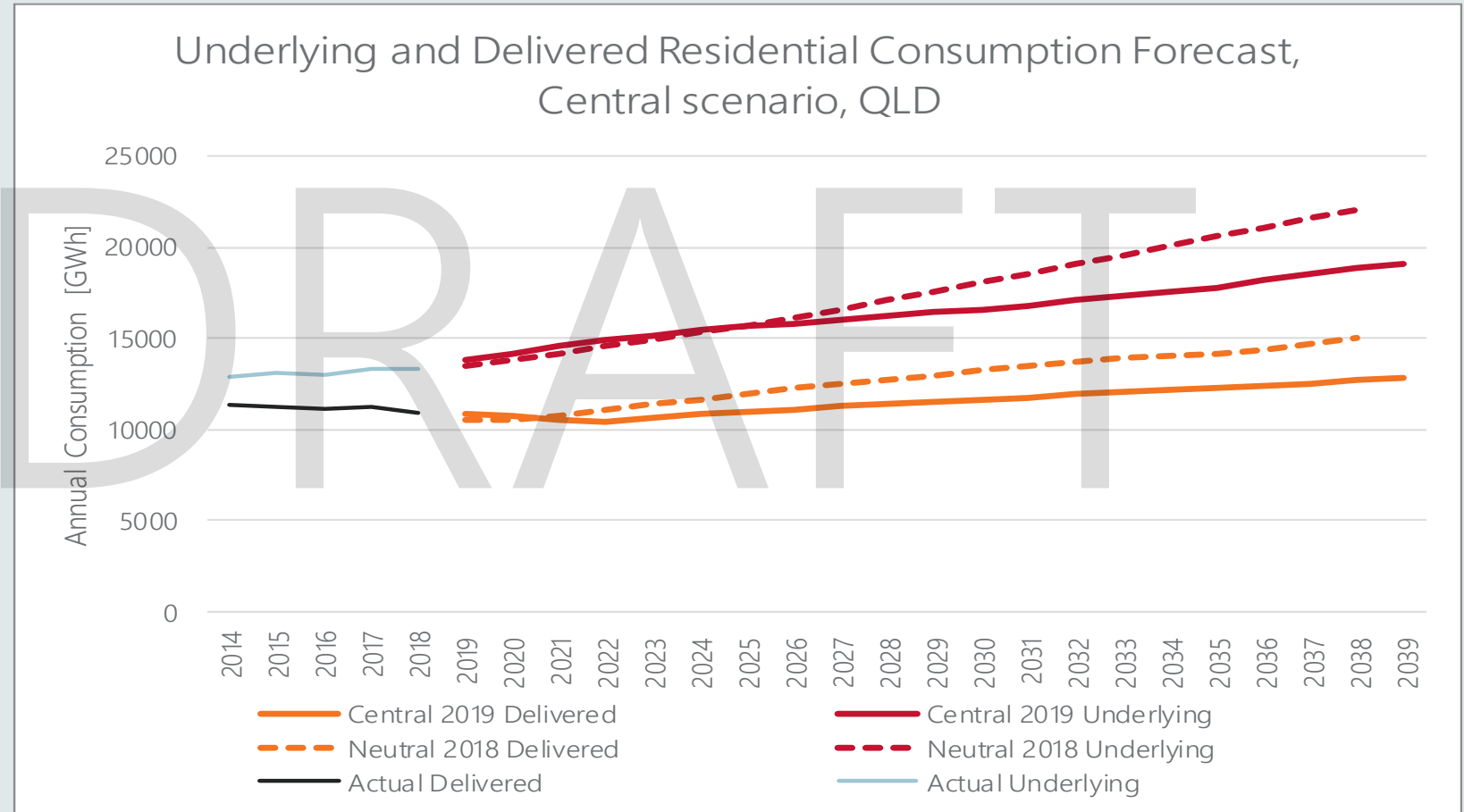
# QLD Underlying Residential Forecast With Key Components

- Revised EV forecasts, lower connections and new appliance impact and updated energy efficiency calculated impacts



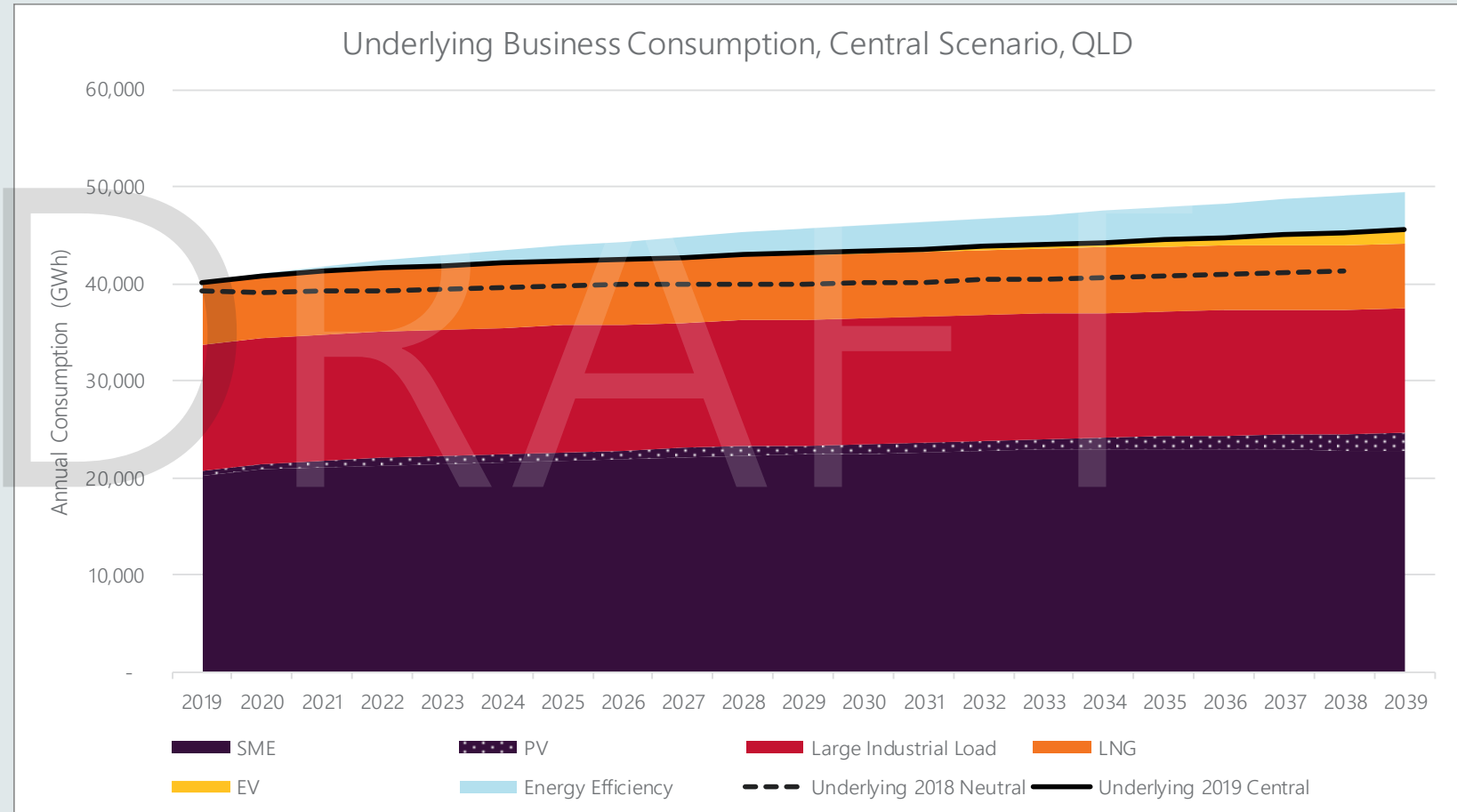


# QLD Residential Forecast

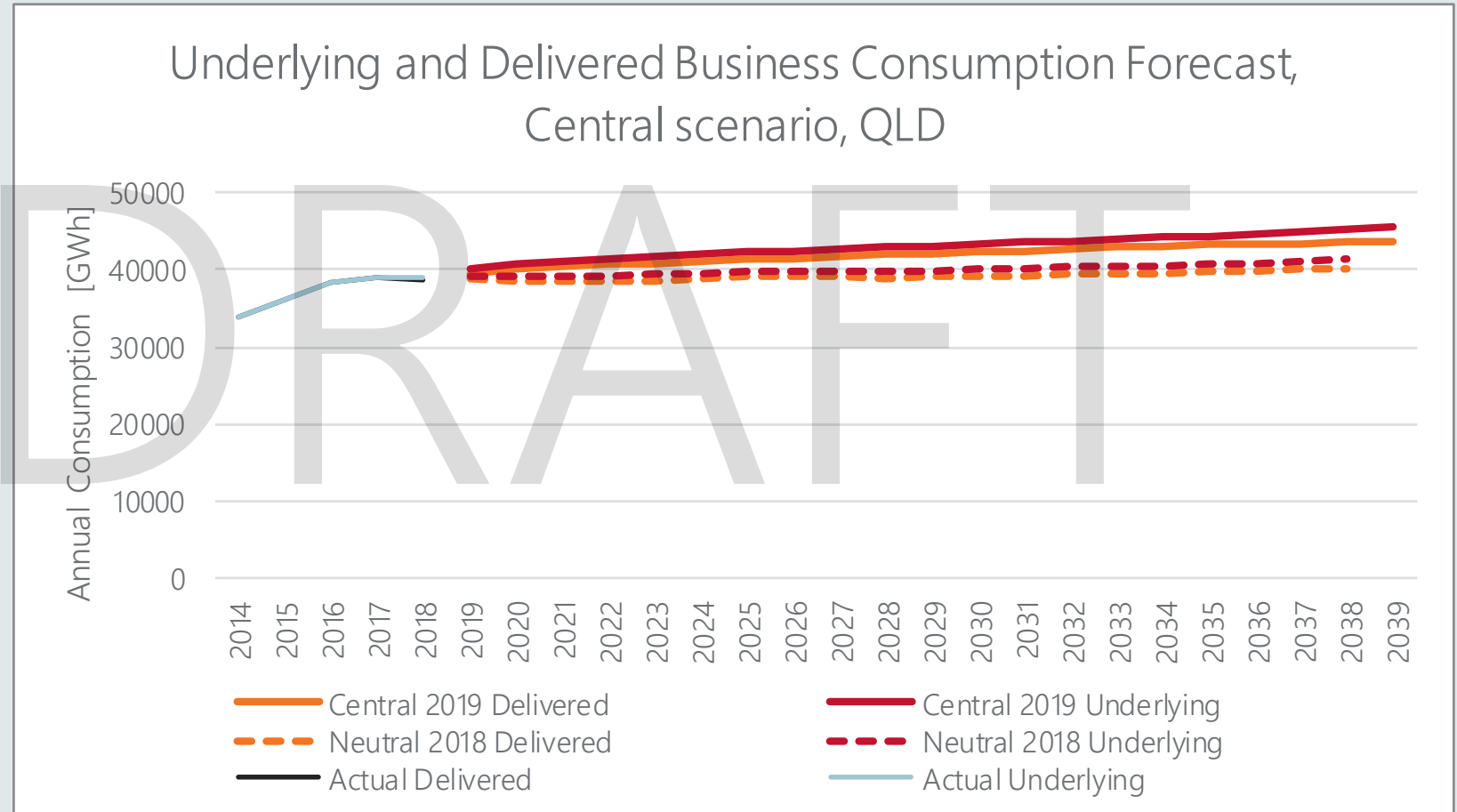


# QLD Underlying Business Forecast With Key Components

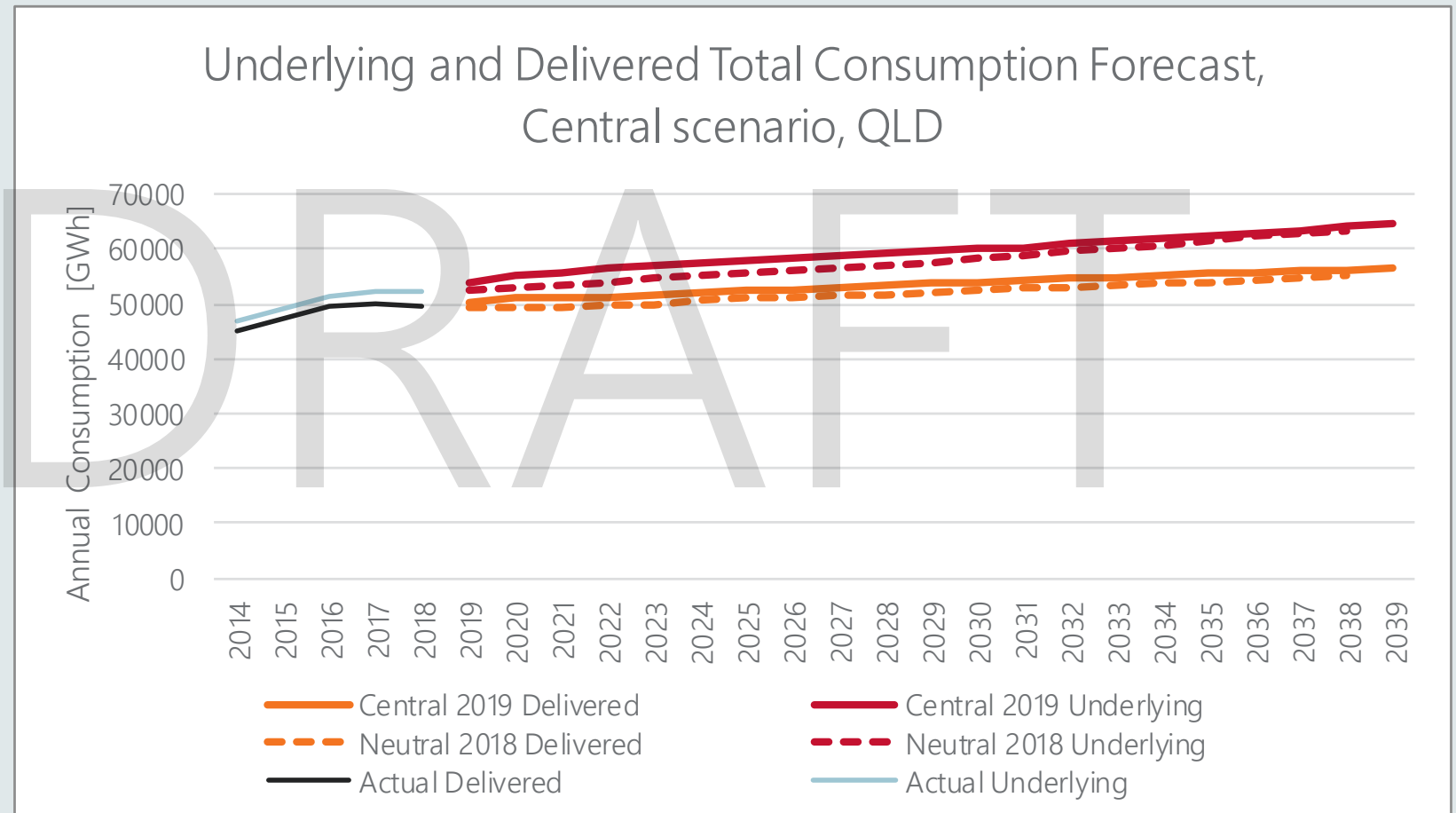
- Updated SME model better capturing the recent boom contributing to economic growth
- Updated energy efficiency impacts over long-term



# QLD Business Forecast

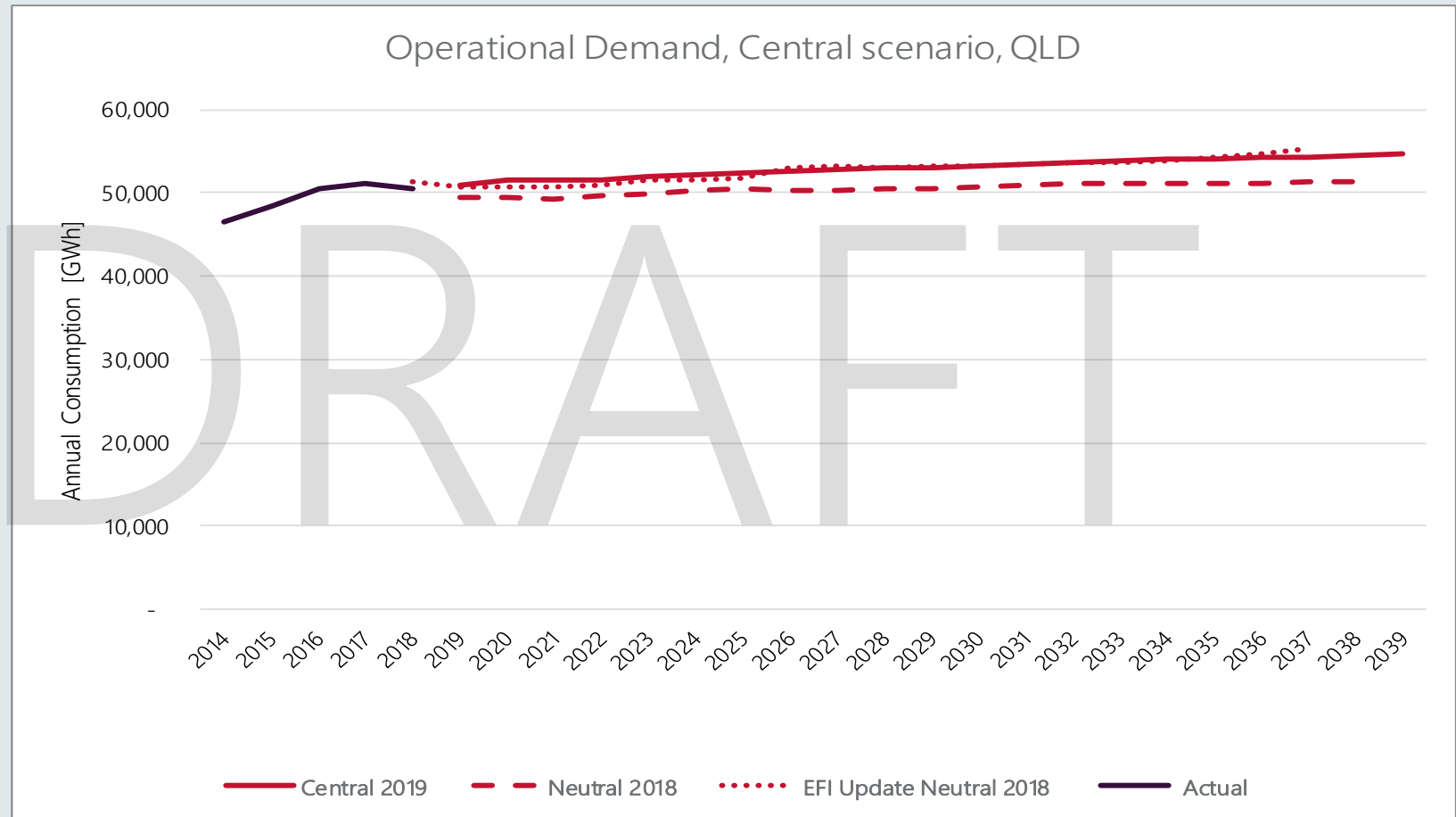


# QLD Total Forecast



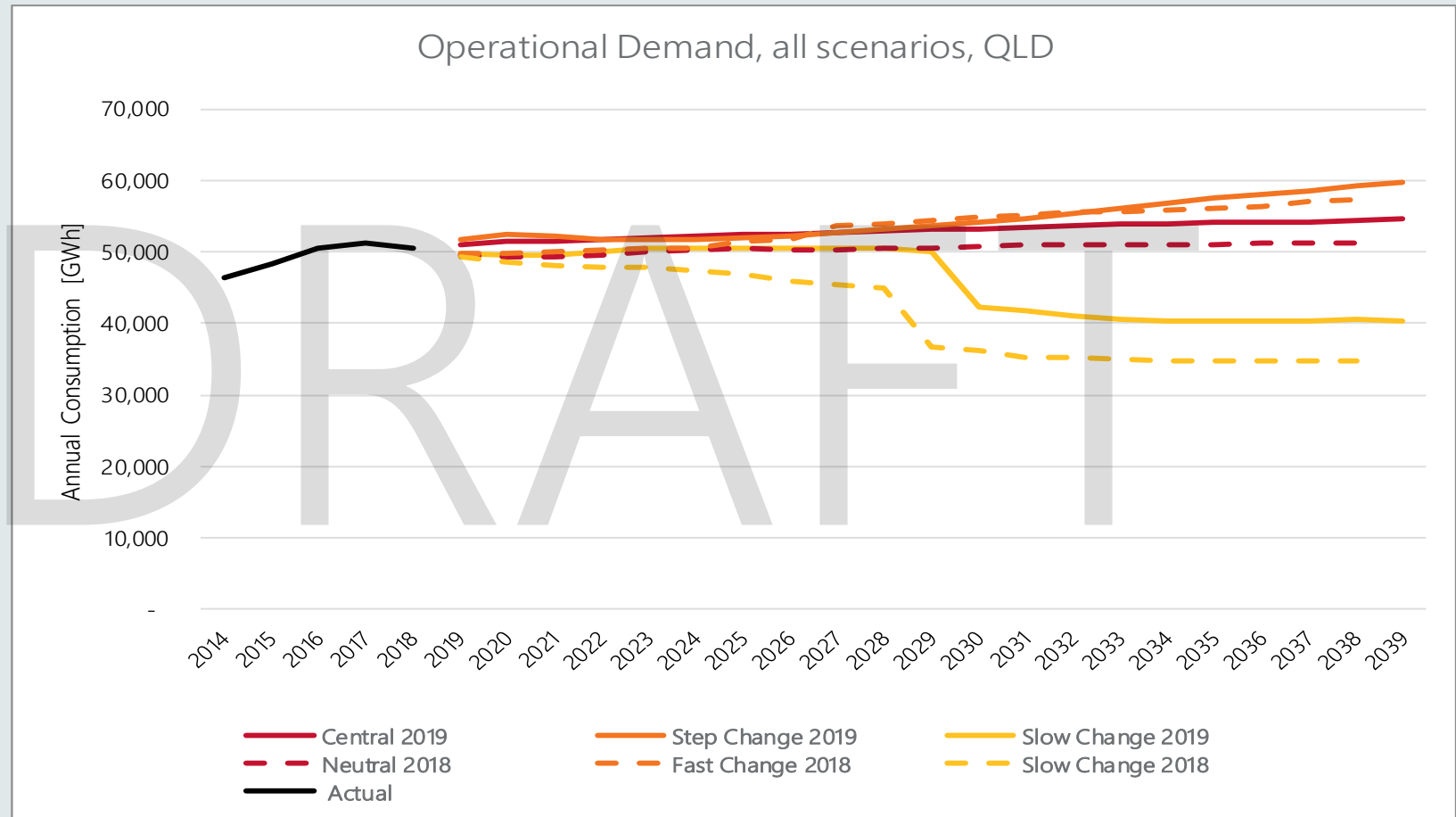
# QLD Annual Operational Energy as Sent Out

- Forecast growth in business sector forecasts offsetting the smaller reductions from the residential sector



# QLD Annual Operational Energy as Sent Out

- All scenarios



# QUEENSLAND

## Draft Maximum Demand Forecasts

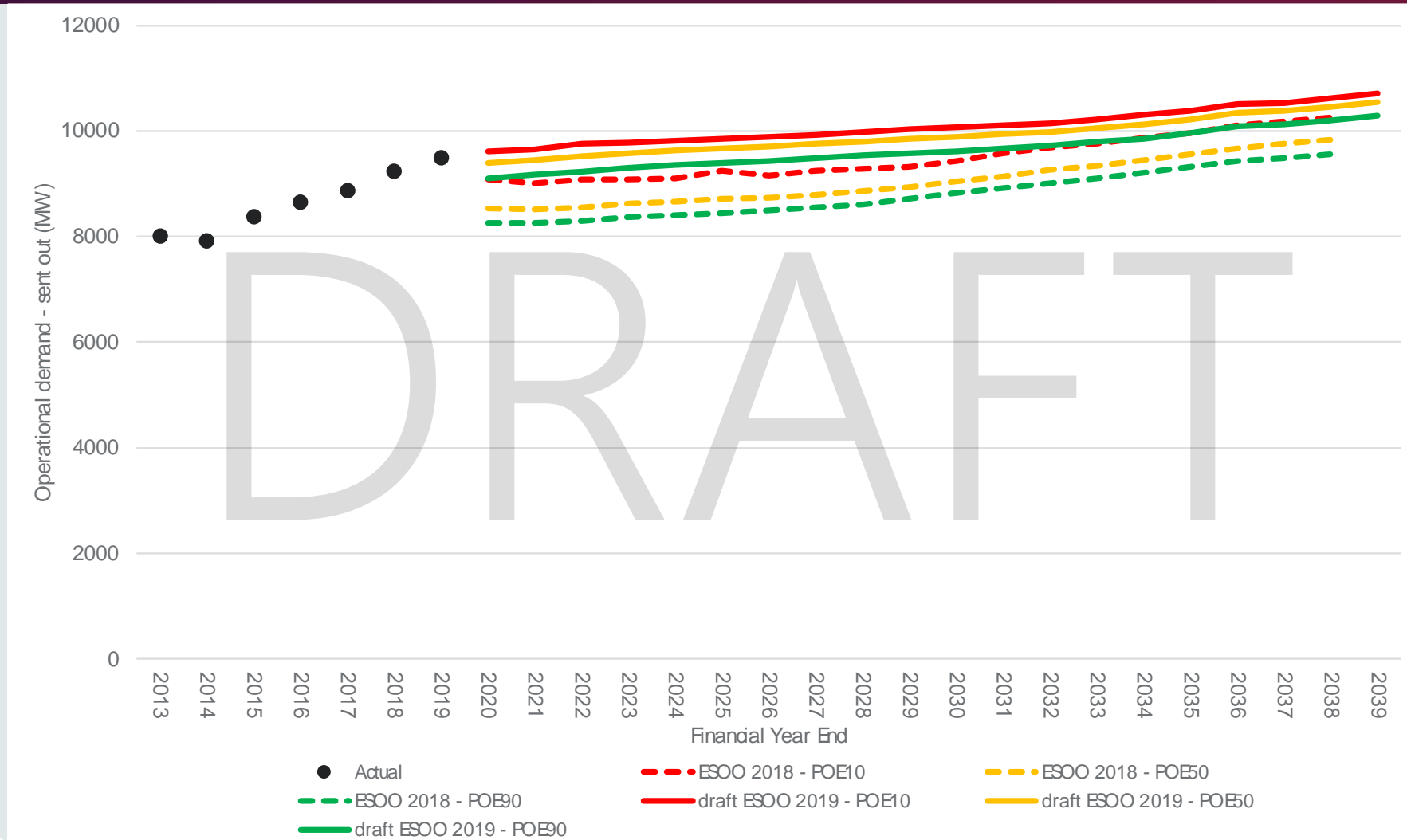
ESOO 2019

# QLD overview

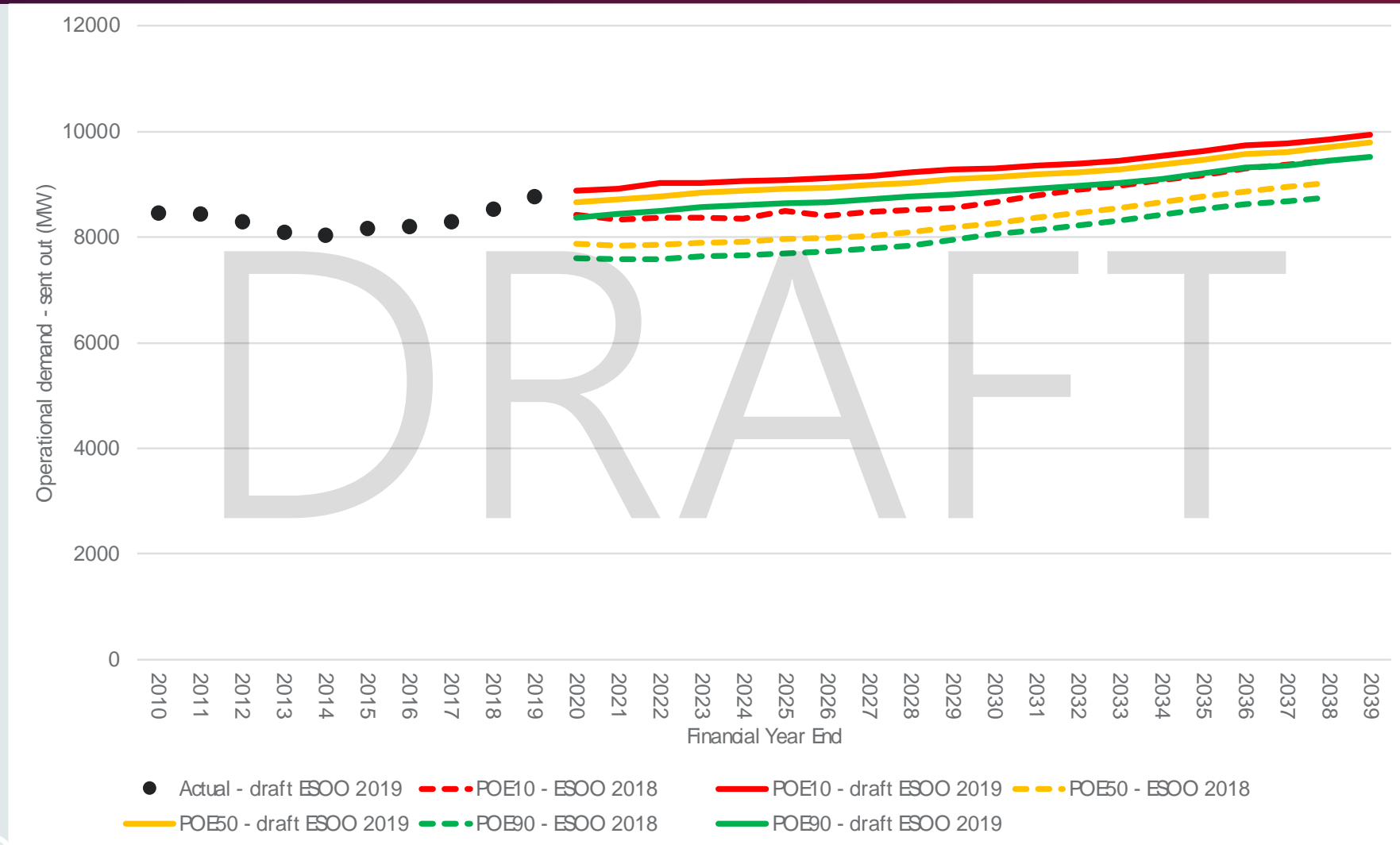
- The base year is more in line with last years actuals and higher than the ESOO2018 forecast due to:
  - GEV model better captures the increasing trend in Queensland maximum demand due to a divergence between maximum demand and average demand (decreasing load factor), resulting in a higher start point this year
  - Narrower distribution due to the GEV model distinguishing between trend and variance
- In the longer term QLD demand is slightly flatter than the ESOO2018 (but still growing) due to:
  - Electricity vehicle capacity 33% lower compared to the ESOO2018 resulting in slower growth in demand out to 2038
  - Higher energy efficiency in this year's forecast compared to the ESOO2018 resulting in slower growth in cooling load
  - Rooftop PV and Battery capacity slightly lower than the ESOO2018 forecast for the next 2 years then slightly higher out to 2030



# QLD summer maximum demand



# QLD summer maximum demand (less LNG)



# SOUTH AUSTRALIA

# SOUTH AUSTRALIA

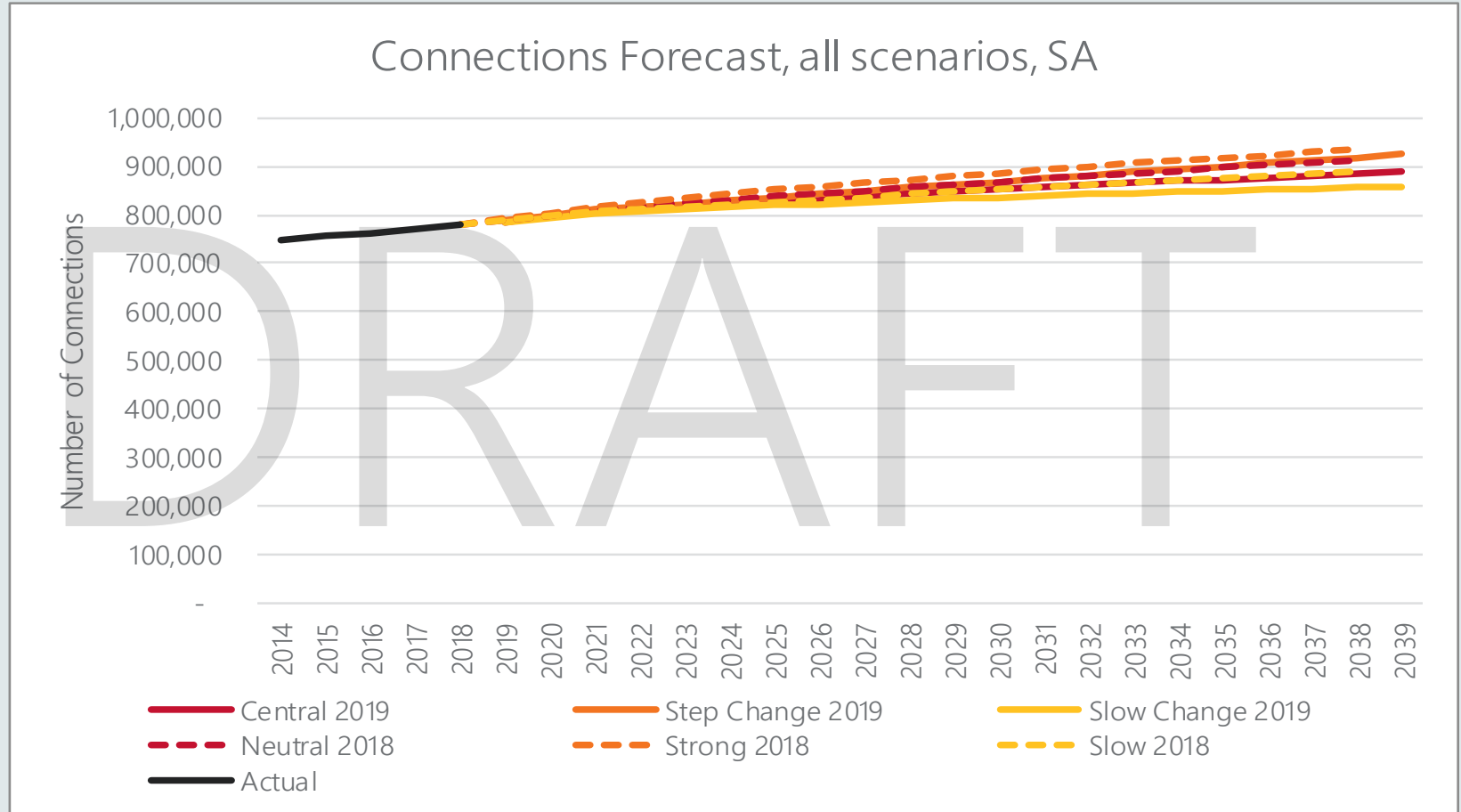
## Key Forecast Inputs

Spread of components for each scenario

# SA Connections Forecast

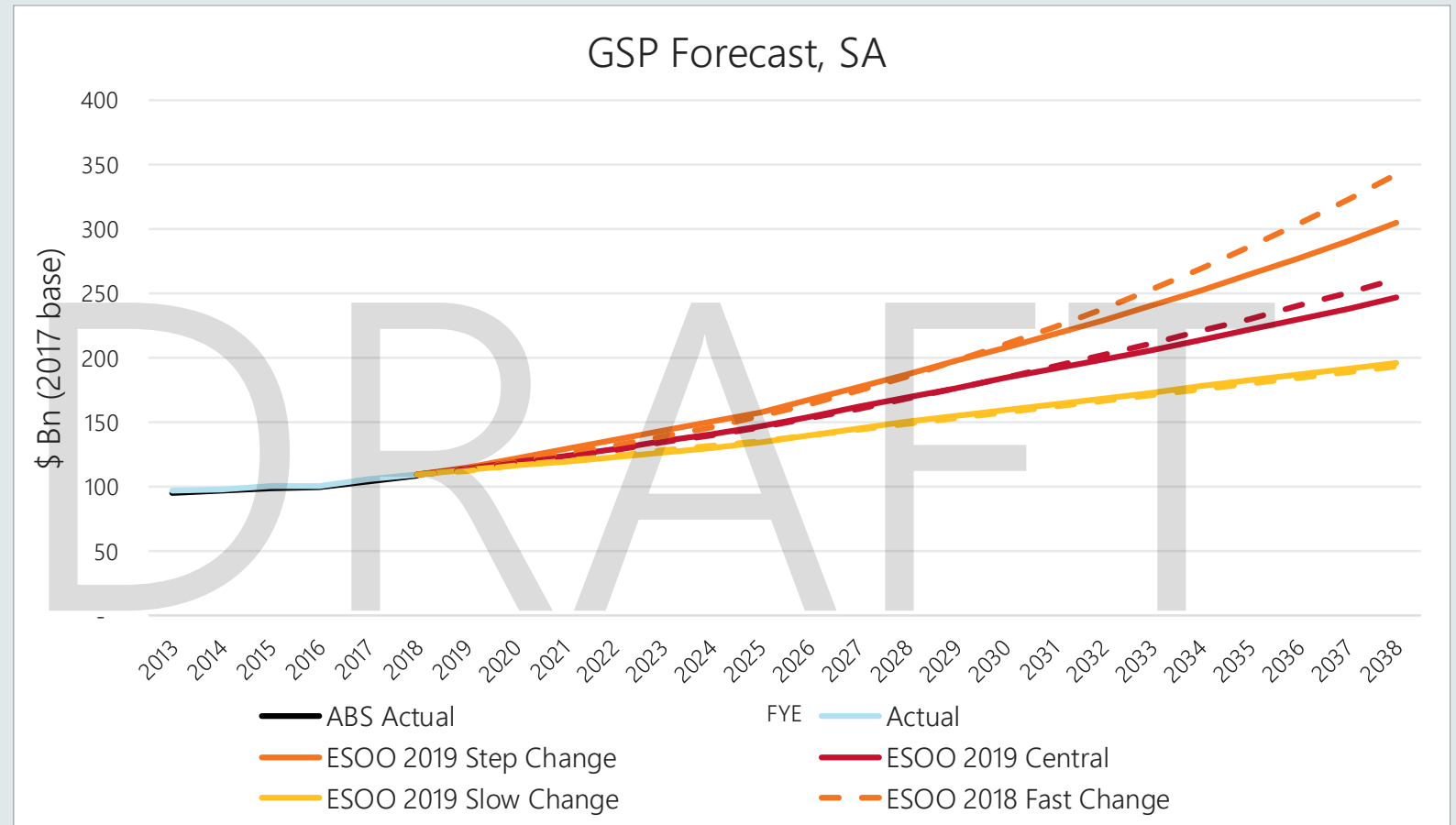
The range of the forecasts has widened due to the increase in the spread of input projections

- 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



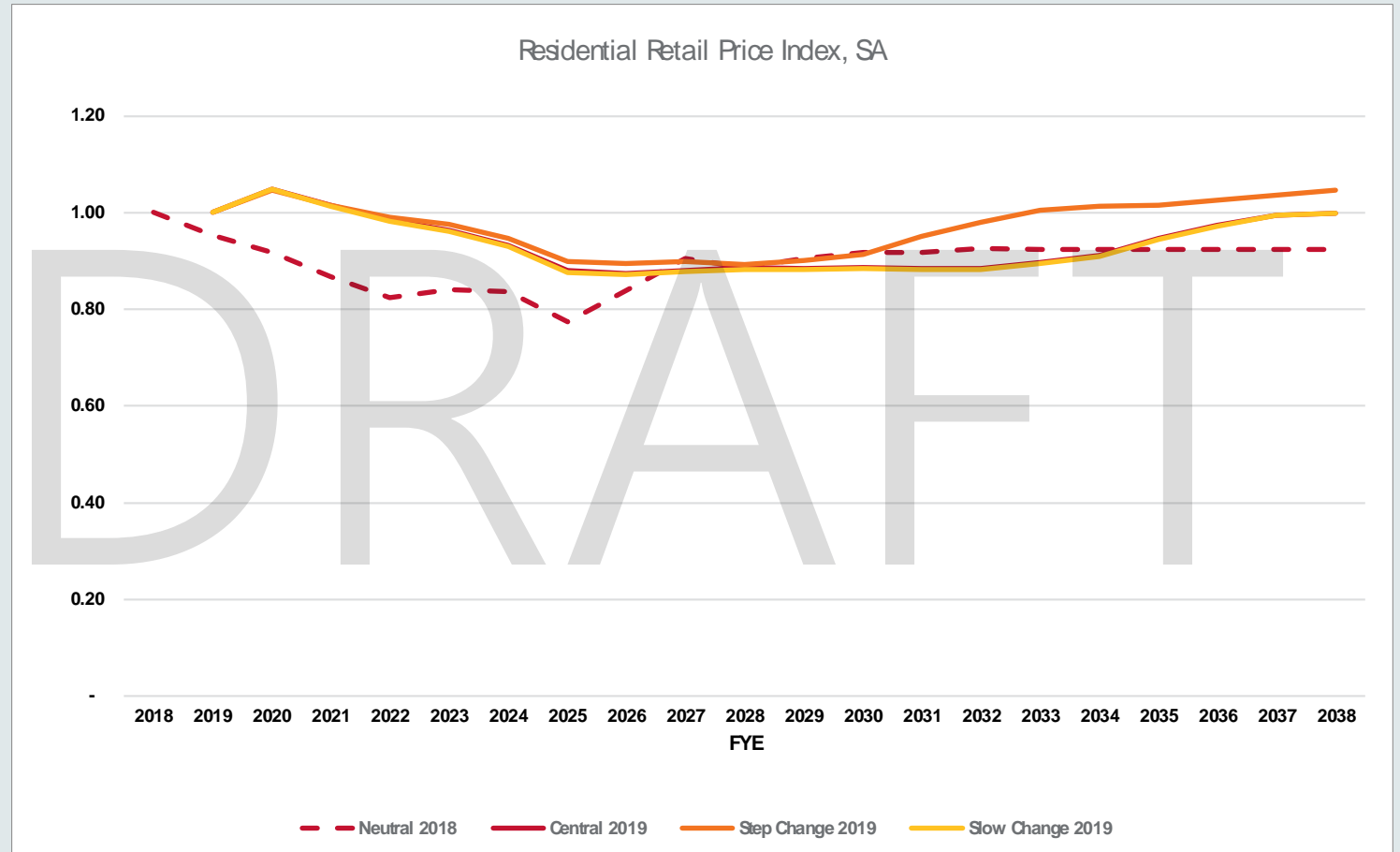
# SA GSP

- SA had downward revisions to population growth rates which lowered 2019 GSP forecasts relative to 2018



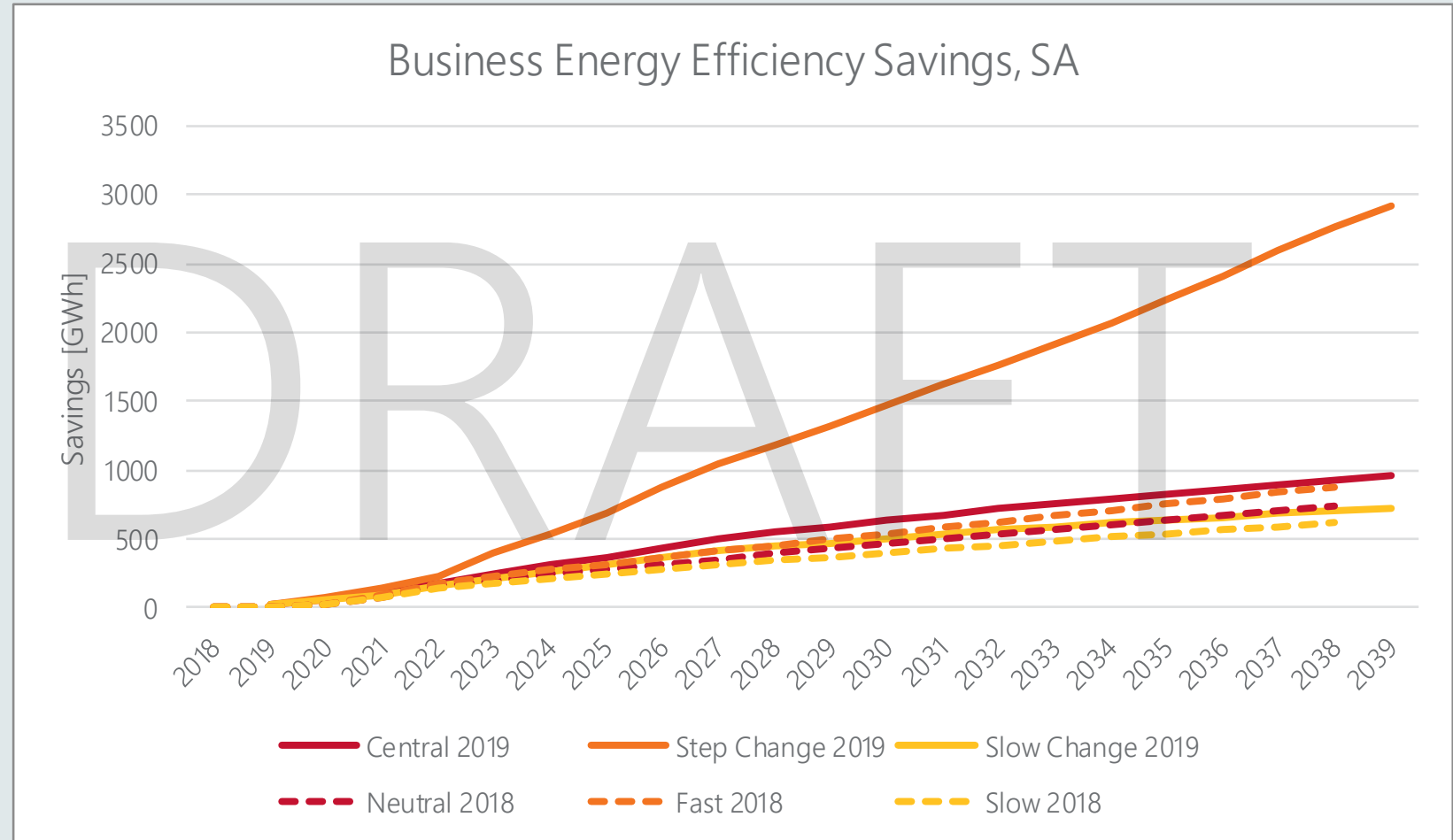
# SA Residential Retail Price Index

- Reduction in medium term as new renewable generation comes online
- Moderate increase over long-term as aging coal fleet retires
- Includes transmission development forecast in AEMO's ISP, including the proposed EnergyConnect interconnector



# SA Energy Efficiency: Business

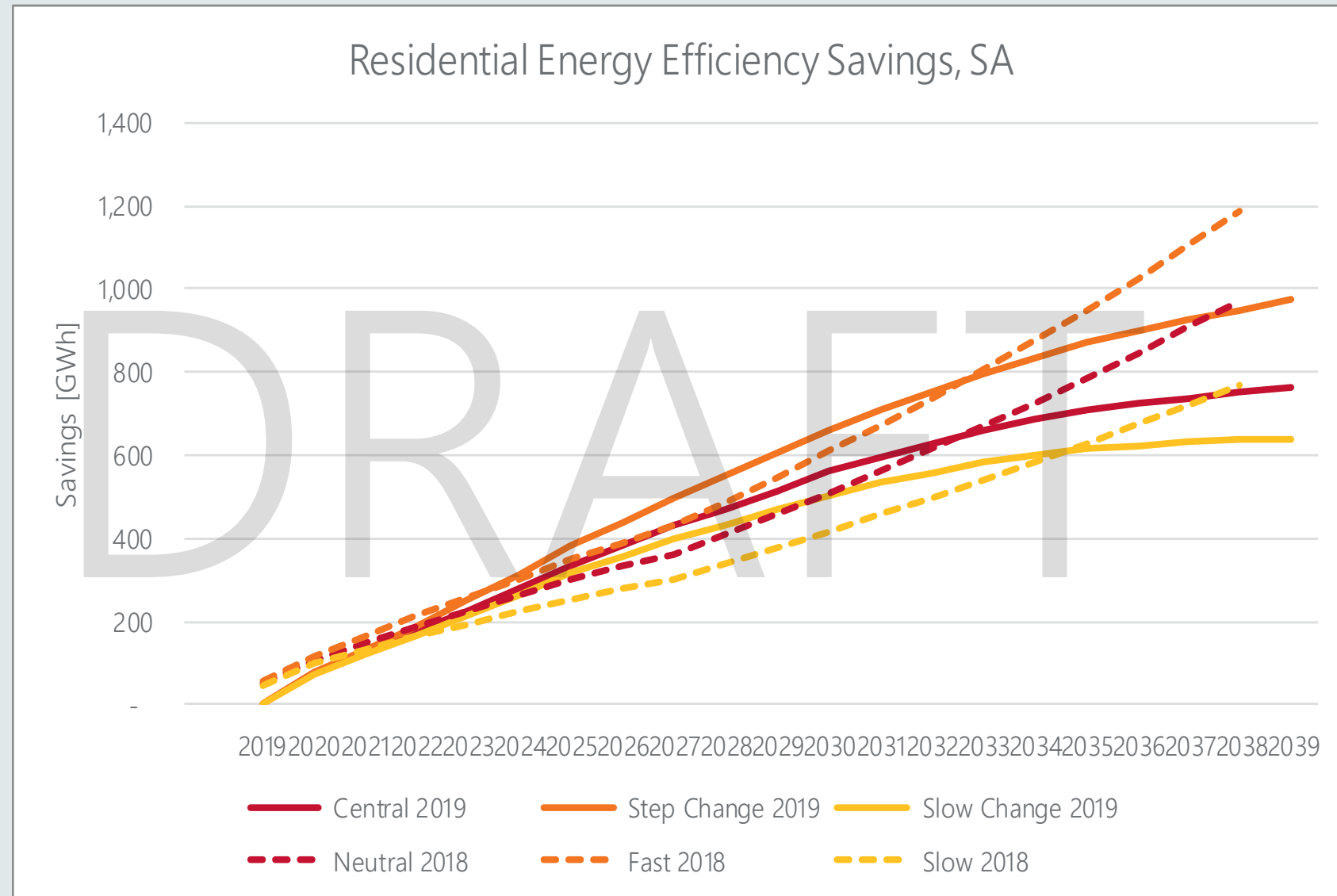
- Better representation of SA REES in 2019 forecasts
- From 2020 REES ends, though 75% of accrued REES savings expected to continue as BAU post-2020
- Step change scenario models two additional measures not considered in the 2018 Fast change scenario, from a low consumption base, related to the future building code and equipment standards (GEMS)





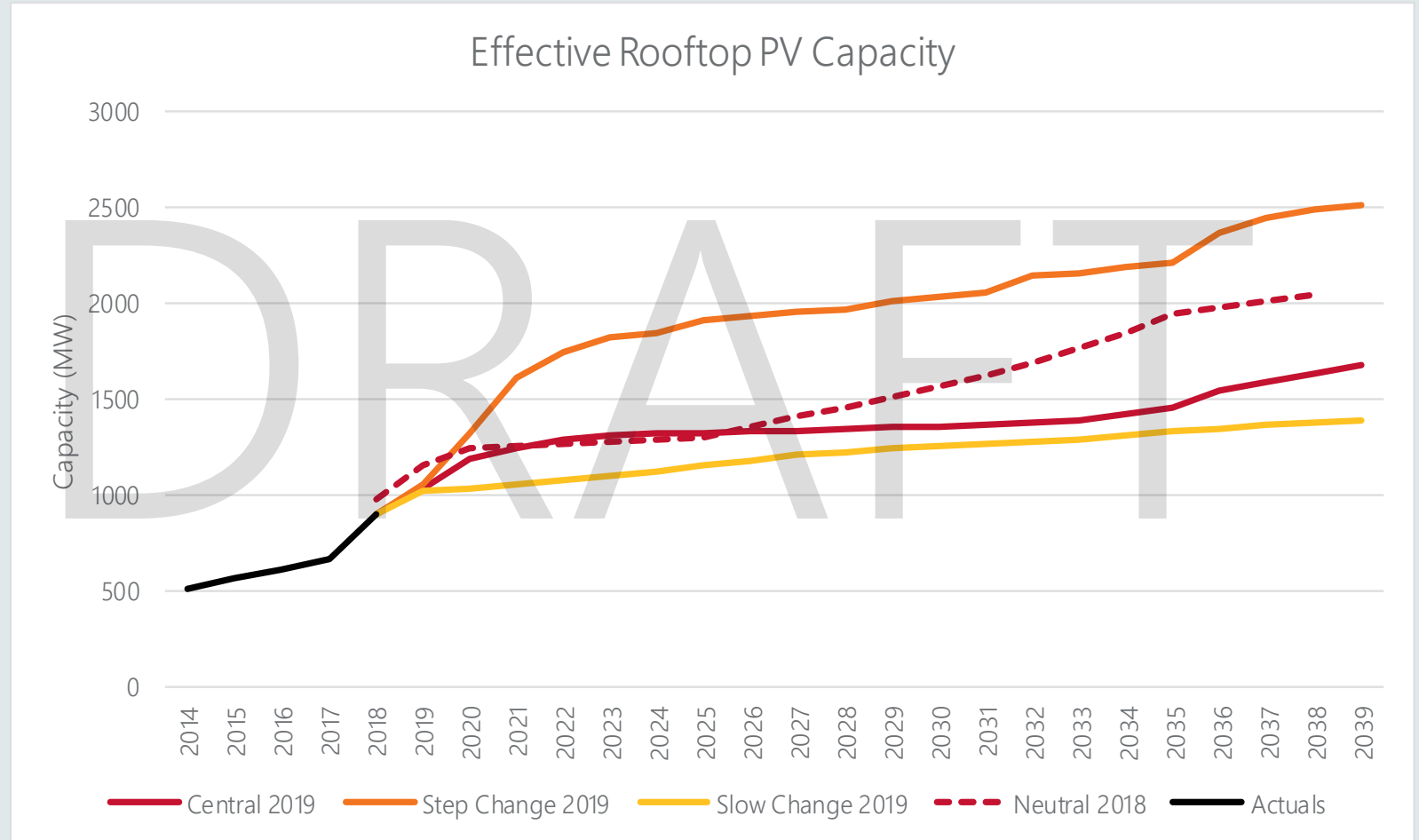
# SA Energy Efficiency: Residential

- Revised dwelling stock model calibrated to AEMO's 2019 connection forecasts
- Improved approach to account for future savings from past activities
- Step change scenario models higher energy star ratings from 2022



# SA PV Forecast

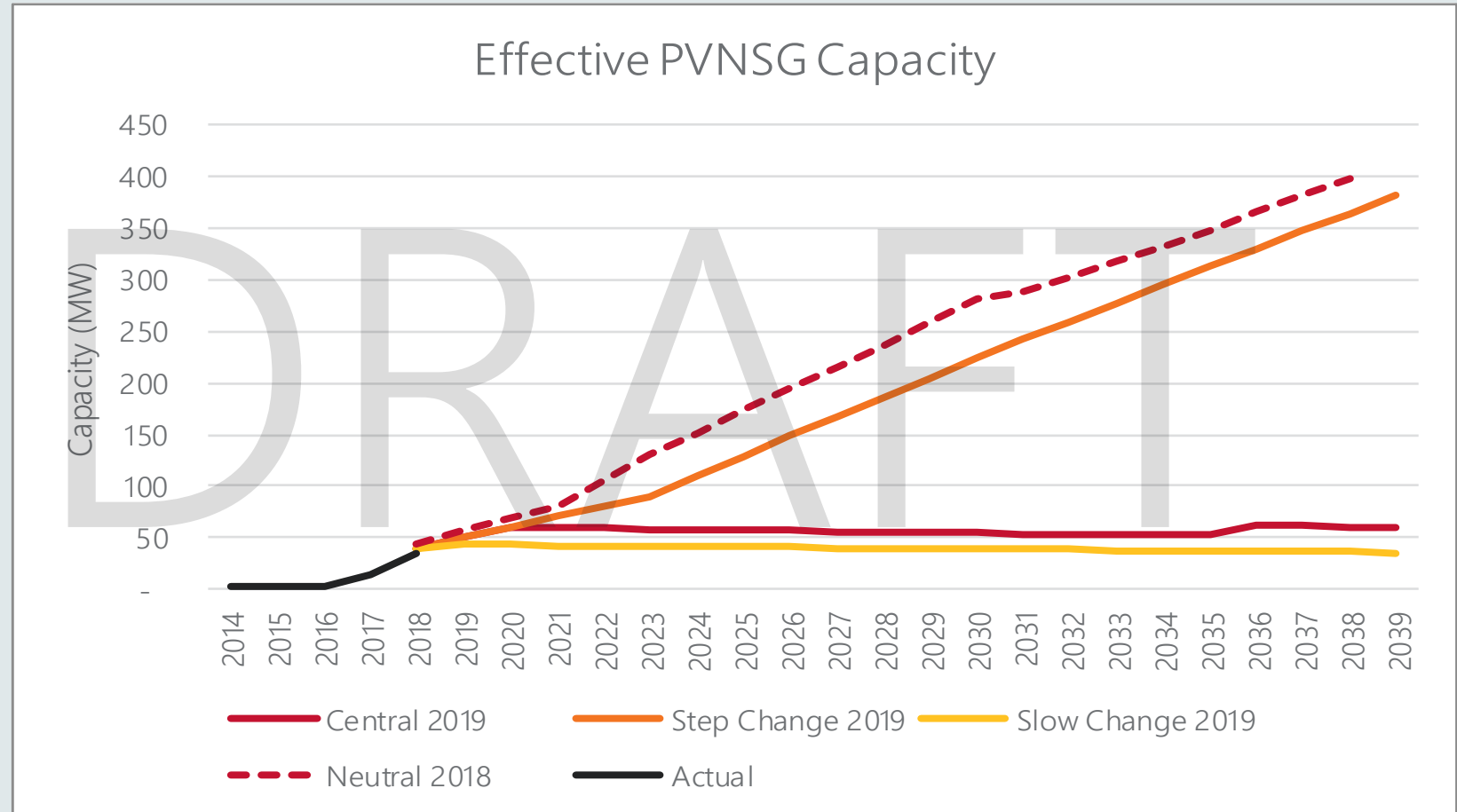
- Forecasts reflect more regular updates in actuals data
- Slower increase in capacity in the short to medium term reflects broad expectations that retail electricity prices will ease
- Assumed capacity factor of 15.4%



# SA PVNSG Forecast

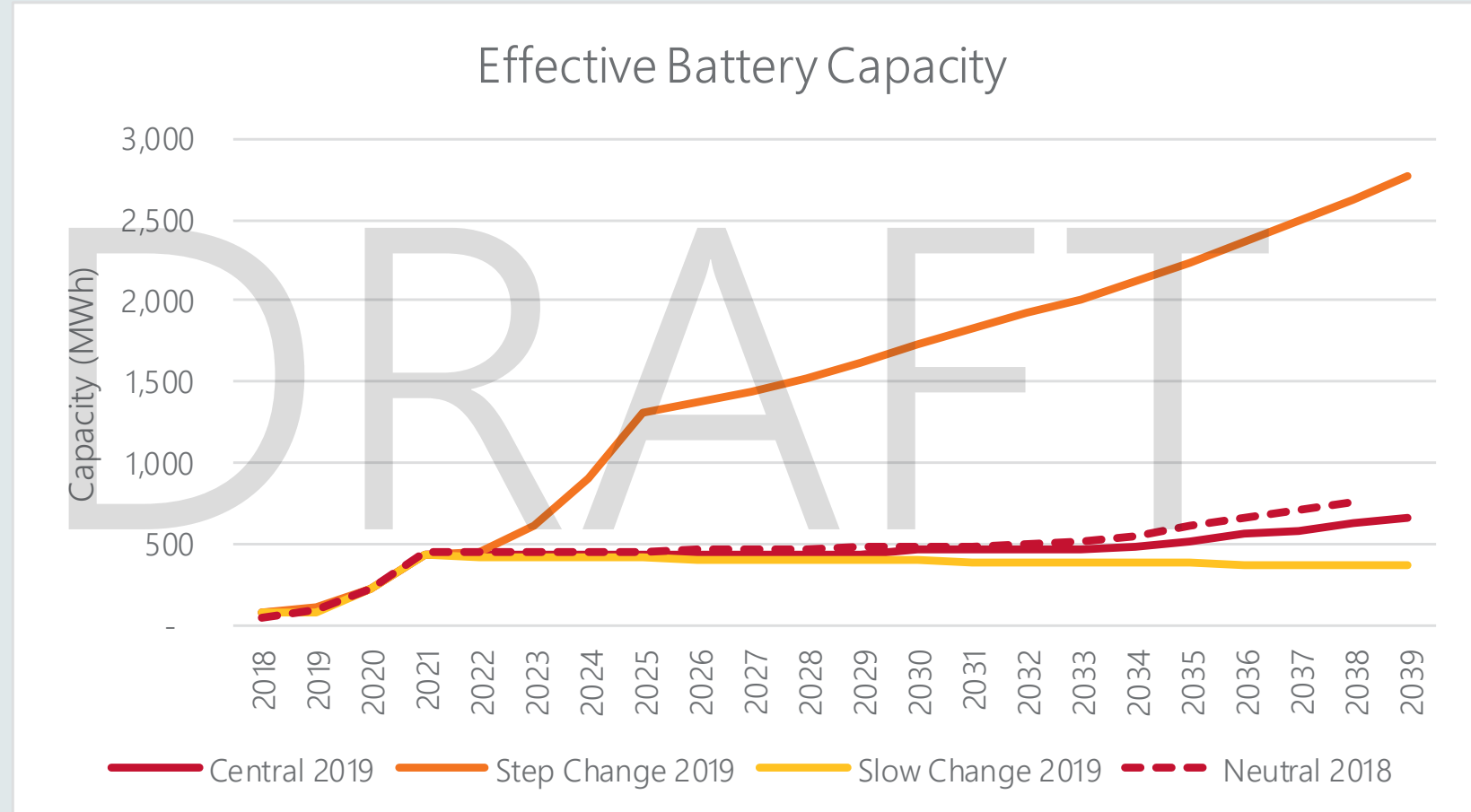
Size range: 100kW to 30 MW

- Slower short term deployment growth in 2019 account for a rapid decline in LGC value since 2018
- Stable outlook in Neutral scenario due to expected crowding out from rooftop PV and large scale solar



# SA Battery Forecast

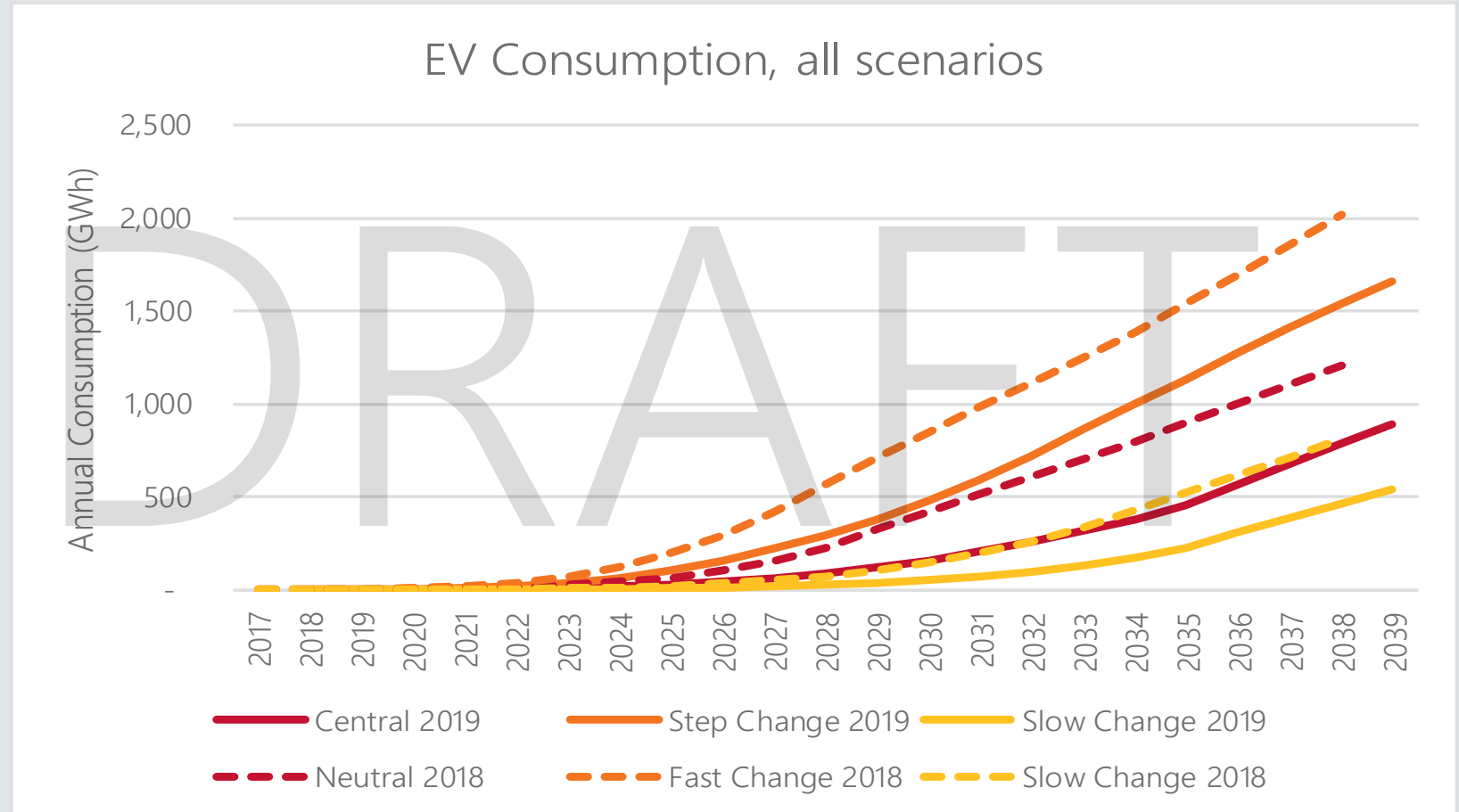
- Assumes large residential rated capacity 14kWh, otherwise 7kWh
- Central and slow scenarios assume a small percentage accessing tariffs which contribute to grid services, while Step change scenario assumes a broader subsidy scheme will be available



# SA EV Capacity Forecast

## By Scenario

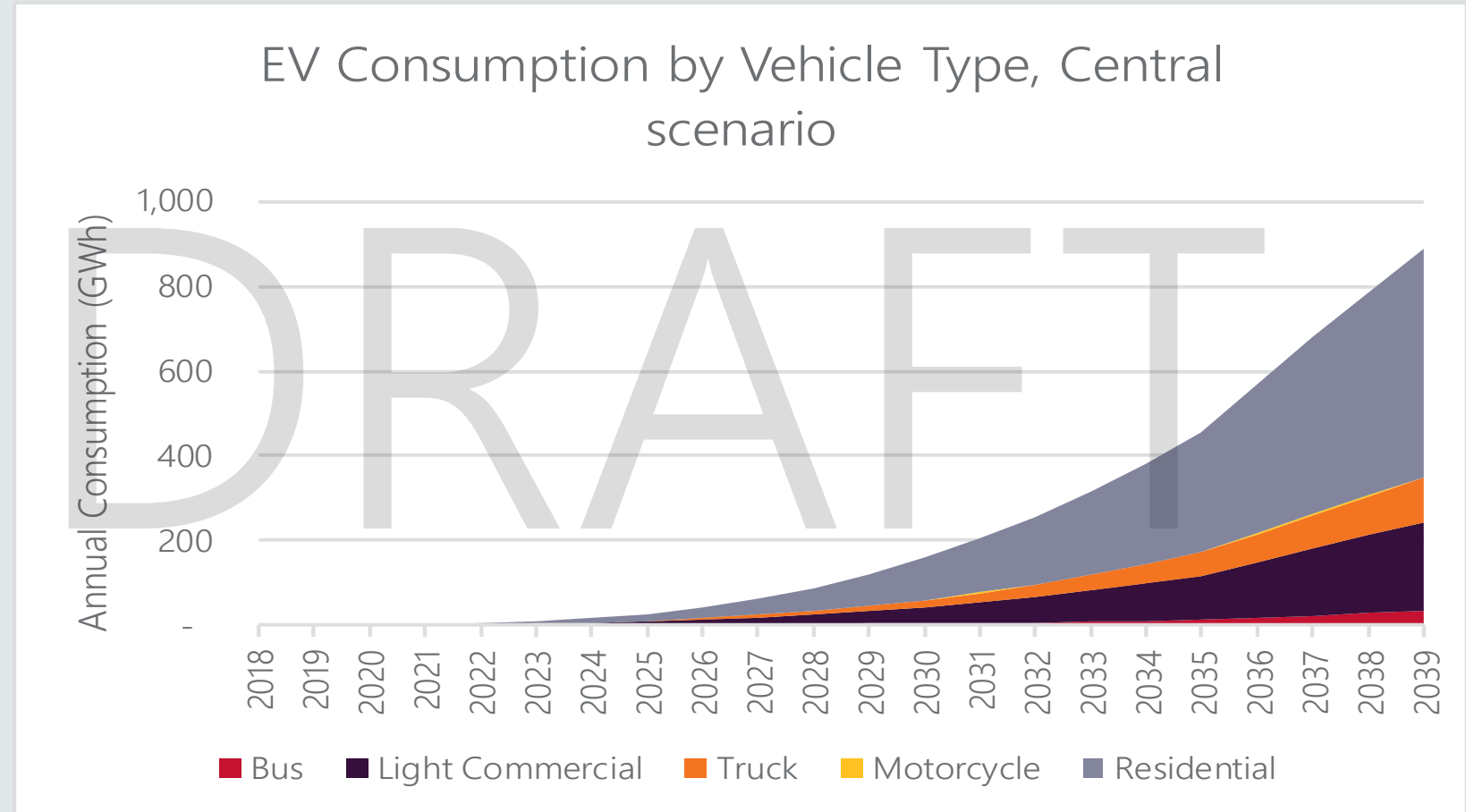
- Decrease on 2018 forecast due to lower national vehicle sales projections, ride share assumptions, market saturation level assumption changes, and the inclusion of fuel cell vehicles



# SA EV Capacity Forecast

## By Vehicle Type

- EV adoption is projected to be dominated by residential and commercial light vehicles



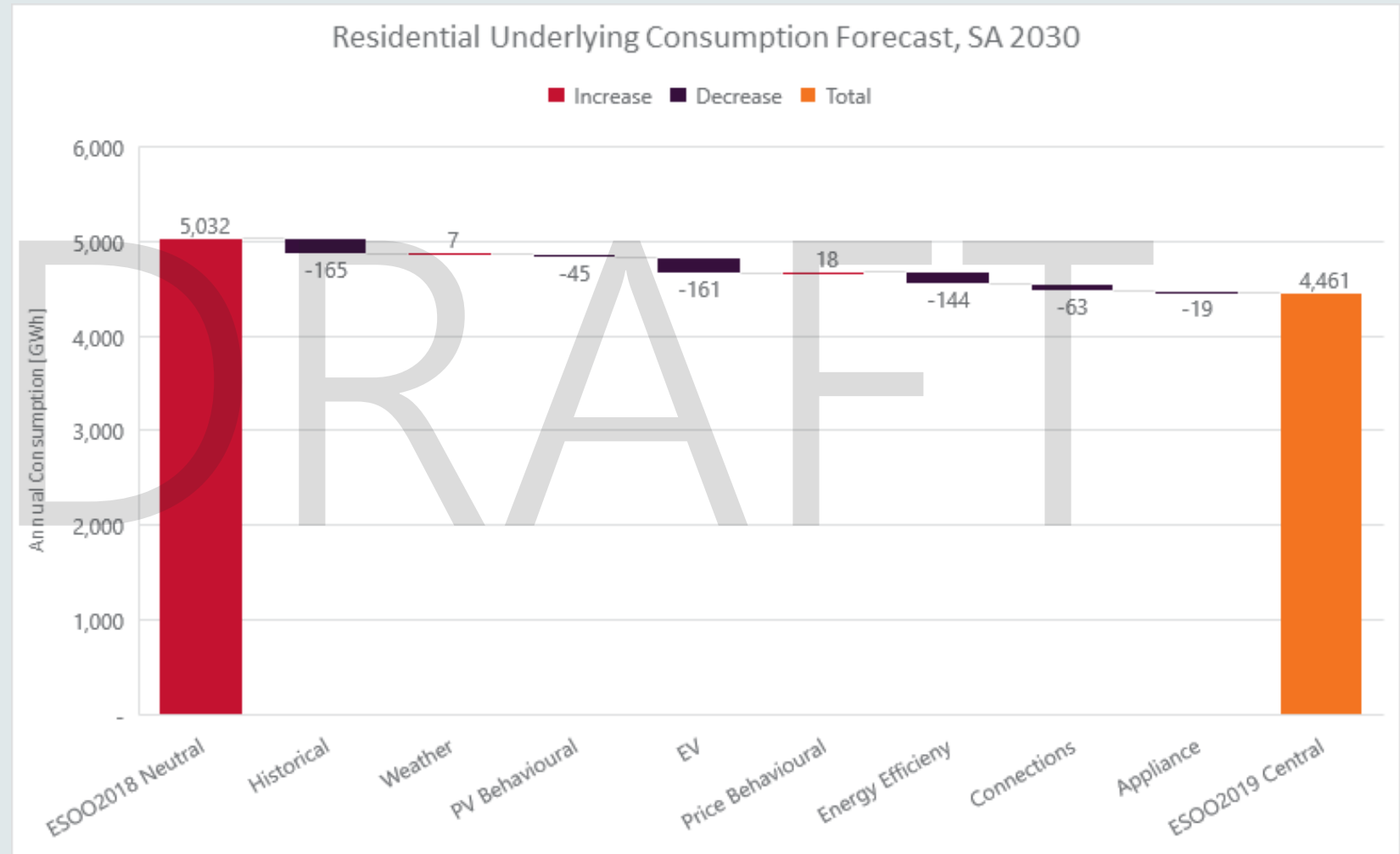
# SOUTH AUSTRALIA

## Draft Annual Consumption Forecasts

ESOO 2019

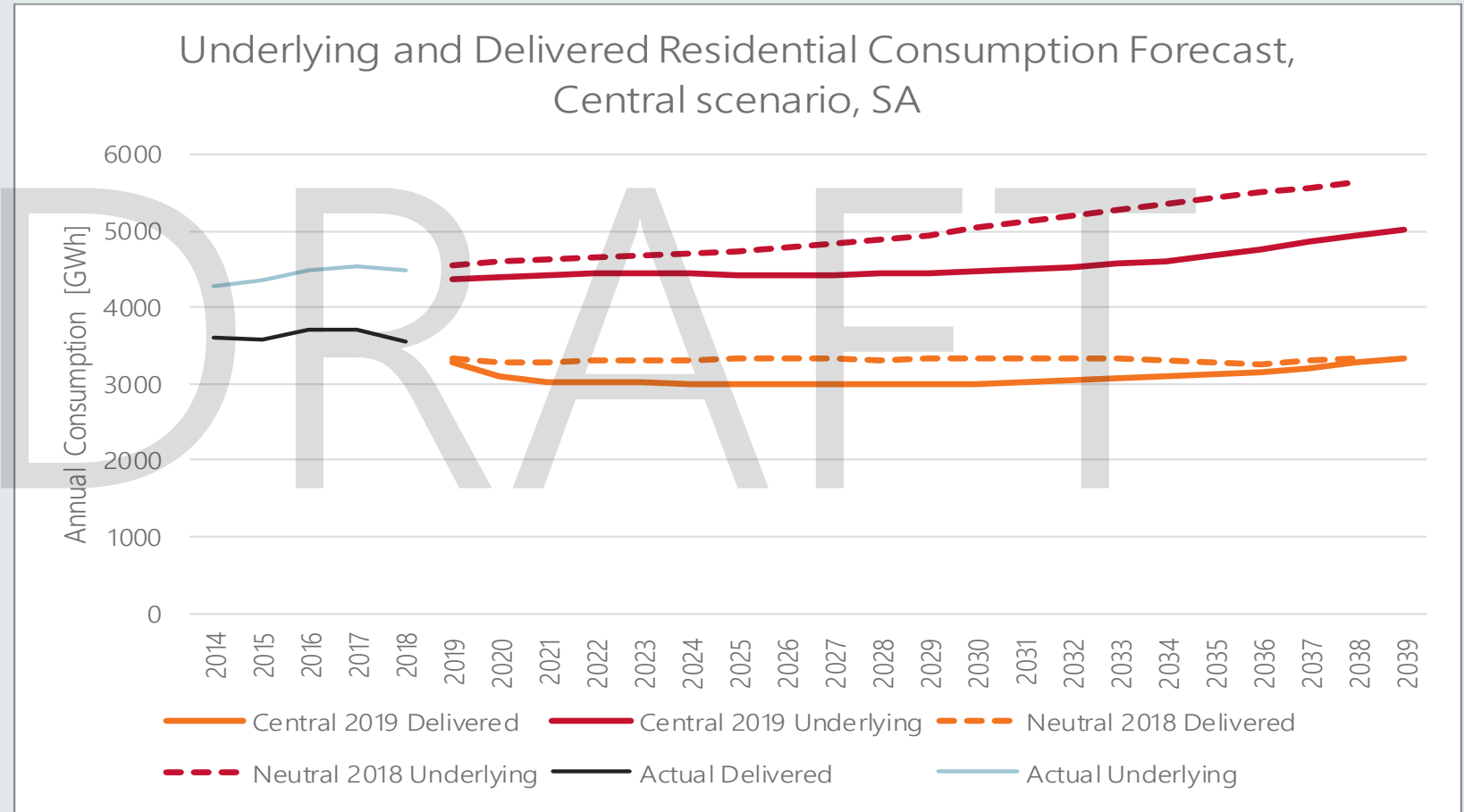
# SA Underlying Residential Forecast With Key Components

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



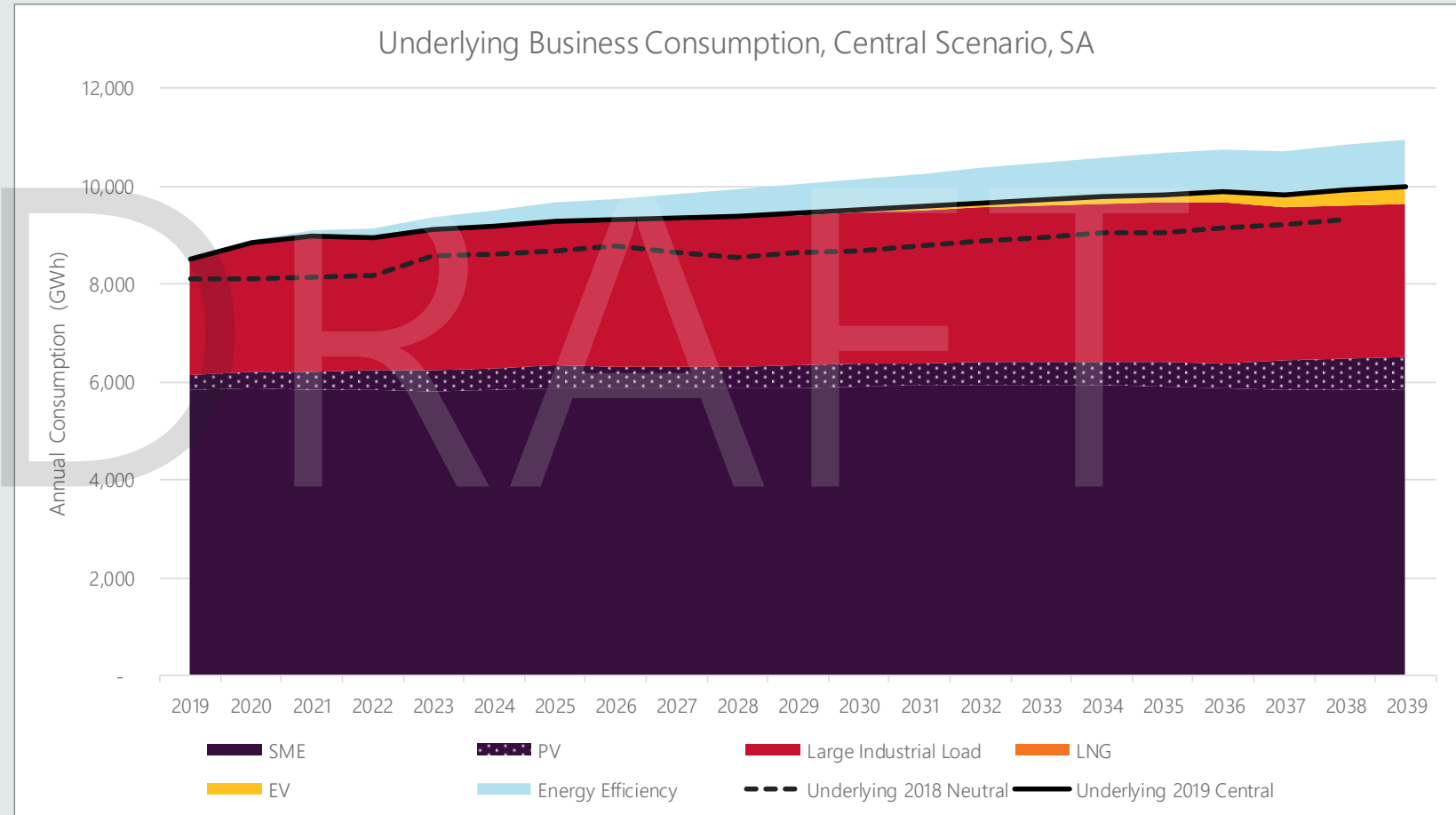


# SA Residential Forecast



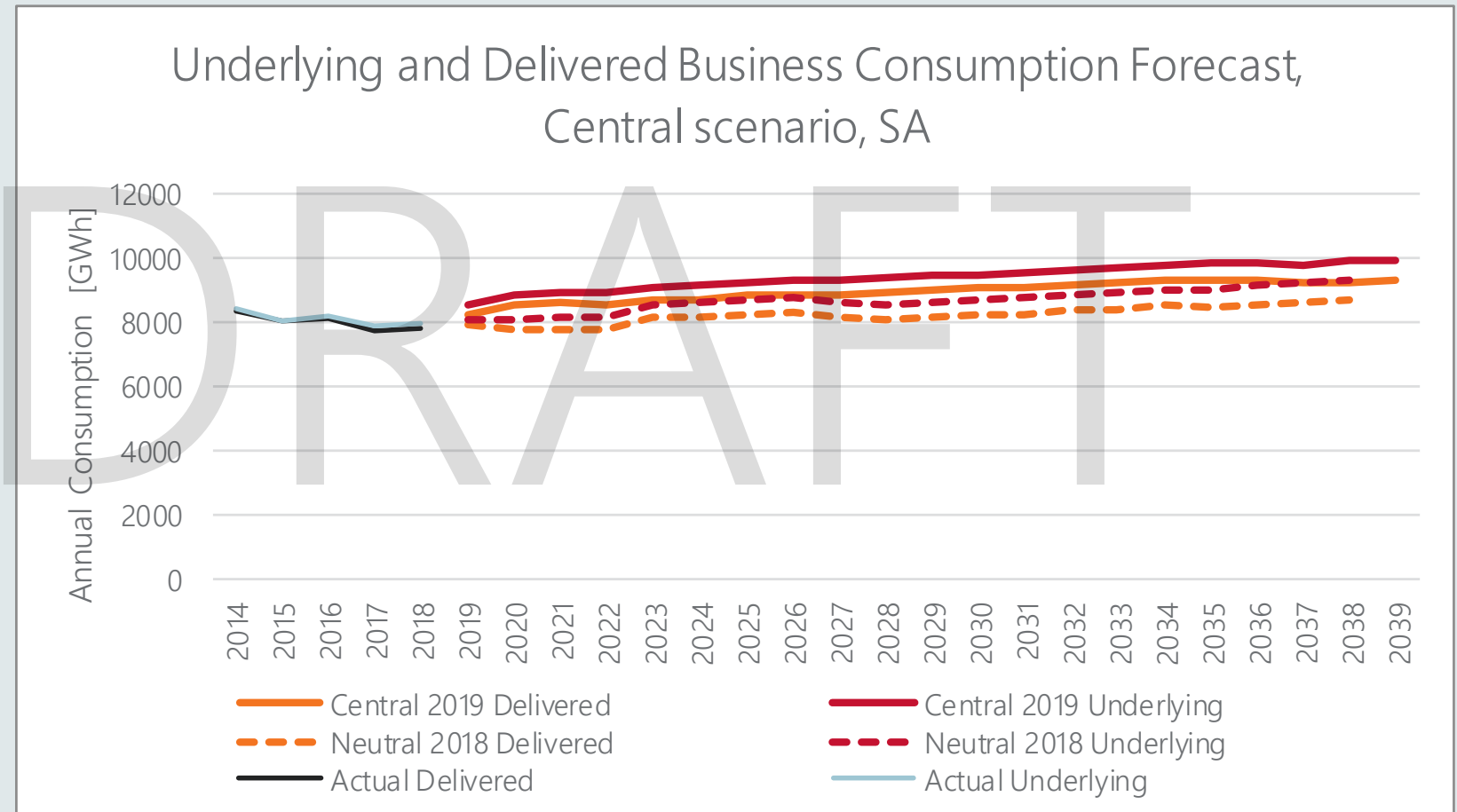
# SA Underlying Business Forecast With Key components

- Updated SME model better capturing the less-energy intensive industries contributing to economic growth
- Improved method for accounting for Large Industrial Load forecasts
- Better representation of projected future energy efficiency savings in 2019 forecasts

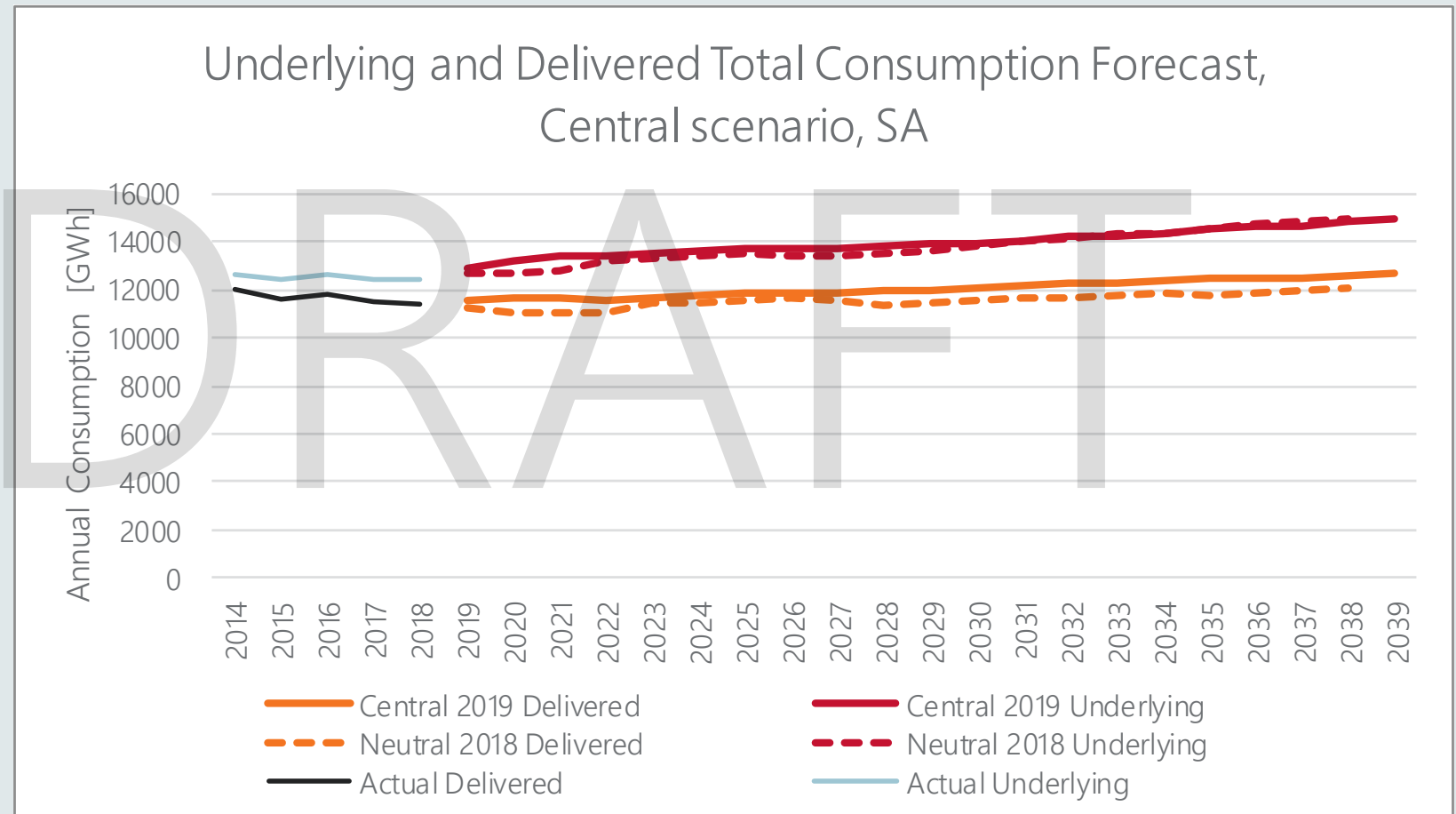


# SA Business Forecast

- Increase in forecast consumption reflects expansions in large industrial loads

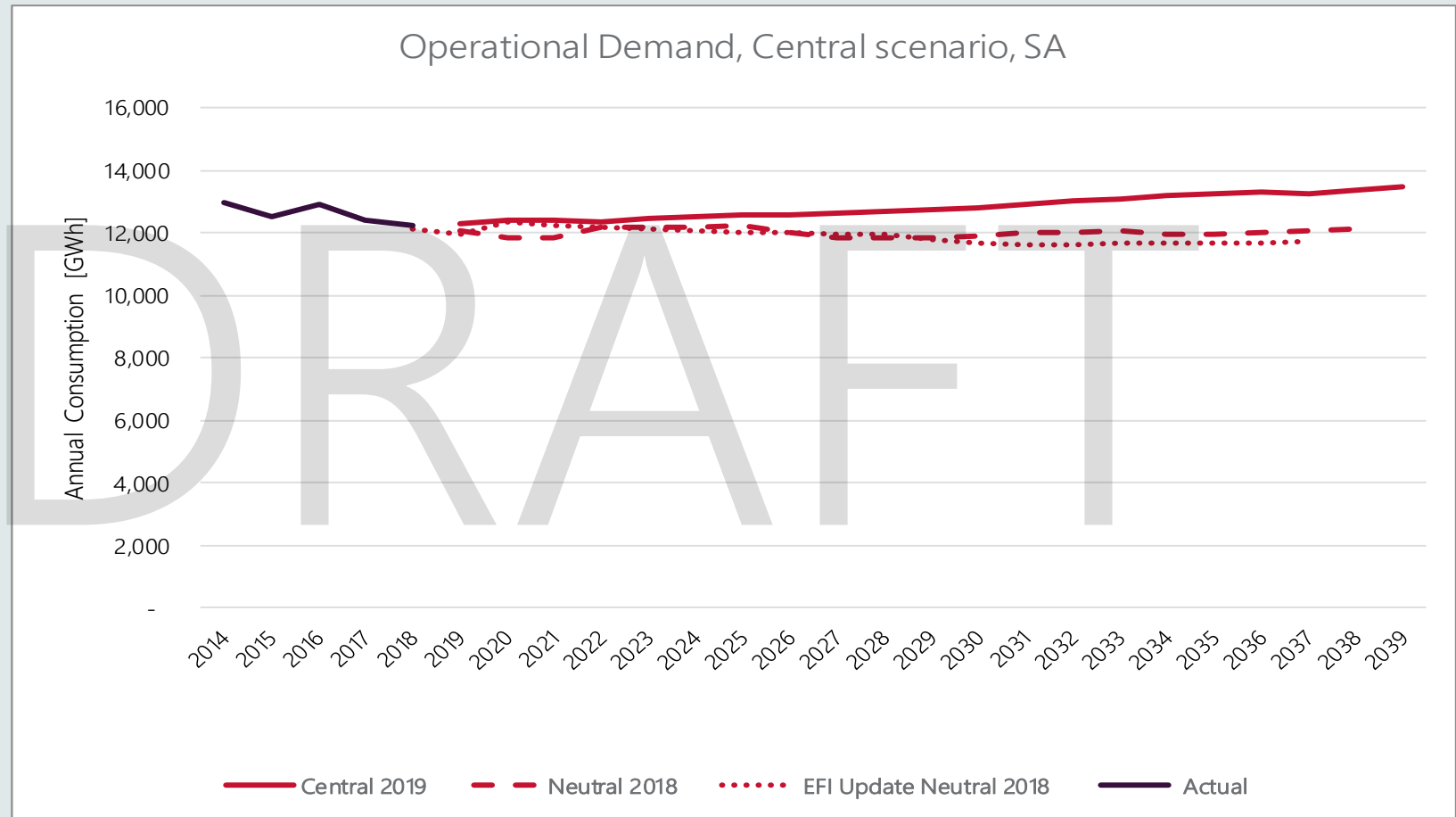


# SA Total Forecast



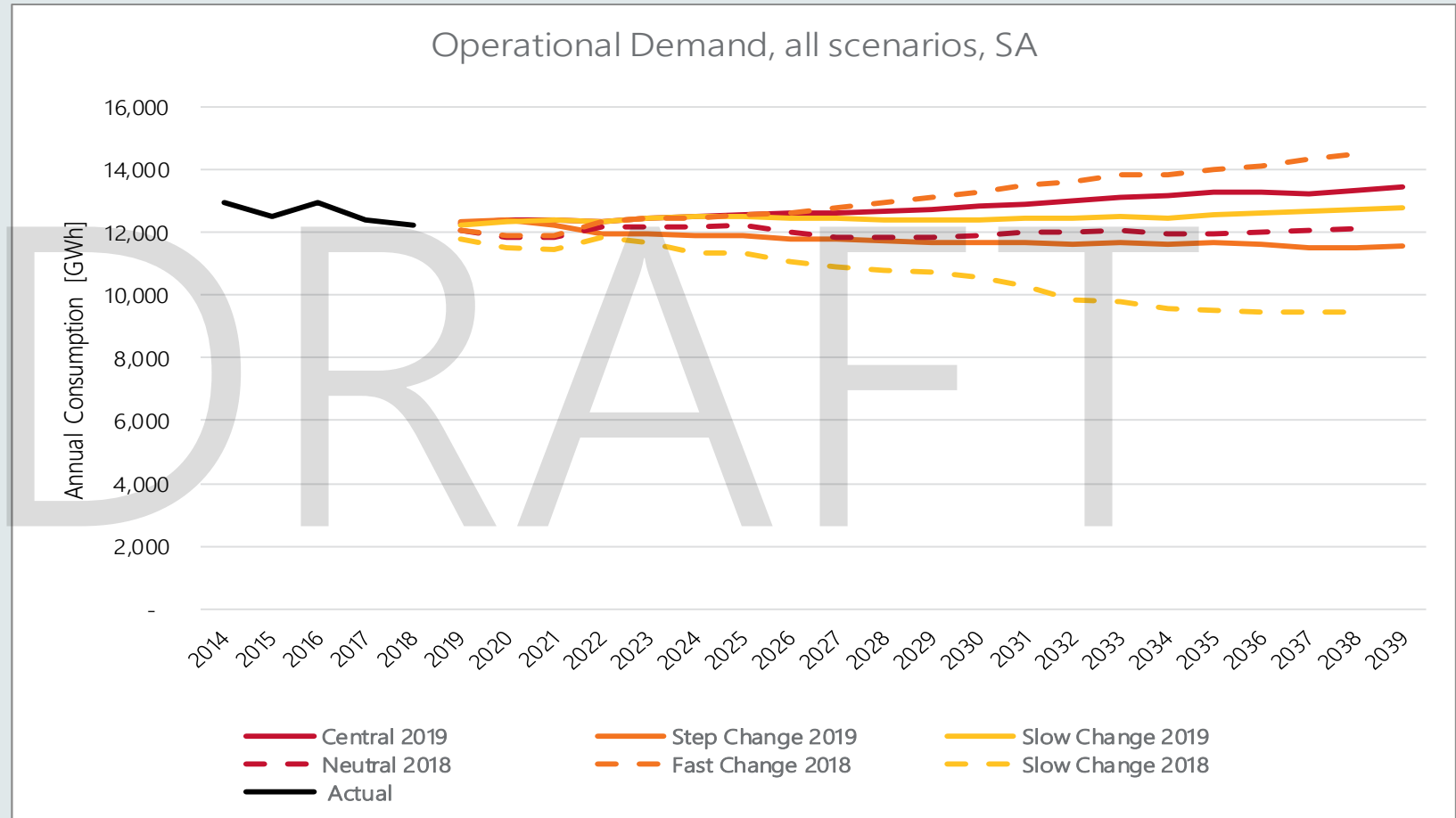
# SA Annual Operational Energy as Sent Out

- Forecast growth in business sector forecasts offsetting the smaller reductions from the residential sector



# SA Annual Operational Energy as Sent Out

- All scenarios



# SOUTH AUSTRALIA

## Draft Maximum Demand Forecasts

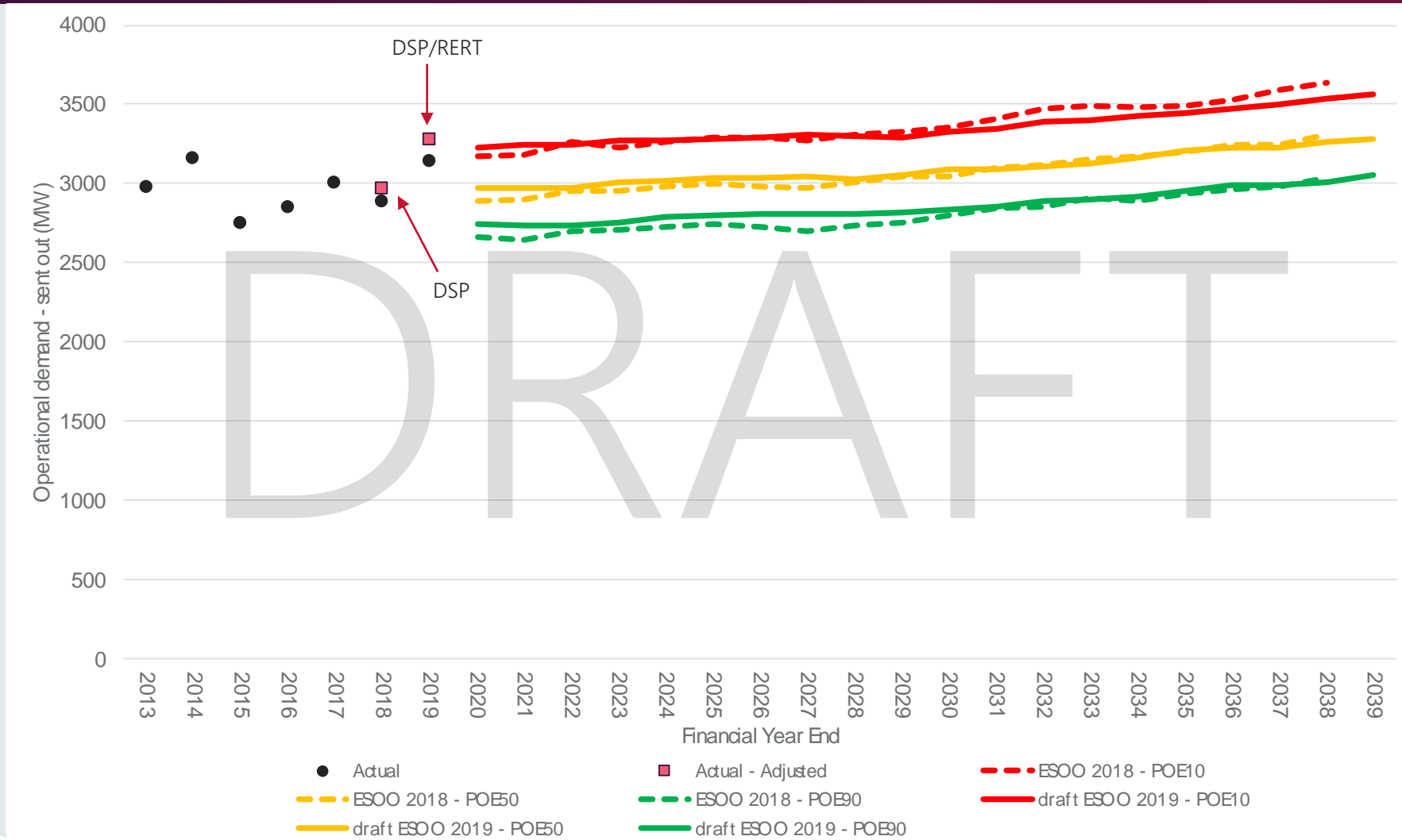
ESOO 2019

# SA overview

- The Base year forecast is similar to the ESOO2018, however this year's forecast grows between 2019 to 2020 while last years forecast declined:
  - Forecast increase in large industrial load in 2020 increasing the starting point slightly
- In the long term SA demand has a similar growth trajectory compared to the ESOO2018 due to:
  - Higher energy efficiency resulting in lower growth in cooling load compared to the ESOO2018.
  - Electric Vehicle uptake is forecast to be lower.
  - Growth in base load in business and residential is offsetting the negative growth drivers



# SA summer maximum demand



# VICTORIA

# VICTORIA

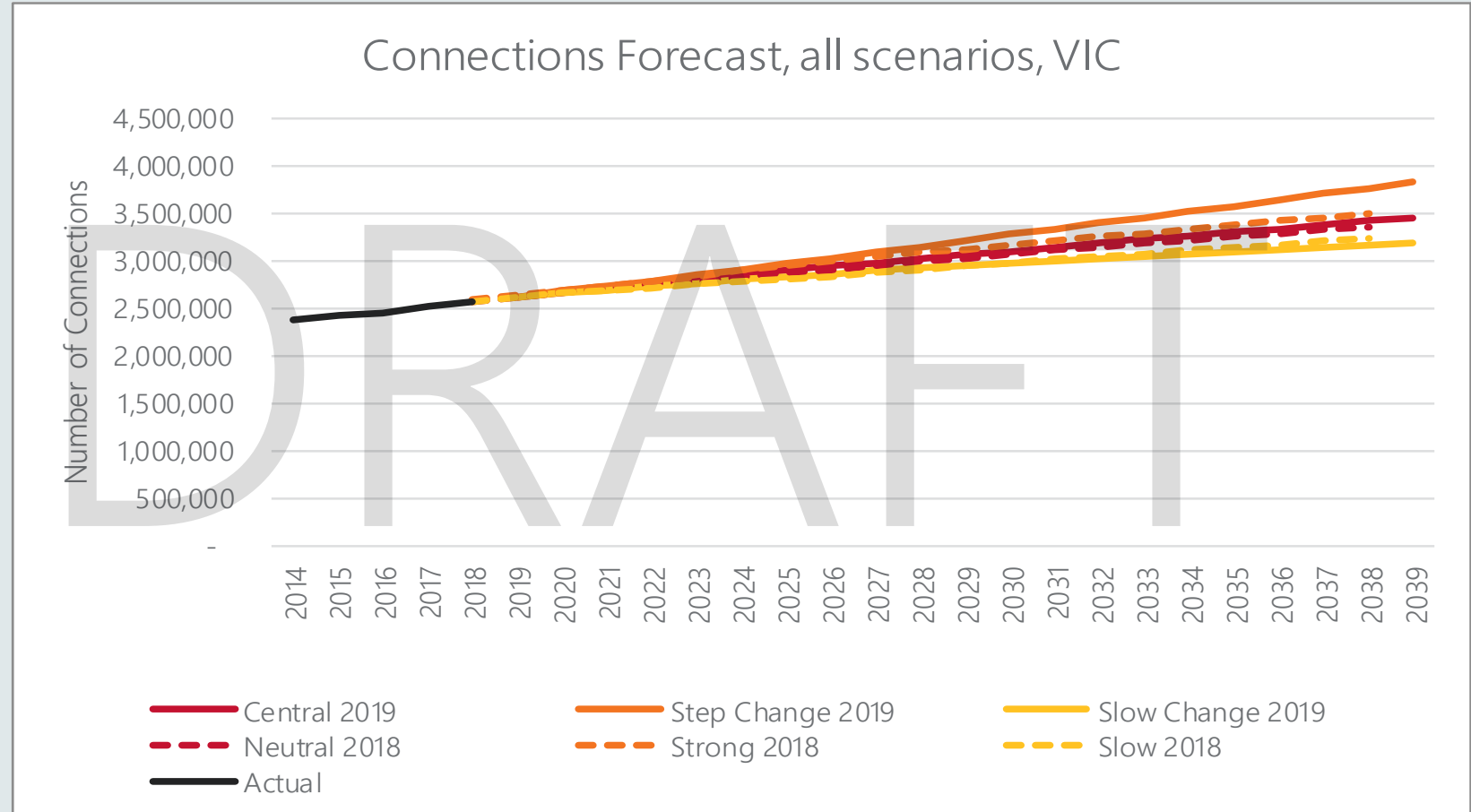
## Key Forecast Inputs

Spread of components for each scenario

# VIC Connections Forecast

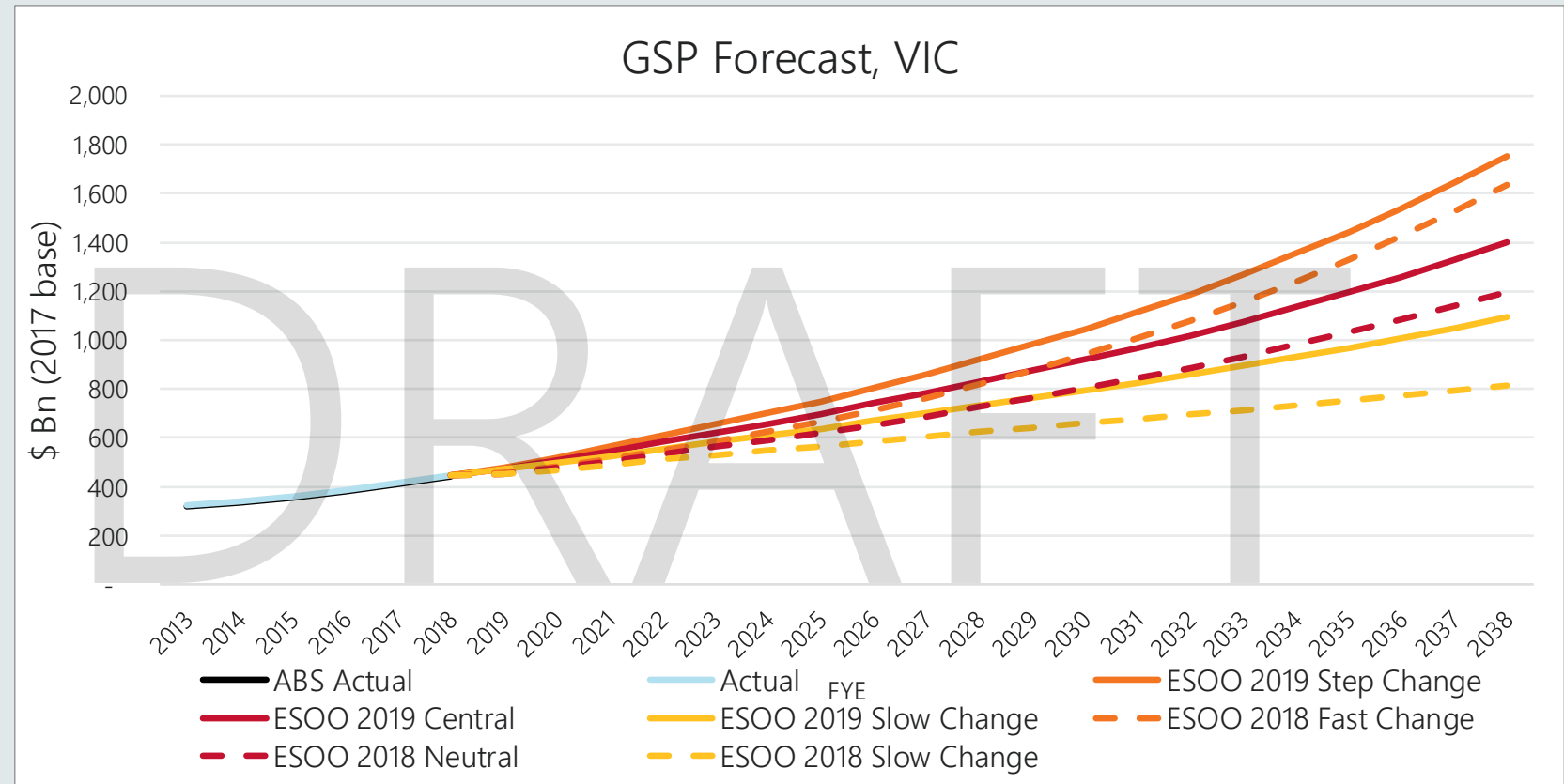
The range of the forecasts has widened due to the increase in the spread of input projections

- 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



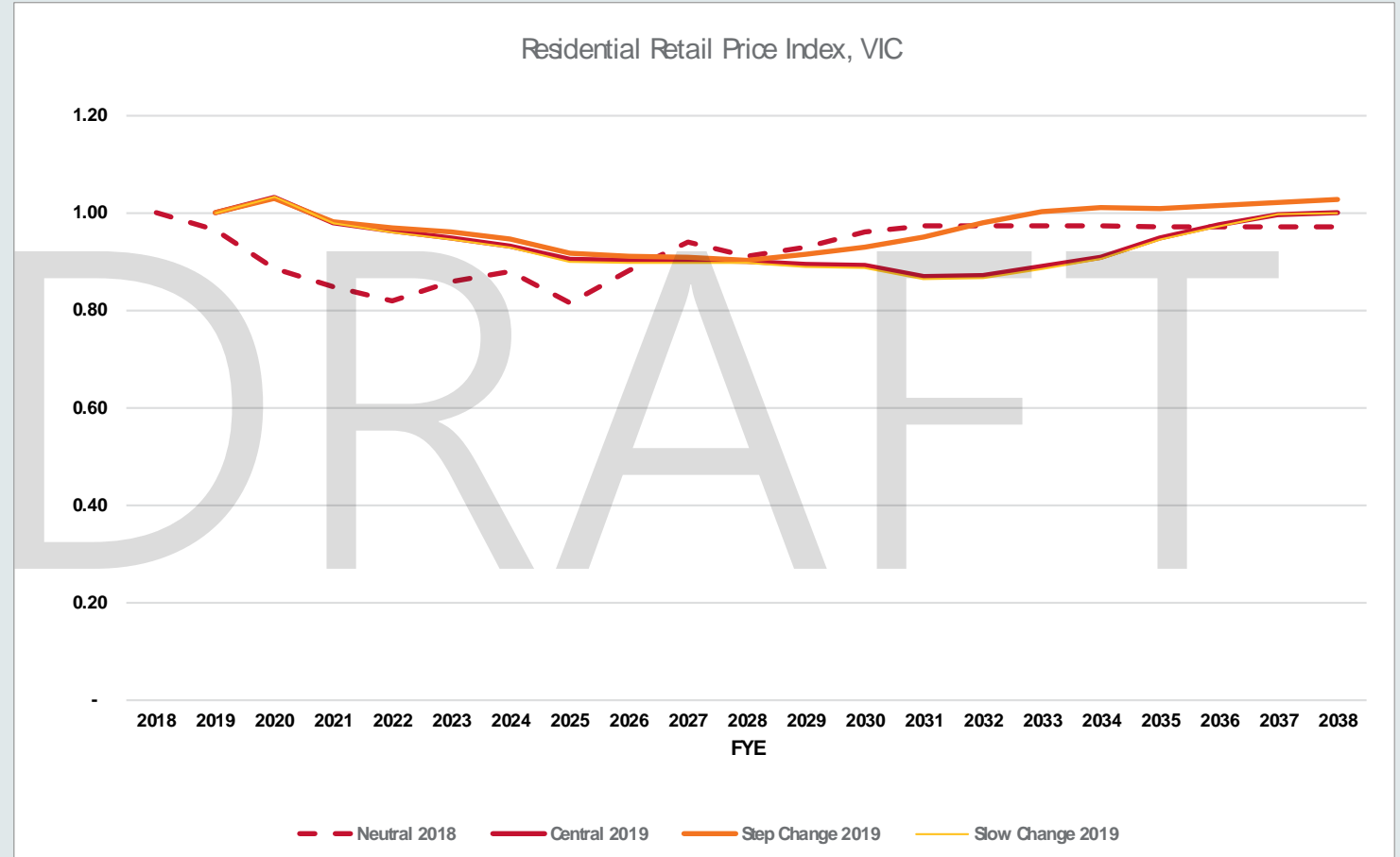
# VIC GSP

- Population growth rates in VIC have been revised upwards to reflect the most recent ABS census data, pushing the state's GSP forecasts up throughout the outlook



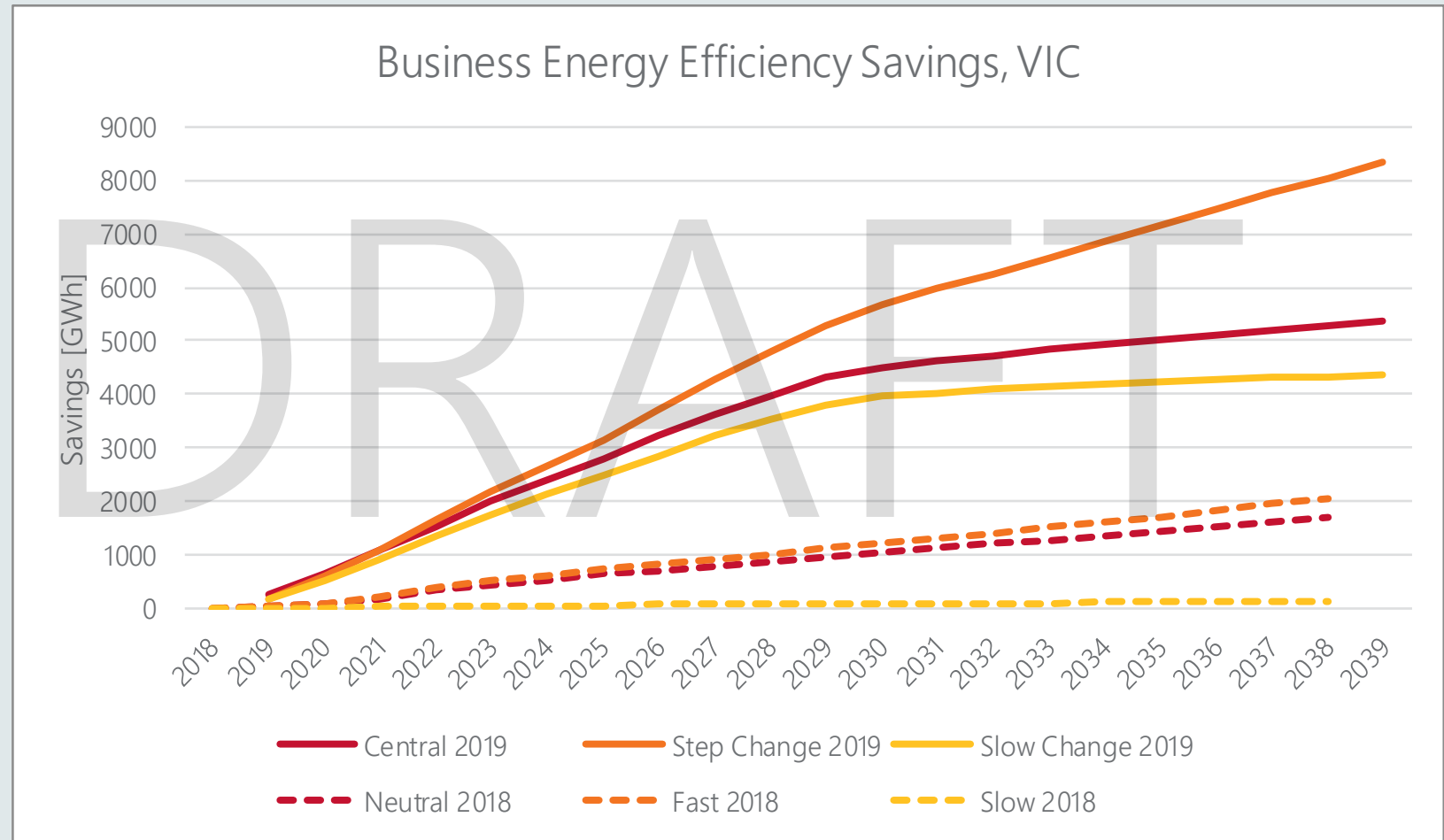
# VIC Residential Retail Price Index

- Reduction in short-to - medium term as new renewable generation comes online
- Moderate increase over long-term as aging coal fleet retires



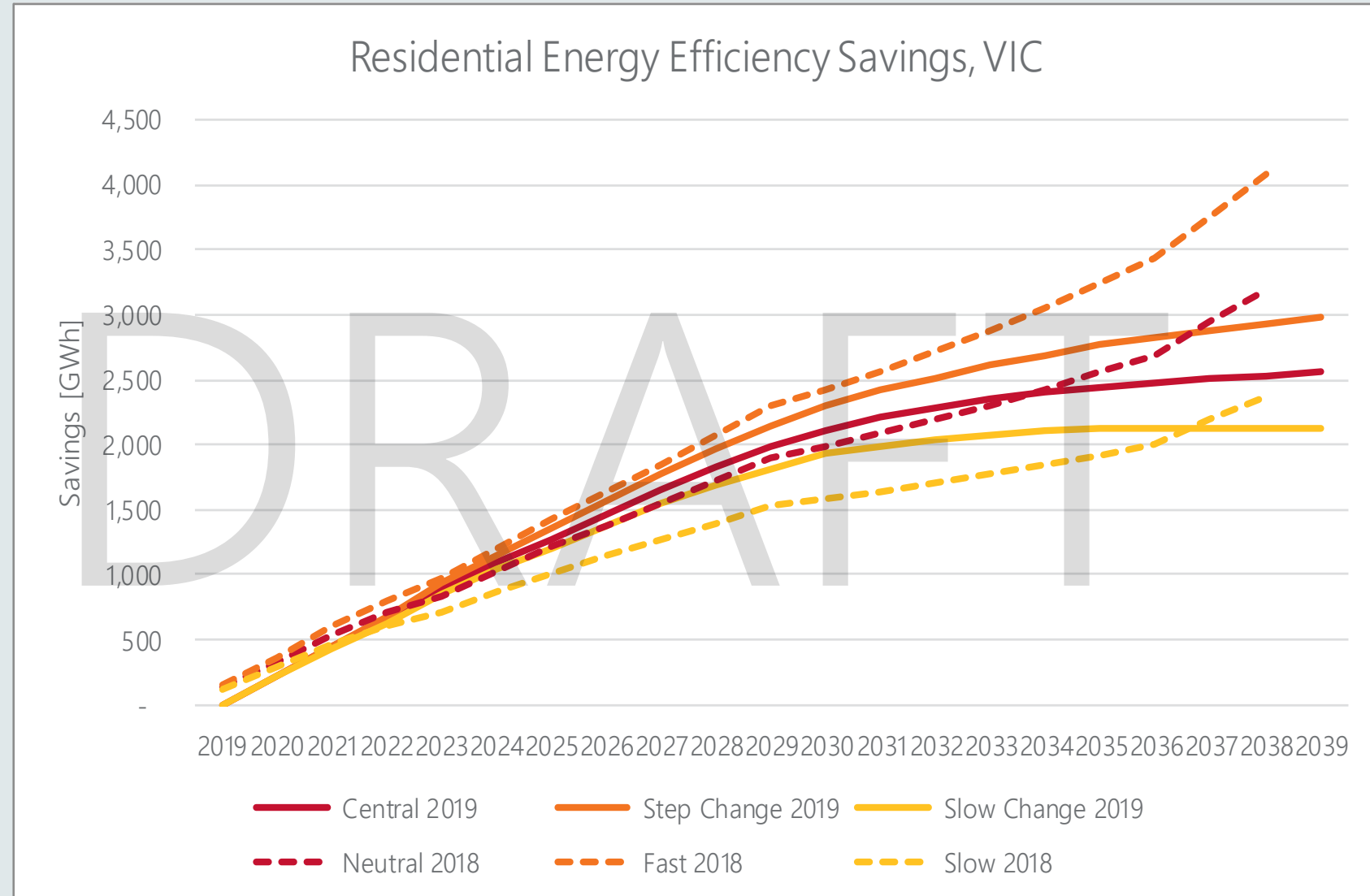
# VIC Energy Efficiency: Business

- Better representation of Victorian Energy Upgrades (VEU) in 2019 forecasts
- From 2030 savings growth slows due to end of VEU scheme, though 75% of accrued VEU savings expected to continue as BAU post-2030
- Step change scenario models two additional measures not considered in the 2018 Fast scenario, related to the future building code and equipment standards (GEMS)



# VIC Energy Efficiency: Residential

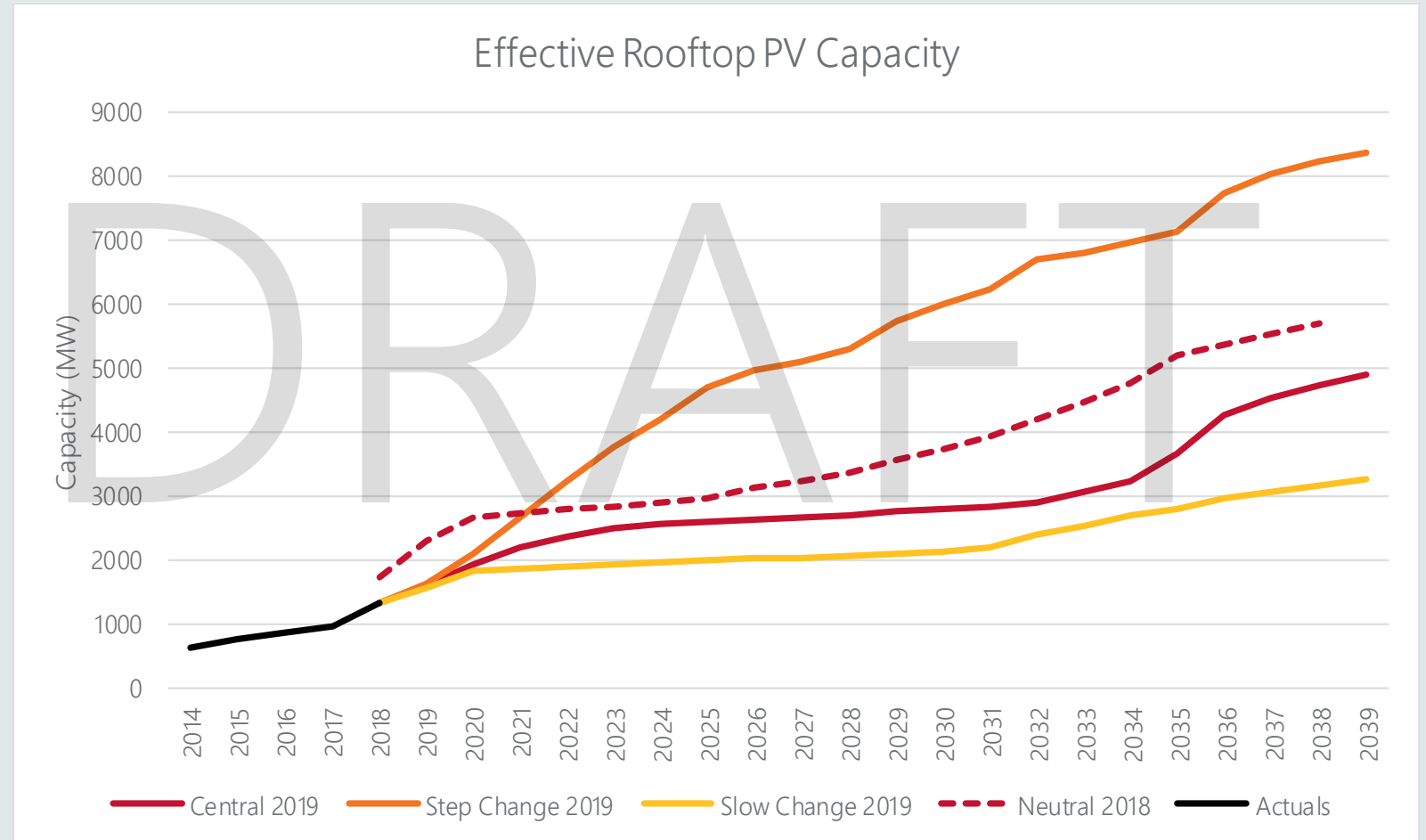
- Revised dwelling stock model calibrated to AEMO's 2019 connection forecasts
- Improved approach to account for future savings from past activities
- Step change scenario models higher energy star ratings from 2022





# VIC PV Forecast

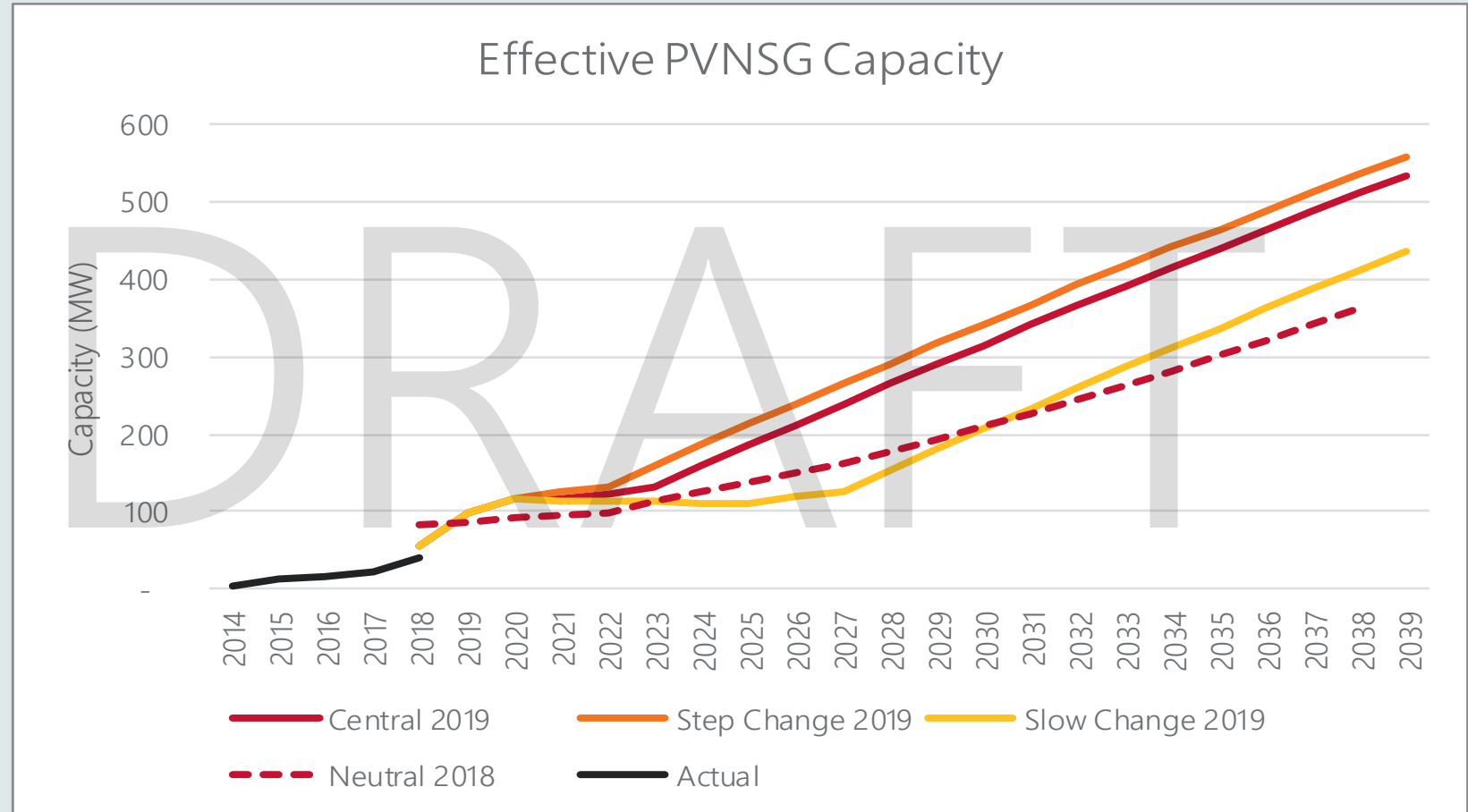
- Forecasts reflect more regular updates in actuals data
- Slower increase in capacity in the short to medium term reflects broad expectations that retail electricity prices will ease
- Assumed capacity factor of 14.2%



# VIC PVNSG Forecast

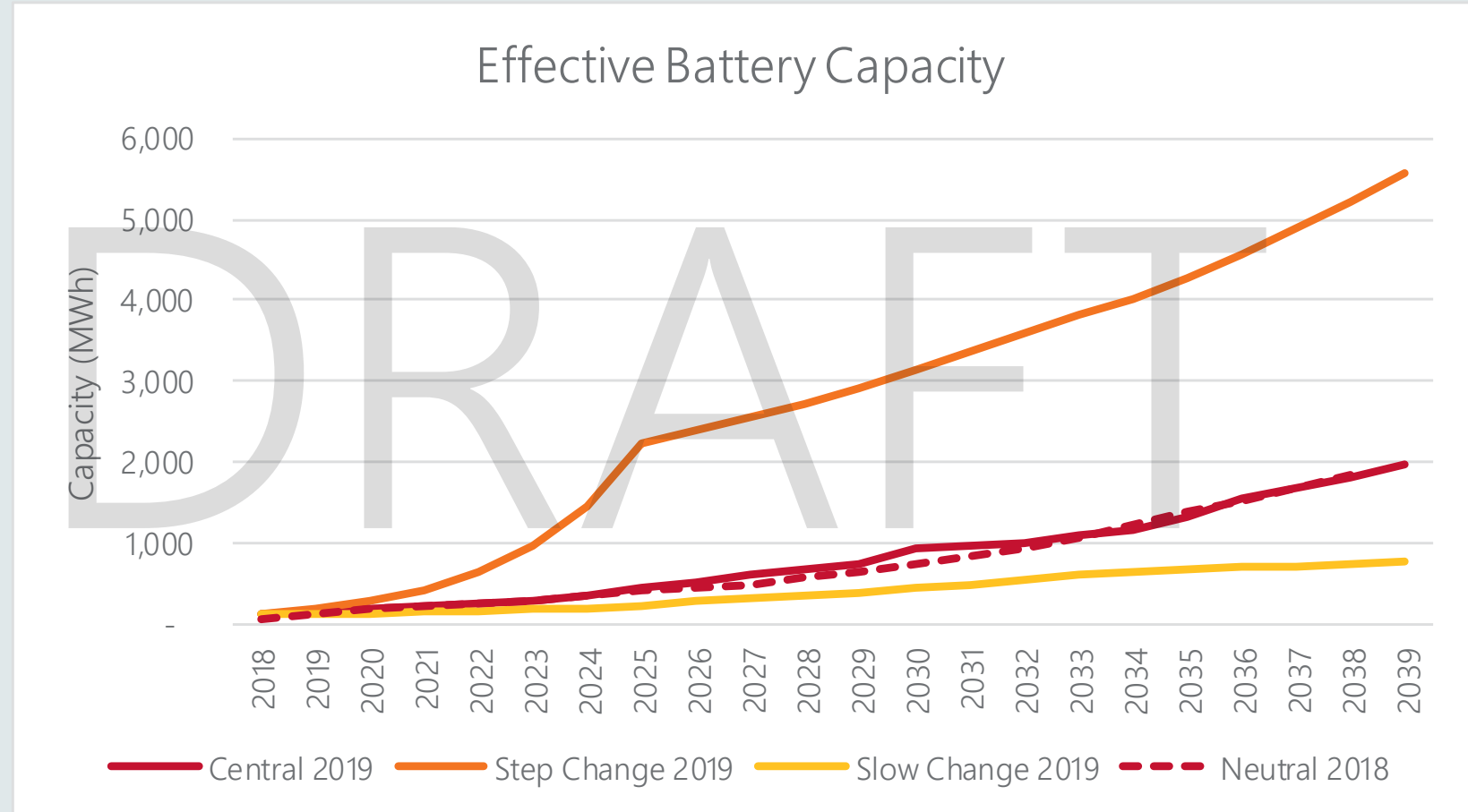
Size range: 100kW to 30 MW

- VIC a major source of new solar capacity due to state-based renewable policies



# VIC Battery Forecast

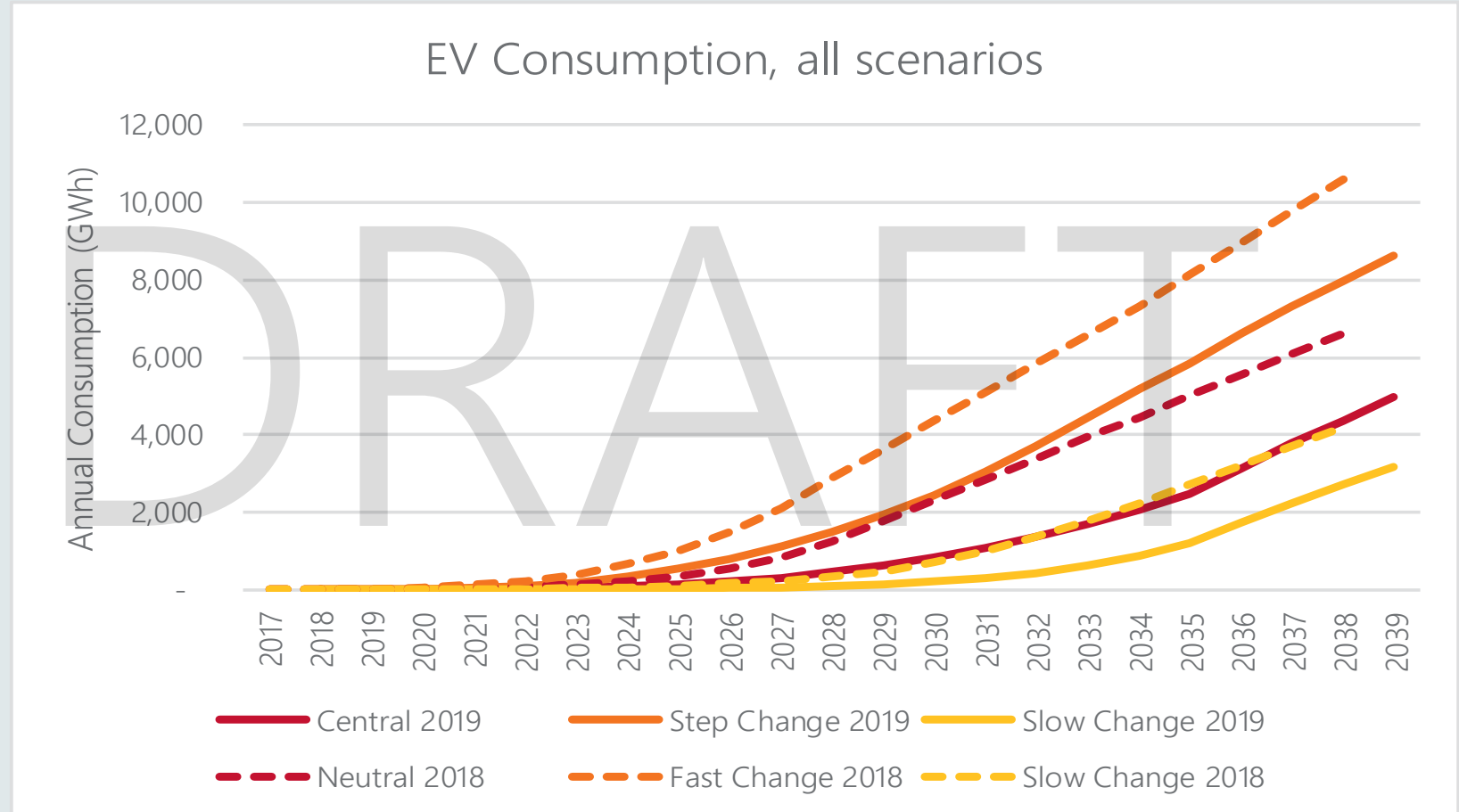
- Assumes large residential rated capacity 14kWh, otherwise 7kWh
- Central and slow scenarios assume a small percentage accessing tariffs which contribute to grid services, while Step change scenario assumes a broader subsidy scheme will be available



# VIC EV Capacity Forecast

## By Scenario

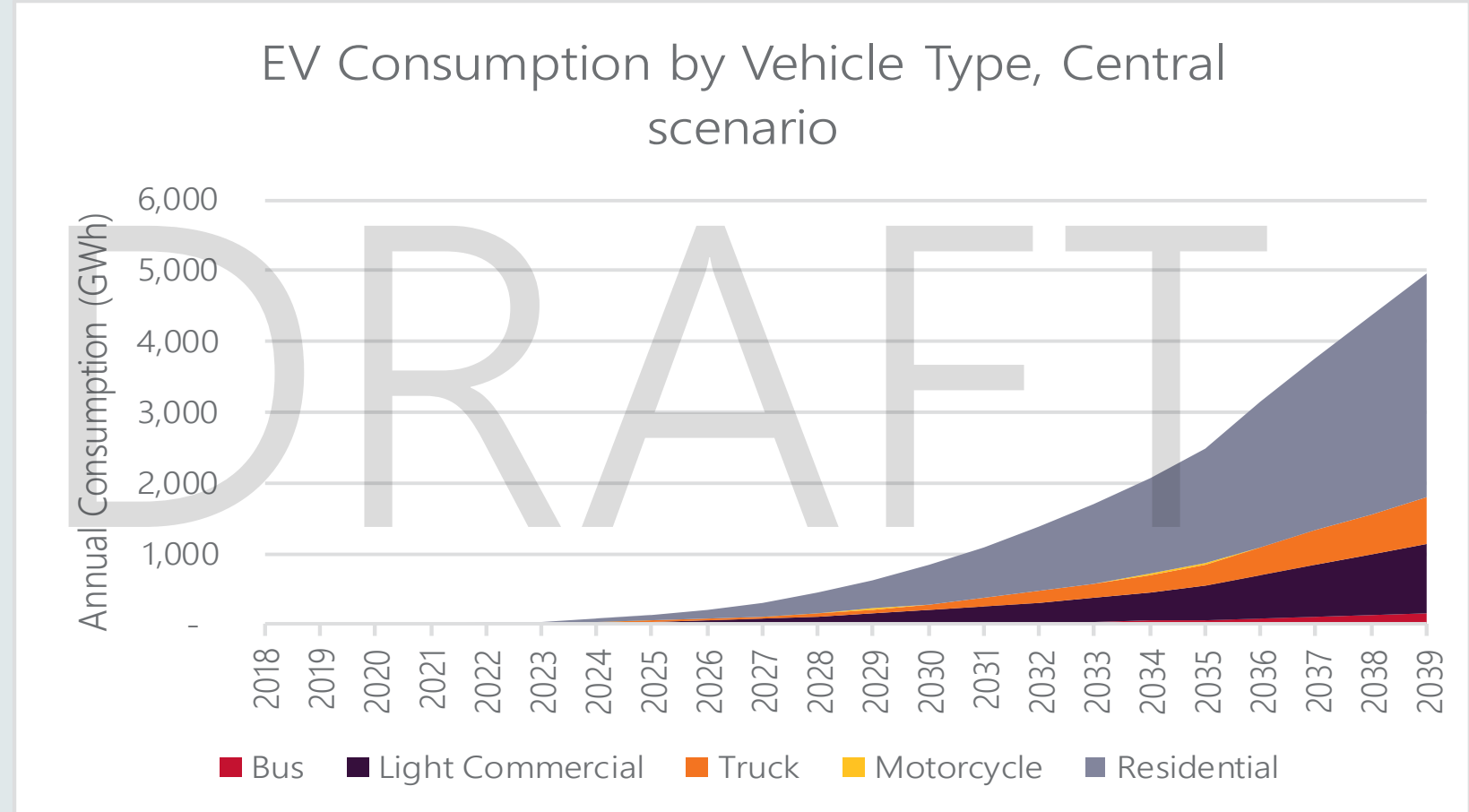
- Decrease on 2018 forecast due to lower national vehicle sales projections, ride share assumptions, market saturation level assumption changes, and the inclusion of fuel cell vehicles



# VIC EV Capacity Forecast

## By Vehicle Type

- EV adoption is projected to be dominated by residential and commercial light vehicles



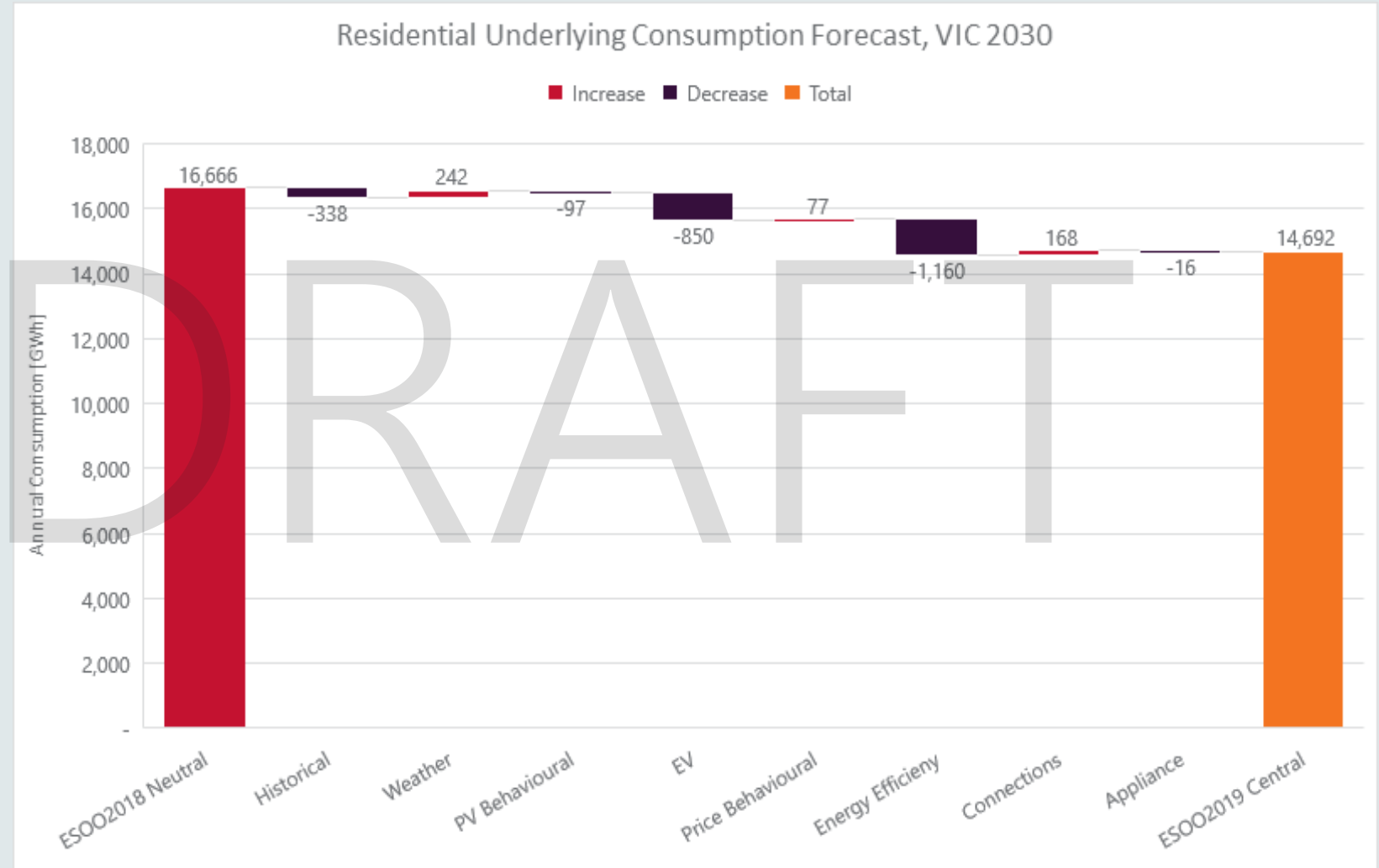
# VICTORIA

## Draft Annual Consumption Forecasts

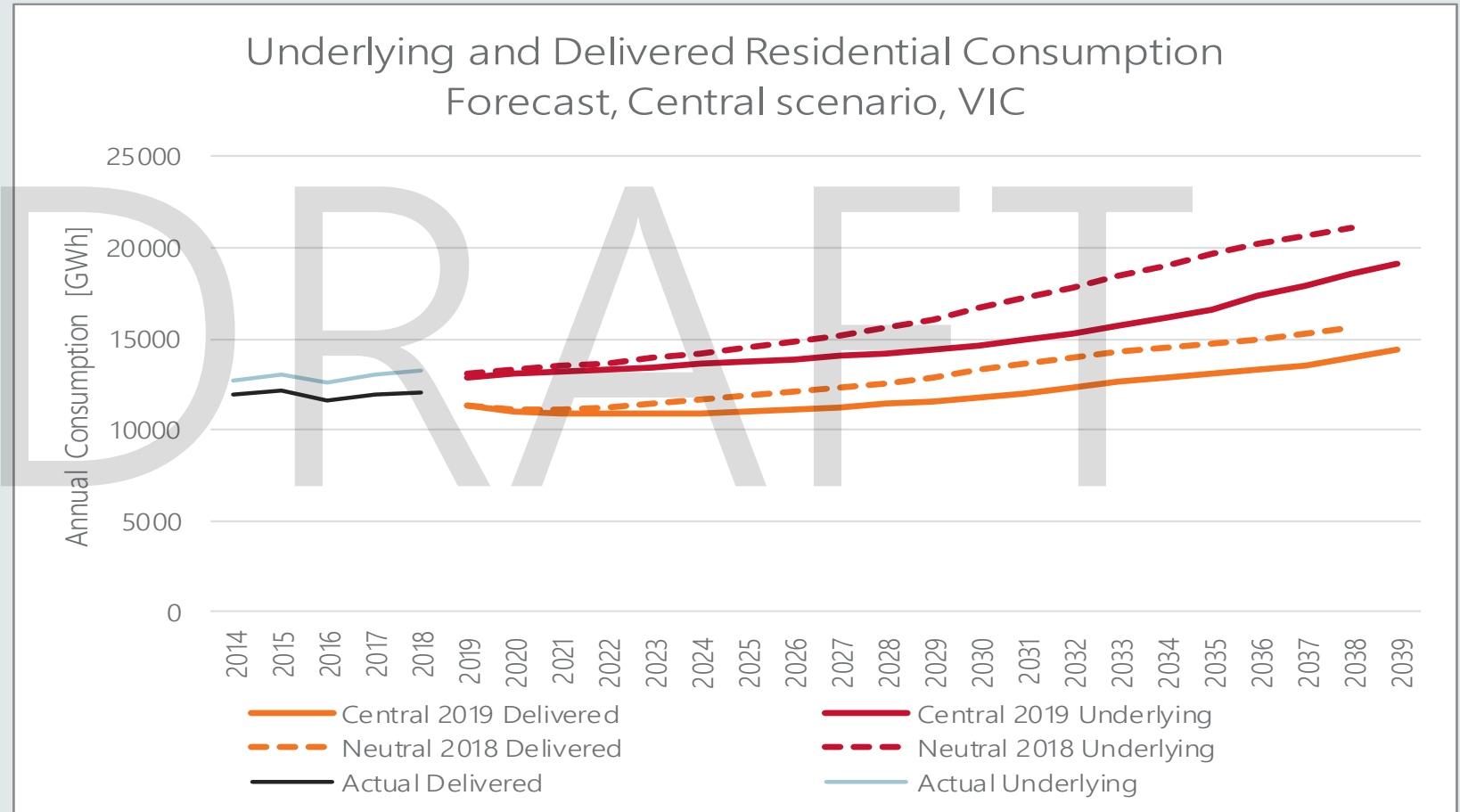
ESOO 2019

# VIC Underlying Residential Forecast With Key Components

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



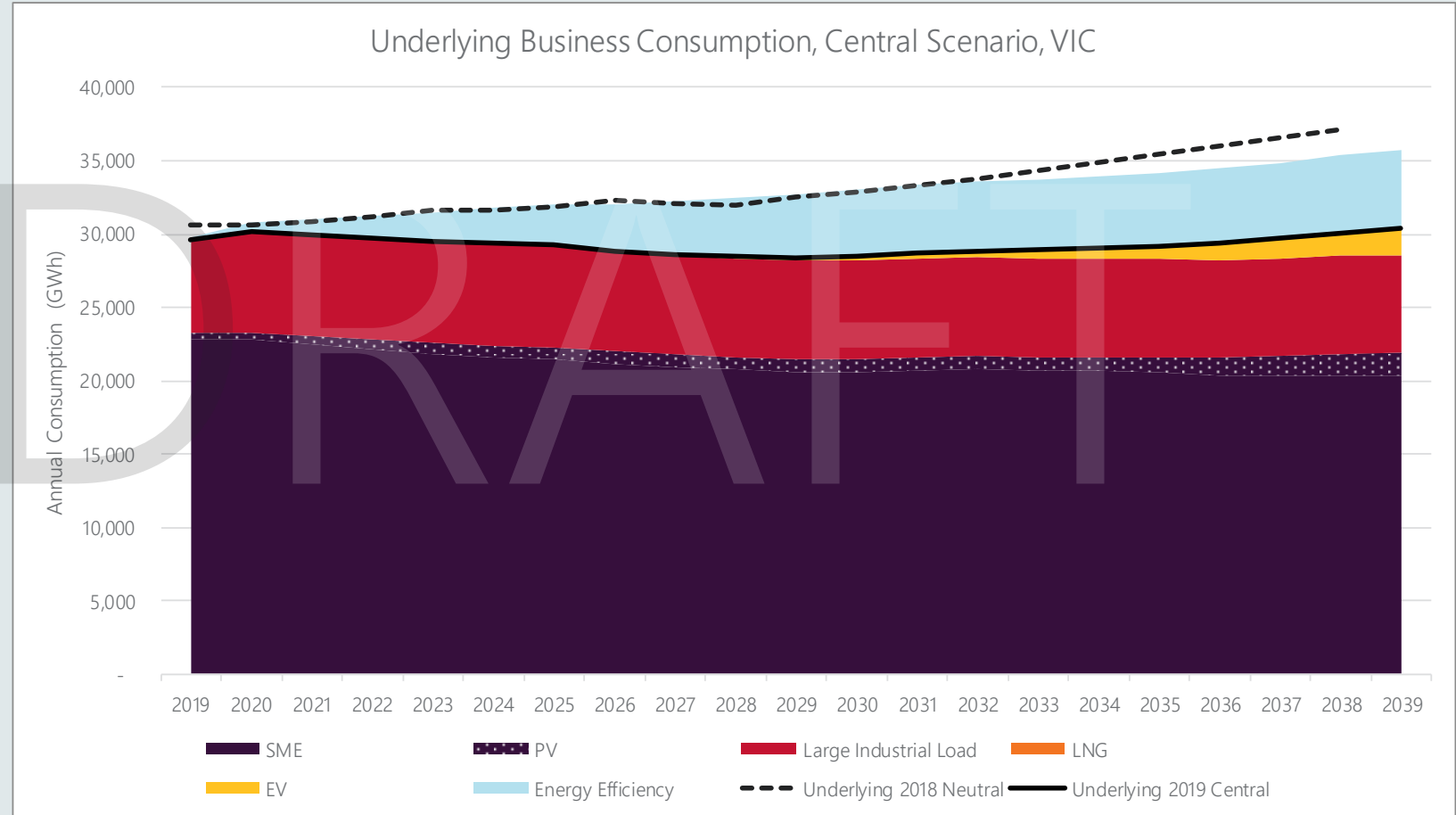
# VIC Residential Forecast



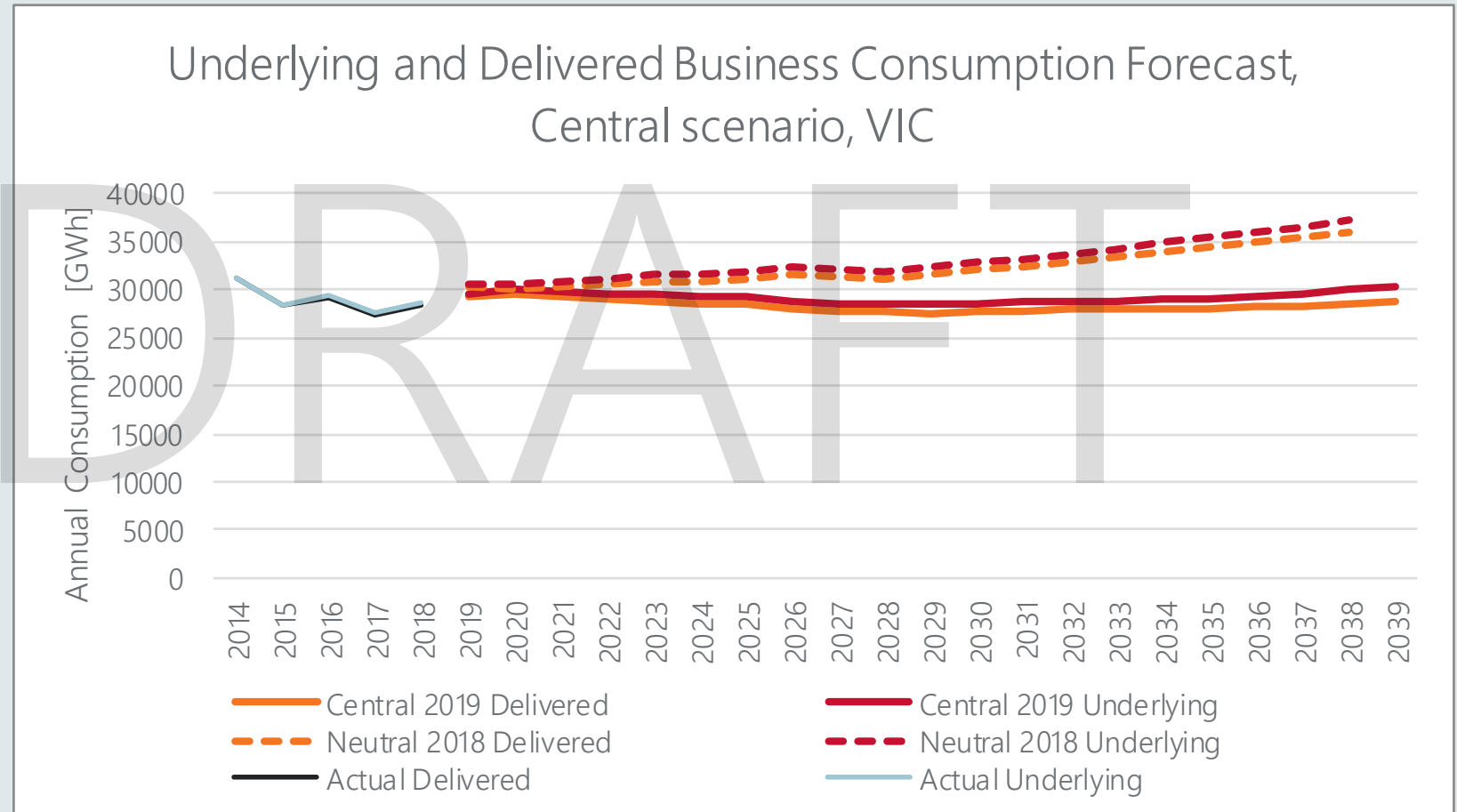


# VIC Underlying Business Forecast With Key components

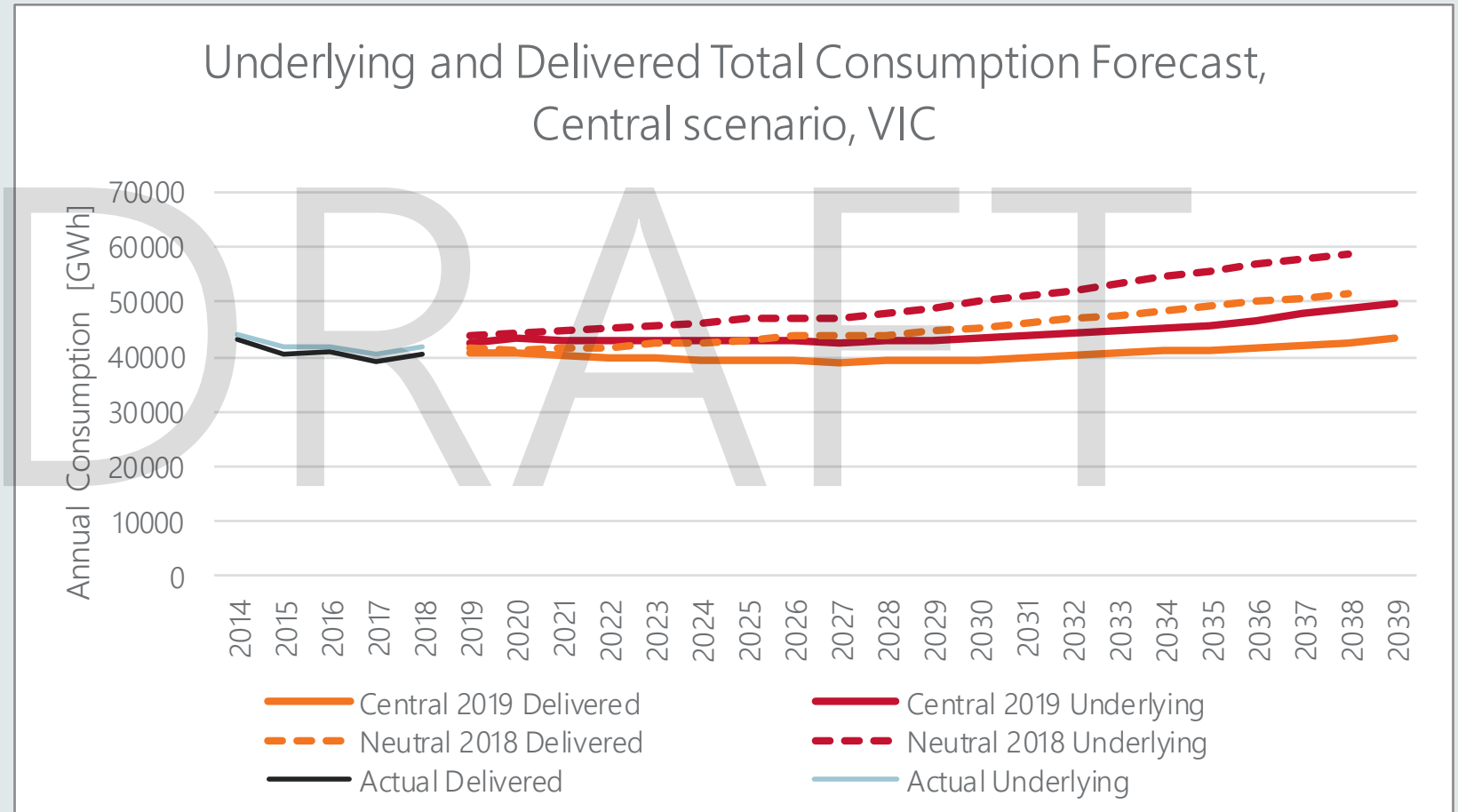
- Updated SME model better capturing the less-energy intensive industries contributing to economic growth
- Improved method for accounting for Large Industrial Load forecasts
- Better representation of projected future energy efficiency savings in 2019 forecasts



# VIC Business Forecast

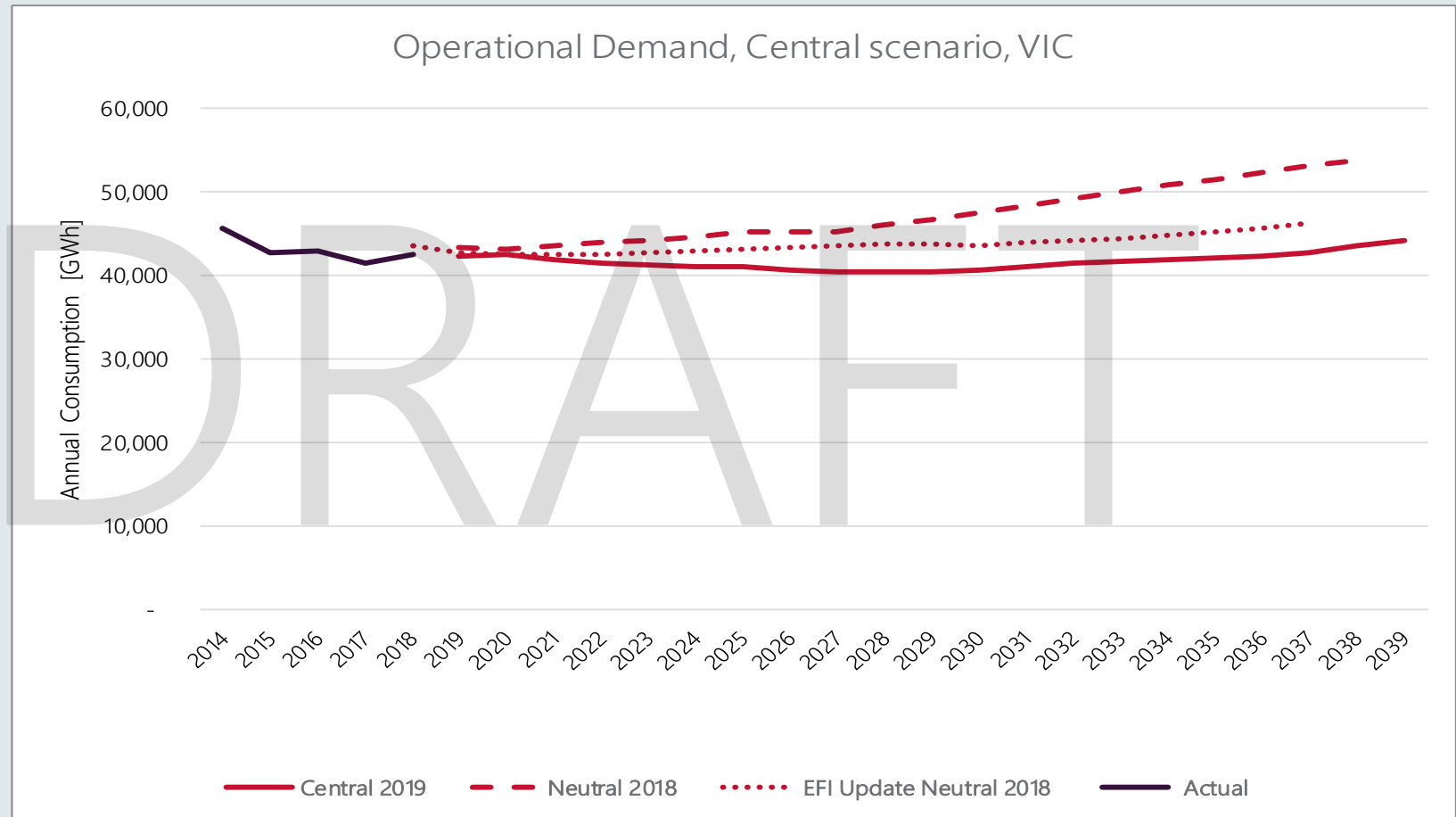


# VIC Total Forecast



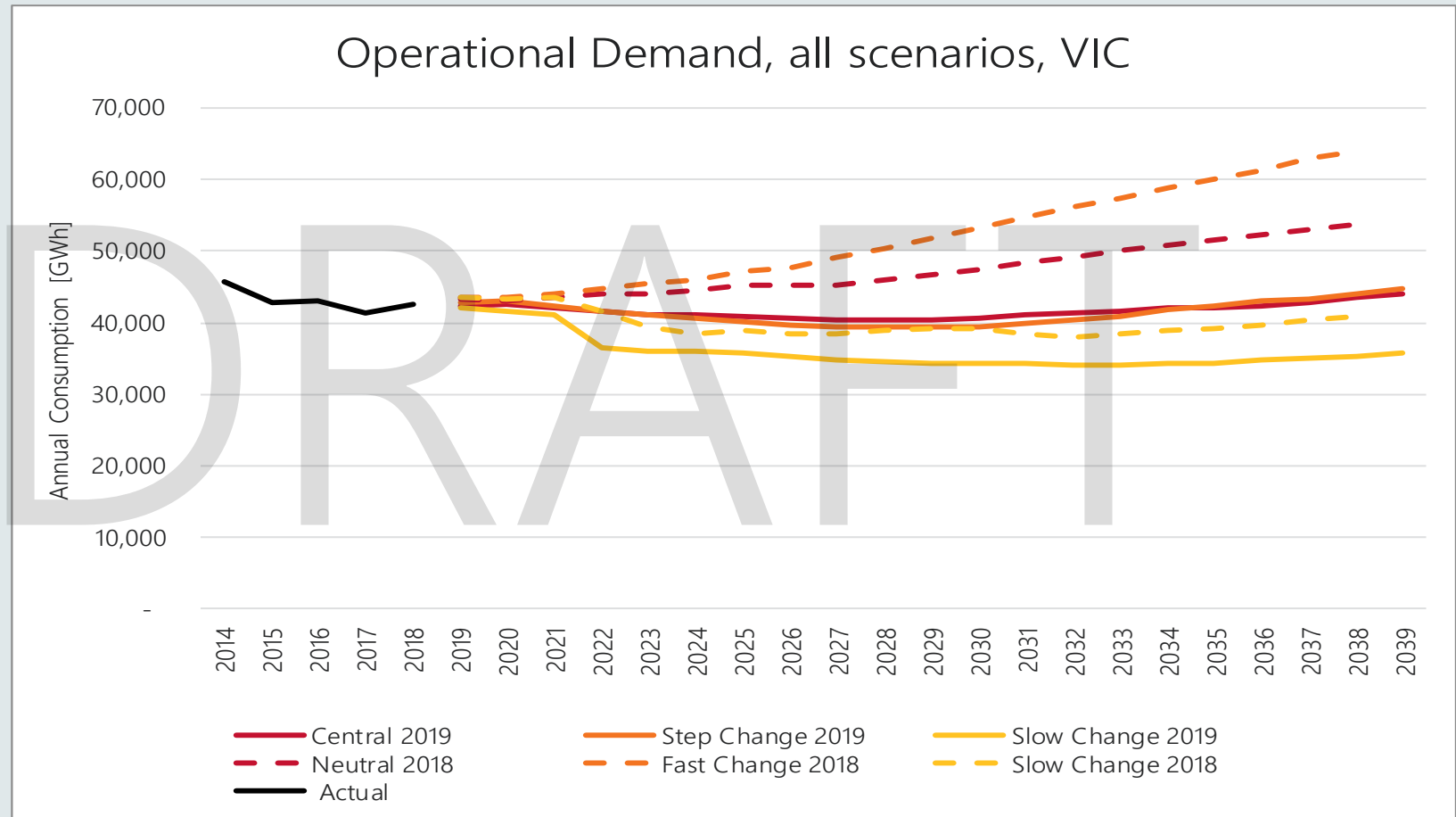
# VIC Annual Operational Energy as Sent Out

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



# VIC Annual Operational Energy as Sent Out

- All scenarios



# VICTORIA

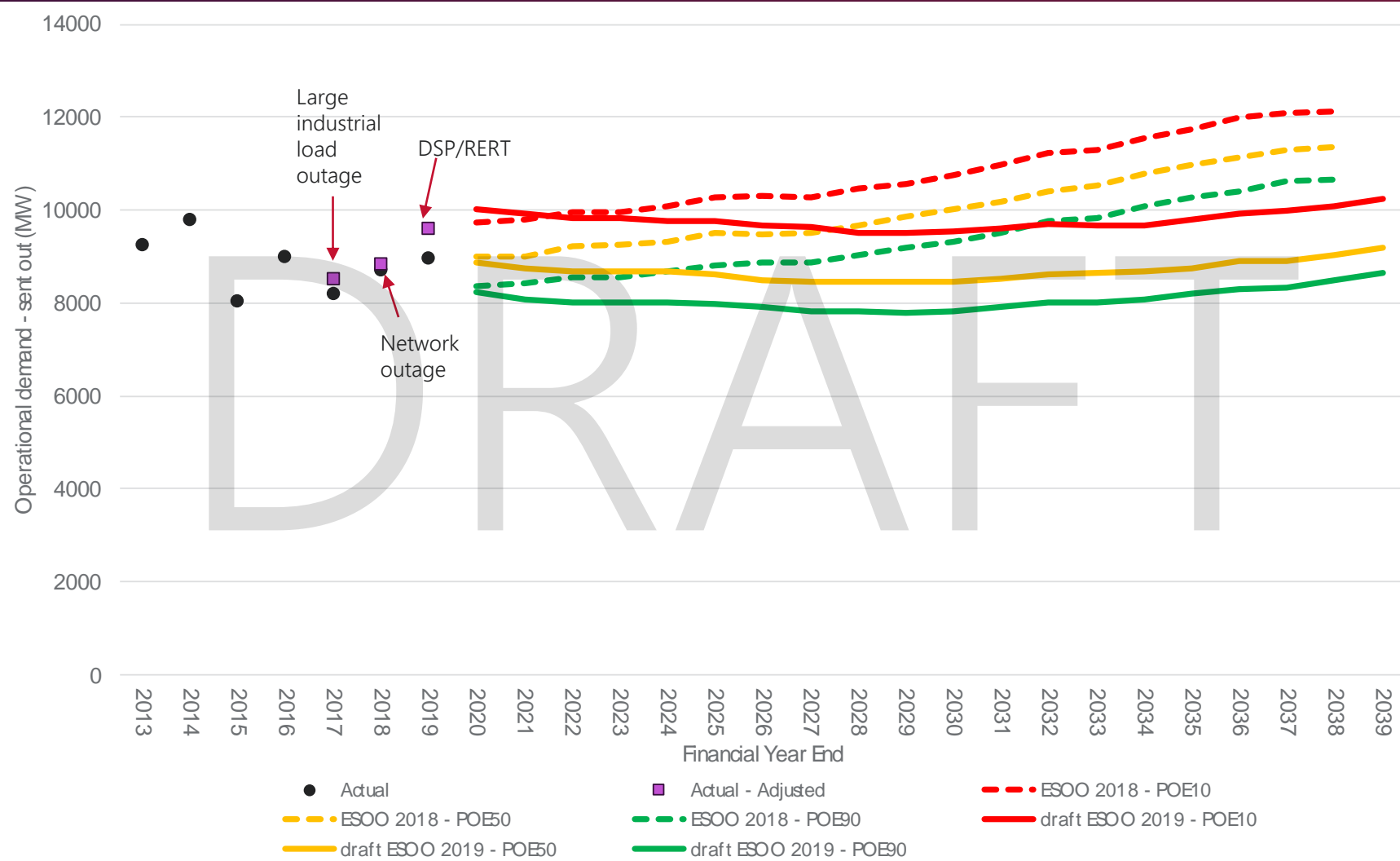
## Draft Maximum Demand Forecasts

ESOO 2019

# Victoria overview

- The base year POE10 forecast is ~1% higher than the ESOO2018 for 2019 while the POE50 and POE90 forecasts are down slightly. For 2020, the forecast increases further, partly due to an increase in large industrial loads (100MW increase).
- Beyond 2020, Victoria's demand forecast is flat compared to the ESOO2018 due to:
  - Energy efficiency scheme resulting in lower growth in cooling load compared to the ESOO2018
  - Electric Vehicles are forecast to be 20% lower compared to the ESOO2018 forecast by 2038
  - Rooftop PV capacity is forecast to be slightly lower than the ESOO2018 which is having a marginal impact on maximum demand
  - Business load is forecast to be lower due to Small-Medium Enterprise load
  - Large industrial loads are forecast to experience flatter growth

# VIC summer maximum demand





# TASMANIA

# TASMANIA

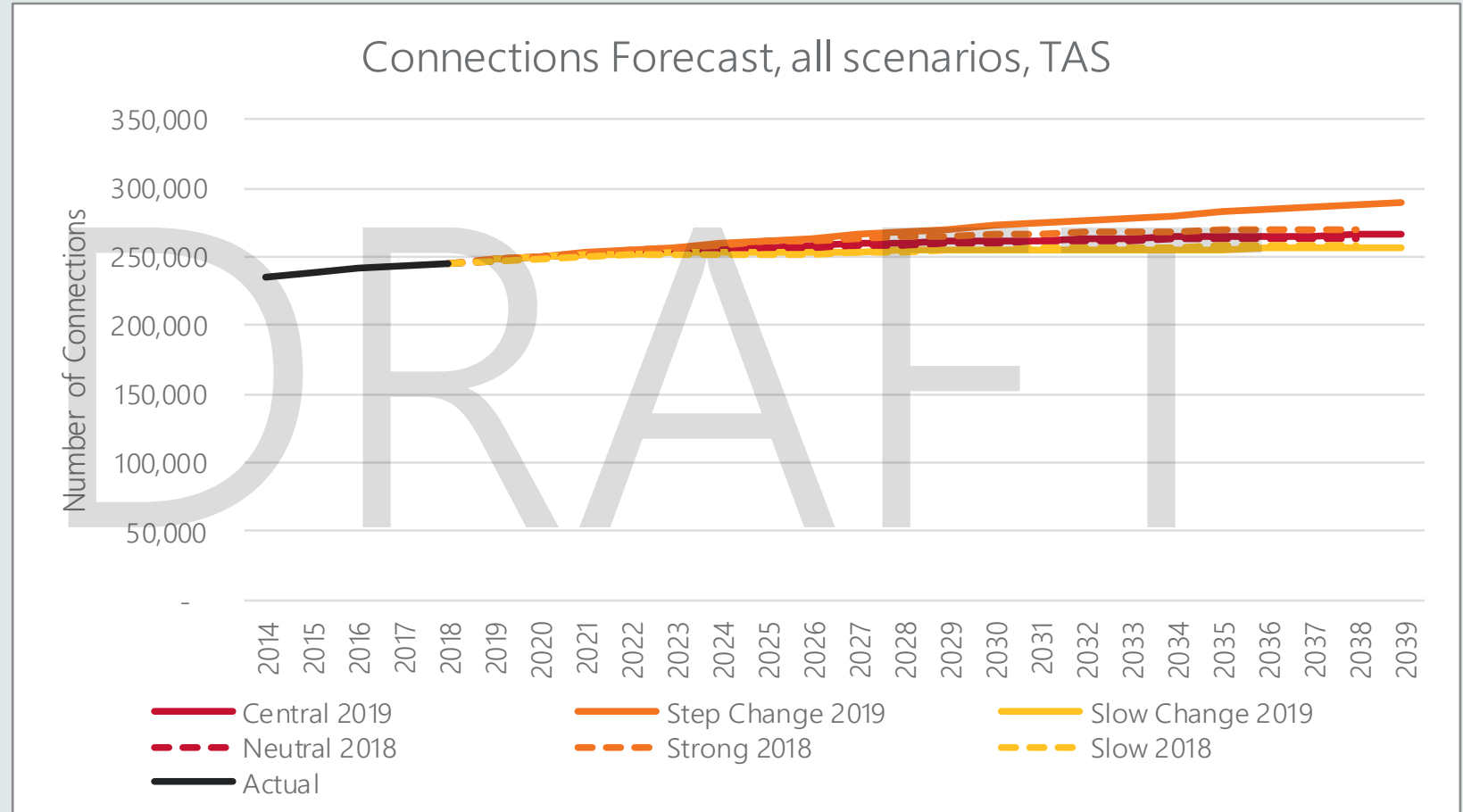
## Key Forecast Inputs

Spread of components for each scenario

# TAS Connections Forecast

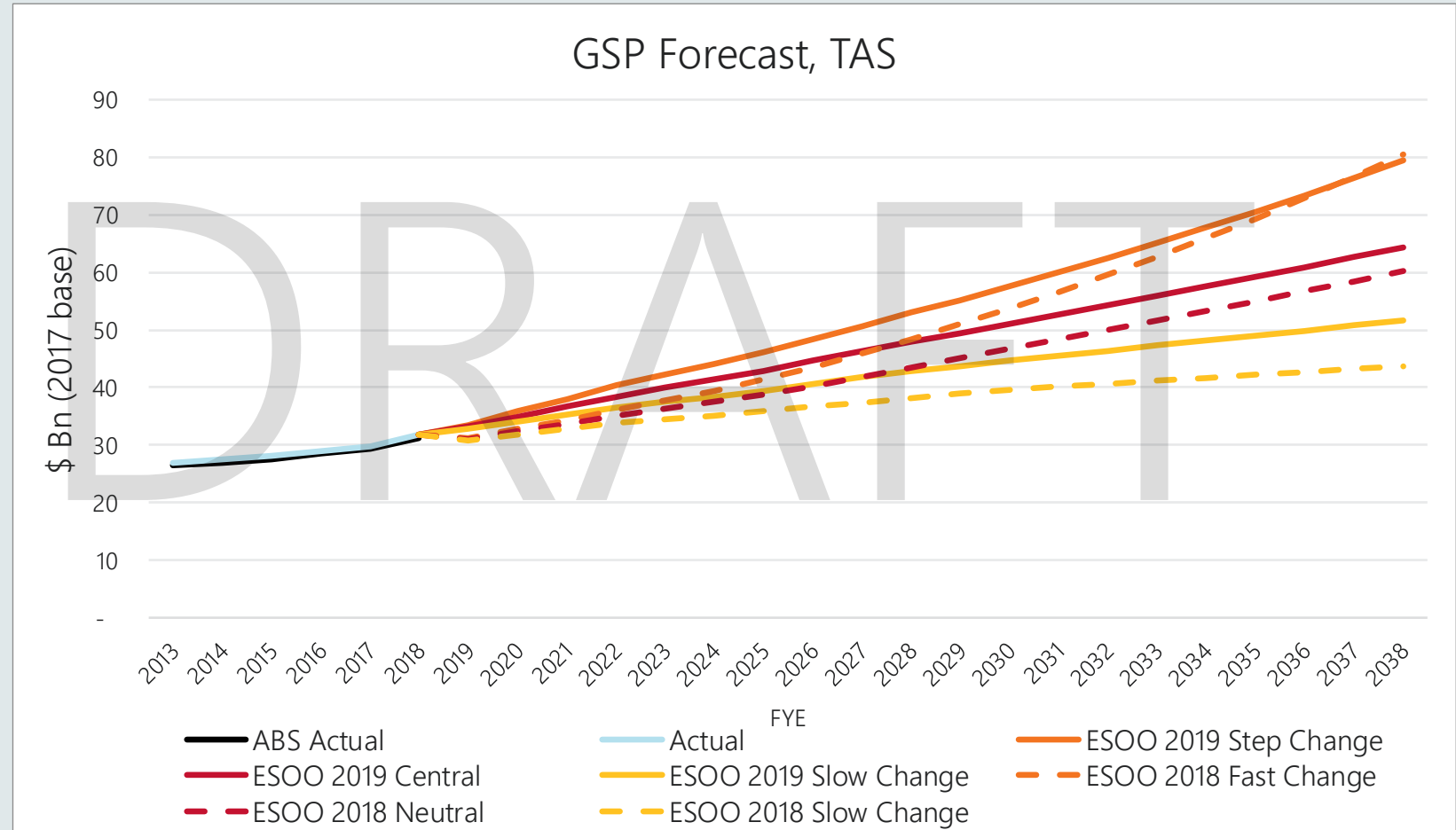
The range of the forecasts has widened due to the increase in the spread of input projections

- 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



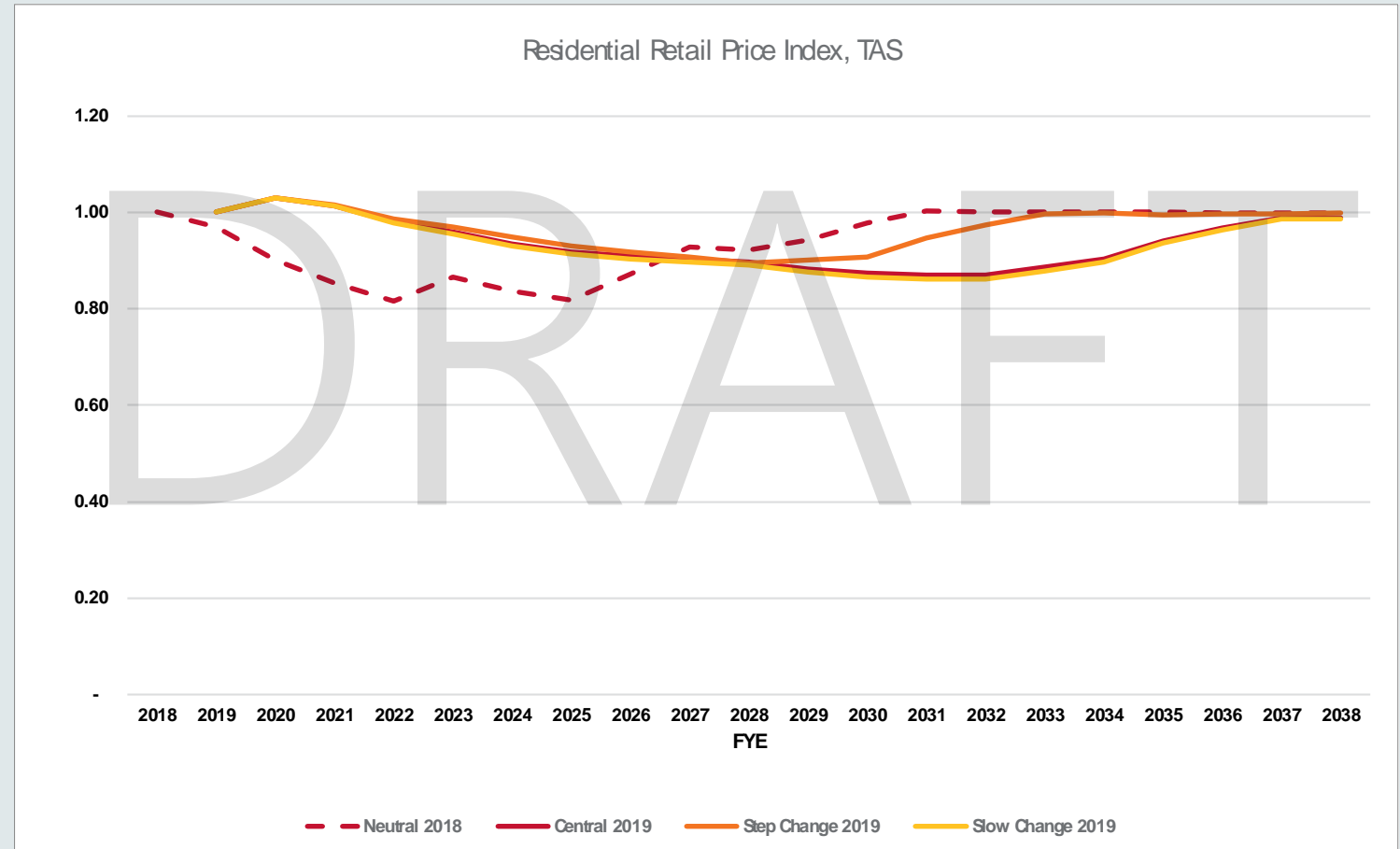
# TAS GSP

- Population projections for TAS were revised upwards to reflect the most recent ABS census data before falling back to previous long-term growth levels. This is reflected in the revisions to the TAS 2019 GSP forecasts



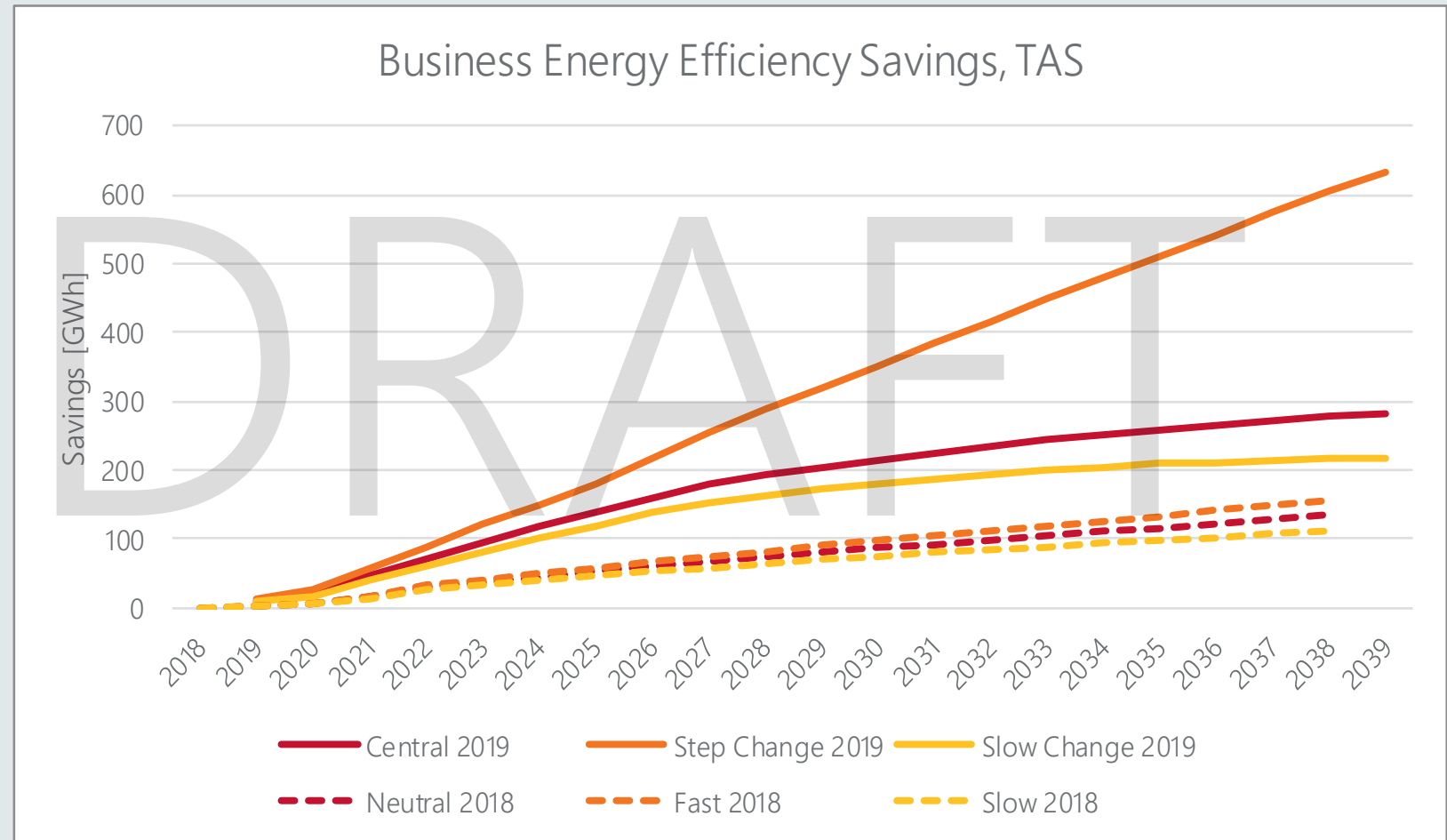
# TAS Residential Retail Price Index

- Reduction in short-to - medium term as new renewable generation comes online
- Moderate increase over long-term as aging coal fleet retires on mainland



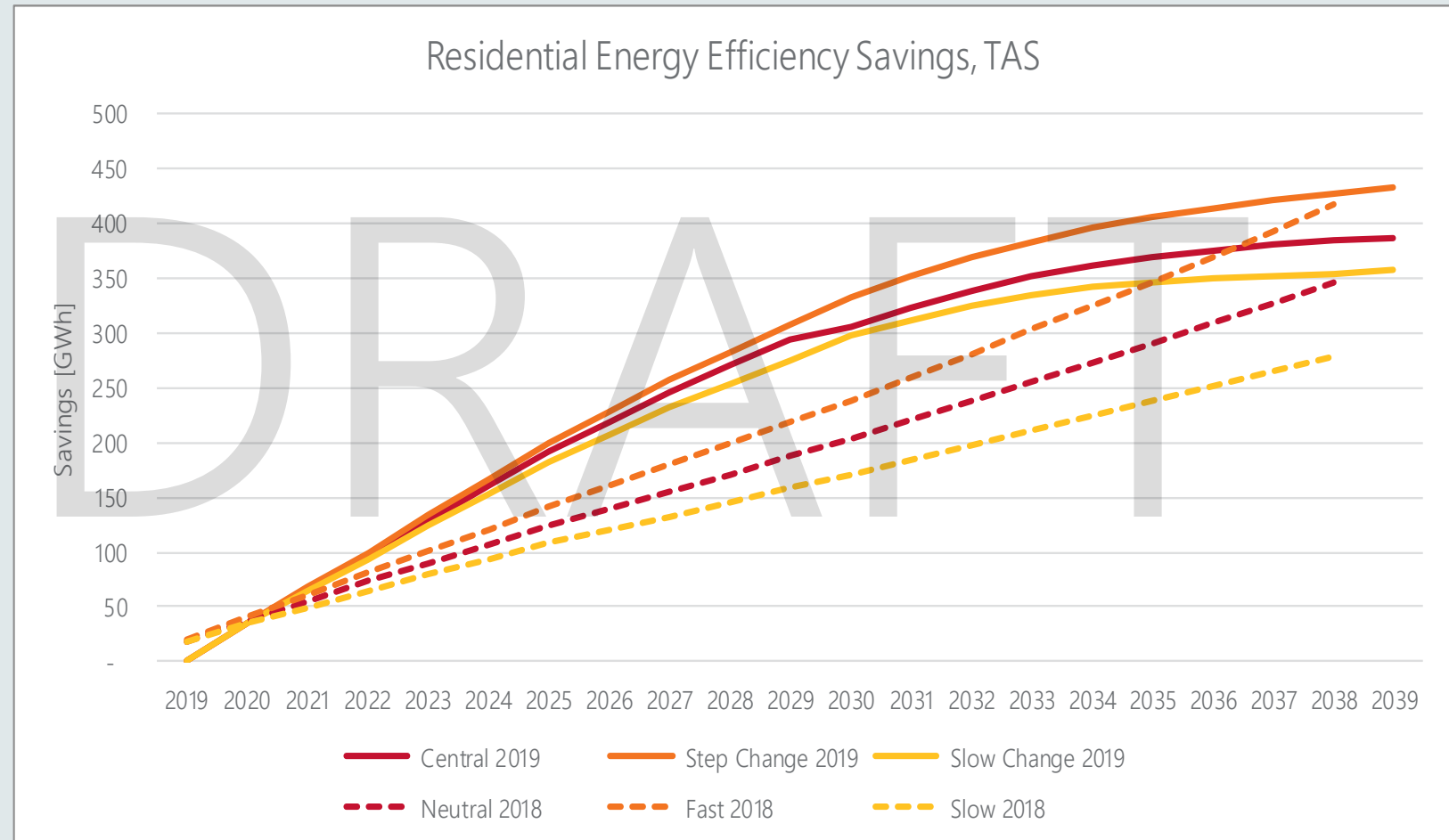
# TAS Energy Efficiency: Business

- Step change scenario models two additional measures not considered in the 2018 Fast change scenario from a low consumption base, related to the future building code and equipment standards (GEMS)



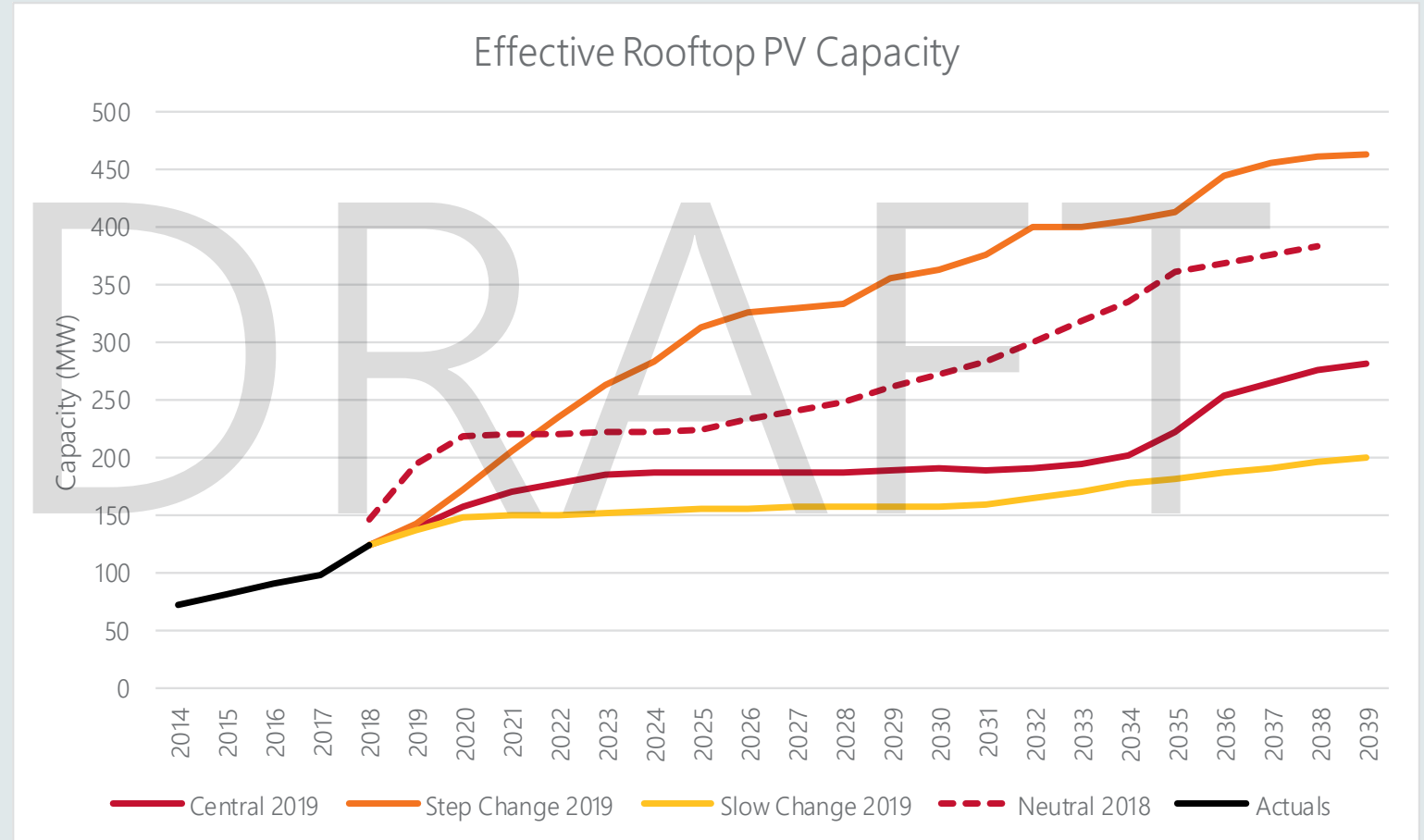
# TAS Energy Efficiency: Residential

- Revised dwelling stock model calibrated to AEMO's 2019 connection forecasts
- Improved approach to account for future savings from past activities
- Step change scenario models higher energy star ratings from 2022



# TAS PV Forecast

- Forecasts reflect updates to actuals data
- Slower increase in capacity in the short to medium term reflects easing of retail electricity prices
- Long term increases reflect increasing retail prices
- Assumed capacity factor of 13.6%

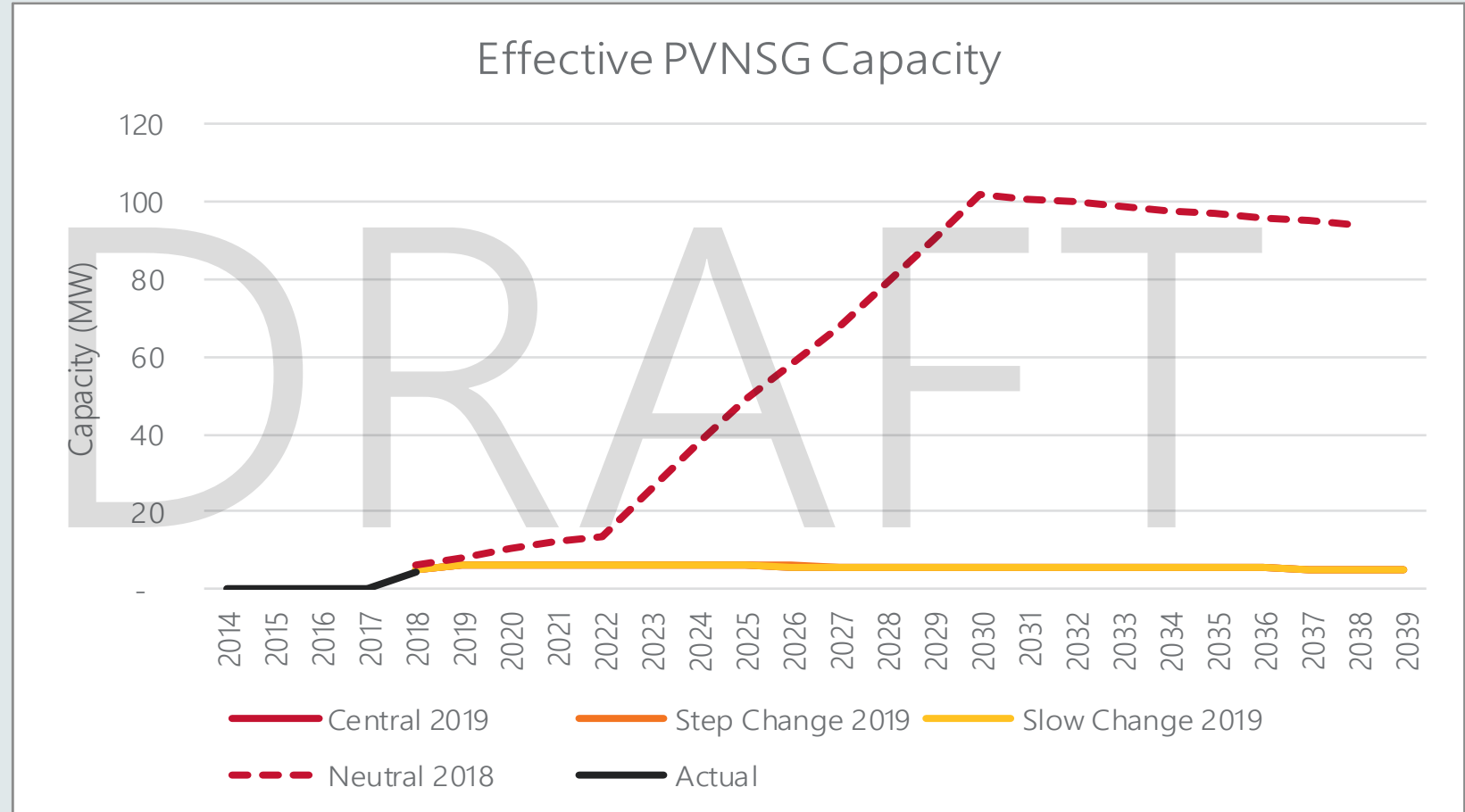




# TAS PVNSG Forecast

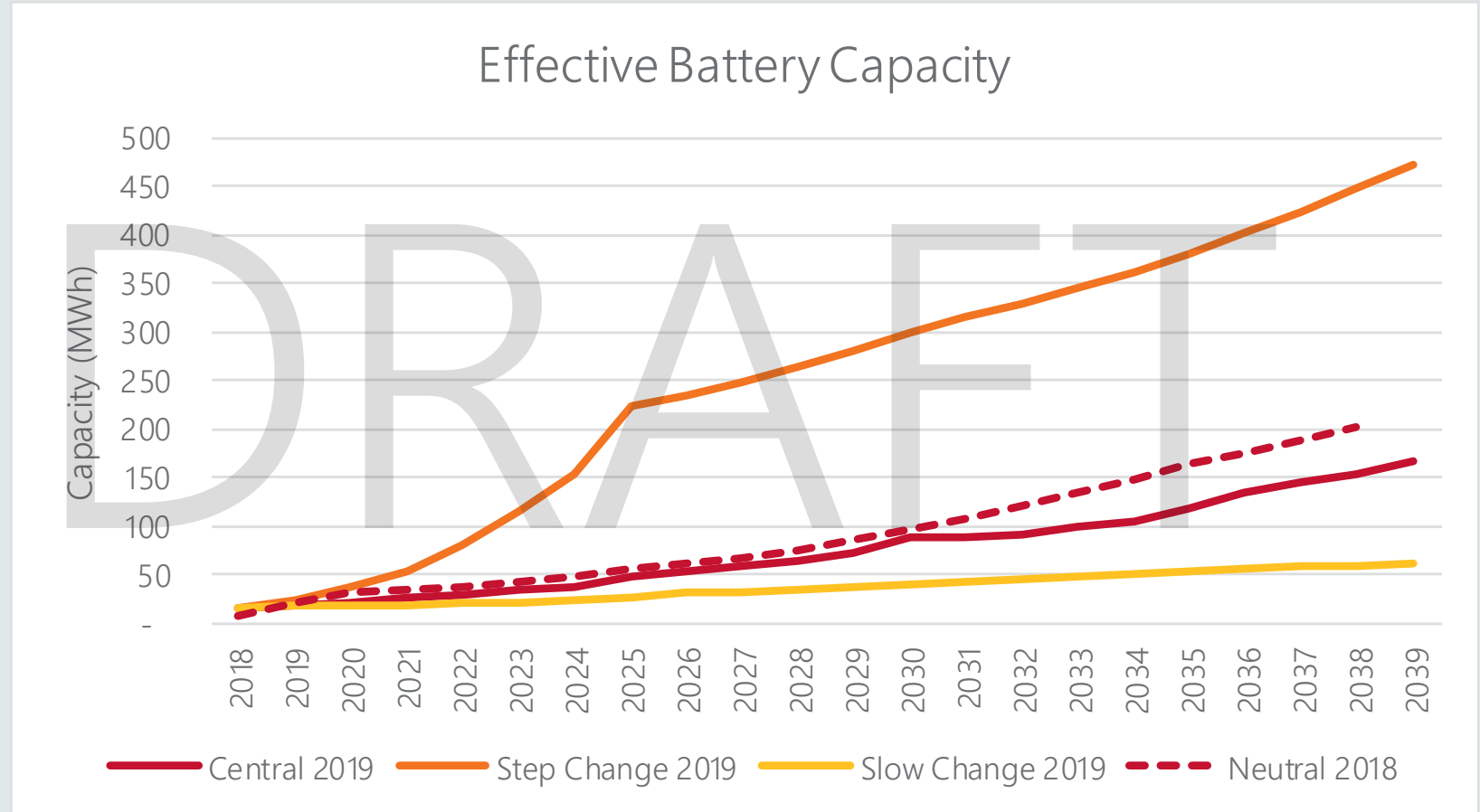
Size range: 100kW to 30 MW

- Slower short term deployment growth in 2019 account for a rapid decline in LGC value since 2018



# TAS Battery Forecast

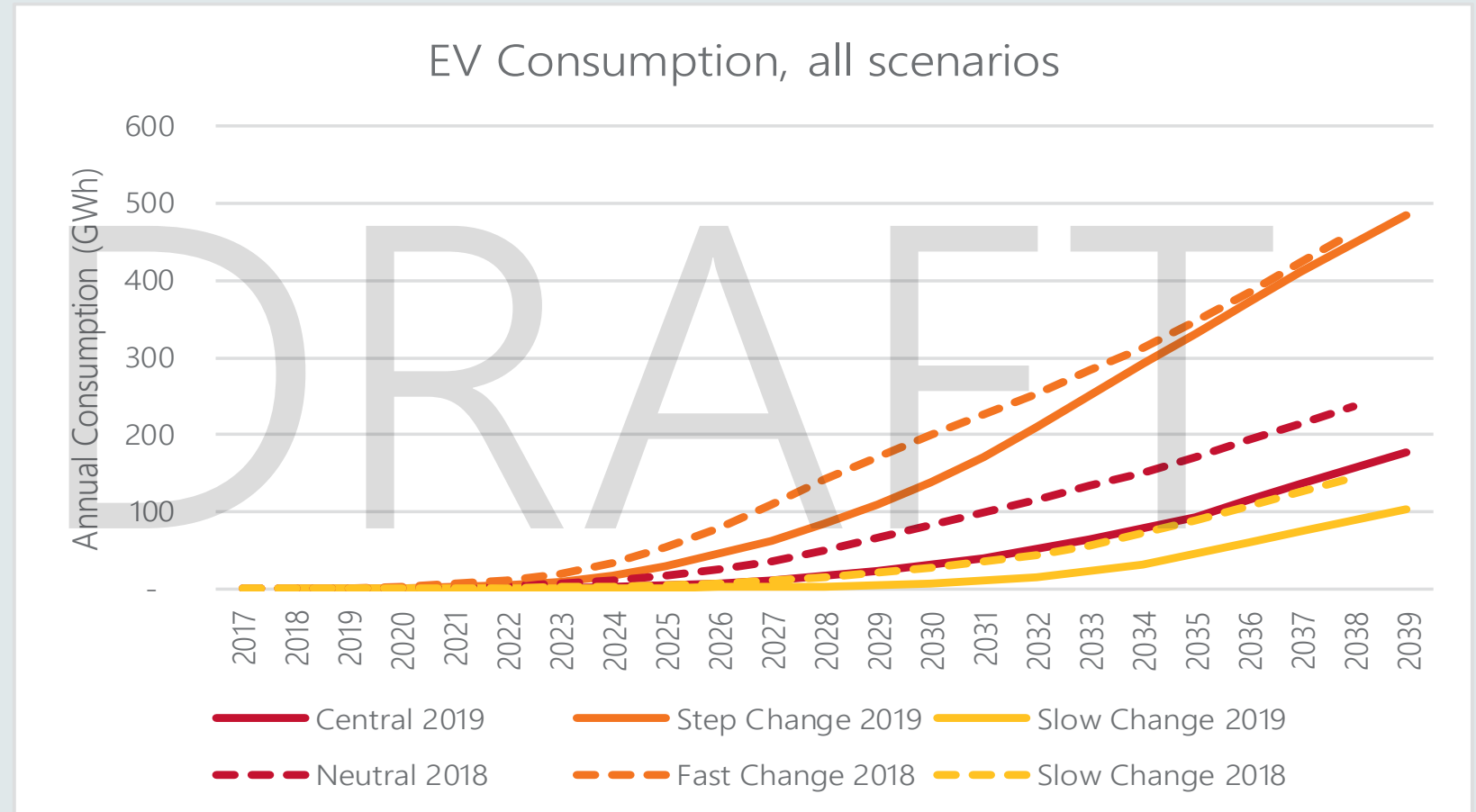
- Assumes large residential rated capacity 14kWh, otherwise 7kWh
- Central and slow scenarios assume a small percentage accessing tariffs which contribute to grid services, while Step change scenario assumes a broader subsidy scheme will be available



# TAS EV Capacity Forecast

## By Scenario

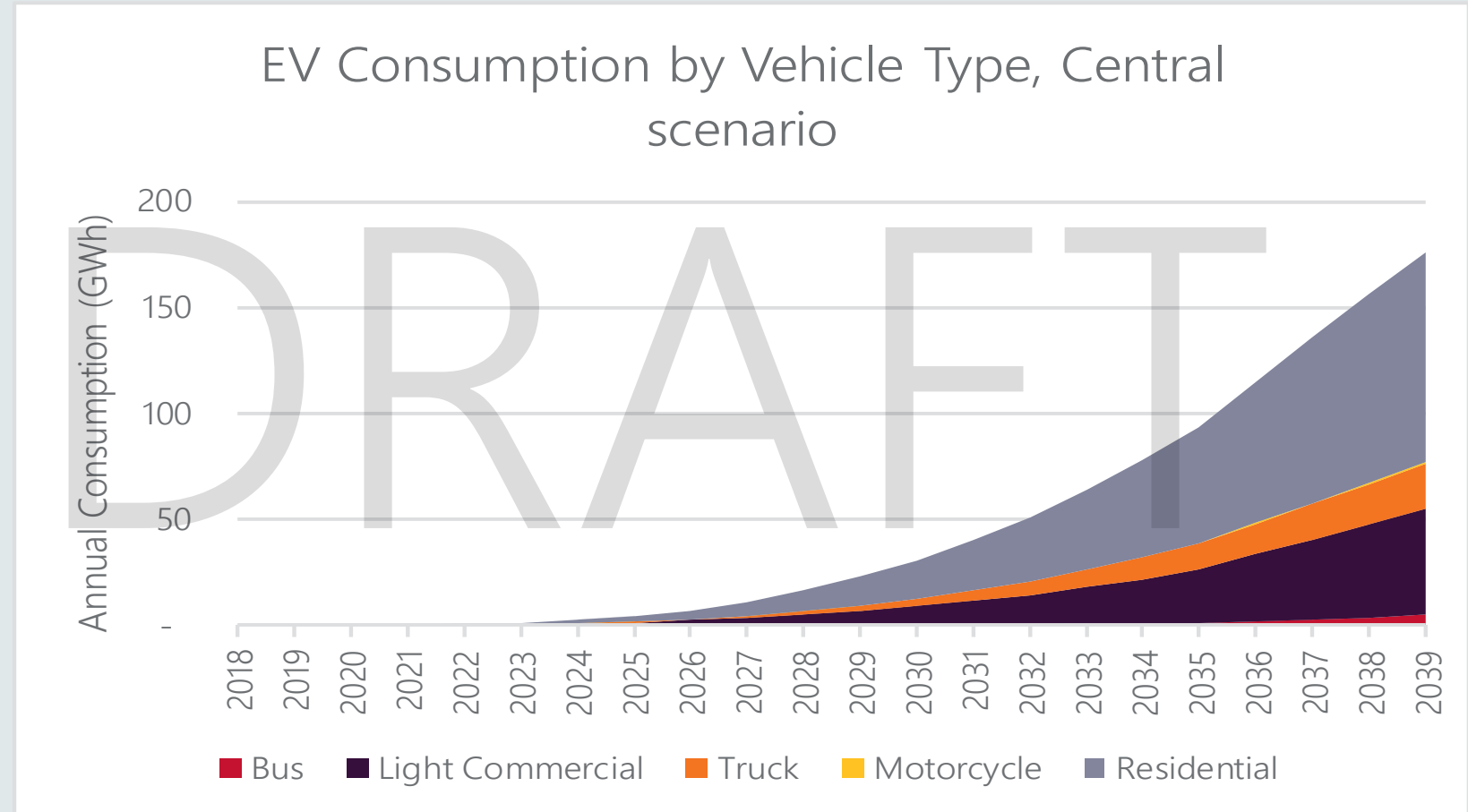
- Decrease on 2018 forecast due to lower national vehicle sales projections, ride share assumptions, market saturation level assumption changes, and the inclusion of fuel cell vehicles



# TAS EV Capacity Forecast

## By Vehicle Type

- EV adoption is projected to be dominated by residential and commercial light vehicles



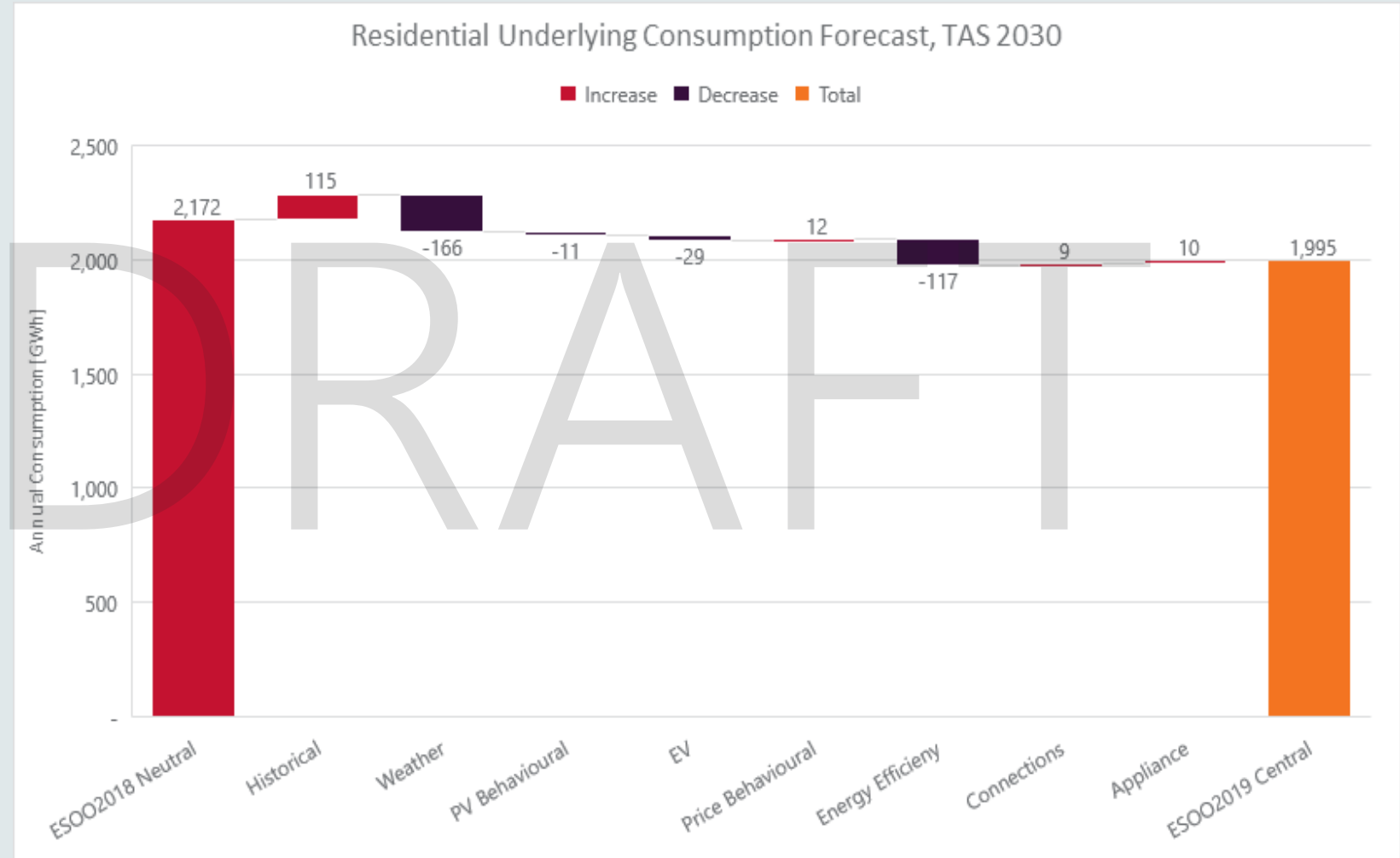
# TASMANIA

## Draft Annual Consumption Forecasts

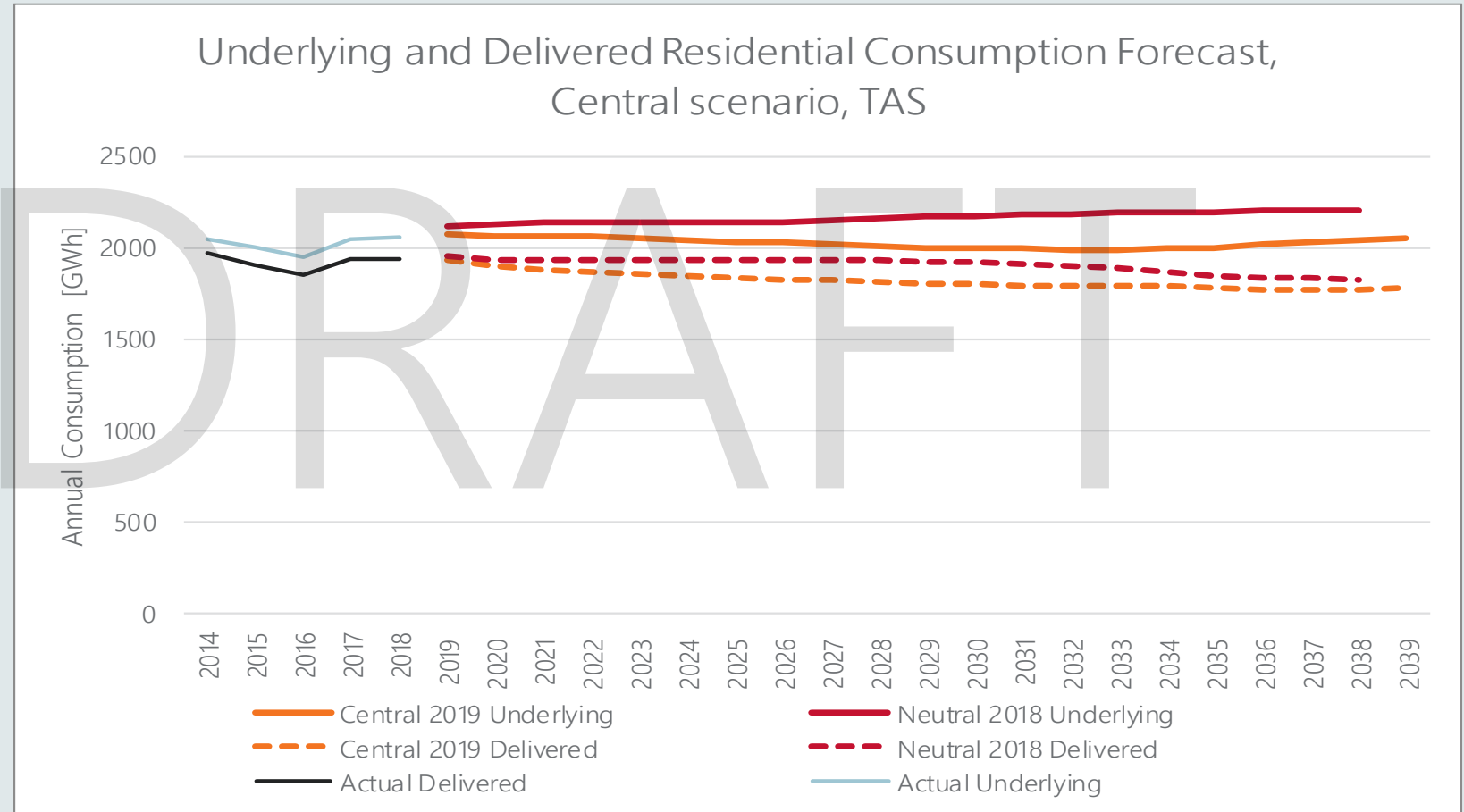
ESOO 2019

# TAS Underlying Residential Forecast With Key Components

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

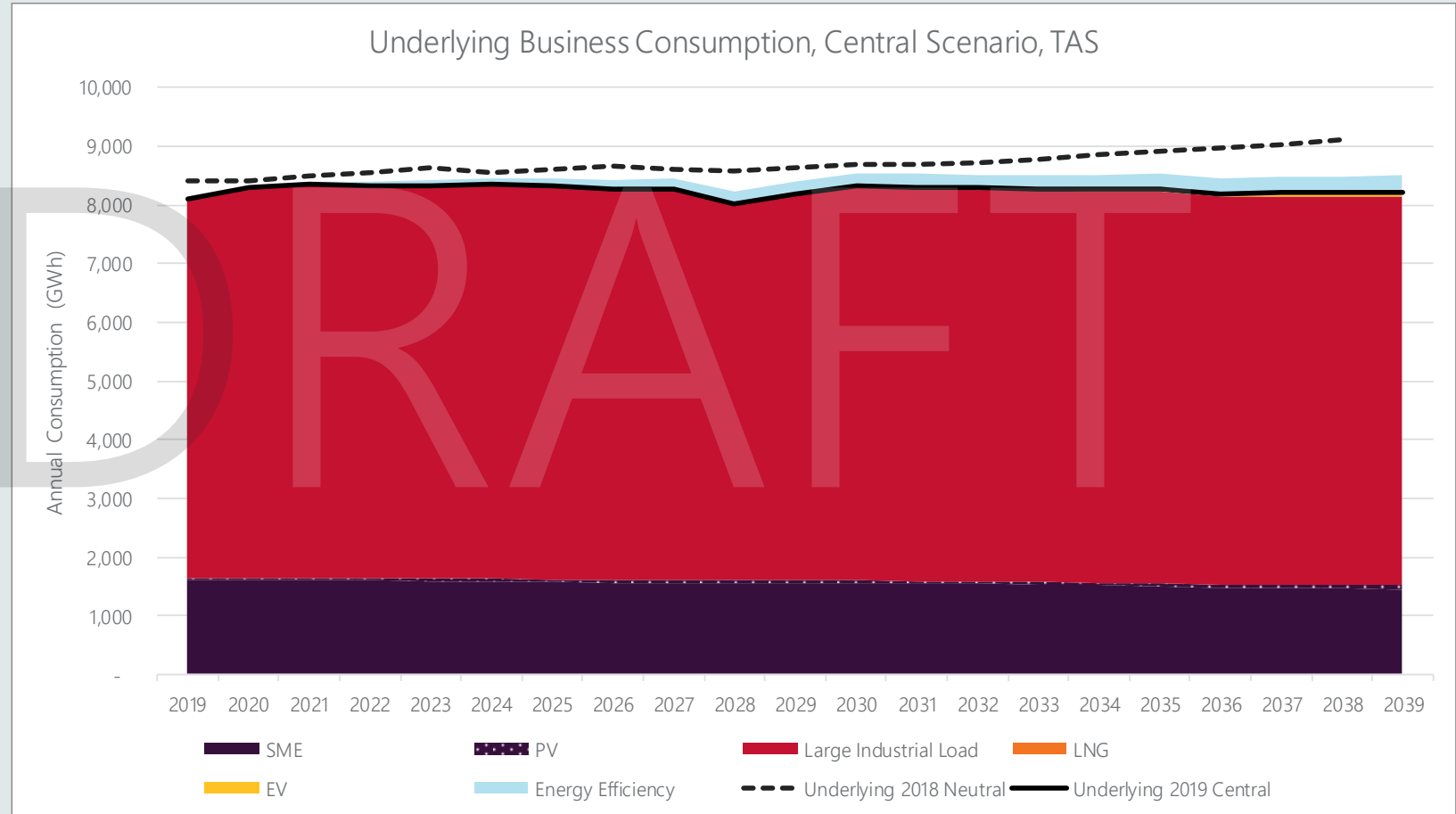


# TAS Residential Forecast



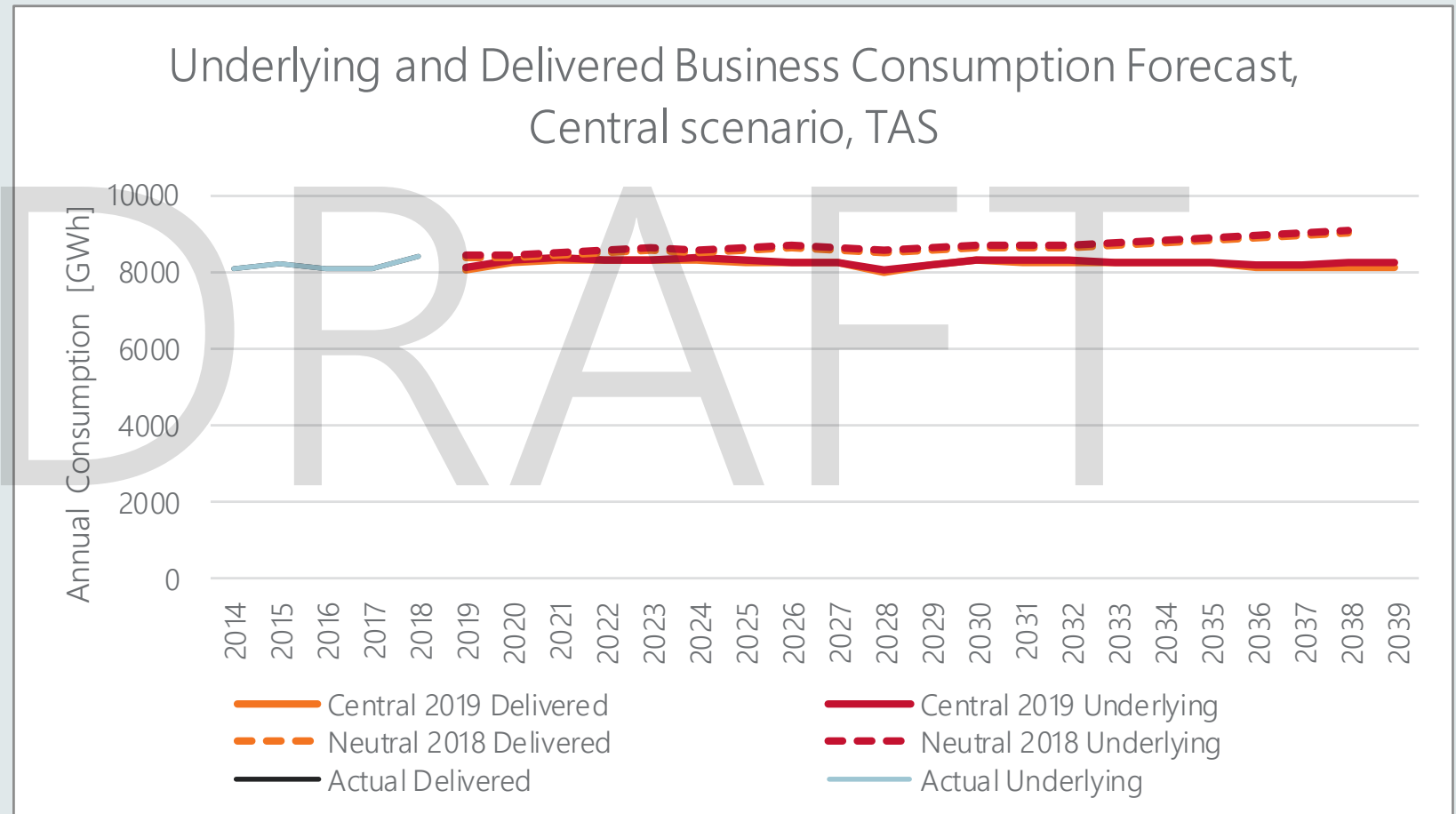
# TAS Underlying Business Forecast With Key Components

- Updated SME model better capturing the less-energy intensive industries contributing to economic growth (population driven)
- Improved method for accounting for Large Industrial Load forecasts
- Better representation of projected future energy efficiency savings in 2019 forecasts

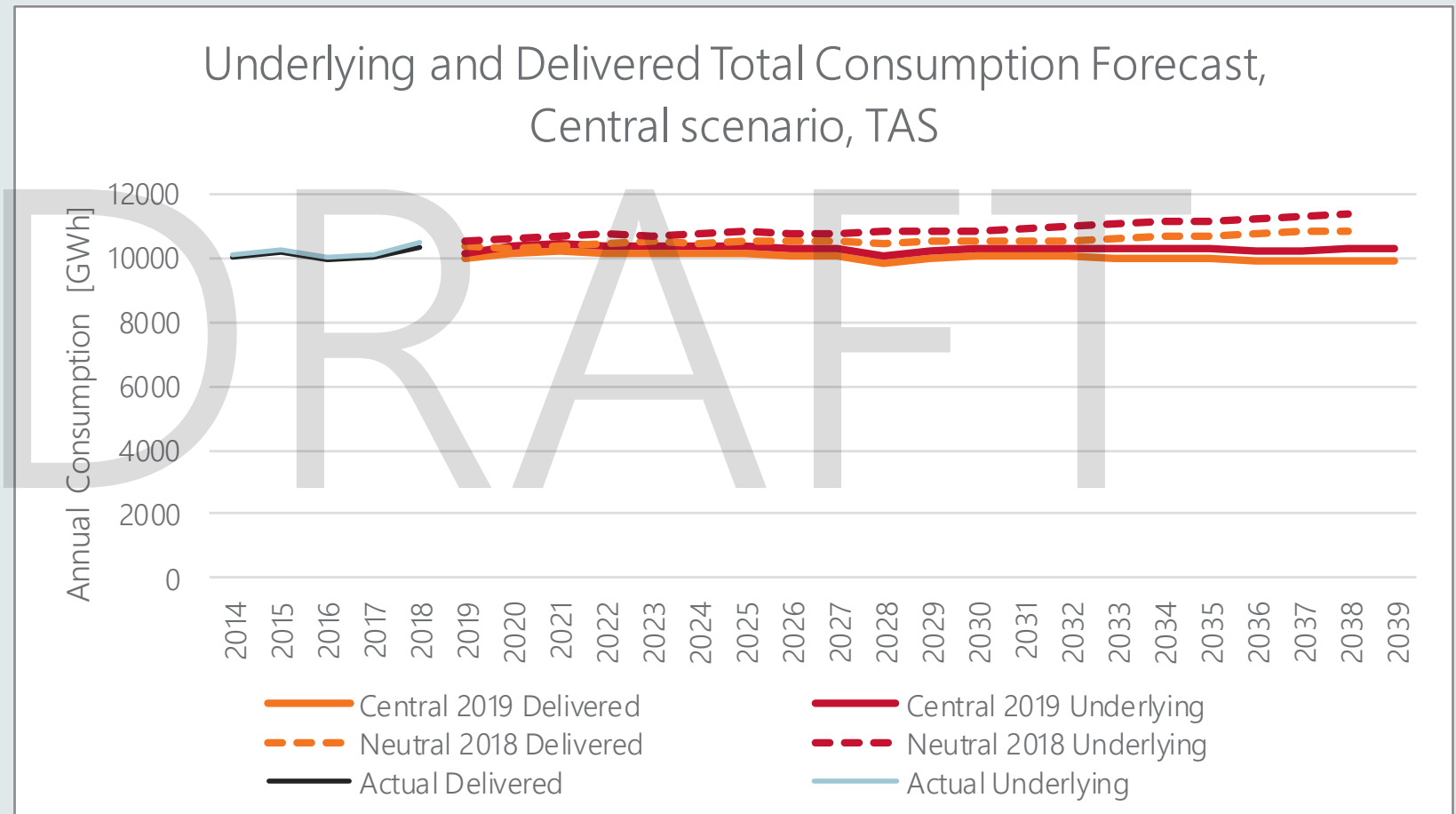




# TAS Business Forecast

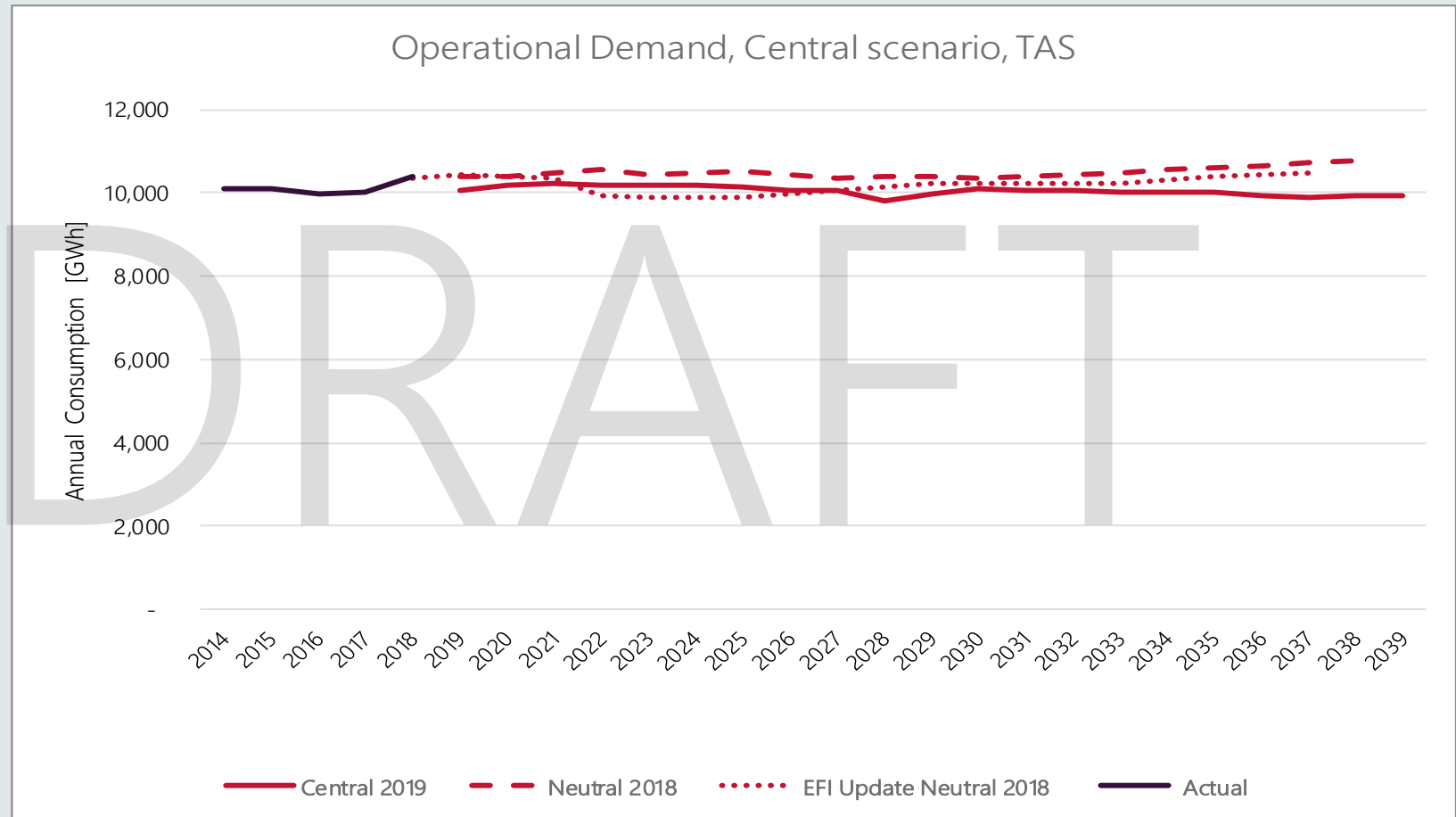


# TAS Total Forecast



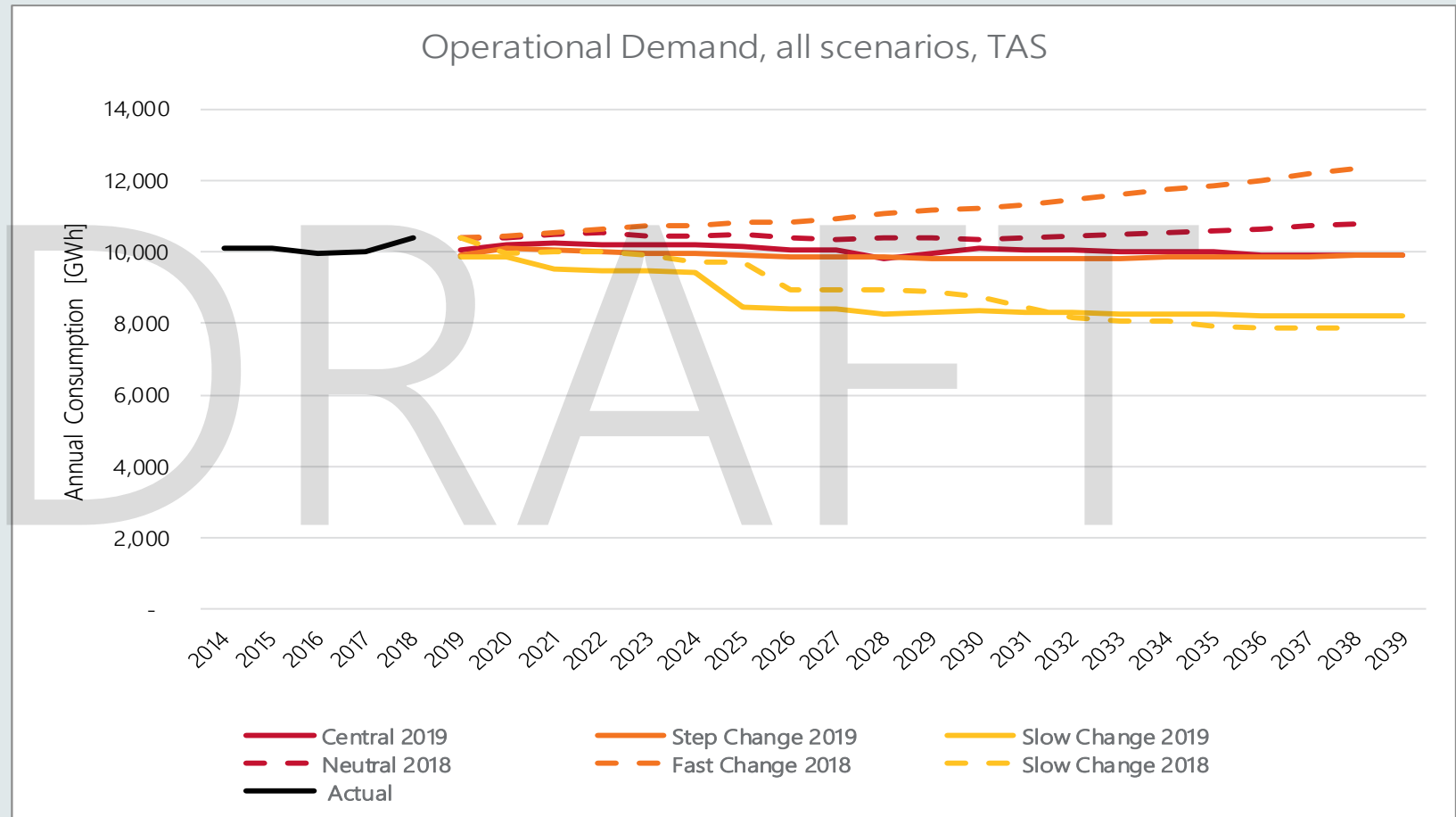
# TAS Annual Operational Energy as Sent Out

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



# TAS Annual Operational Energy as Sent Out

- All scenarios



# TASMANIA

## Draft Maximum Demand Forecasts

ESOO 2019

# Tasmania overview (winter)

- The base year (2019) forecast is slightly higher than the ESOO2018 due to an upward trend in demand and large industrial load:
  - Over the last 5 years Large industrial load has been steadily increasing by about 3-5MW a year for the last 5 years. This year we forecast a 5-10MW increase in Large Industrial load between 2018 and 2019 and between 2019 and 2020 consistent with history.
  - Further residential load is experiencing steady growth in the first few years.
- Long-term growth this year is similar to the ESOO2018 forecast:
  - Electric Vehicles growth is forecast to be lower compared to last year, although due to the charging pattern adopted this year, in particular with the inclusion of Large Commercial Vehicles and electric trucks, we are forecasting more vehicle charging at time of maximum demand (9am).
  - Heating load (relevant for Tasmania's winter maximum demand) and base load is forecast to be slightly lower than the ESOO2018 in the long term.

# TAS winter maximum demand

