ESOO 2020 Inputs and Assumptions Update/Refresh

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Agenda

- Recap of major inputs used in the electricity consumption forecasts and how they are used
- Draft updates completed for 2020-21 compared to 2019-20
- Open discussion of main inputs (Energy Efficiency, appliances, connections, retail price)
- Economic and demand forecast update considering Covid-19

Component Models

Residential, Business and combined Annual consumption forecasts

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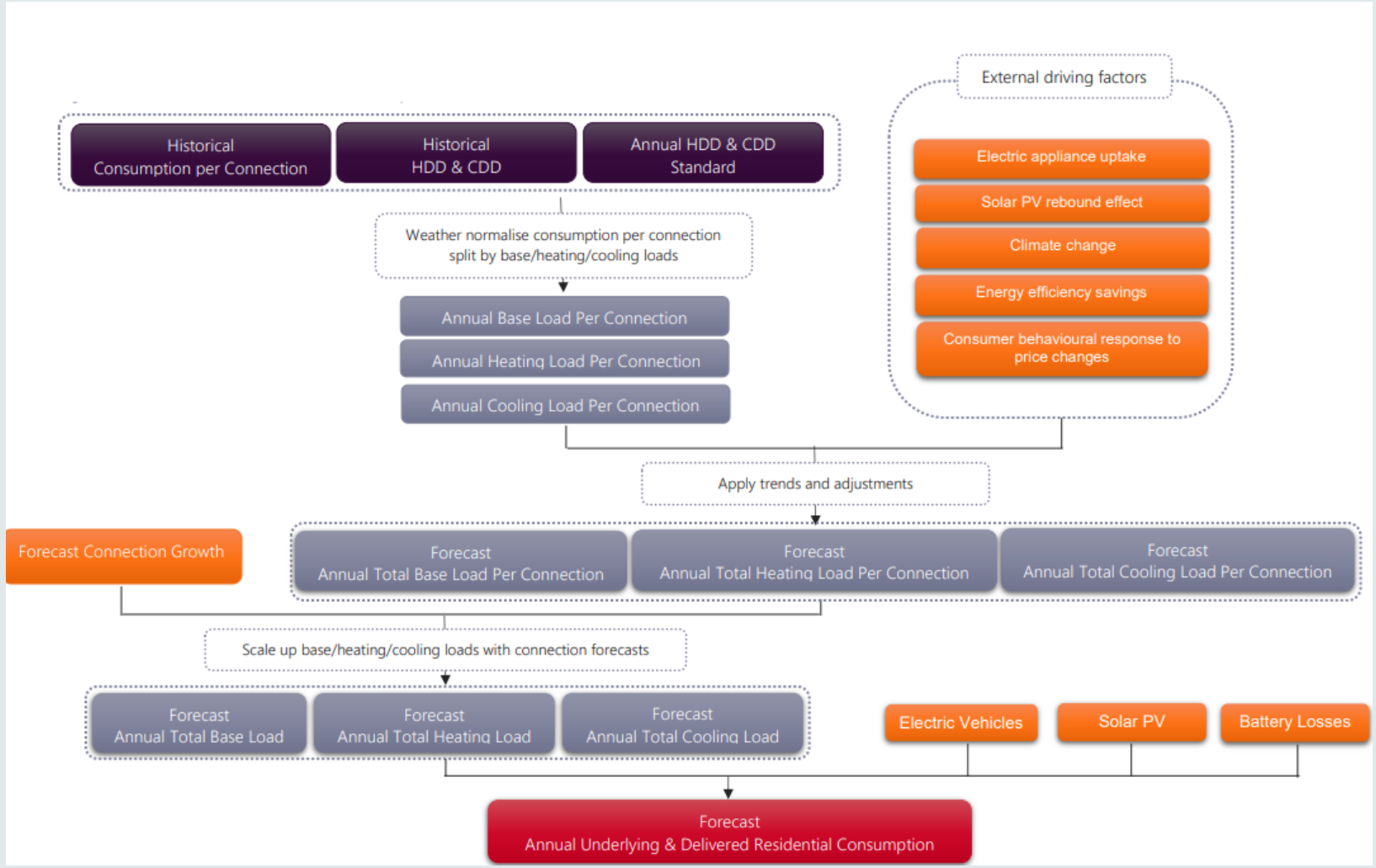
Residential Model Process Flow



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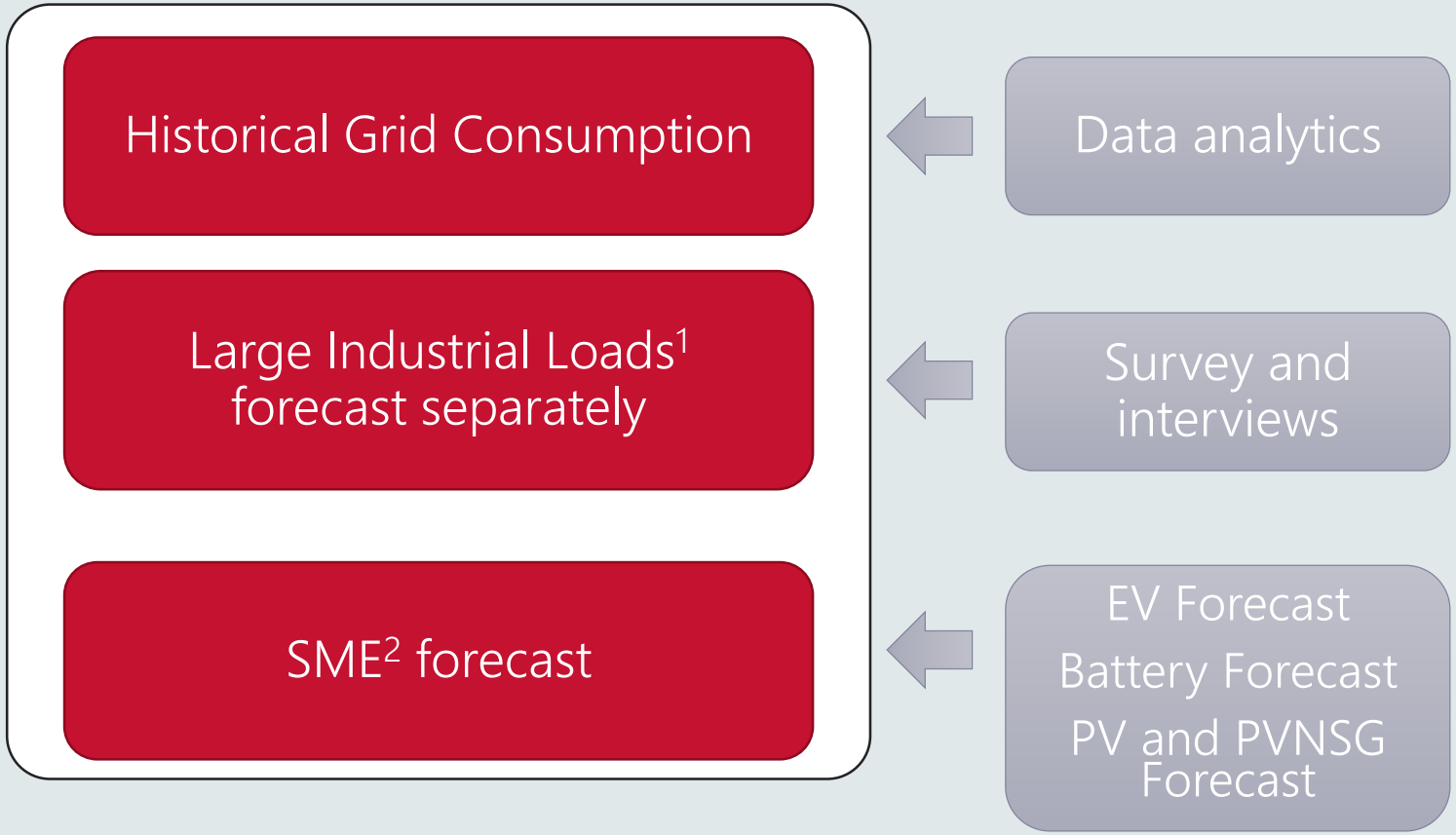
Business Model



[1] Generally classified as consumers that use more than 10 MW for at least 10% of the year. Industries modelled include aluminium, LNG and desalination plants, etc.

[2] Small to medium enterprises (SME) is the aggregate load once large industrial loads are removed from the historical data. This sector is modelled using economic factors.

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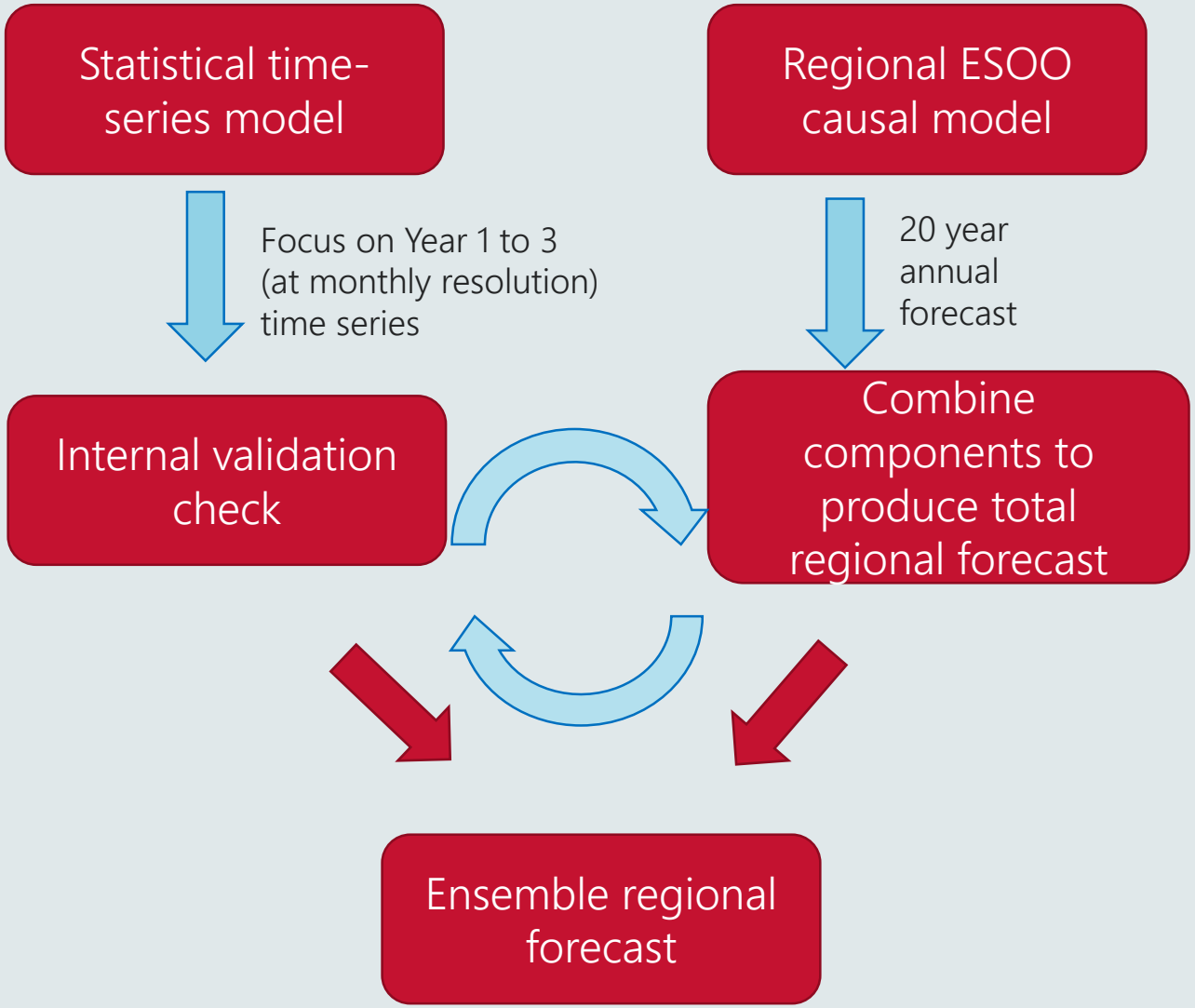
Annual Consumption model validation step

- Time-series analysis to be utilised to uncover demand patterns not captured by the long term components
- The framework applies the most appropriate method for the situation both in terms of impact, data visibility and predictability.



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Component Updates

Key input updates (Draft)

Component inputs

AEMO has previously or is currently consulting with the FRG on:

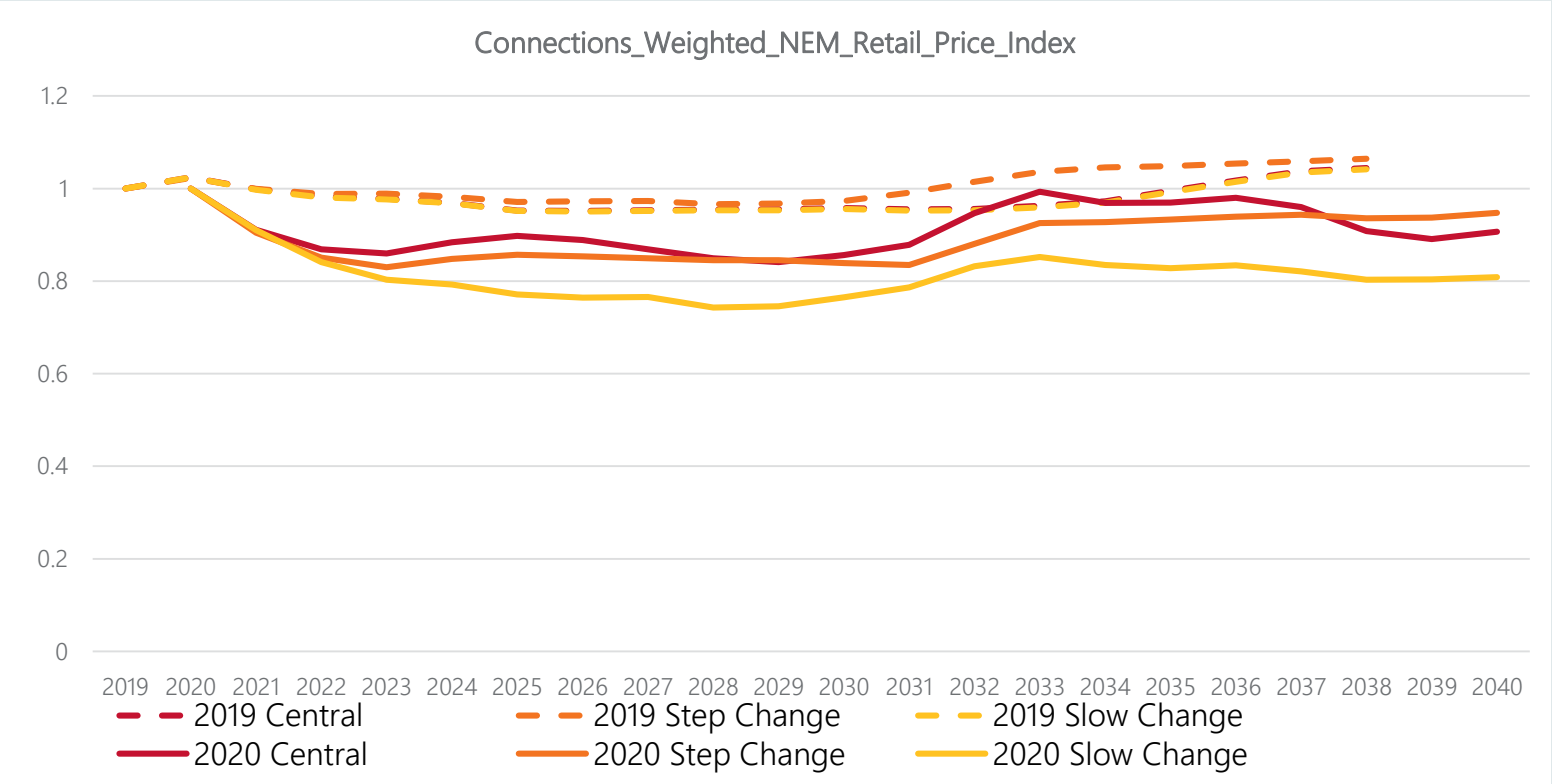
- Economics – discussed in February FRG
- Distributed Energy Resources – discussed in February FRG, and again today

In this FRG, AEMO will provide an overview on key components being updated:

- Retail prices
- Connections forecast
- Appliance uptake, energy efficiency and fuel switching
- Large industrial load survey process (from 2019)
- Economic forecasts (impact of COVID-19)

Retail Price (Draft)

- AEMO's forecasting process accounts for the impact of customer price changes arising from consumers adjusting behaviour (short term) or investment decisions (longer term) resulting in changes to consumption trends.
- Forecast retail prices are based on:
  - Wholesale price forecasts based on AEMO's Draft 2020 Integrated System Plan.
  - Other components (retail, distribution, environmental) based on forecast values from AEMC's Residential Electricity Price Trends 2019 report



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Connections Methodology

Updated connection model now contains economic information, building classes along with a time-series trend to enable more alignment to AEMO scenario drivers, energy efficiency inputs and short-term accuracy.

Please refer to Table 22 of the 2019 AEMO Forecasting Accuracy Report for details on the Connections forecast improvement process

1. The residential consumption model that AEMO uses requires a forecast of active residential electricity connections (dwellings)
2. Previous model used Housing Industry Association (HIA) and Australian Bureau of Statistics (ABS) household and population forecast
3. The residential model has been updated:
   - Consultant advice for a dwelling stock model split by climate zone and building class (Class 1 and Class 2*), based on HIA data
   - Spread between scenarios drawn from ABS population series differences and scenario forecasts of the construction sector activity (Division E) provided by AEMO's economic forecasts (BIS Oxford Economics)
   - Grown by short-term (3-5 year) time-series trend in electricity connections which have historically been quite stable in growth trends

* The building codes of Australia classify Class 1 buildings as detached houses and Class 2 containing two or more sole-occupancy units each being a separate dwelling

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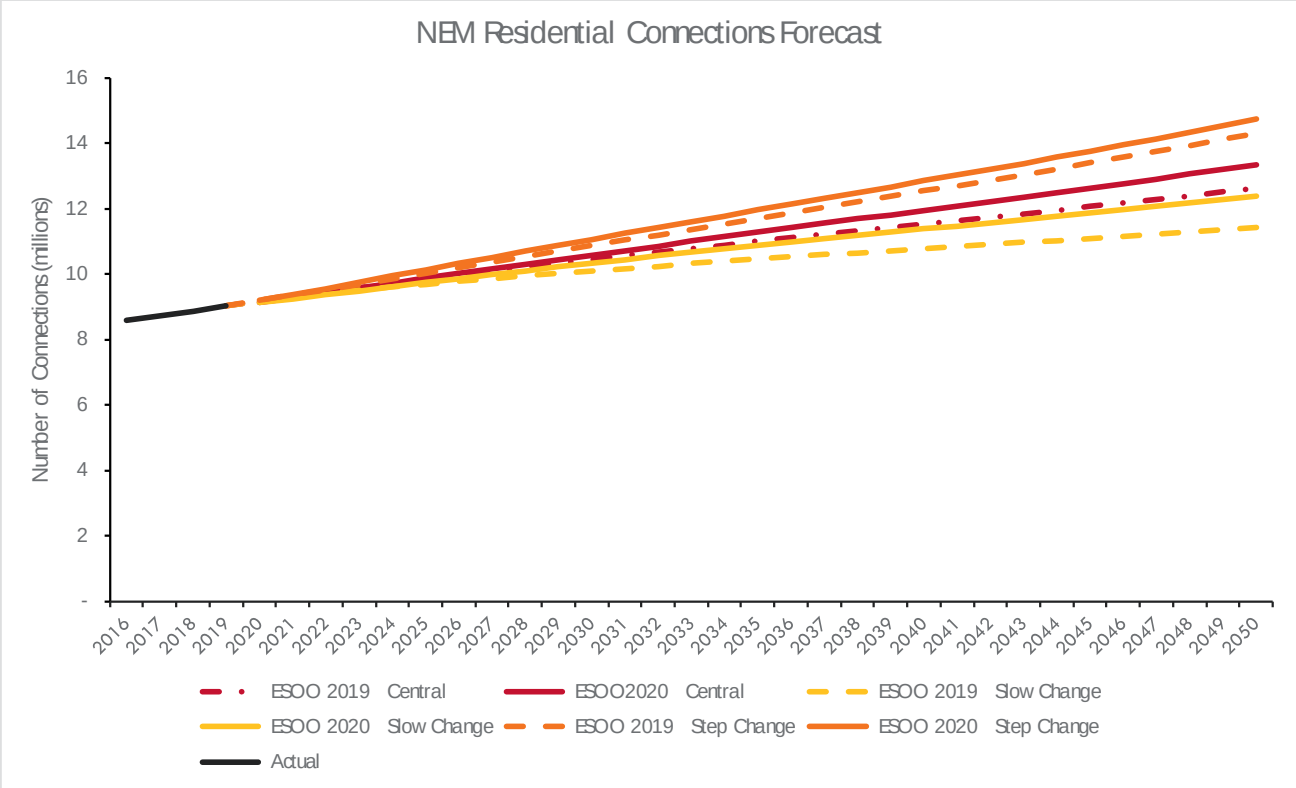
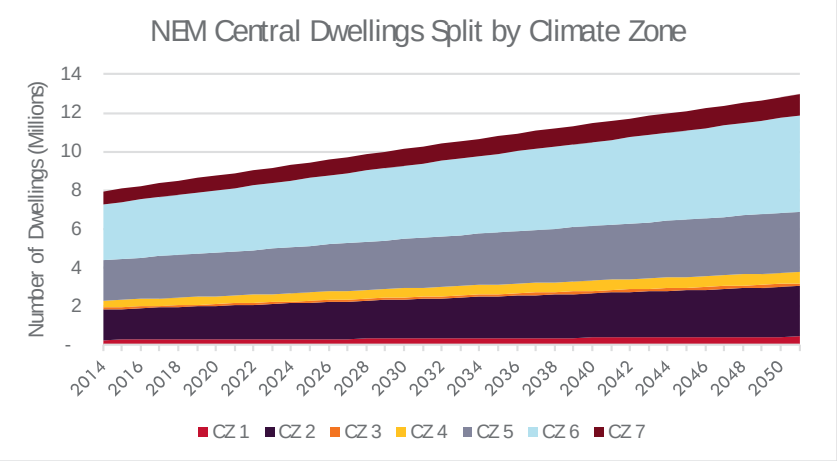
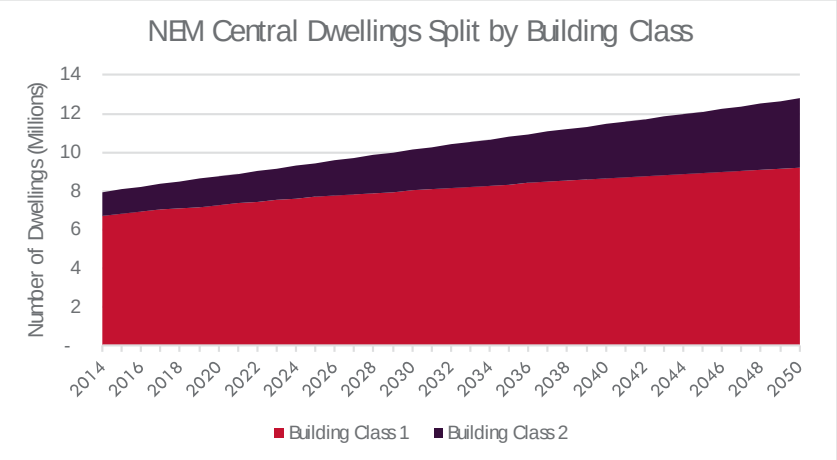
Connections Outlook (Draft)

- The 2020 forecast is similar in the short-term to the 2019 forecast but slightly higher by 2050 for all scenarios reflecting the change in approach

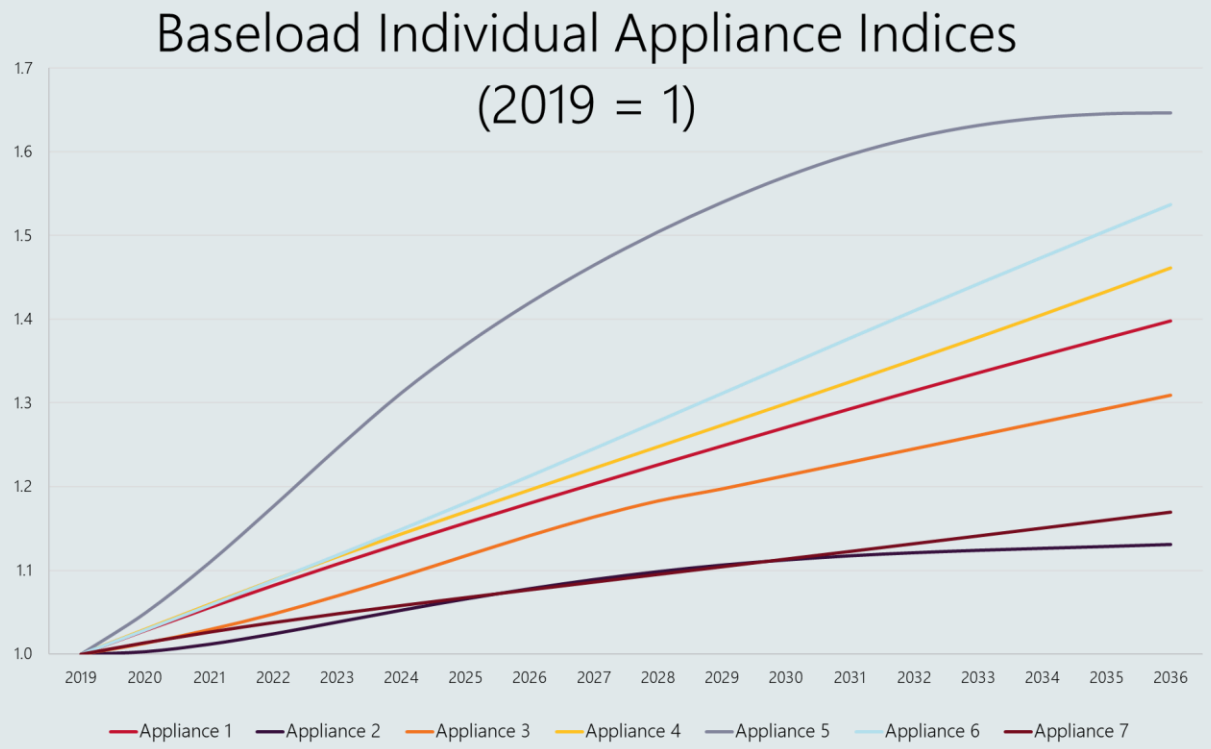


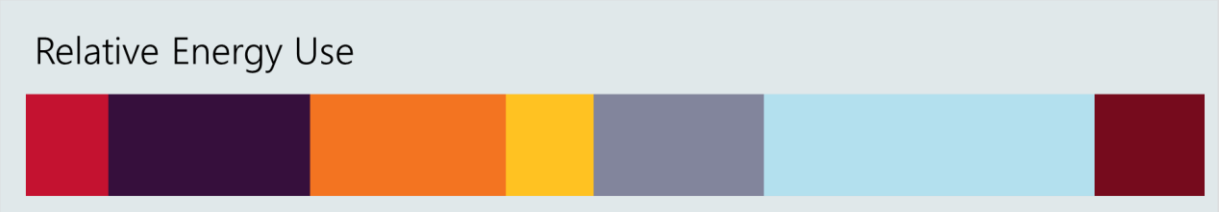




Appliance Index

- Residential Baseline Study (RBS) data
- Baseload, Heating and Cooling Indices per household (HH) relative to base year
- Indices comprise metrics to represent quantum of appliance growth/ energy consumption, and include stock numbers
- Stock numbers modified for fuel switching e.g. space conditioning other than building codes and water heating
- Step change and Slow change scenarios developed by applying HH income per capita index relative to Central scenario and connections forecast





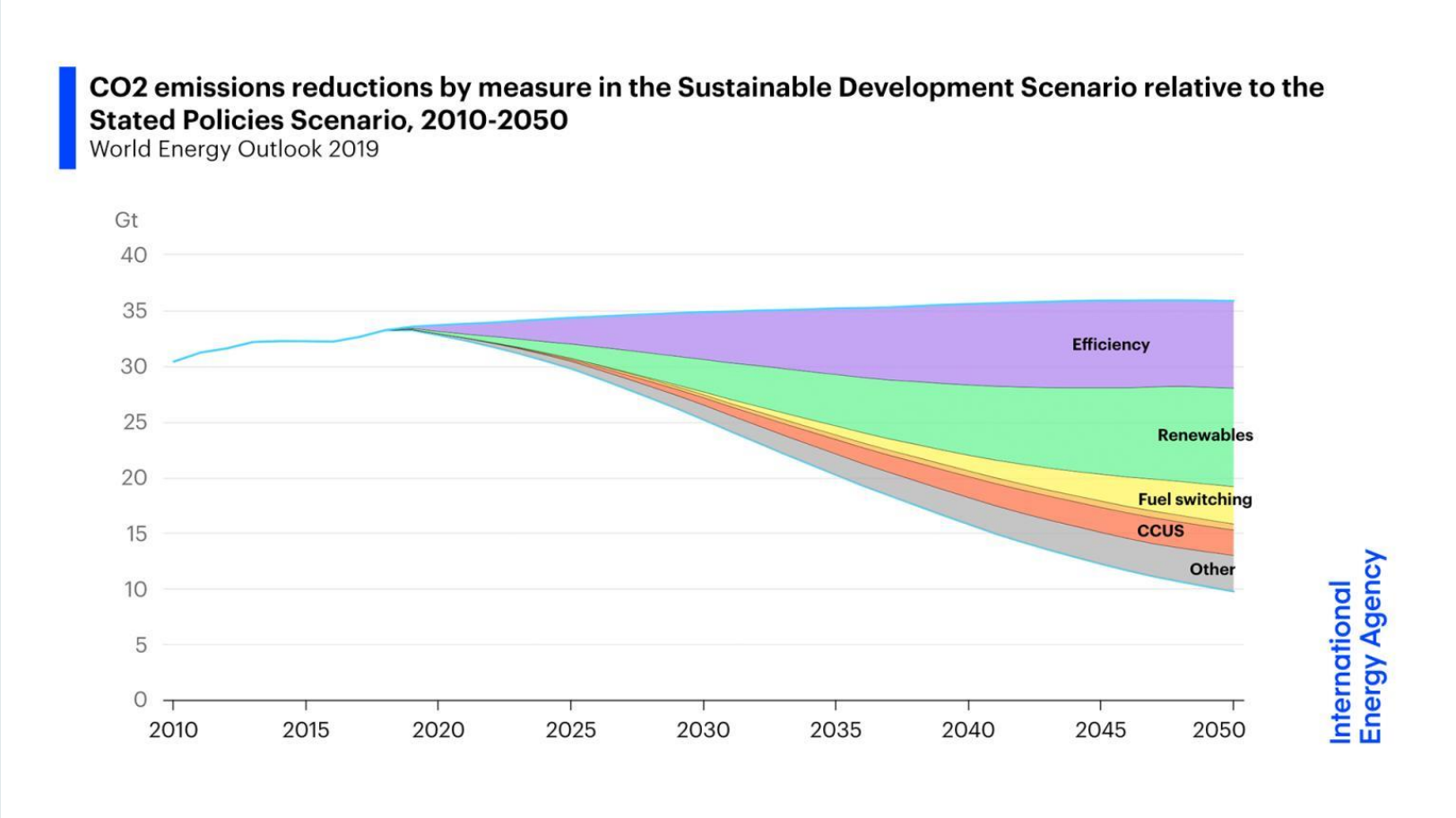
Baseload Index = Σ Individual Appliance Indices x Relative Energy Use/ HH

Energy Efficiency

The International Energy Agency (IEA) identifies that savings in electricity consumption from increasing energy efficiency represent a significant proportion of global CO_2 reductions.

AEMO forecasts future energy efficiency savings through a component-driven model from current and planned policies at both the national and jurisdictional level.

"Energy efficiency is at the heart of any strategy to guarantee secure, sustainable and inclusive economic growth"



Source: IEA *World Energy Outlook* November 2019

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Energy Efficiency: Scope & Input Drivers

Scope	State Schemes	GEMS	Building Codes	NABERS + CBD
Residential				
Commercial				
Industrial				

Large industrial loads removed using Australian Energy Statistics (AES) & AEMO meter data

SME sector

Input Drivers				
Economics (GSP)				
Stock Model				
HBC Split				

Scenario specific

Scenario Specific

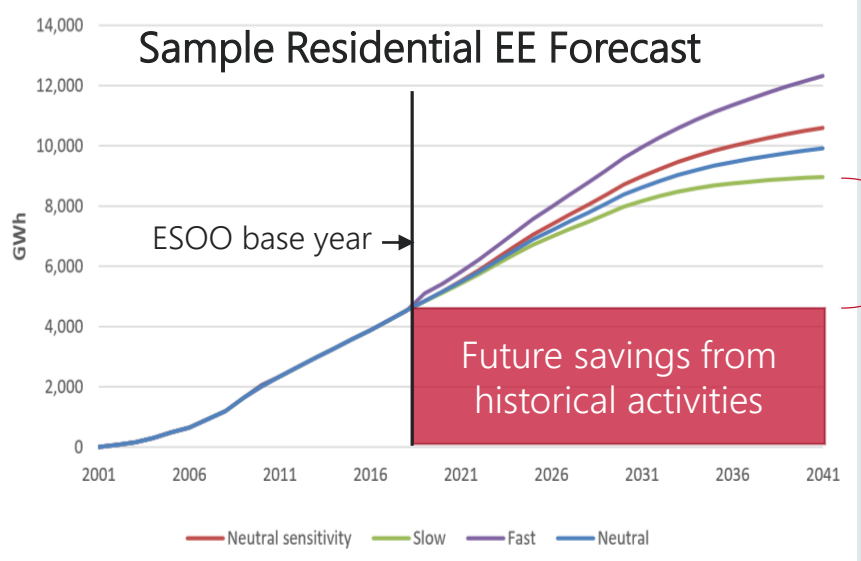
By National Construction Code climate zone

Uncertainty especially Commercial

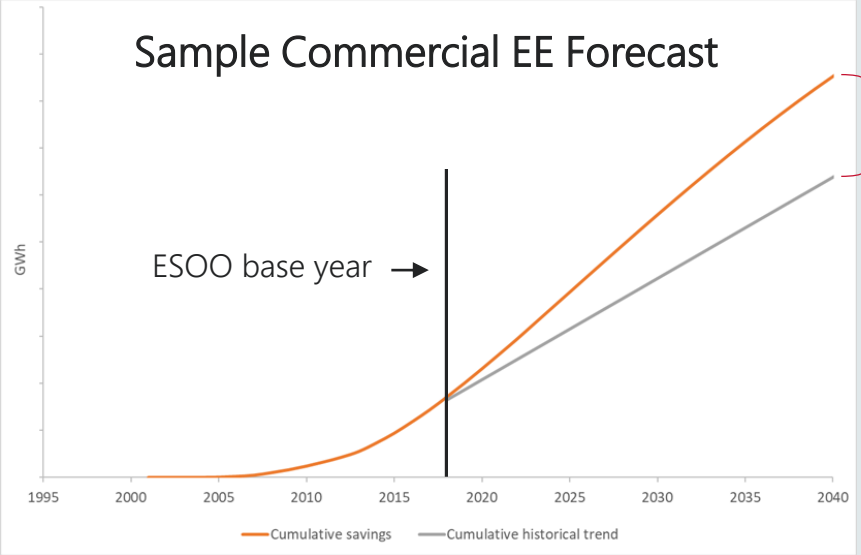
Baseload, Heating and Cooling EE Forecasts developed for the Residential and SME Sectors

Energy Efficiency: Application to models

- 2020 model broadly applies a consistent methodology to the 2019 forecasting approach
  - Savings from building code improvements; more energy-efficient appliances, equipment and processes via GEMS and state schemes; and commercial building performance ratings
  - AEMO's forecasts considers discounts to estimated scheme savings to consider adjustments such as reduced building occupancy affecting space conditioning and potential non-compliance.
  - Further downward adjustments consider broader non-realisation of estimates savings
  - AEMO accounts for historical savings to forecast the forecast savings, relative to the ESOO base year. See graphs.



Forecast savings



Cumulative Forecast savings

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Energy Efficiency: Updates & Improvements

2020 input updates

- Updated GSP Forecasts from BIS Oxford (further updates expected as the Corona virus situation evolves)
- New Residential Building Stock Model that forms the basis for the Connections Forecast. Grown by short-term time series trend of NMI connections

2020 planned improvements

- Develop Heat Base Cool split for each NCC climate zone in each jurisdiction

Potential future improvements

- New Commercial Building Stock Model and improved understanding of building energy use (Commercial Building Baseline Study)
- Feedback from stakeholders regarding actual realised savings from policy measures (e.g. via measurement and verification)

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Energy Efficiency and other components

	Measure	GSOO		ESOO	
		EE Forecast	Fuel Switching	EE Forecast	Appliance Index
Baseload	NCC 2022 (water heating)		✓		✓
Baseload	VIC Solar Homes (solar electric hot water)		✓		✓
Baseload	ACT Climate Change Strategy (water heating)		✓		✓
Heating	NCC 2022 (space heating)	✓ (Code)		✓ (Code)	
Heating	E3 Program Zoned Label (space heating)		✓	✓ (GEMS)	
Heating	ACT Gas Heater Rebate		✓		✓
Heating	ACT Climate Change Strategy (space heating)		✓		✓

Large Industrial Load Survey Process

Industrial Survey Questions

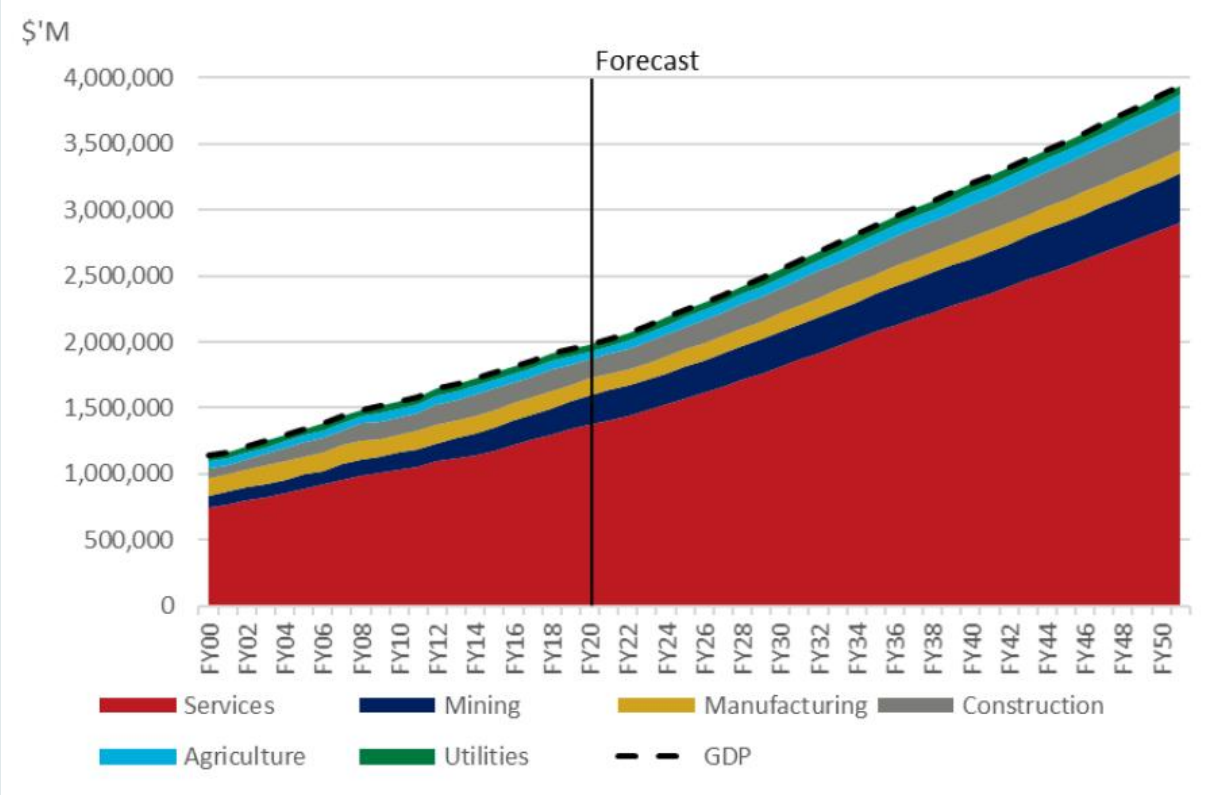
AEMO surveys the major industrial loads the following questions:

1. How influential do you think each of the following drivers is on determining your business performance?
    a. Electricity prices
    b. Population growth
    c. Economic growth
    d. Exchange rate
    e. International commodity prices
    f. Cost of renewable energy and smart-grid technologies
    g. Renewable energy policies
    h. Energy efficiency policy and schemes
    i. Other (please specify)
2. Does your business have any energy efficiency measures planned in the future
3. Are there any other business circumstances that might impact your forecasts?
4. Please provide in spreadsheet format your expected annual consumption (GWh) for Central, Step Change and Slow Change.
5. Please provide your expected maximum demand (MW) for the above scenarios
6. Please provide any details of on-site electricity production
7. Please provide details of your gas consumption forecast (if any)

Economic forecasts

Impact of Covid-19

Economic forecasts



- Economic forecasts provided by BIS Oxford Economics
- Forecasts were completed in early February, prior to the scale of Covid-19 being identified
- As such, coronavirus impacts were forecast as a slight drag, and temporary, limited to primarily a Chinese economic impact
- Since this time, the scale and influence of Covid-19 pandemic has escalated

Economic forecast update: Covid-19

- AEMO continues to work closely with BIS Oxford Economics to ensure that the ESOO forecasts sufficiently capture the near term impacts of coronavirus.
- The global and domestic impacts will materially affect Australia's economy. The timing and depth of impact is uncertain, and almost impossible to forecast with accuracy at the moment.
- BIS Oxford Economic's latest advice remains that the key impacts will be:
  - Services sector – tourism, education
  - Supply chain disruptions, particularly manufacturing bottlenecks
  - Energy and fuel – particularly LNG and oil markets
  - Equity markets – sharp corrections will influence the ongoing availability of capital to invest in recovery, and may influence fiscal response
- AEMO will ensure the ESOO reflect BIS Oxford Economic's latest advice that is as up to date as practical considering the fluidity of the economic and social impact of the virus.

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