Estimating COVID-19 impacts on electricity consumption

Incorporating the estimated impacts into forecasting scenarios

Energy.forecasting@aemo.com.au

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Purpose and Agenda

Purpose:

- Discuss observations of consumption impacts to date
- Collaborate on methods and assumptions for incorporating COVID-19 into electricity consumption forecasts
- Discuss appropriate sensitivities to ESOO scenarios that can assist stakeholder needs

Agenda:

- Recap of ESOO Scenarios
- Observations of COVID-19 impact on business and residential consumption
- Economic forecasts, and the relationship to electricity consumption
- COVID adjustments to forecast electricity consumption

FRG collaboration on the ESOO component forecasts, to date…

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Meeting	ESOO related discussion	Presenter
Jan FRG	• Economic draft projections – used as inputs to electricity demand forecasts	BIS Oxford
Feb FRG	• DER insights, assumptions, inputs, methodology and forecasts	GEM, CSIRO, AEMO
Mar FRG	• Initial COVID-19 Update • DER draft forecast update • ESOO inputs and assumptions – NEM and WEM	AEMO
Apr FRG	• COVID-19 Economic Impacts • Final DER information	BIS Oxford, GEM, CSIRO, AEMO
Today	• **Estimating COVID-19 impact on electricity consumption**	**AEMO**
May FRG	• Draft annual electricity consumption forecasts	AEMO
Jun FRG	• Draft minimum and maximum demand forecasts	AEMO

	Agenda
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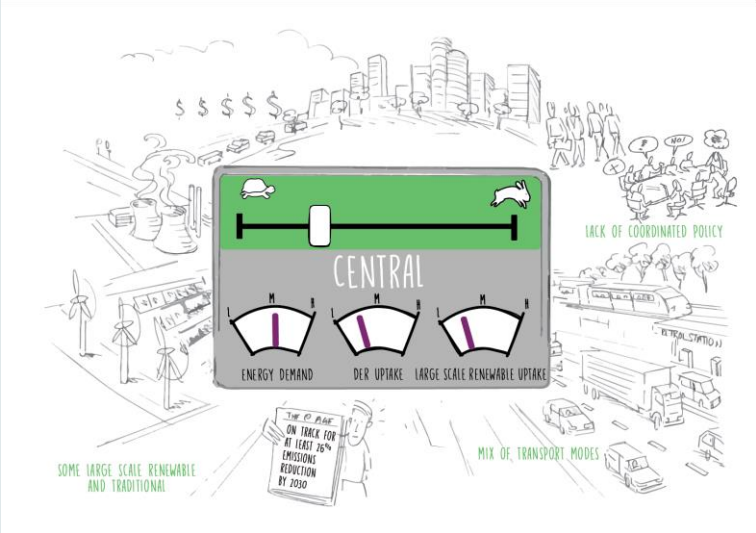
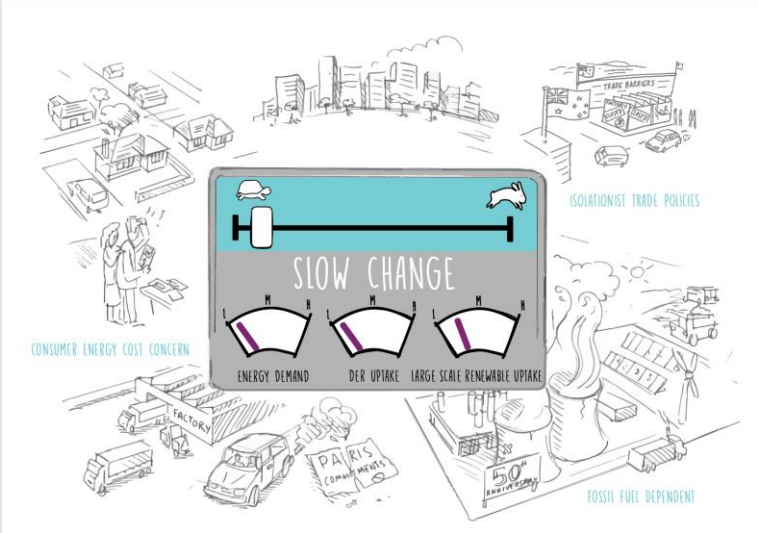
ESOO scenarios at a glance

Central Scenario



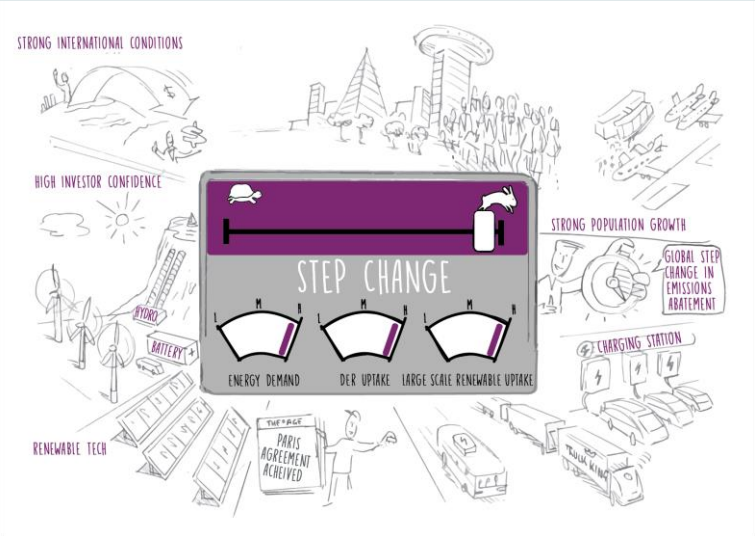
- **Central estimates**
- Gradual technology development
- Moderate DER uptake
- Economics rather than policy
- Coal generators retiring on schedule
- Higher temperatures and more extreme weather conditions

Slow Change



- **Challenging global and local conditions**
- Lower economic activity and growth – closure of some industry
- Slower cost reductions
- Lesser DER uptake
- Limited technology transition
- Higher temperatures and more extreme weather conditions

Step Change



- **Stronger economic activity**
- Stronger population growth
- Stronger international coordination on climate change
- Greater innovation
- Faster DER uptake

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Observed increase in residential consumption, offset by business decline

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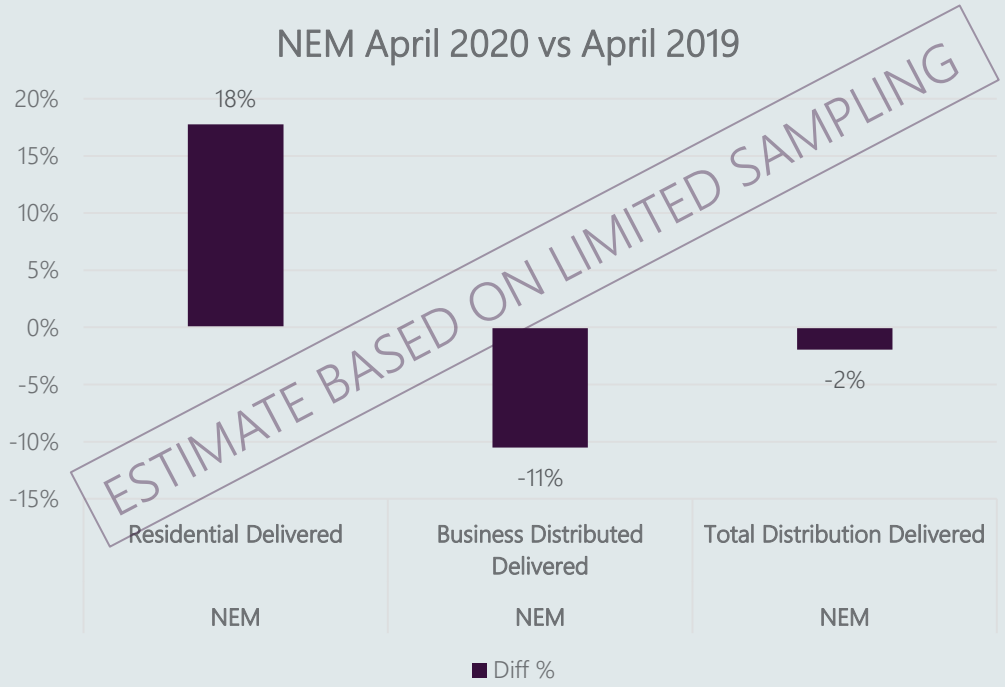
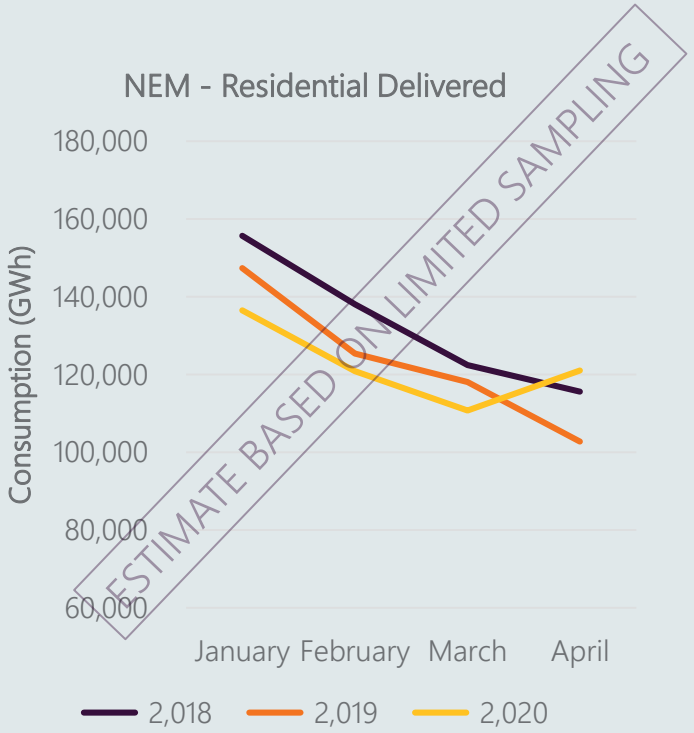
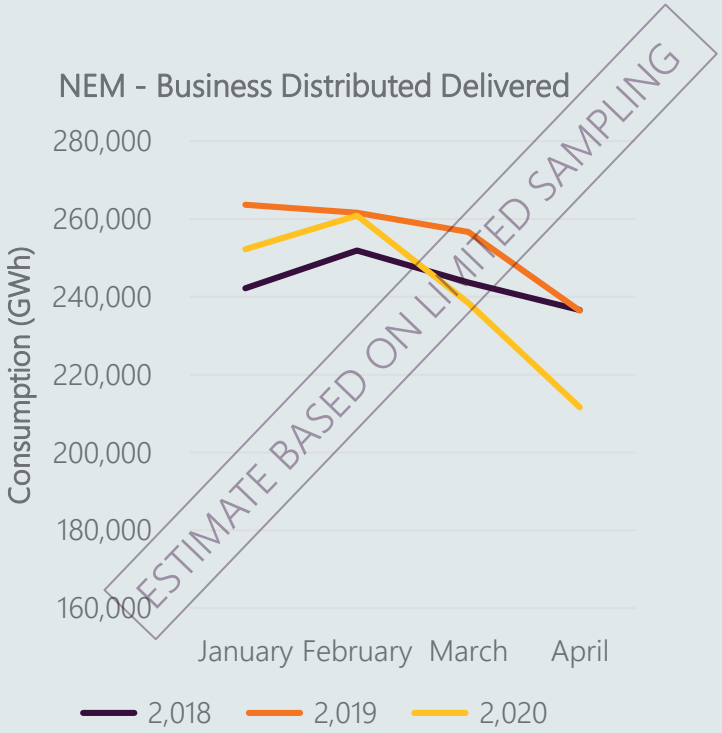
- Since severe restrictions were progressively put in place we have observed:
  - increased residential consumption,
  - reduced business consumption,
  - but industrial consumption remains relatively unchanged (ports, refineries lower).
  - Net impact is a minor reduced level of consumption







Observations are not temperature adjusted – temperature effects may also have contributed to consumption differences.

Forecast economic impacts: BIS Oxford Economics (BIS OE)

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Driver	Baseline Scenario	Downside Scenario
Description	Updated best estimate	Rolling restrictions, based on scenario developed by Imperial College (UK)
Social narrative	• After initial rapid infection rate, travel restrictions and social distancing limit COVID-19 transmission	• The only way to control the virus is through strict social lockdowns until a vaccine is available
Period of strict social / economic restrictions	• Severe restrictions until Q2 2020 • Gradual relaxation until Q4 2020	• Strict restrictions for 15-18 months (to approximately Q2 / Q3 2021)
Monetary / Fiscal policy settings	• Very supportive initially, and then again to kickstart the economy	• While policies are extended, the support is insufficient to stop widespread bankruptcies and closures
Economic impacts	• Some loss of economic activity, particularly in travel, tourism and education sectors	• Long run supply chains are severely disrupted. • High levels of unemployment.
Population impacts	• Limited total impact on population growth, with restricted travel movements lowering net migration for 12-24 months	• Larger impact on population growth, with borders closed for longer periods, lowering net migration for several years
Commodity impacts	• Limited exposure to downturn for iron ore, base metals and coal, while international demand remains relatively robust	• Limited exposure initially, but longer run impacts due to lower global demand
Key data indicators	• Little / no second wave outbreak (domestic & globally) • Effectiveness of Jobkeeper policy in keeping labour market active • Investment / construction data	• Rate of virus transmission and failures to flatten the curve • Moderate/high transmission impacts of any social restrictions

COVID having a noticeable drag on economic activity

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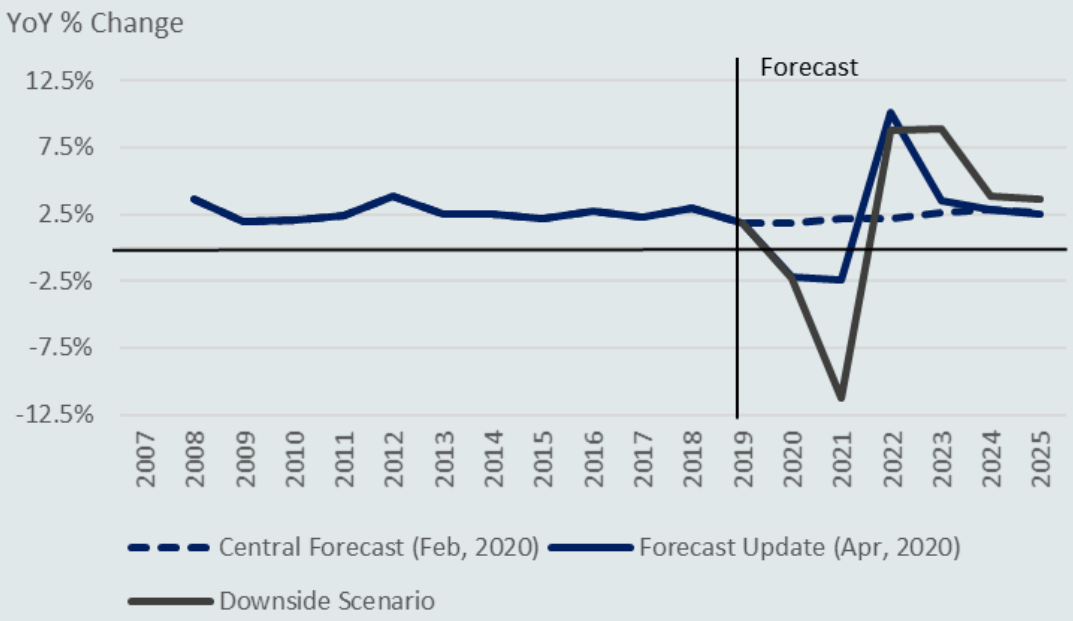
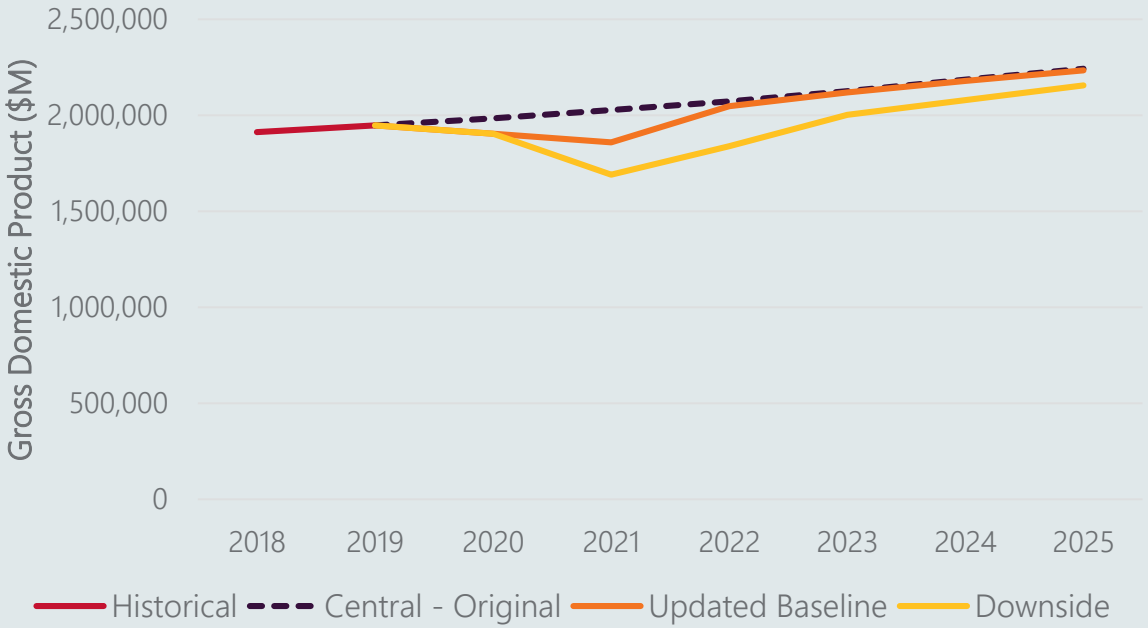


Source: Haver Analytics/ BIS Oxford Economics



	7 May RBA: Baseline Scenario	BIS OE: Baseline	BIS OE: Downside
FYE 2020	-1%	-2%	-2%
FYE 2021	-3%	-2%	-11%
FYE 2022	6%	10%	9%

- Forecasts broadly in line with RBA forecasts for FYE2020 and FYE2021
- BIS OE include stronger recovery in FYE2022
- RBA's own downside case has a longer recovery timeframe

Sectoral contributions to GDP and electricity consumption are not equal

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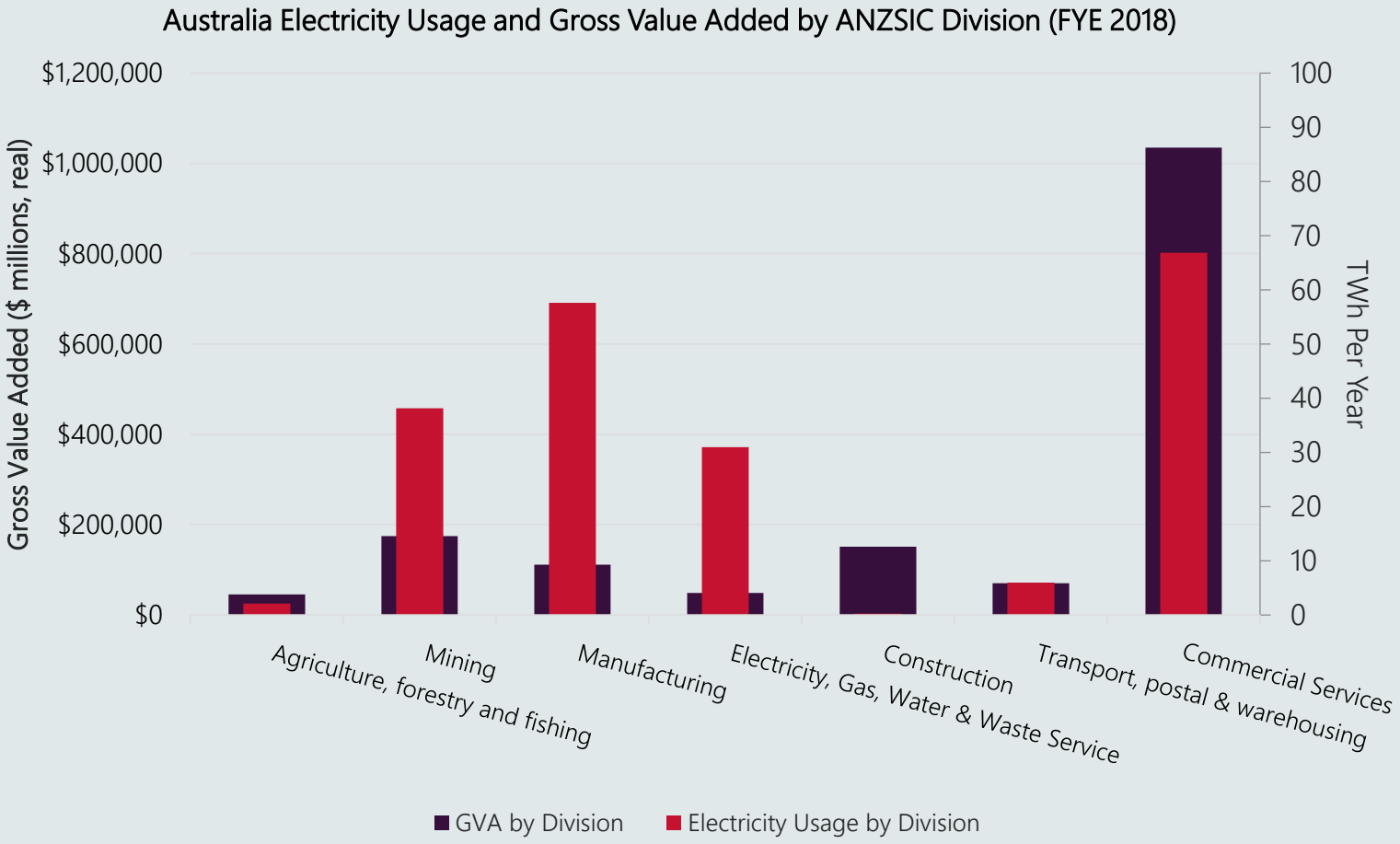
- Commercial services, Manufacturing & Mining represents the largest proportion of Australia's electricity consumption.
- But commercial services represent highest % of GVA



Source: BIS Oxford (Commercial Services is the aggregate of ANZSIC divisions F, G, H, J, K, L, M, N, O, P, Q, R, S)

Forecast economic impacts may have a larger effect on consumption than GDP forecasts indicate

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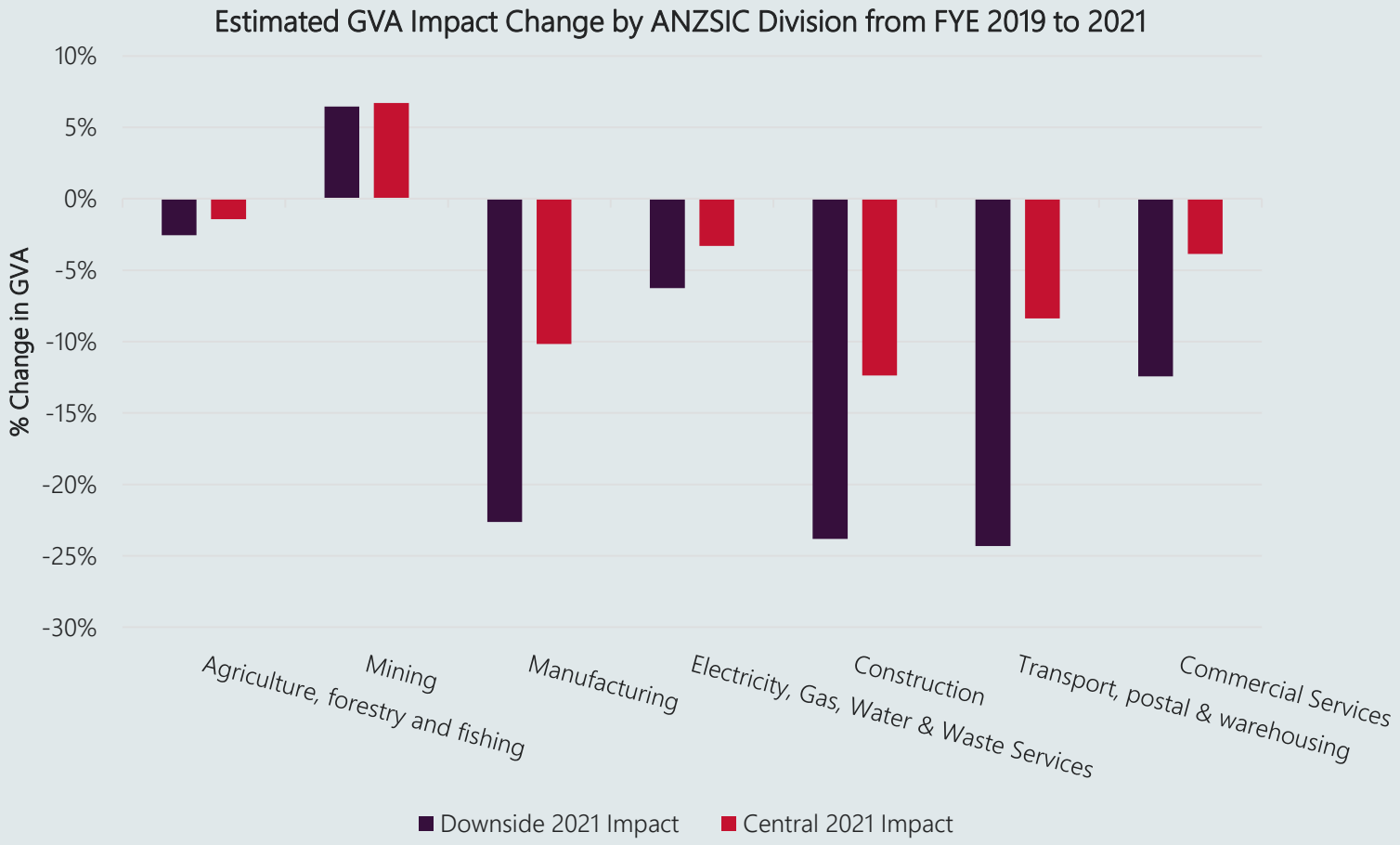
- Manufacturing, Mining, Transport and Construction are forecast by BIS Oxford to have the largest relative decline due to COVID-19.



Source: BIS Oxford (Commercial Services is the aggregate of ANZSIC divisions F, G, H, J, K, L, M, N, O, P, Q, R, S)

Key uncertainties affecting the forecast period less related to economic indicators

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- Residential sector:
  - How have travel restrictions and migration controls impacted electricity connections, and what adjustments, if any, are appropriate?
  - How has appliance usage changed, and how long-lasting will any bounce in consumption from 'working from home' affect a post COVID-restriction economy
  - How has DER uptake slowed, and how has construction slowdown or reduced disposable income affected uptake of energy efficiency measures
- Commercial sector:
  - How successful will stimulus measures be at bringing back the commercial services / retail sectors?
  - How will suppressed consumer and business confidence translate to energy consumption?
  - How will greater levels of unemployment affect electricity consumption trends?
  - How will slowdowns affect manufacturing modernisation – is this an opportunity to increase energy efficiency savings, or decrease due to lack of investment?
- Industrial sector:
  - How much global supply chain disruption has actually impacted on Australian industrials
  - How much global erosion in commodity demand is appropriate for our resources sector
    - Are oil and gold price fluctuations poor indicators of the outlook for iron ore and other base metals, and other manufacturing

Incorporating downside sectorial impacts into electricity forecasts

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- Interviewing and surveying large industrial users of energy and incorporating plausible downside risks into the forecasts.
- The business sector economic model will be stress-tested by incorporating the more granular information from the BIS Oxford GVA division forecast (as a similar percentage fall in GVA does not necessarily equate to a similar percentage fall in energy consumption).
- AEMO has flagged between 6 to 8 TWh in Australia's non-LIL sector to be at risk based on examining the economic impacts at the divisional level.

DER uptake slows due to COVID, while uncertainty means a scenario approach is important

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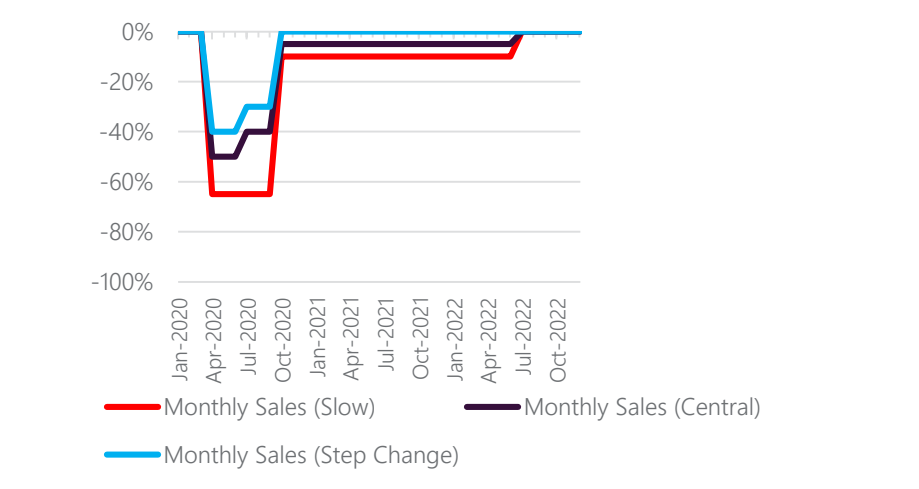
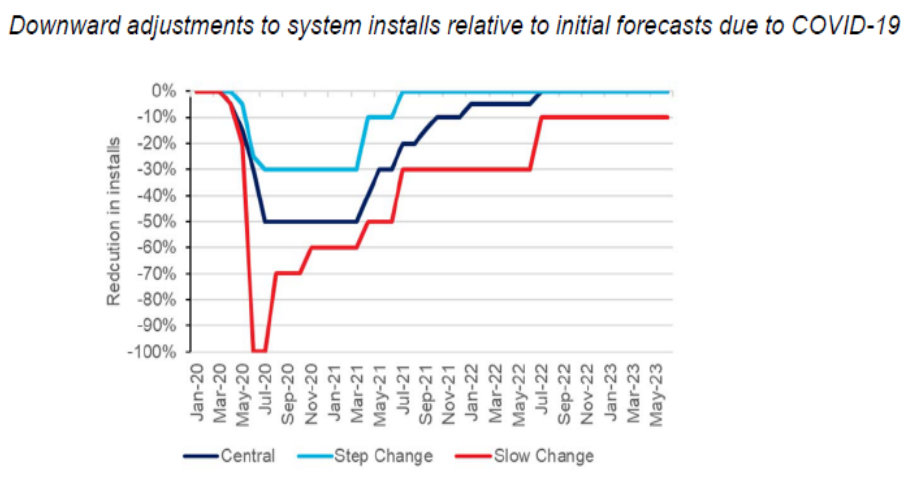
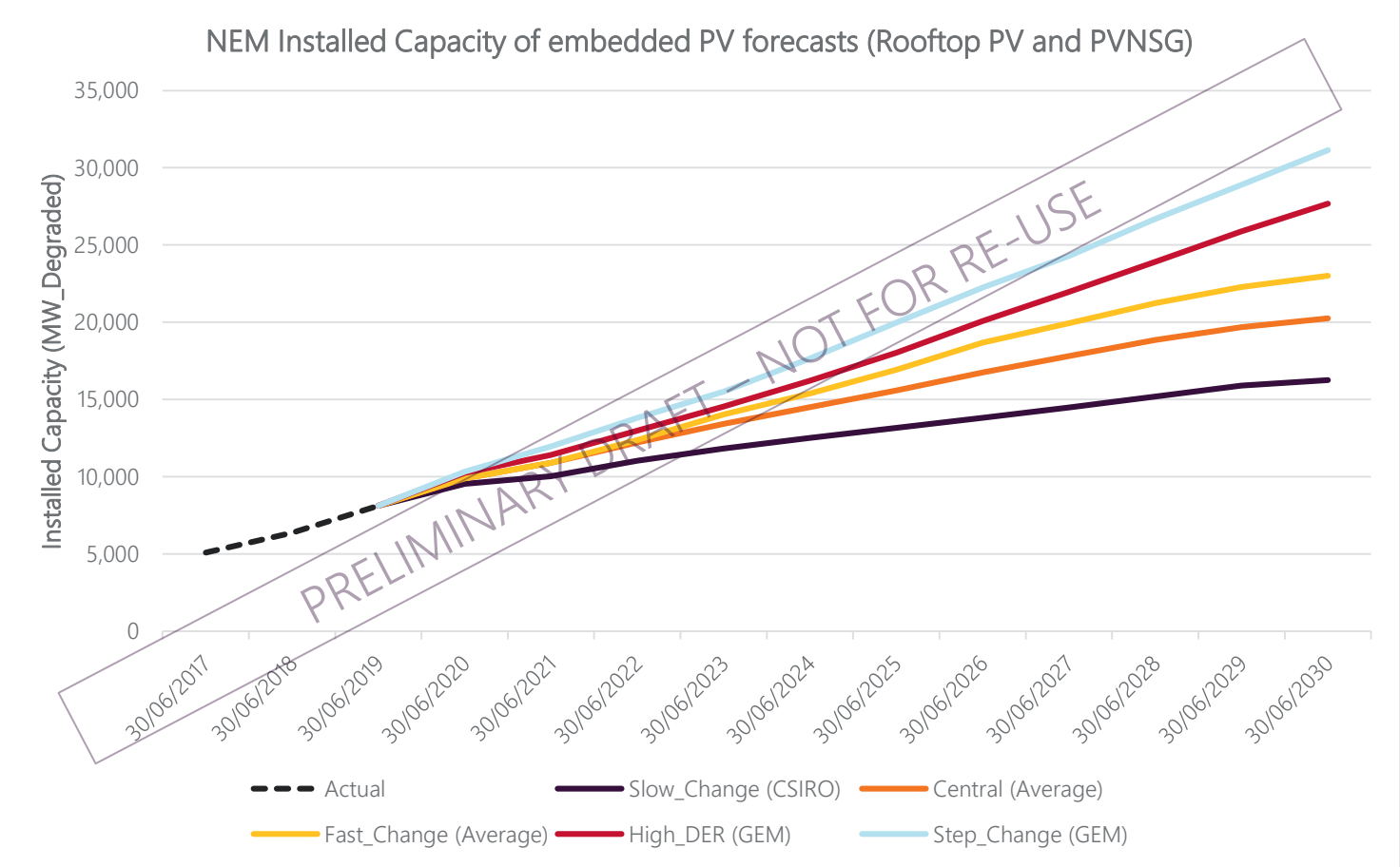
DER near term impact: CSIRO



DER near term impact: GEM



Resulting spread of forecast uptake trends across scenarios, to 2030



Forecasting models require consideration of structural breaks

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- AEMO's preliminary forecasts consider:

  <u>Central Scenario</u>
  - BIS OE updated Baseline economic outlook – economic recovery ("V" shaped) following approximately 6-9months of social restrictions
  - Moderate uptake of DER, post COVID adjustments
  - Residential uplift via increased appliance usage rates
  - Commercial sector adjusted lower to reflect lower commercial operation

  <u>Slow Change Scenario</u>
  - BIS OE updated Downside economic outlook – slow economic recovery ("U" or "L" shaped)
  - Low uptake of DER, post COVID adjustments
  - Residential uplift but commercial impacts are more severe than residential growth
  - Industrial load closure risks eventuate to reasonable decline of intensive loads

Preliminary forecasts feature greater erosion in consumption growth

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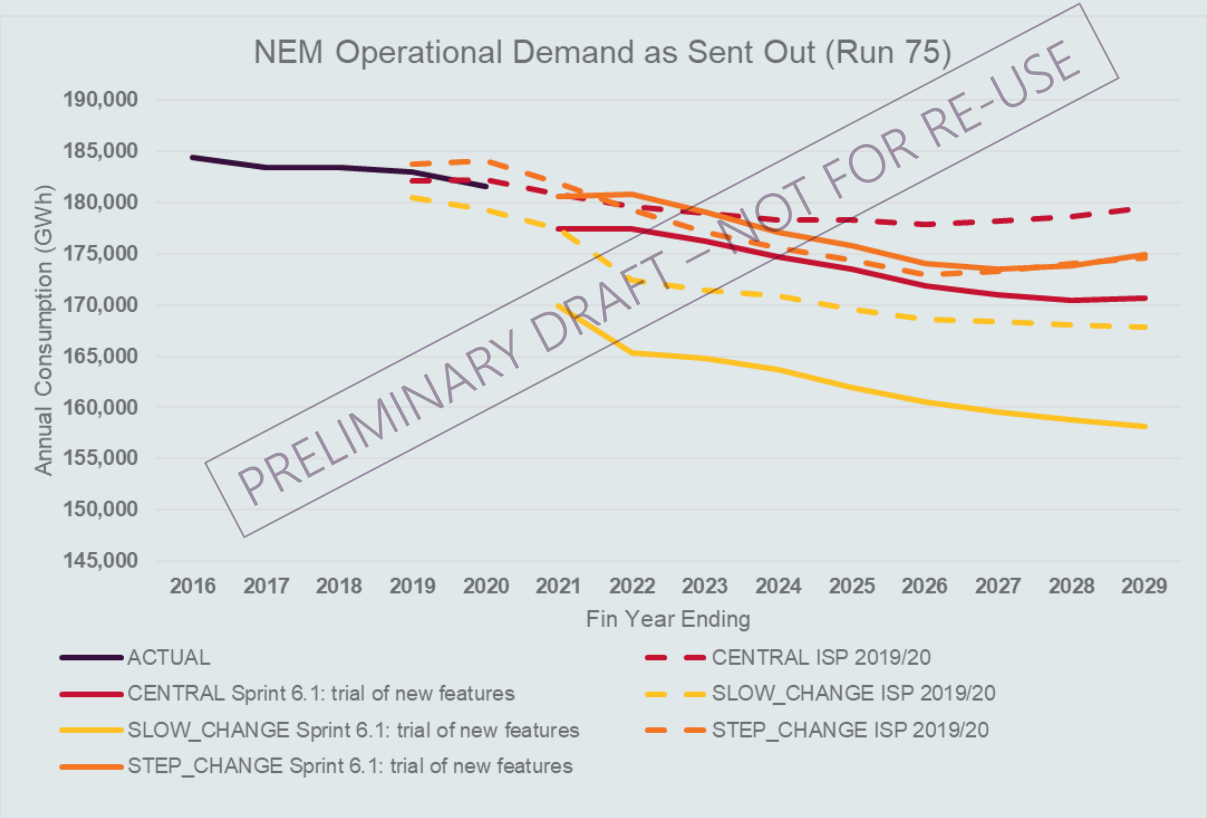
- Forecasts are PRELIMINARY and include KNOWN DATA GAPS
- COVID impacts materially lowering 2021 forecasts – with a much lower 'Slow Change' scenario aligned to Downside circumstances
- Key insight is the much wider degree of forecast uncertainty
- Additional impacts yet to be fully captured:
  - Large industrial loads
  - SME model refinements
  - Refined Energy efficiency trends



Additional sensitivities can highlight the variability

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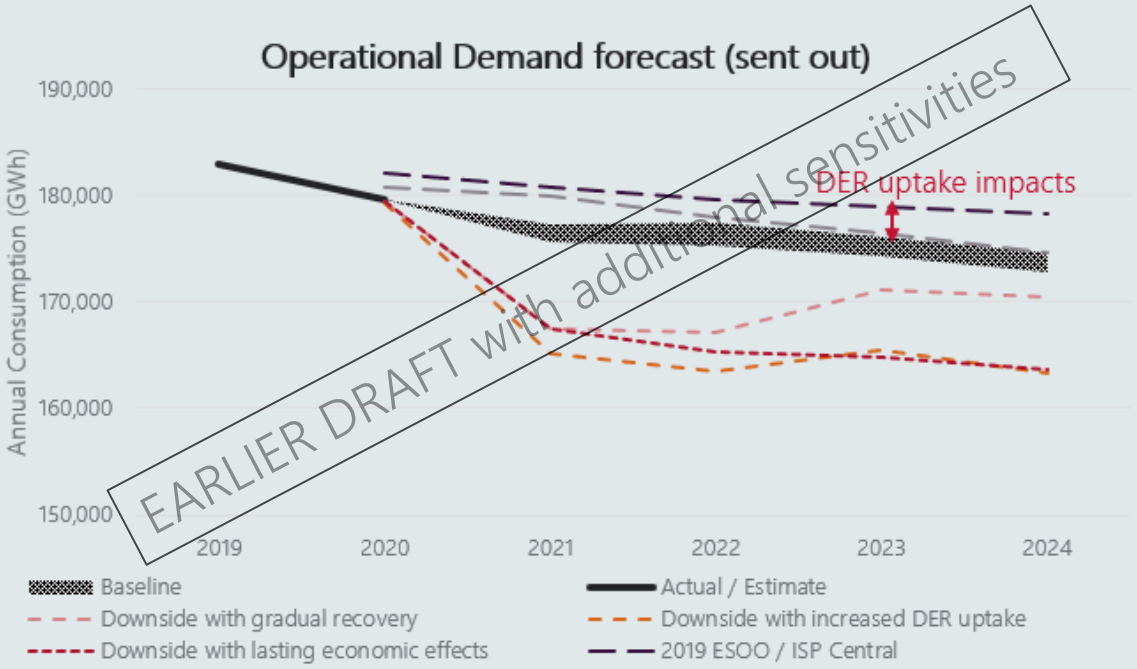
- DER uptake differences driving as much impact as COVID



Additional variations exist that can explore the range of outcomes more exhaustively:

- Central (Baseline)
- Central (Downside)
- Downside with stronger DER uptake
- Downside with industrial closures

These could explore the near term COVID impacts to the range of forecast outcomes, while considering the appropriate long-term trends that apply after COVID

Additional sensitivities can highlight the variability

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- Example relationship between consumption components and each scenario
- Longer term trends would deviate as a combined influence of each component, however the near-term COVID narrative would focus on uplifts / reductions from social restrictions and economic impacts domestically and internationally

	Step Change	Central (Baseline)	Central (Downside)	Downside (DER uplift)	Downside (industrial closures)	Slow Change
Economy	Higher growth	Central (Baseline)	Central (Downside)	Central (Downside)	Central (Downside)	Slow Growth
Commodity Outlook	Strong	Neutral	Neutral	Neutral	Weaker	Weak
COVID restrictions	6-9 months	6-9 months	15-18 months	15-18 months	15-18 months	15-18 months
DER uptake	High	Central	Central	High	Temporary stimulus	Low
Business / Industrial activity	V-shaped recovery	V-shaped recovery	U-shaped recovery	U-shaped recovery	L-shaped recovery	L-shaped recovery

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Questions that can assist us

- Do the scenarios presented reasonably capture the appropriate range for stakeholder purposes?
  - ESOO adequacy assessments will focus on Slow Change, Central and Step Change scenarios, but an ESOO update will be provided if the outlook changes materially from Central assumptions
- What sensitivities would provide greatest benefit to stakeholders?
- How much post-COVID transformation should be influenced by COVID
  - Lasting structural economic impacts?
  - Lasting social impacts?
  - Lasting behavioural impacts?

AEMO

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Energy.forecasting@aemo.com.au

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