# 2022 Draft Gas Consumption Forecasts

24 November 2021 FRG Meeting

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# Background and Purpose

Today's presentation consults on the draft 2022 gas consumption forecasts, which are key inputs to the 2022 Gas Statement of Opportunities (GSOO)

- Today's agenda includes:
  - GSOO 2022 scenario overview
  - Key changes and updates
  - Stakeholder feedback: inclusion of decarbonisation drivers ie. electrification, hydrogen consumption and hydrogen production
  - Draft consumption outlook
  - Peak demand initial insights
  - LNG draft consumption outlook
  - Discussion

| Timing | Gas consumption forecasts | Responsible |
|---|---|---|
| Jan 2021 | Discussion on 2021 forecasts | AEMO |
| June 2021 | CSIRO Multi-sector modelling | CSIRO |
| July 2021 | IASR consultation and publication | AEMO |
| **Today** | **2022 draft consumption forecasts** | **AEMO** |
| March 2022 | 2022 GSOO released | AEMO |

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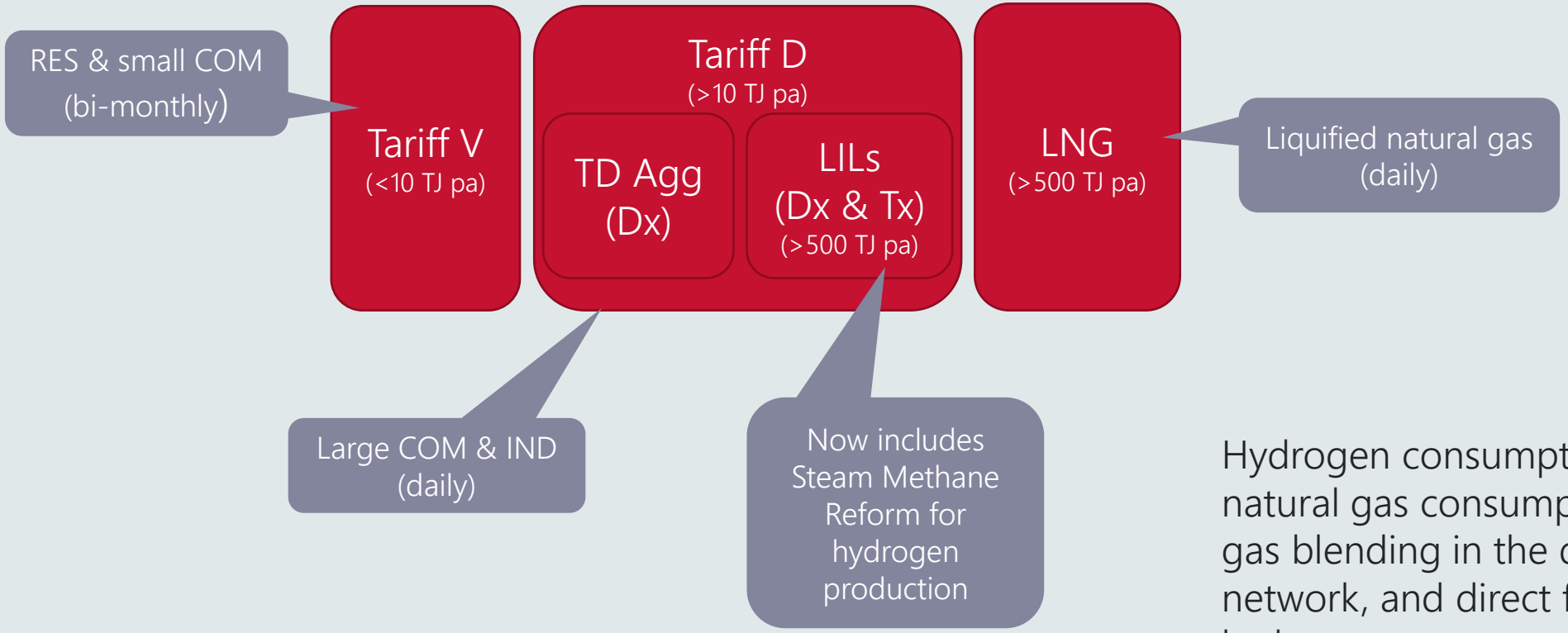
# Natural gas consumption forecast overview




Hydrogen consumption offsets natural gas consumption through gas blending in the distribution network, and direct fuel switching by large energy users.

# Scenario overview

# 2022 GSOO scenario overview

| Driver | Net Zero 2050 | Hydrogen Superpower | Strong Electrification |
|---|---|---|---|
| | **Technology-led**<br>With a national emissions abatement end goal | **Economy and technology-led**<br>With Australia leveraging competitive advantage to export hydrogen | **Economy and technology-led**<br>Sensitivity to Hydrogen Superpower with full electrification |
| Economic & population growth | Central | Higher growth | Higher growth |
| Energy efficiency improvement | Moderate | High | High |
| Residential fuel switching | Moderate | High | High |
| COVID-19 Recovery | Moderate | Quick | Higher growth |
| Gas prices | Moderate | Moderate | Moderate |
| Hydrogen adoption | Low (Potential for domestic consumption) | Large NEM-connected export and domestic consumption | Minimal |
| Relative Concentration Pathway (avg. temp rise) | RCP4.5 (around 2.6°C increase in temperatures by the end of the century) | RCP1.9 (consistent with limiting temperature increases to 1.5°C) | RCP1.9 (consistent with limiting temperature increases to 1.5°C) |

A **Low Gas Price sensitivity** explores potential impacts of lower gas prices on consumption by residential, commercial, and large industrial consumers, and GPG, based on the Steady Progress[1] scenario with no explicit Net Zero 2050 target

1 Refer to: https://aemo.com.au/-/media/files/major-publications/isp/2021/2021-inputs-assumptions-and-scenarios-report.pdf for a more detailed scenario description

# Key changes and updates

# Updates to model inputs and methodology

## Model input updates

- Gas price forecast
  Lewis Grey & Associates
- Energy Efficiency forecast
  Strategy Policy Research
- Economic forecast
  BIS Oxford Economics
- Large Industrial Load (LIL) surveys
- Distribution surveys

## Key methodology changes ★

- Multi-sector modelling inputs
  - Electrification
  - Hydrogen
  - Steam methane reforming - new natural gas load to produce hydrogen
- Energy intensity in long-term Tariff-D Aggregate model

★ Resulting from stakeholder feedback

# Results of actioning feedback on decarbonisation drivers

# For the first time[1] AEMO gas models assess the impacts of economy-wide decarbonisation

By 2040 the scenarios show[2]:

- **Net Zero 2050:** In winter, we increasingly heat our homes with air-conditioning and use heat pumps, with gas heating appliances reduced by 55% since 2020. Electricity used in industry and manufacturing processes increase from 20% to 30%.

- **Hydrogen Superpower:** Houses use 90% less natural gas for heating and cooking than in 2020, switching to hydrogen (54% of the change) or electricity. Hydrogen has become a significant source of energy in the NEM. Industry reduces use of natural gas by over 65% since 2020, with a bit over half of that demand shifting to hydrogen instead.

- **Strong Electrification:** Houses use 90% less natural gas for heating and cooking than they used in 2020 switching to electricity. Industry reduces natural gas use by over 65% since 2020 shifting to electricity.

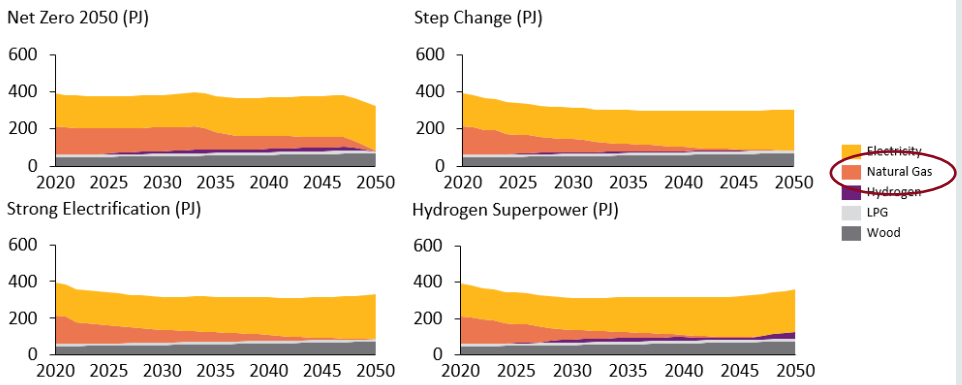
1 https://aemo.com.au/-/media/files/major-publications/isp/2021/2021-inputs-assumptions-and-scenarios-report.pdf
2 https://aemo.com.au/-/media/files/major-publications/isp/2021/2021-inputs-assumptions-and-scenarios-report-overview.pdf

# CSIRO forecast a large reduction in gas consumption across all sectors and scenarios

Recap from 30 June

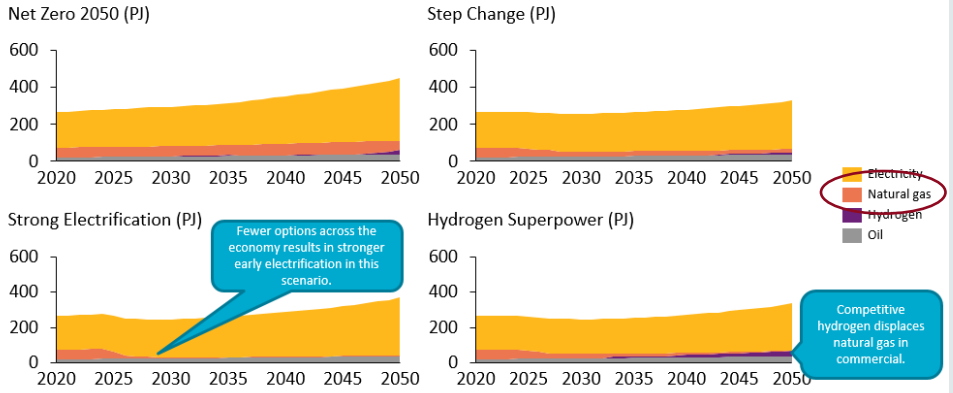
*Fuel switching from natural gas to electricity expected in residential buildings…*

**Residential fuel use**



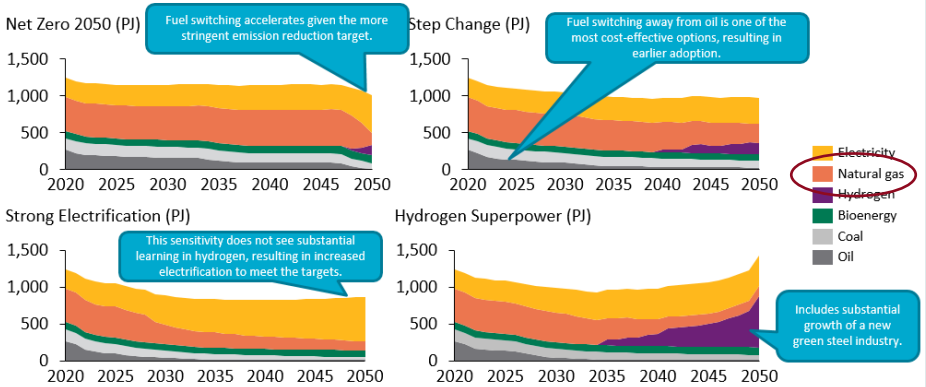

*Electricity use remains dominant in commercial buildings…*

**Commercial fuel use**



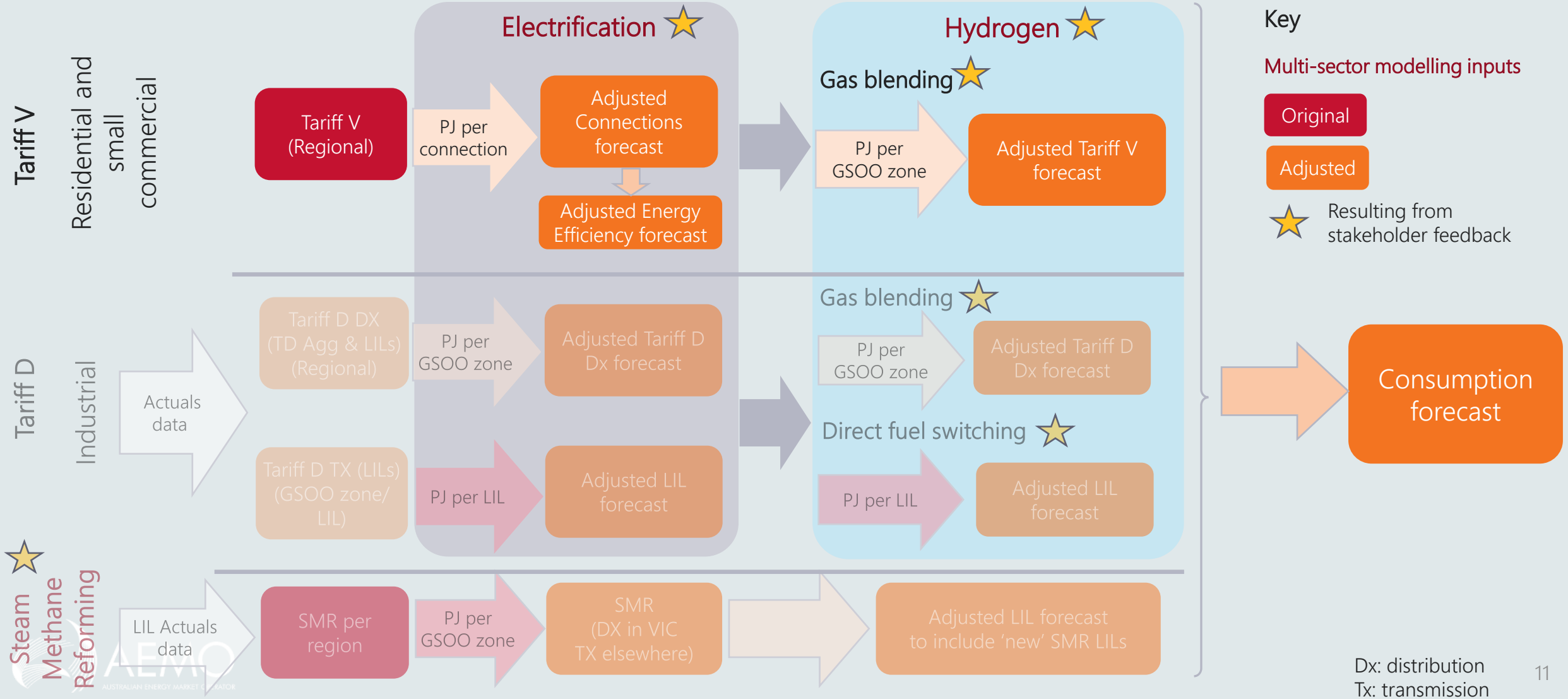

*Industry can continue to grow in a decarbonised economy through low emission fuels…*

Industry fuel use




*Slides duplicated in the appendix

# AEMO incorporates decarbonisation drivers in its gas consumption models




Dx: distribution
Tx: transmission

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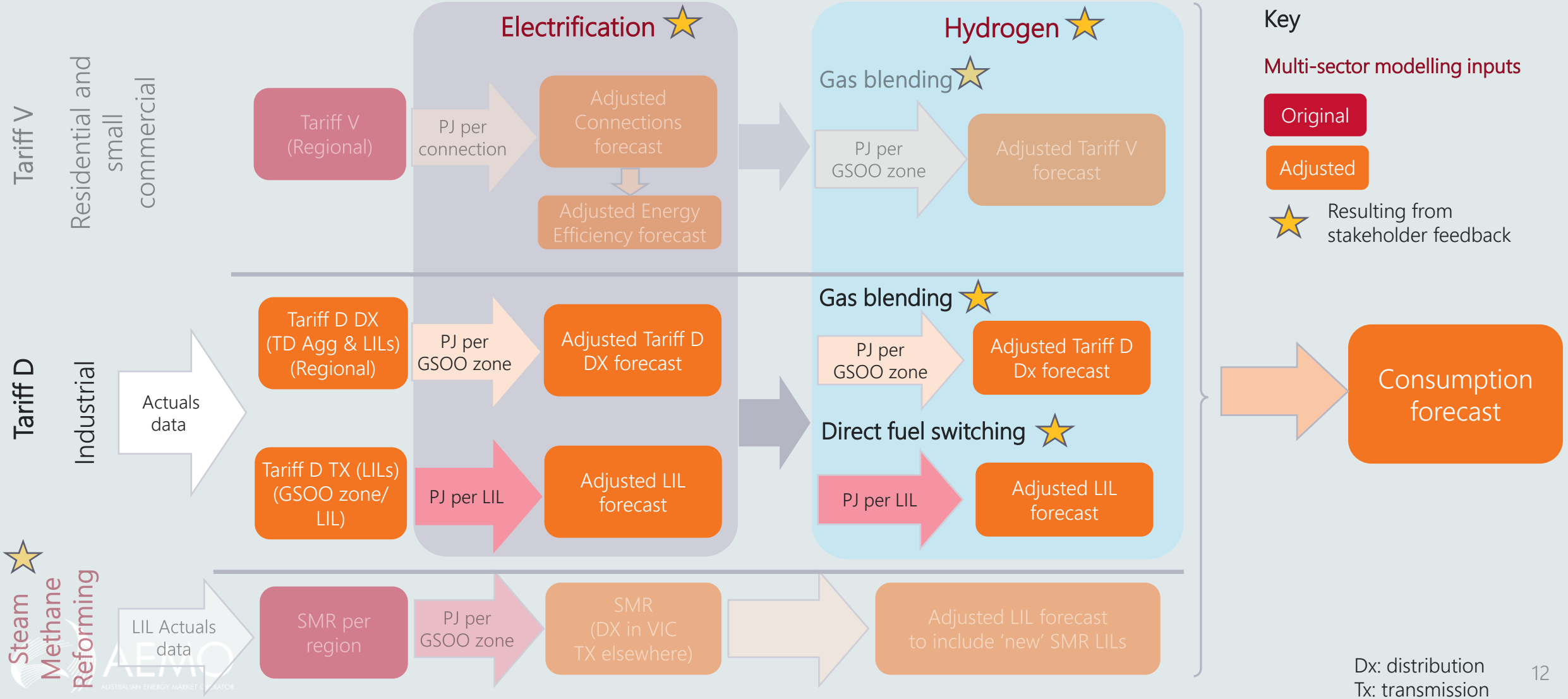


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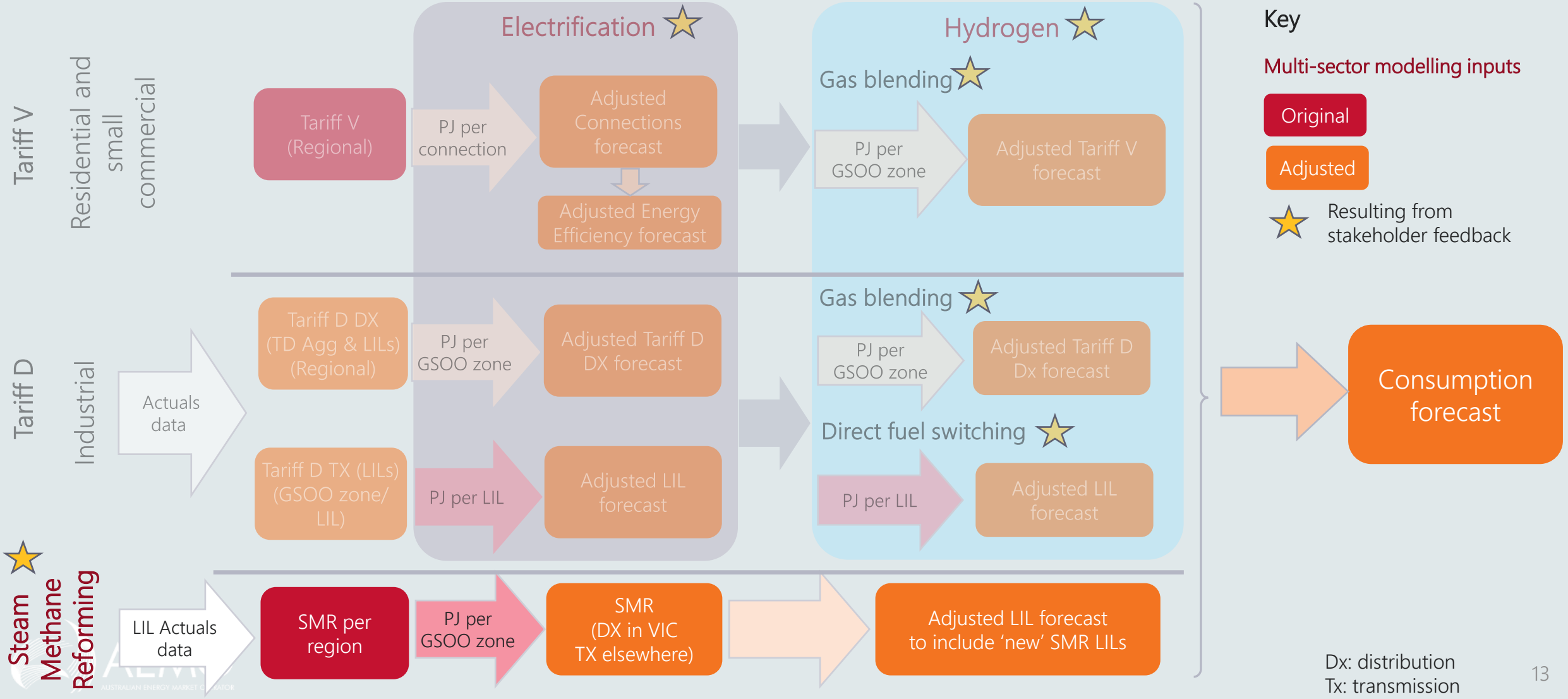


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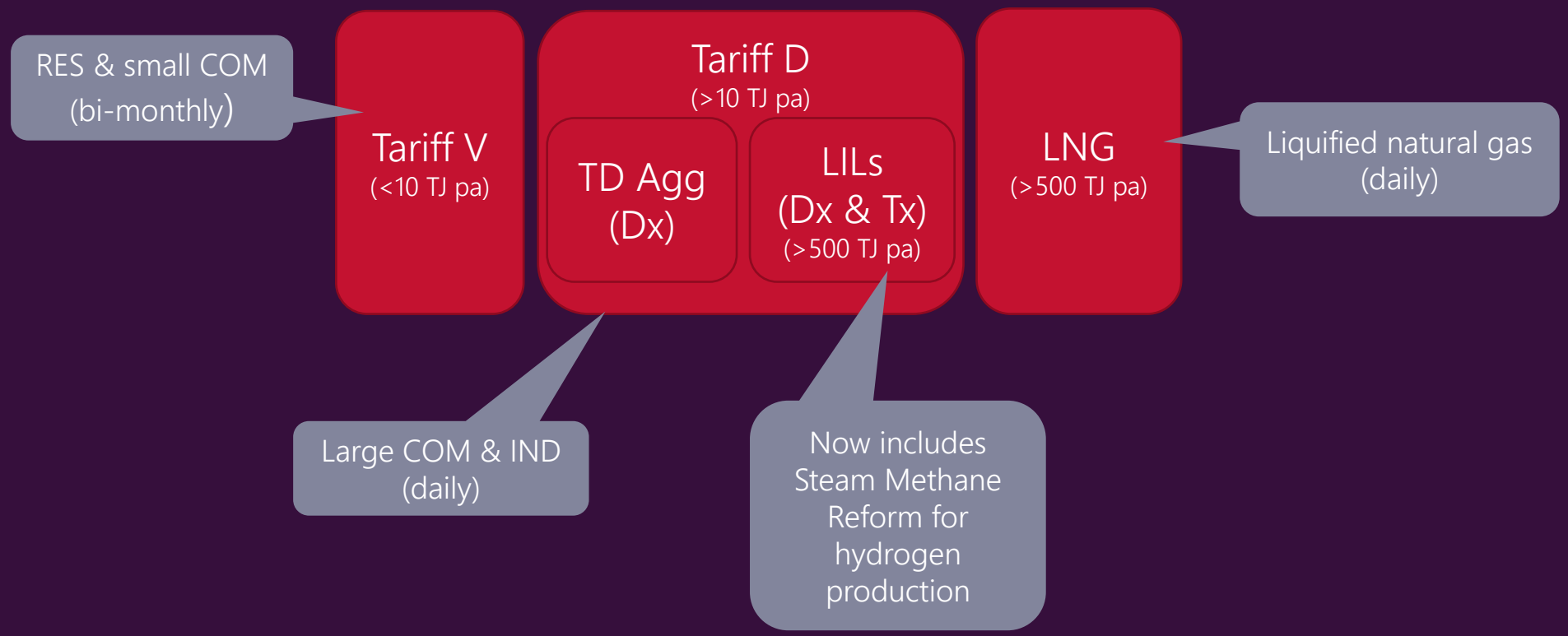
# Draft forecasts by sector

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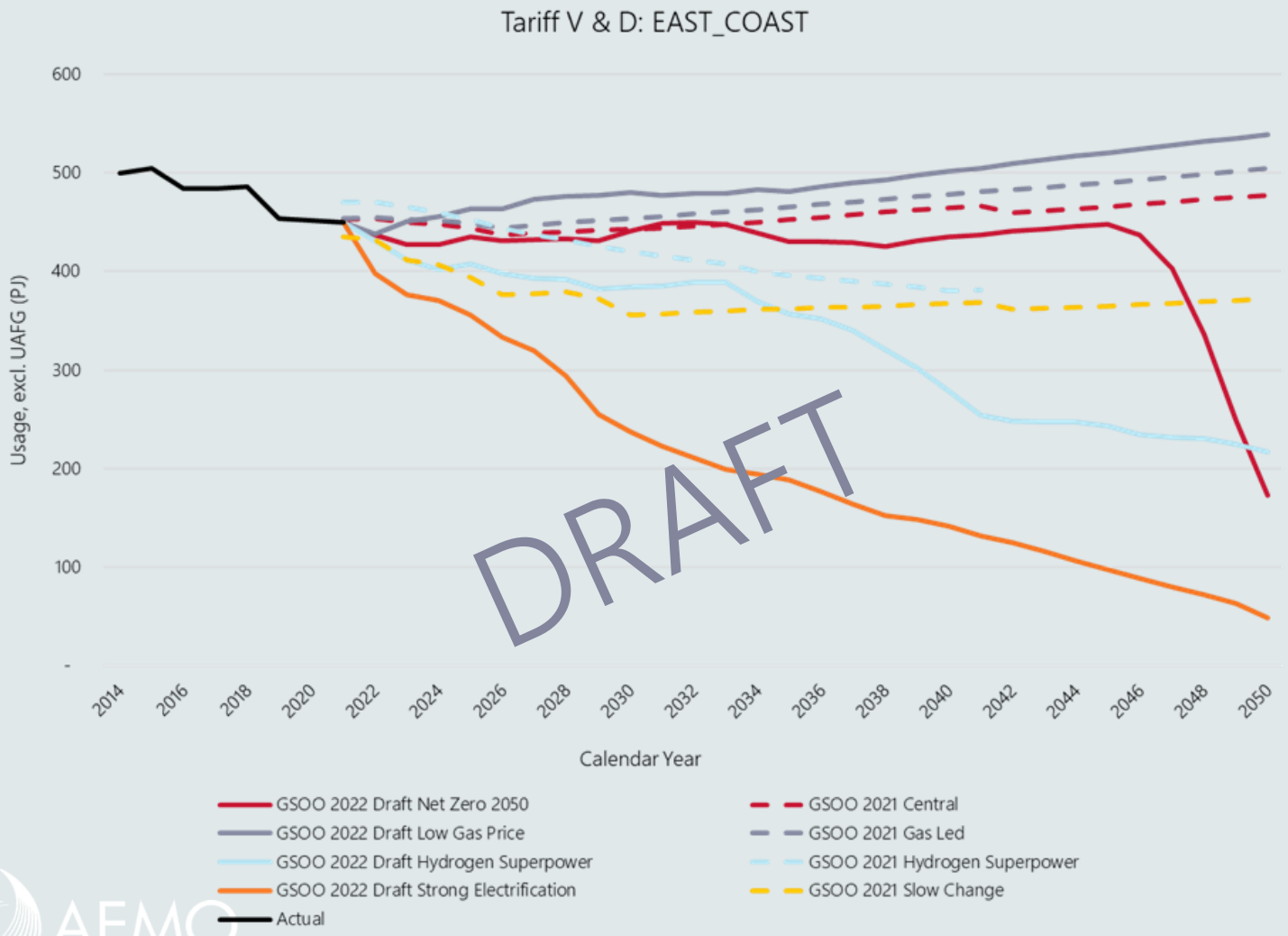
# Residential, Commercial and Industrial gas consumption reduces with electrification, but is partially offset by hydrogen production in Net Zero 2050



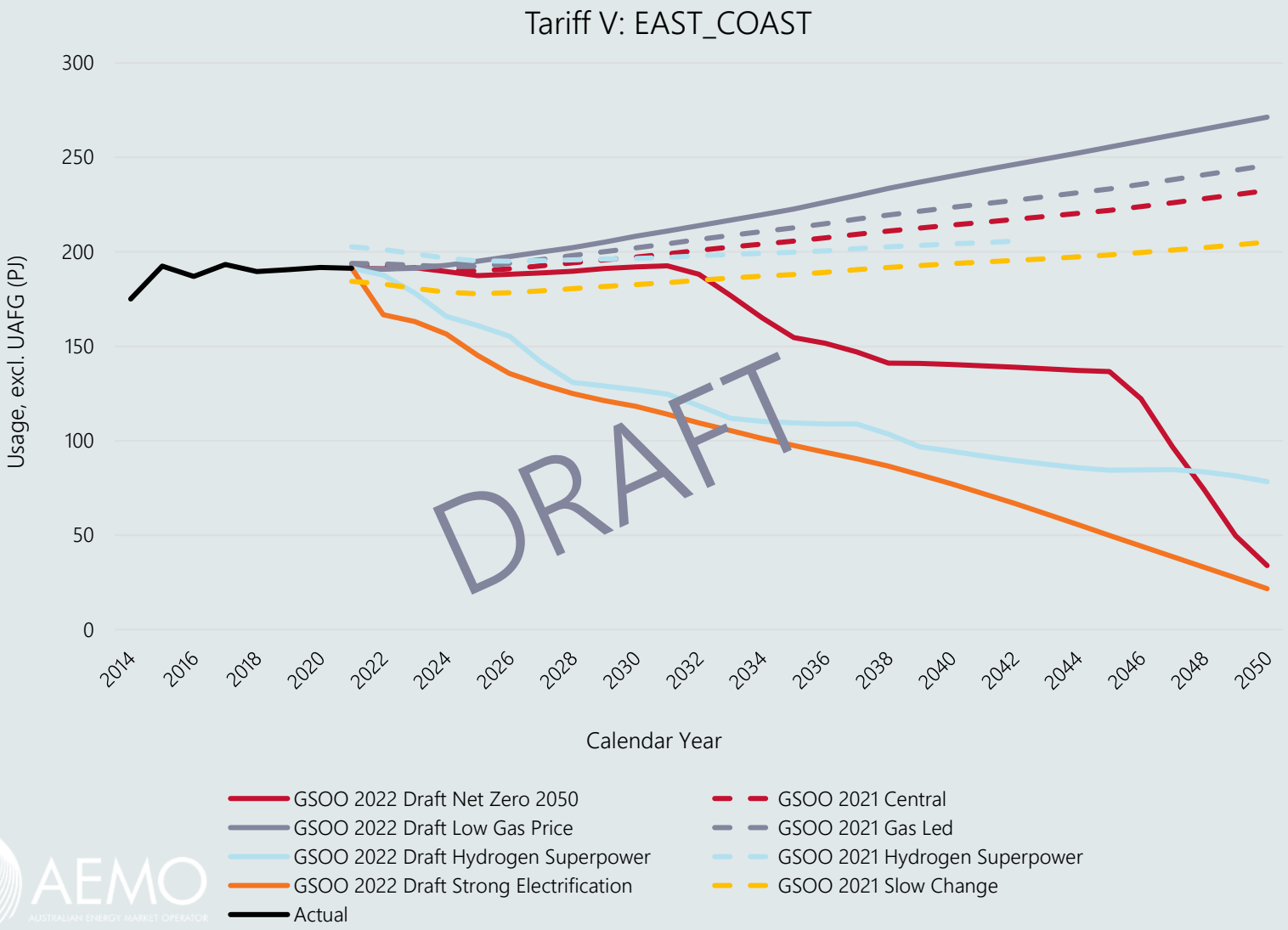

Forecasts are developing drafts and subject to change. They show dynamics of drivers from multi-sector modelling.

Decarbonisation drivers in all scenarios except Low Gas Price sensitivity

Net Zero 2050 forecast drops from mid 2040s significantly due to later action to meet net zero target

Minor variances in figures since FRG presentation resolves data currency between models

# Residential and small commercial gas consumption declines due to fuel switching

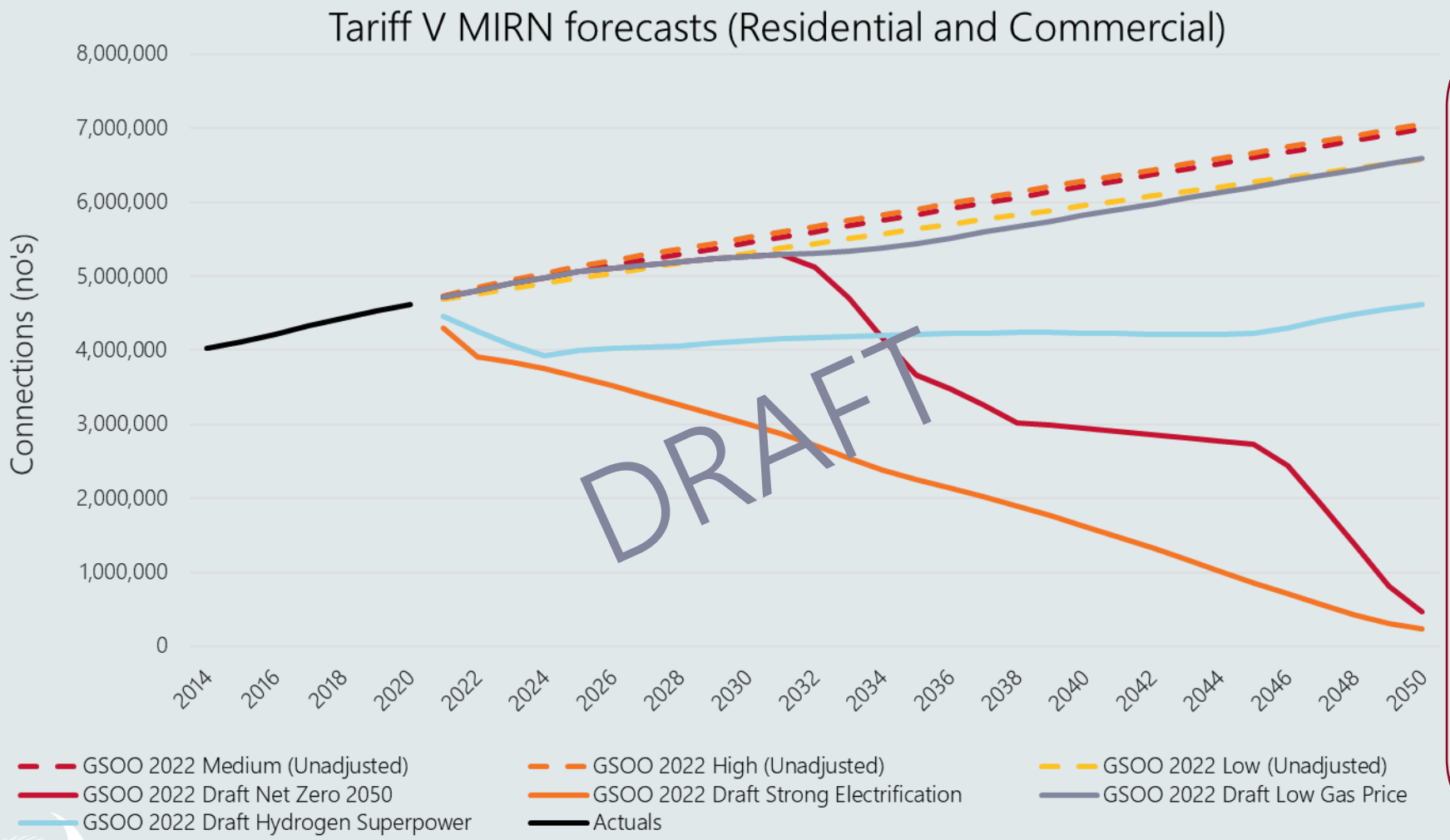



Forecast currently excludes RES energy efficiency, which is potentially a major source of savings

Low Gas Price is the high growth scenario

Net Zero 2050 shows greatest decline from mid 2040s

# Residential and Commercial gas connections decline due to electrification



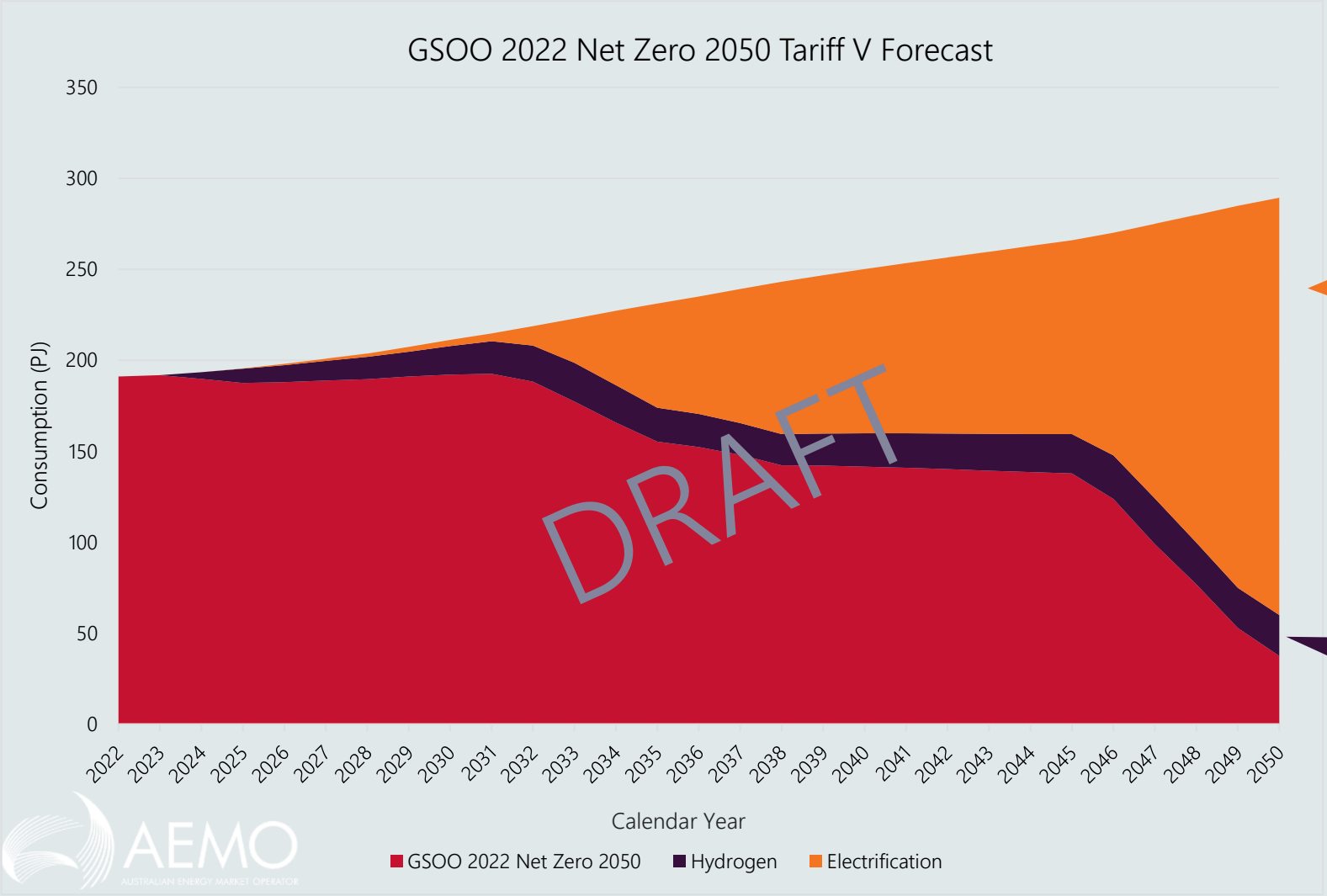

MIRN forecasts follow scenario population drivers and NMI connections growth

Adjustments reflect decarbonisation driver of electrification, with new gas connections not occurring as customers preference electricity over gas

Significant in the Strong Electrification and Net Zero 2050 scenarios

MIRN: Meter Installation Reference Number – a gas connection

# Under Net Zero, fuel switching reduces future residential and commercial gas consumption




Electrification is significant from mid 2040s. Applied via reduction in connections (to a floor of zero connections), consistent with significant reduction in consumption shown in CSIRO's modelling

Hydrogen adjustment represents gas blending in the distribution network which offsets natural gas consumption

Excludes RES energy efficiency

# Work in progress for Residential and small Commercial: retail price and energy efficiency to be incorporated

Not yet incorporated:

Retail price forecasts

- Adopts draft wholesale price forecasts being presented by LGA at this FRG

Energy efficiency forecasts

- The National Construction Code is the major source of gas savings from better-designed houses (more insulation, better windows, etc), further reducing consumption significantly
- Forecast assumes base star rating of R1.5 stars down from R2.0 in previous years, significantly changing estimated savings. AEMO is considering how best to incorporate higher savings, e.g. recalibrate to align with previous assumptions.

Stakeholder feedback:

What else could AEMO consider?

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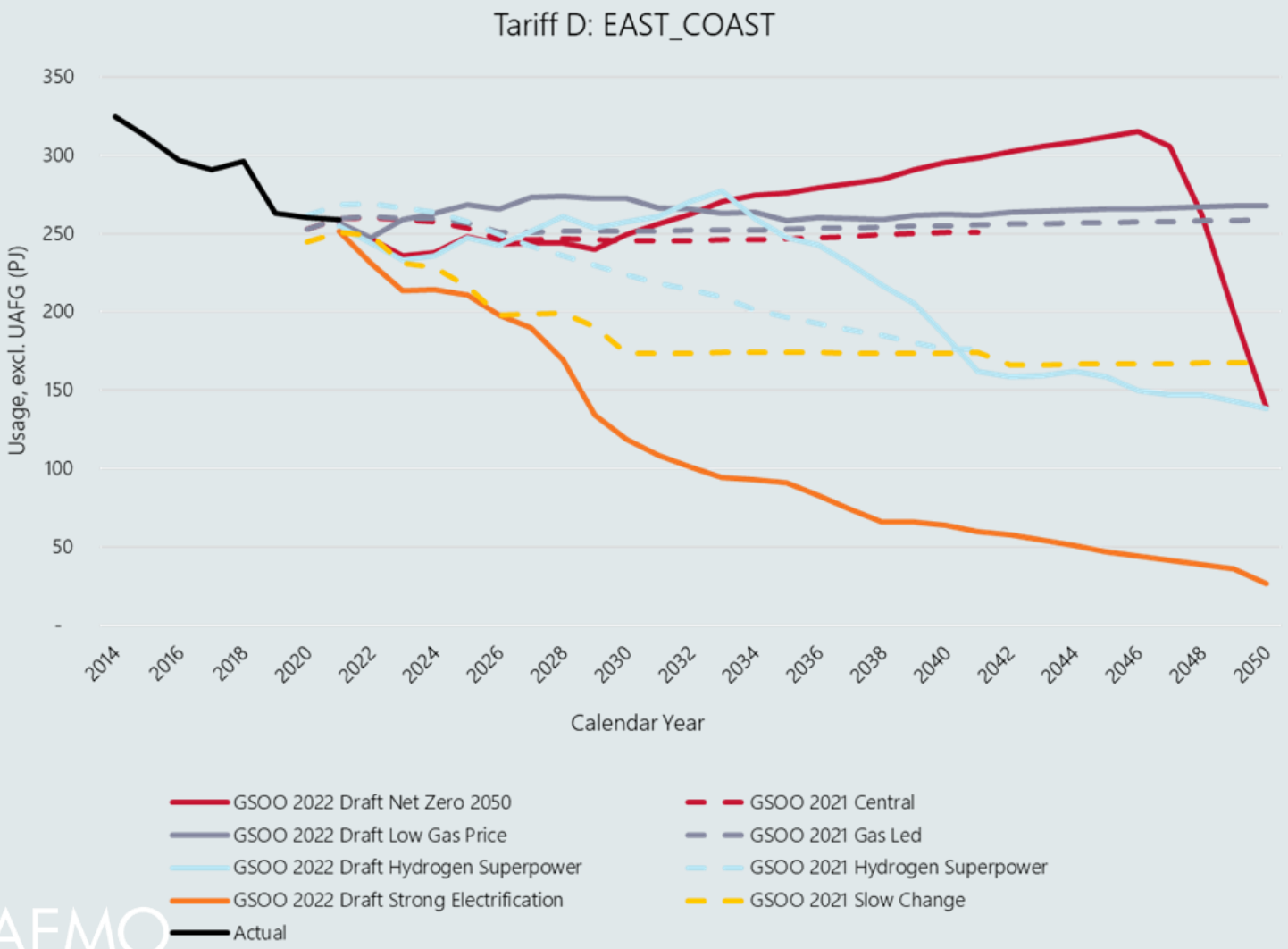
# Hydrogen production drives increases in Large Commercial and Industrial gas consumption in Net Zero 2050

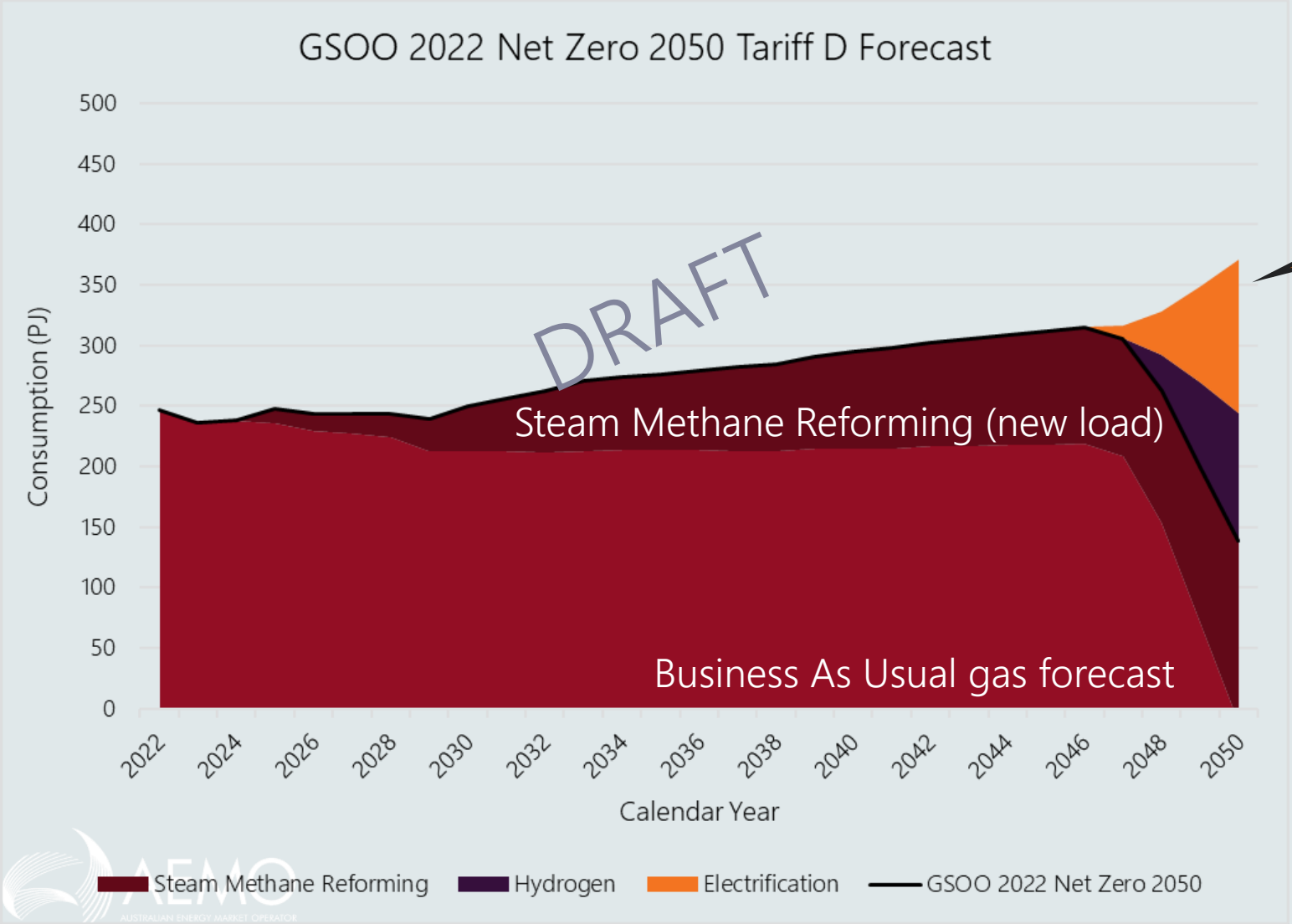



Fluctuations driven by decarbonisation adjustments for electrification and hydrogen, and new steam methane reforming load (hydrogen production) in Net Zero 2050.

They are most noticeable in the LIL forecasts.

Minor variances in figures since FRG presentation resolves data currency between models

# Multi sector adjustments lower annual consumption




Hydrogen and electrification offset natural gas consumption from the mid 2040s as part of net zero by 2050 goal

## Stakeholder feedback

- For electrification, AEMO assumes that all large energy users have the potential to switch from gas to electricity and apportions the adjustment pro-rated by consumption. Are there other methods that AEMO could consider?
- Does the scale of Steam Methane Reforming align with the scenario narratives?

Minor variances in figures since FRG presentation resolves data currency between models

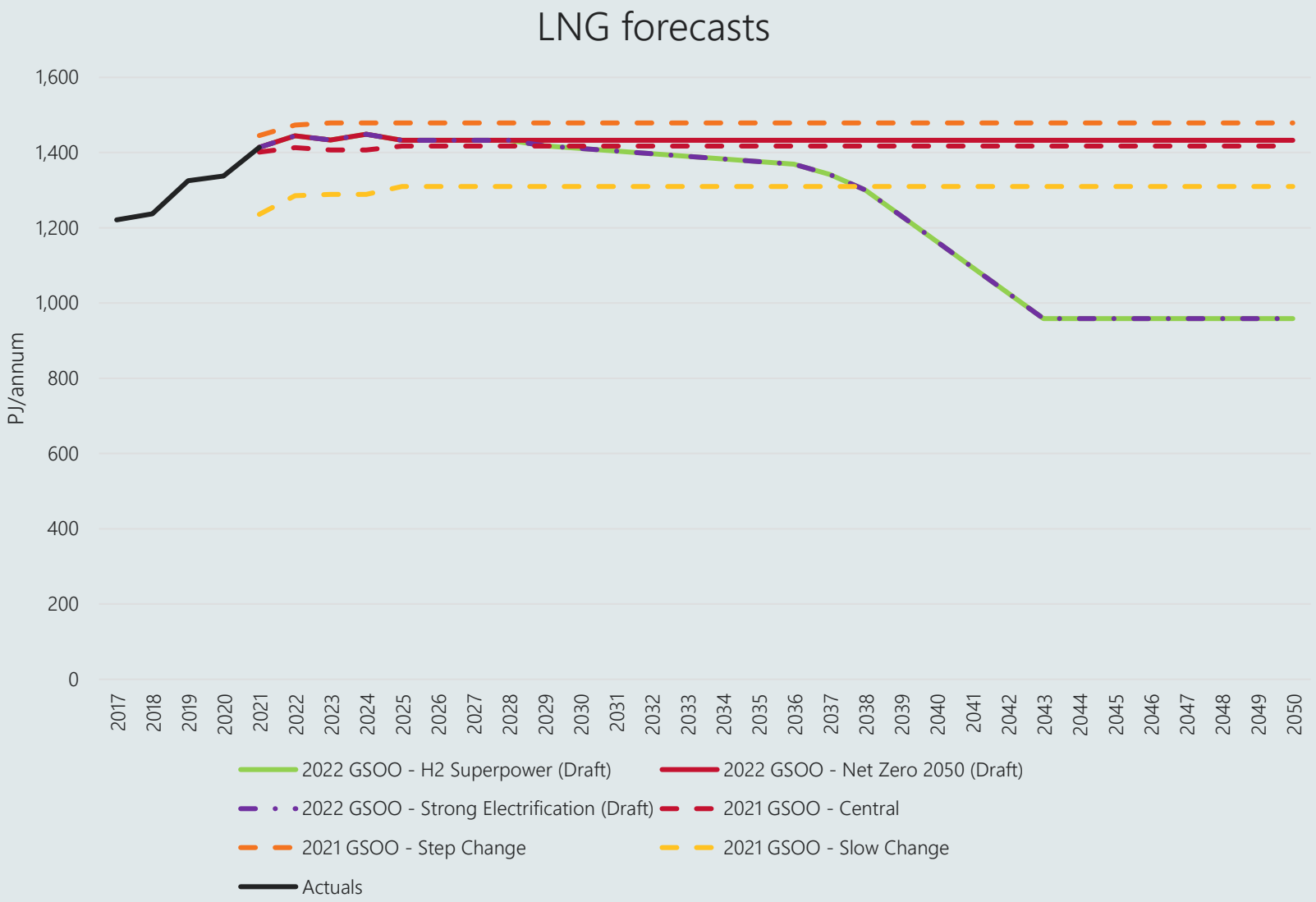
# Peak day forecasts generally follow the annual consumption drivers

- Only considers natural gas (Tariff V + Tariff D)
- Electrification proportion in winter and summer to remain the same - no significant change in the rate of electrification across the components (gas heating doesn't electrify at a faster rather than gas hot water, for example).
- Proposing: No changes to the peak day gas forecasting methodology.

# LNG

Compared to the 2021 GSOO there is higher forecast consumption in the 2022 GSOO due to:

- Improved GSOO survey responses from LNG operators.
- Higher LNG prices in the international markets
  - Most LNG producers are operating at or close to full capacity and have allocated the vast majority of their shipments to customers.
- Near-term tightness in the international LNG market is due to:
  - Power curbs and outages across China due to coal shortages for electricity generation. Switching to GPG generation.
  - Low levels of European gas storage, fuelling restocking efforts
  - Maintenance at LNG plants prolonged and delayed due to COVID-19




**Note:** The 2022 Hydrogen Superpower, Net Zero 2050 and Strong Electrification scenarios all have the same LNG forecast until 2029.

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# Seeking stakeholder feedback

## General

- Do the scenarios provide a reasonable view of potential gas futures?
- Are there other trends or risks that AEMO could consider that have not been discussed?

## Tariff V forecast

- For Energy Efficiency, the consultant assumed a base star rating of R1.5 stars down from R2.0 in previous years, significantly changing estimated savings. AEMO is considering how best to incorporate higher savings, e.g. recalibrate to align with previous assumptions,. What else could AEMO consider?

## Tariff D forecast

- For TD electrification, AEMO assumes that all large energy users have the potential to switch from gas to electricity and apportions the adjustment pro-rated by consumption. Are there other methods that AEMO could consider?
- Does the scale of Steam Methane Reforming align with the scenario narratives?

# Appendix: Model inputs by region

1. Tariff V: Connections
2. Tariff V: Retail price index

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# New South Wales

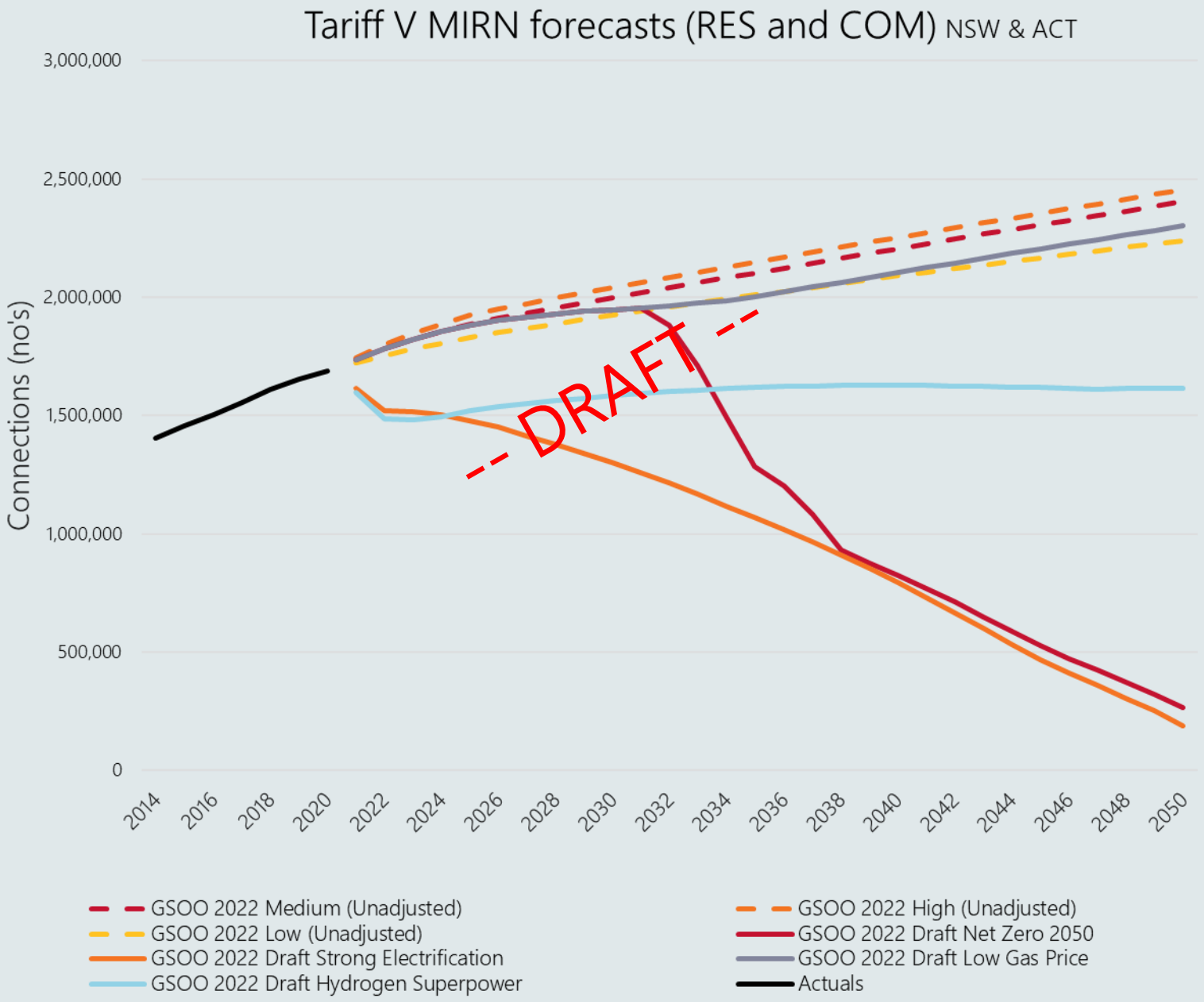
# MIRN forecast

Unadjusted MIRN forecast assumes no new residential connections from 2023 for the ACT.

The BAU forecasts are linked to NMI growth in the long term.

CSIRO forecasts have been incorporated in the connections forecast to show the impact of electrification.

The greatest fall in new connections is observed under the Net Zero 2050 and Strong Electrification scenarios.

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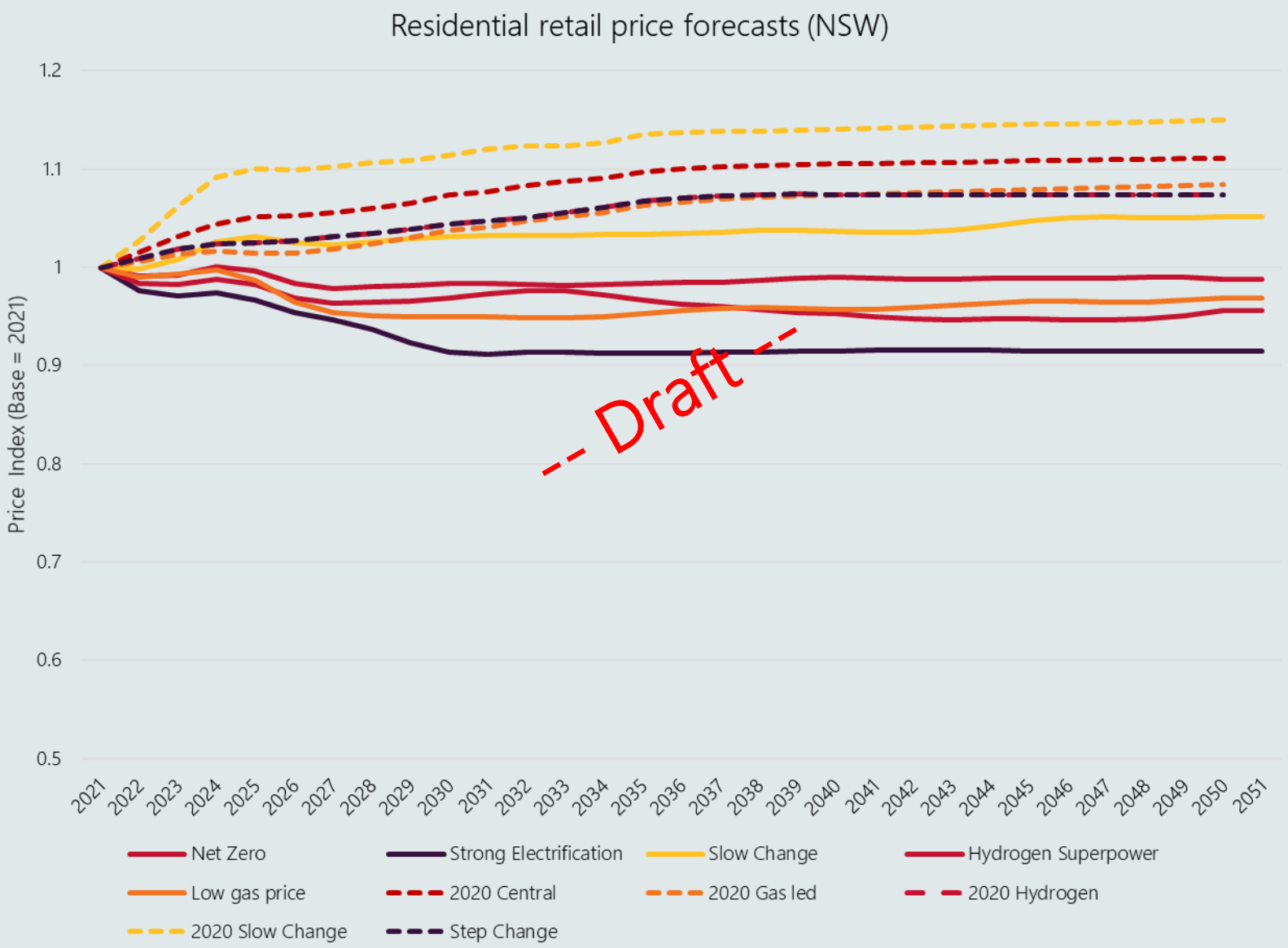
# Residential retail price forecast

Retail price forecasts are largely driven by the wholesale gas price, and to a lesser extent, distribution costs and/or retail margins. The increased spread across scenarios in 2022 reflects the increased spread across wholesale price forecasts, the reasons for which will be examined in the following presentation by LGA.

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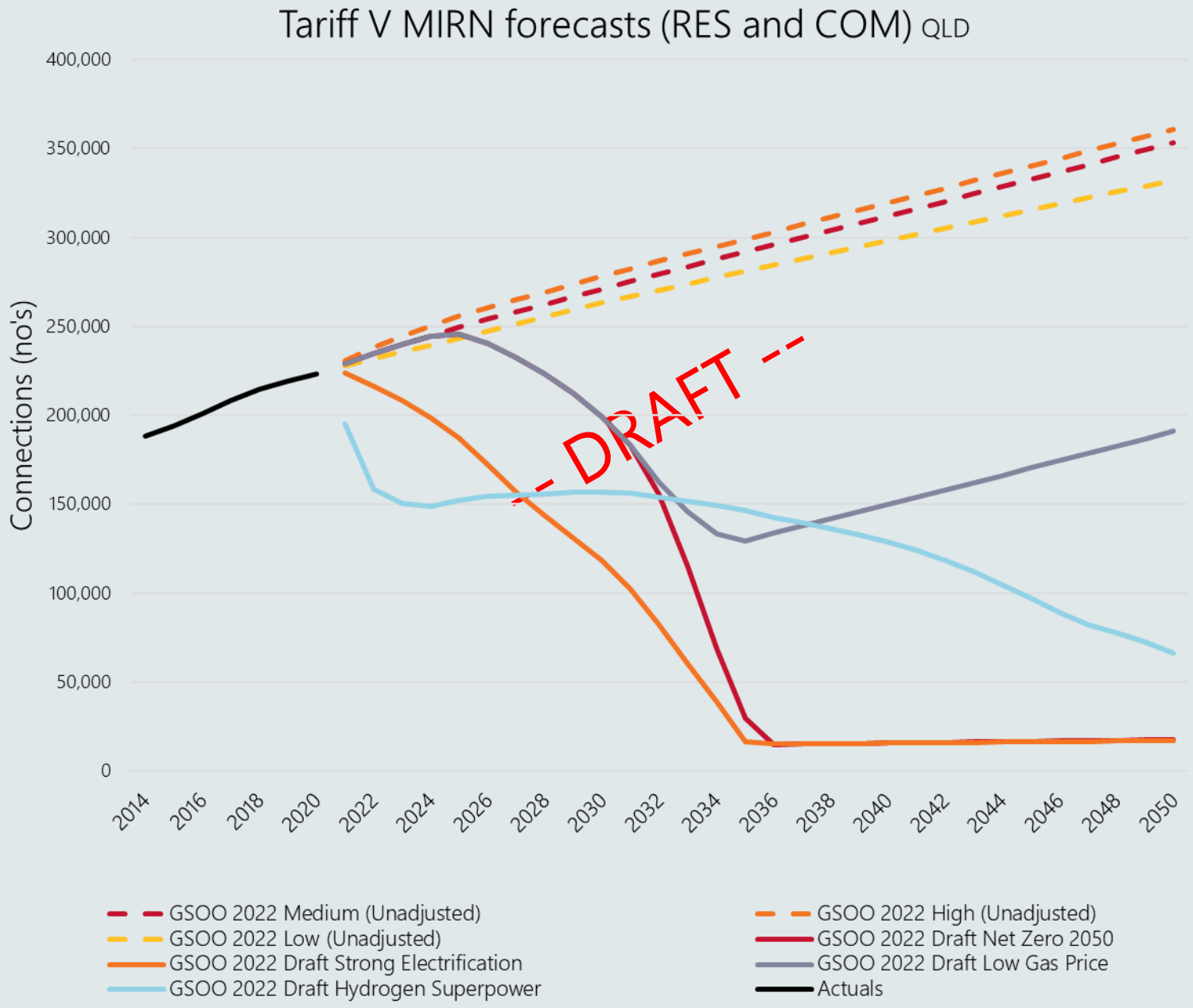
# Queensland

# Connections

The Unadjusted forecasts are linked to NMI growth in the long term.

CSIRO forecasts have been incorporated in the connections forecast to show the impact of electrification.

The greatest fall in new connections is observed under the net zero and strong electrification scenarios.

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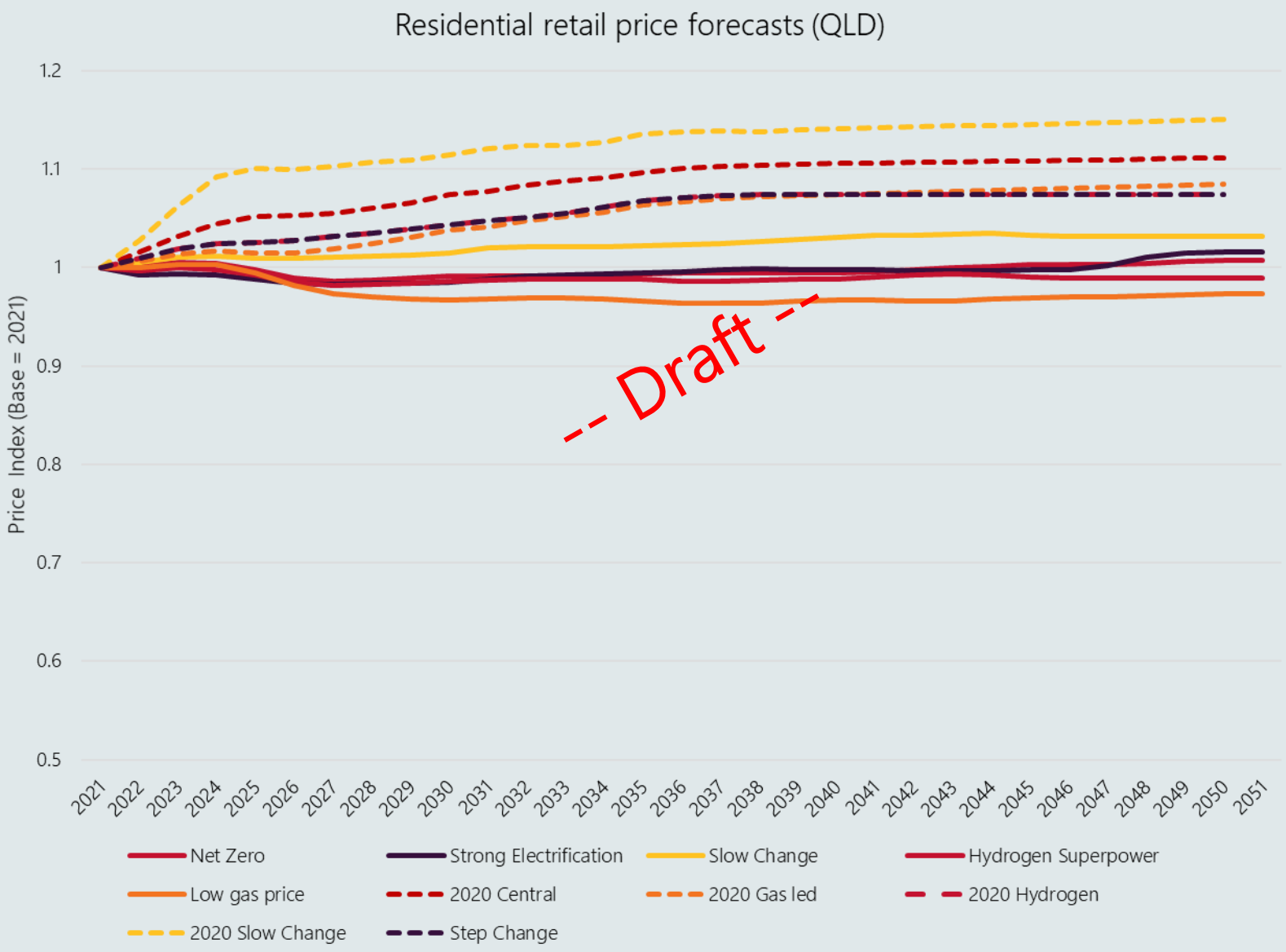


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# South Australia

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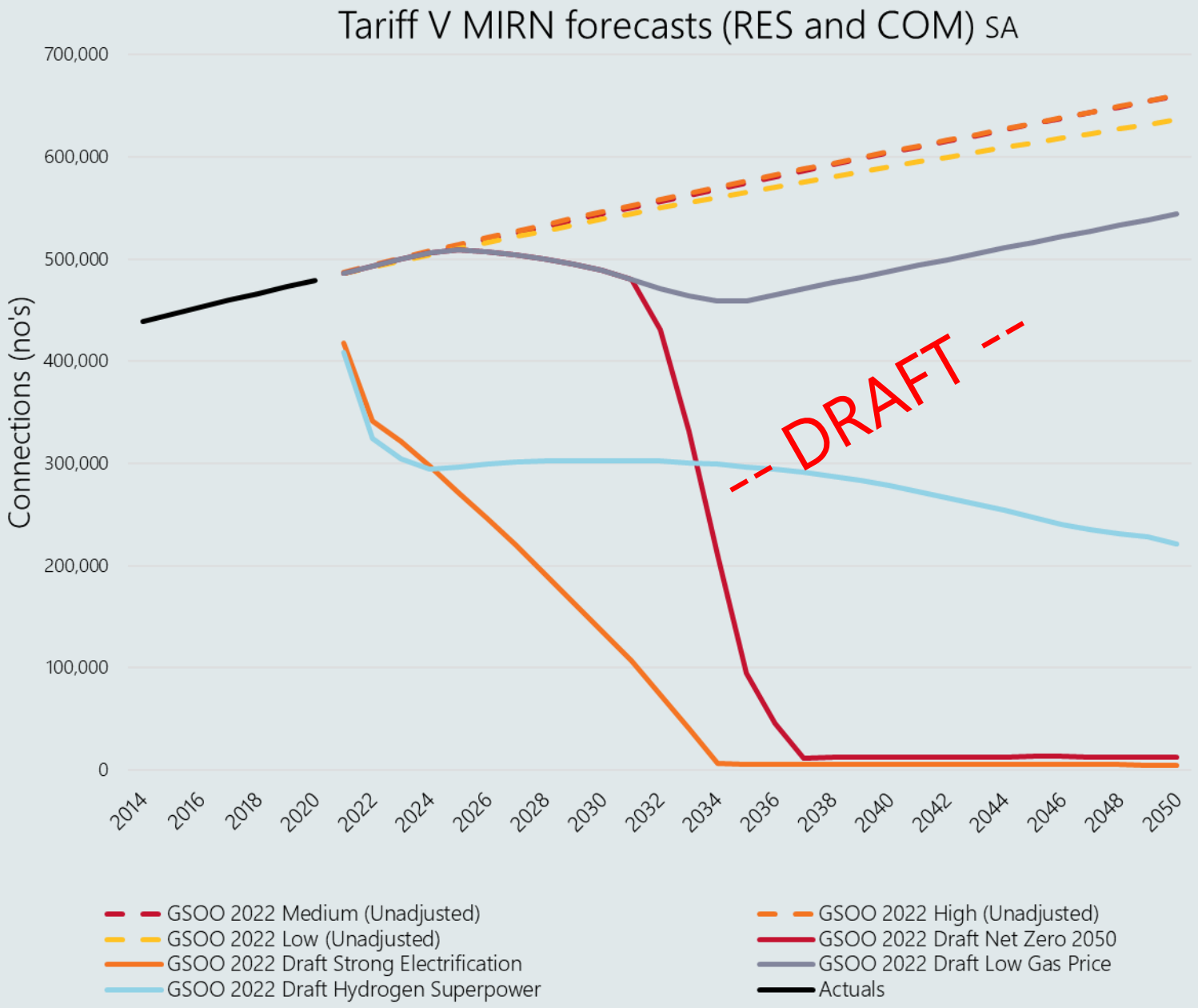


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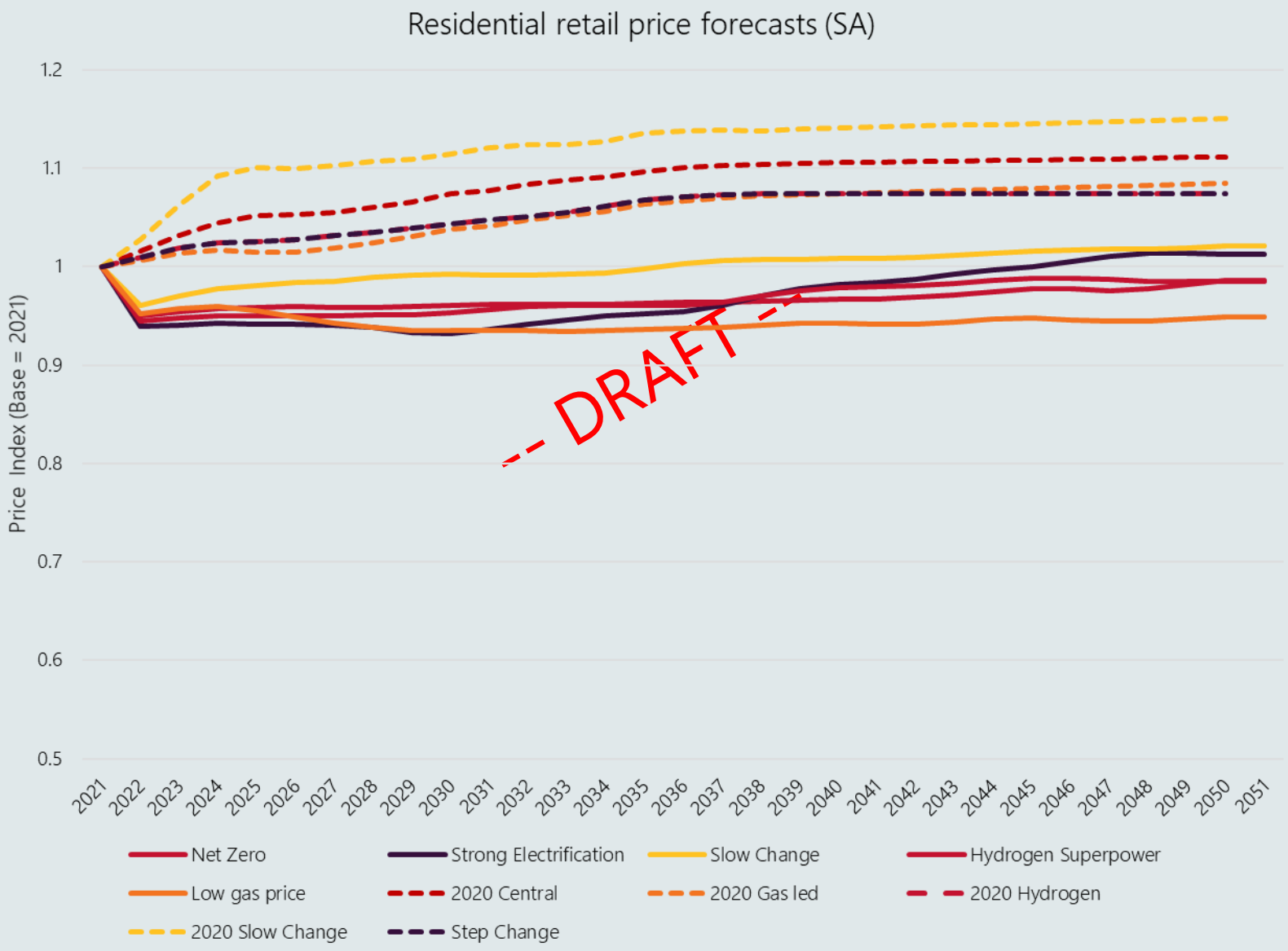
# Residential retail price forecast

The drop in South Australian retail prices from 2021 to 2022, across all scenarios, is the result of the forecast drop in wholesale prices.

These results will be examined more closely in the following LGA Presentation .

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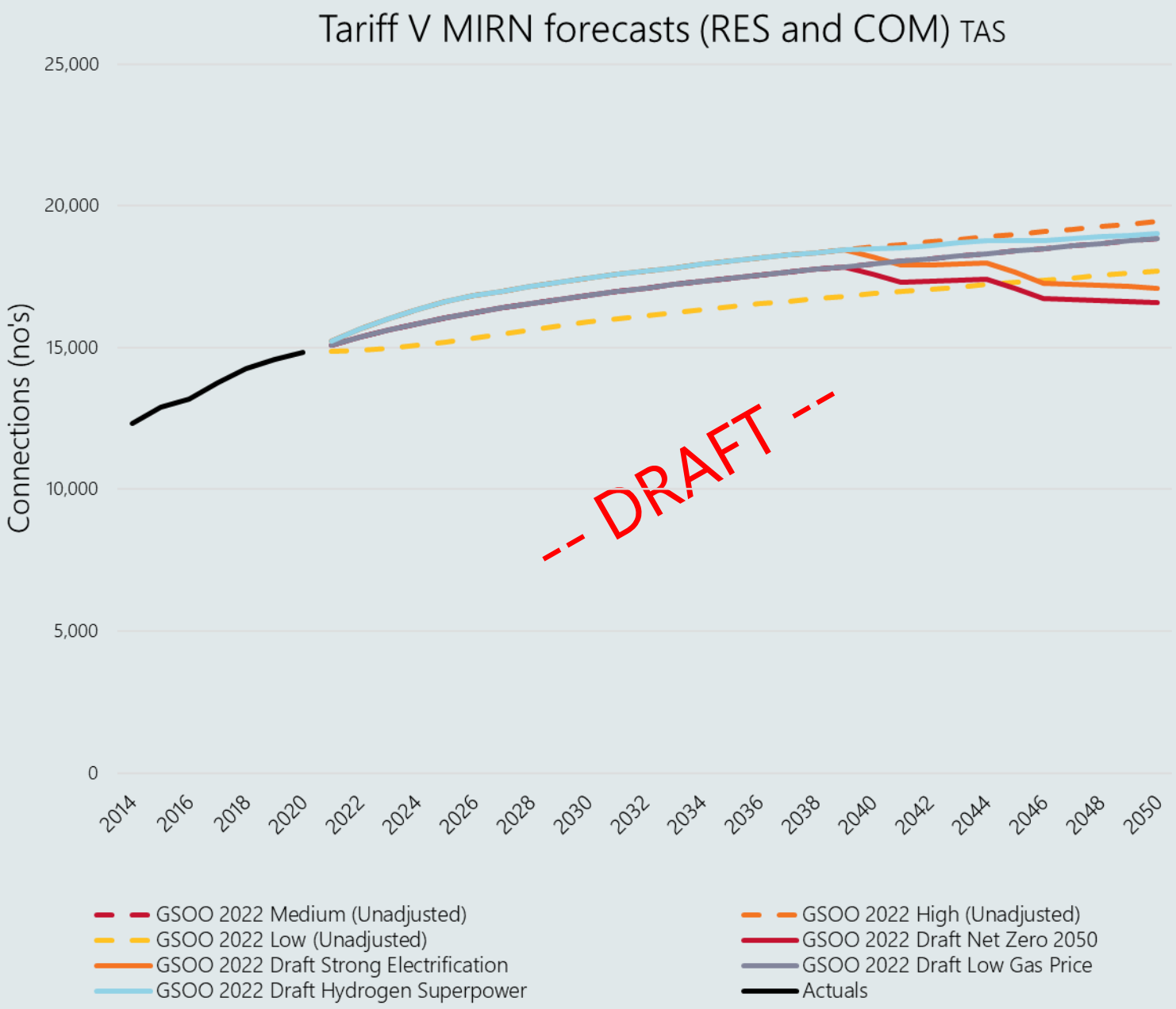
# Tasmania

# Connections

The Unadjusted forecasts are linked to NMI growth in the long term.

CSIRO forecasts have been incorporated in the connections forecast to show the impact of electrification.

The level of electrification is less evident in Tasmania compared to other regions.

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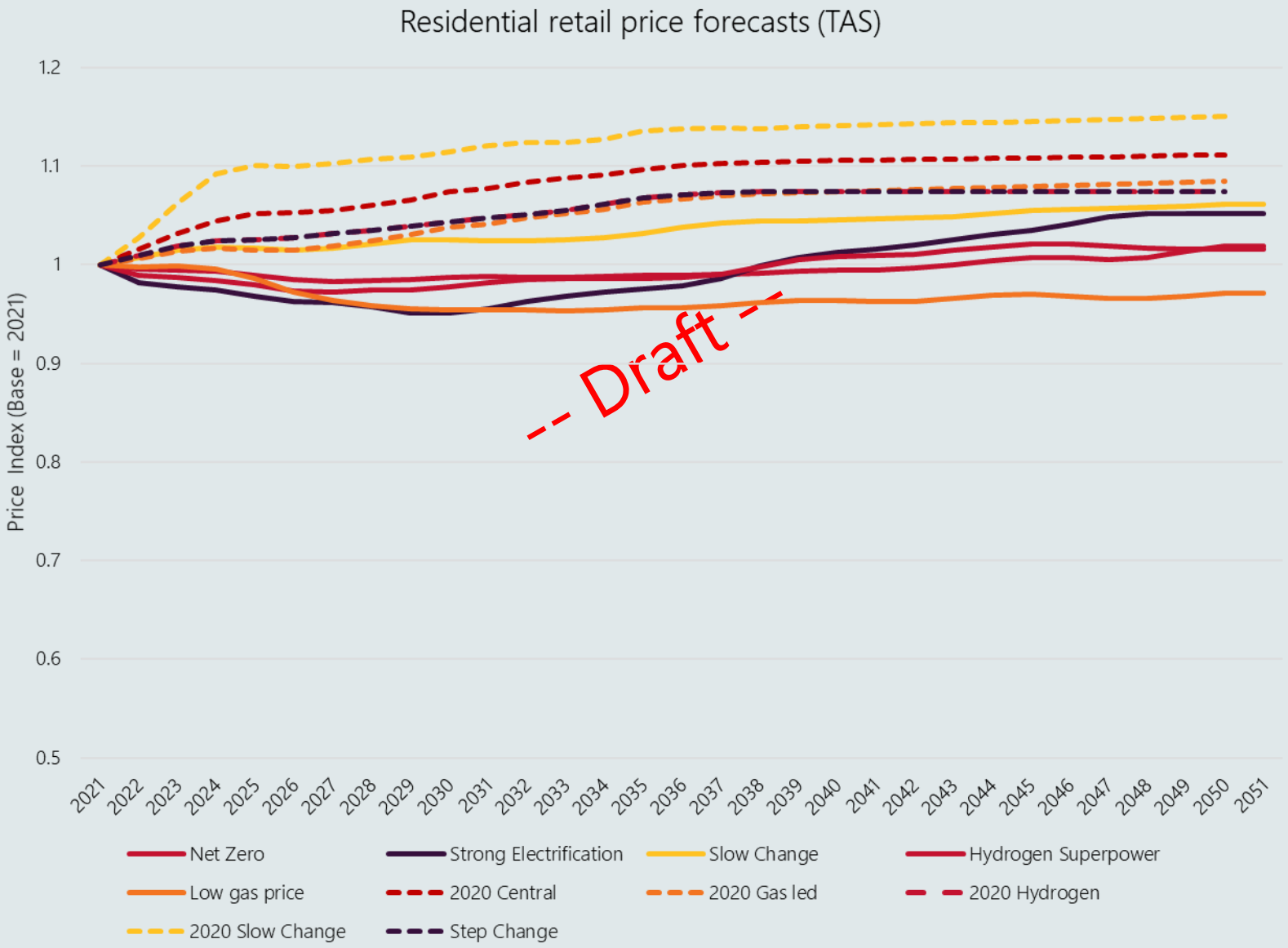


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# Victoria

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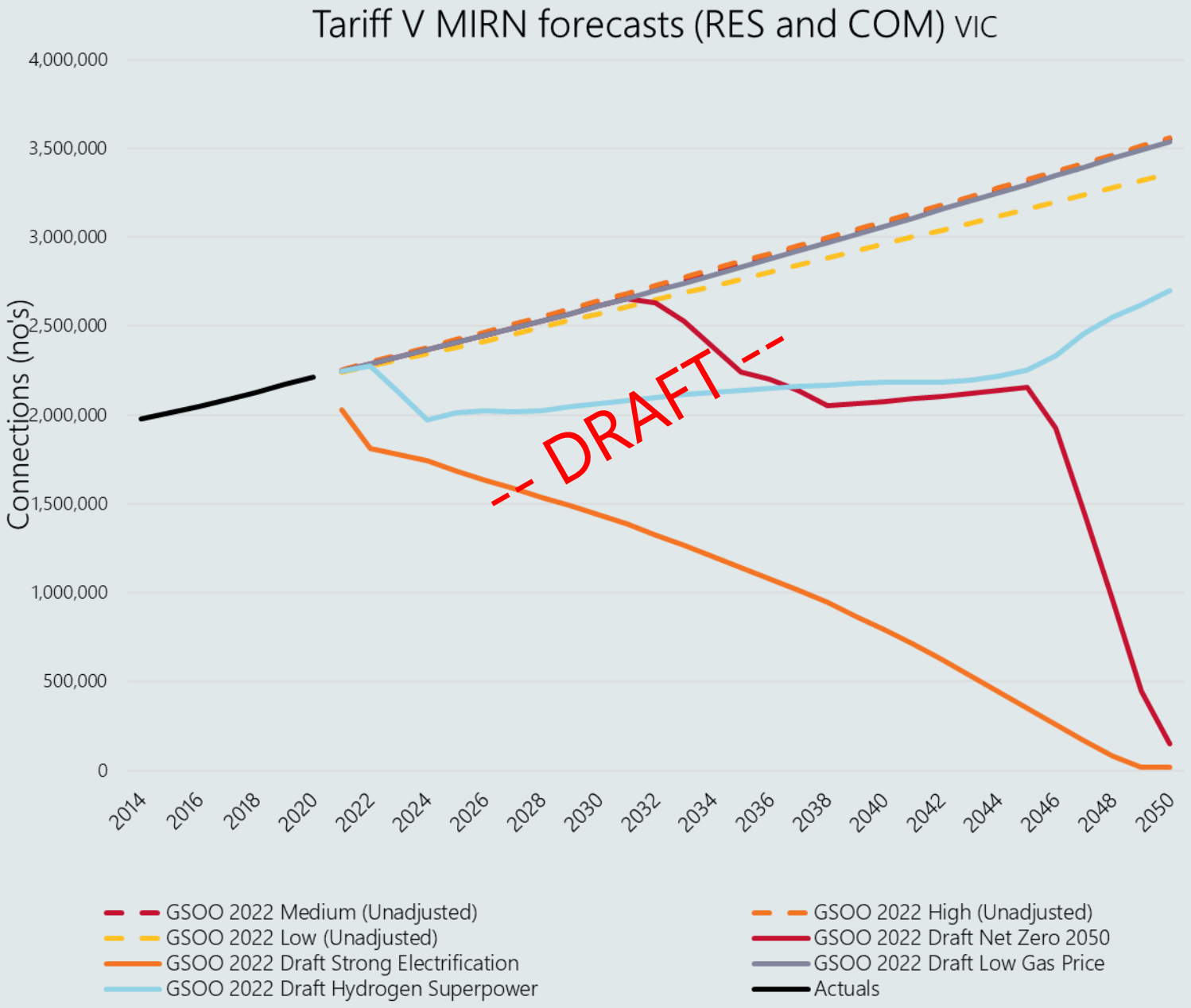


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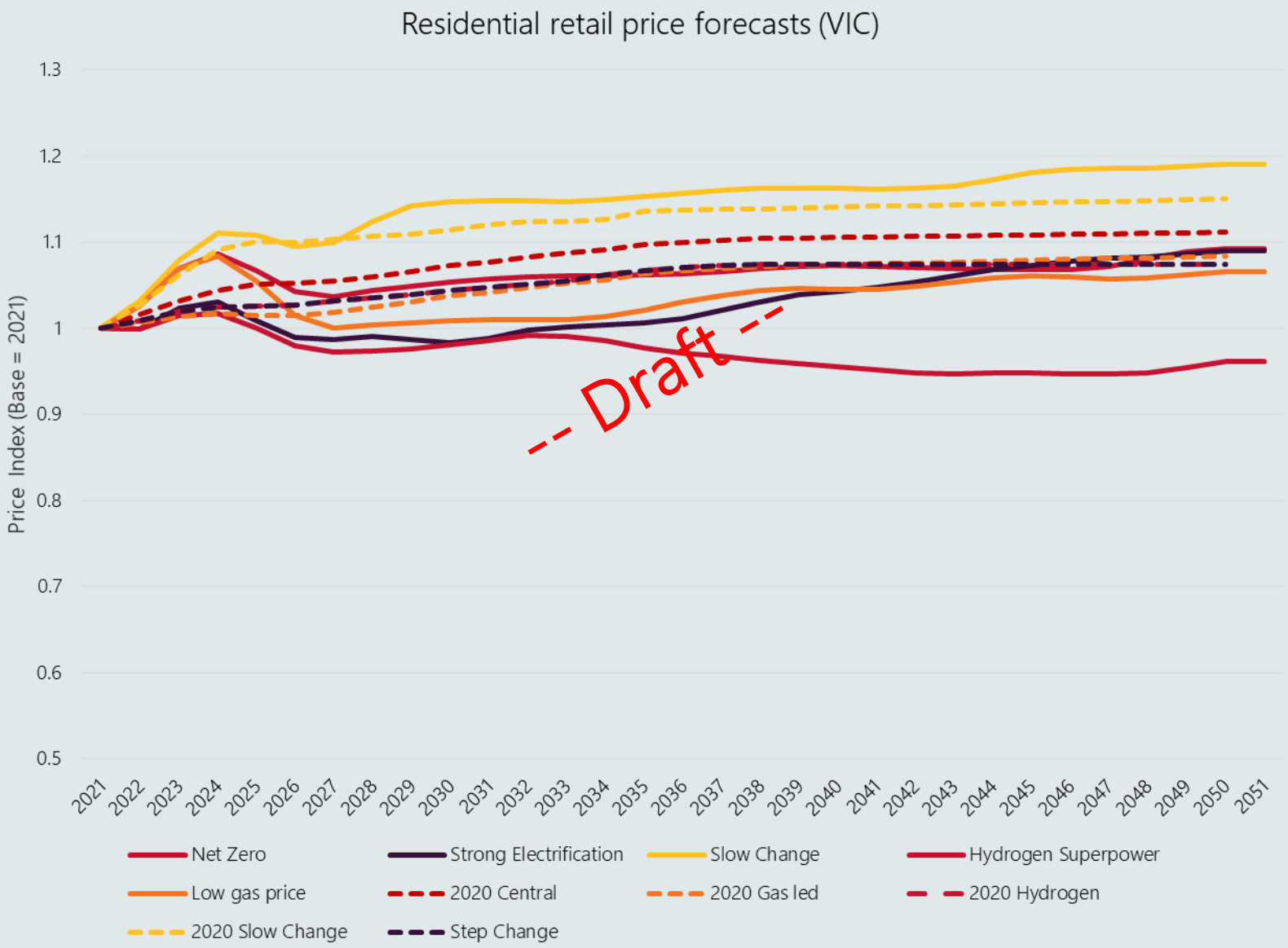


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# CSIRO Multi-sector modelling slides

Duplication of slides from 30 June 2021 FRG

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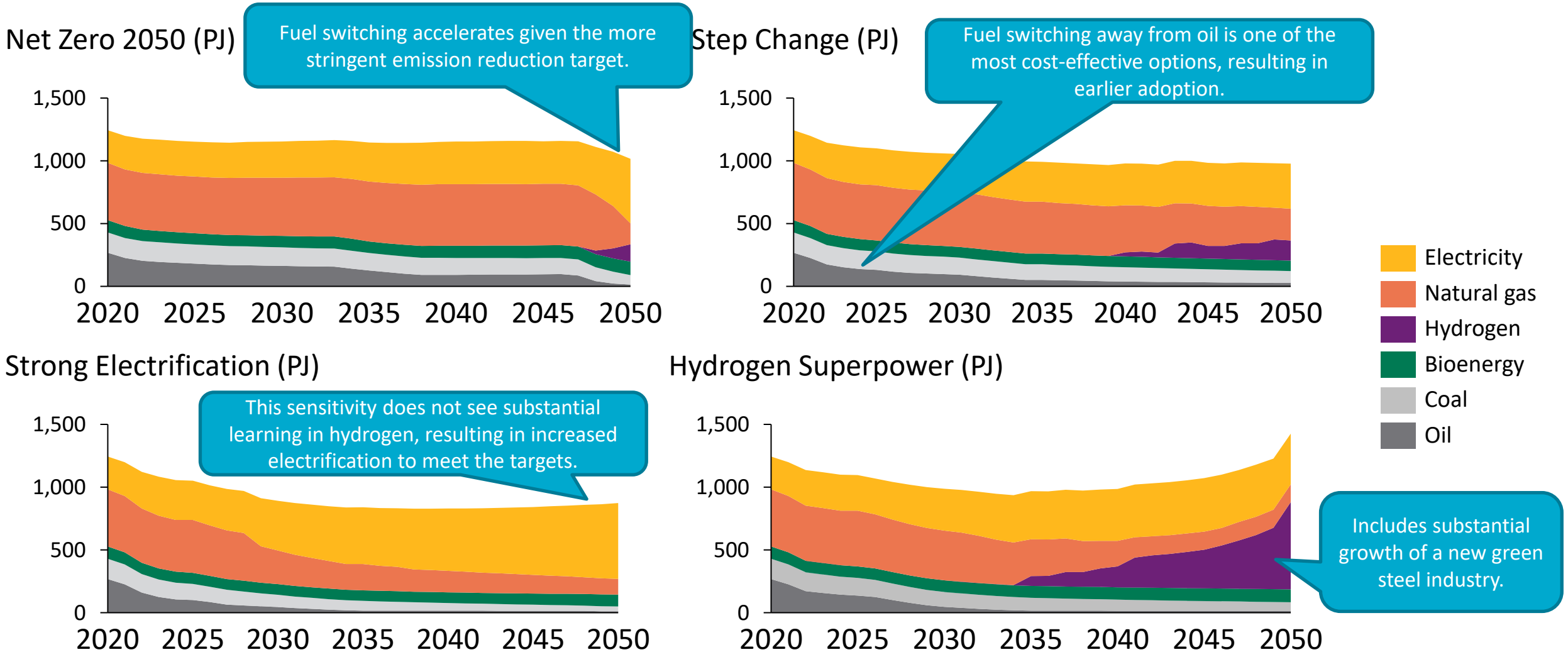
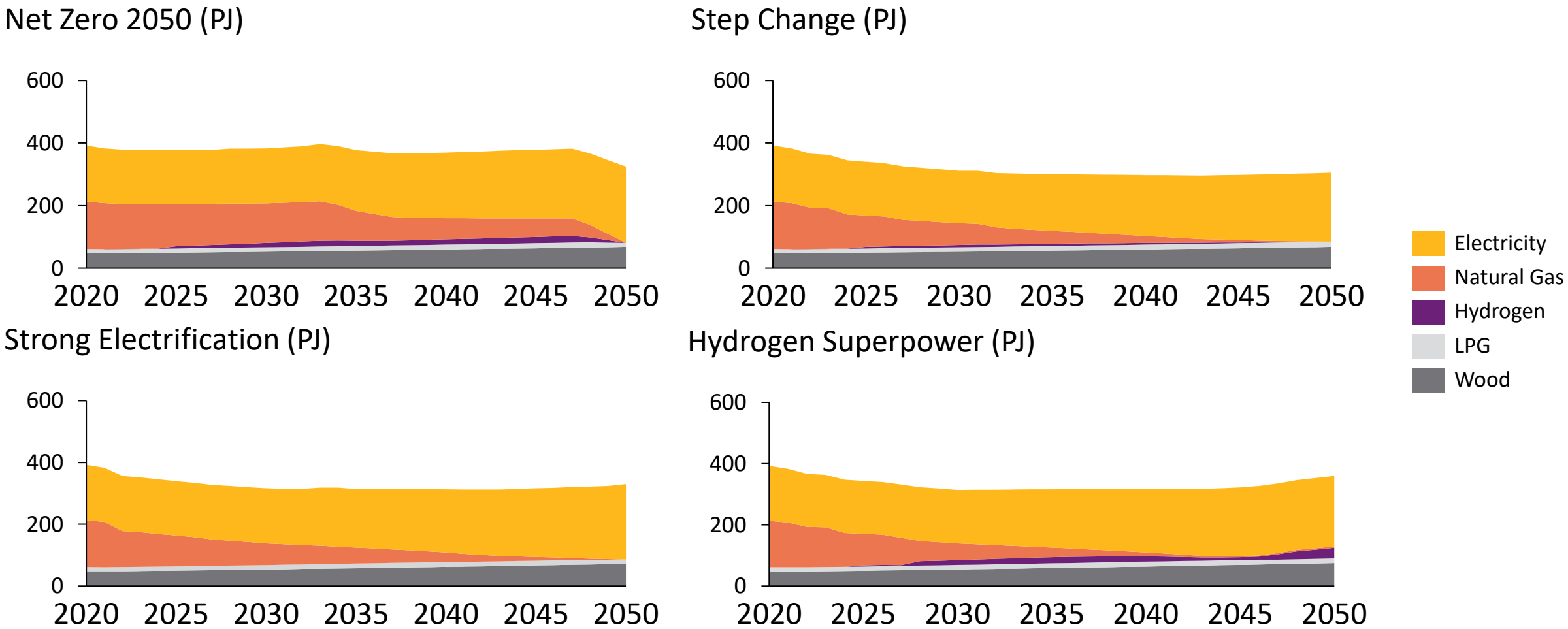
# *Industry can continue to grow in a decarbonised economy through low emission fuels…*

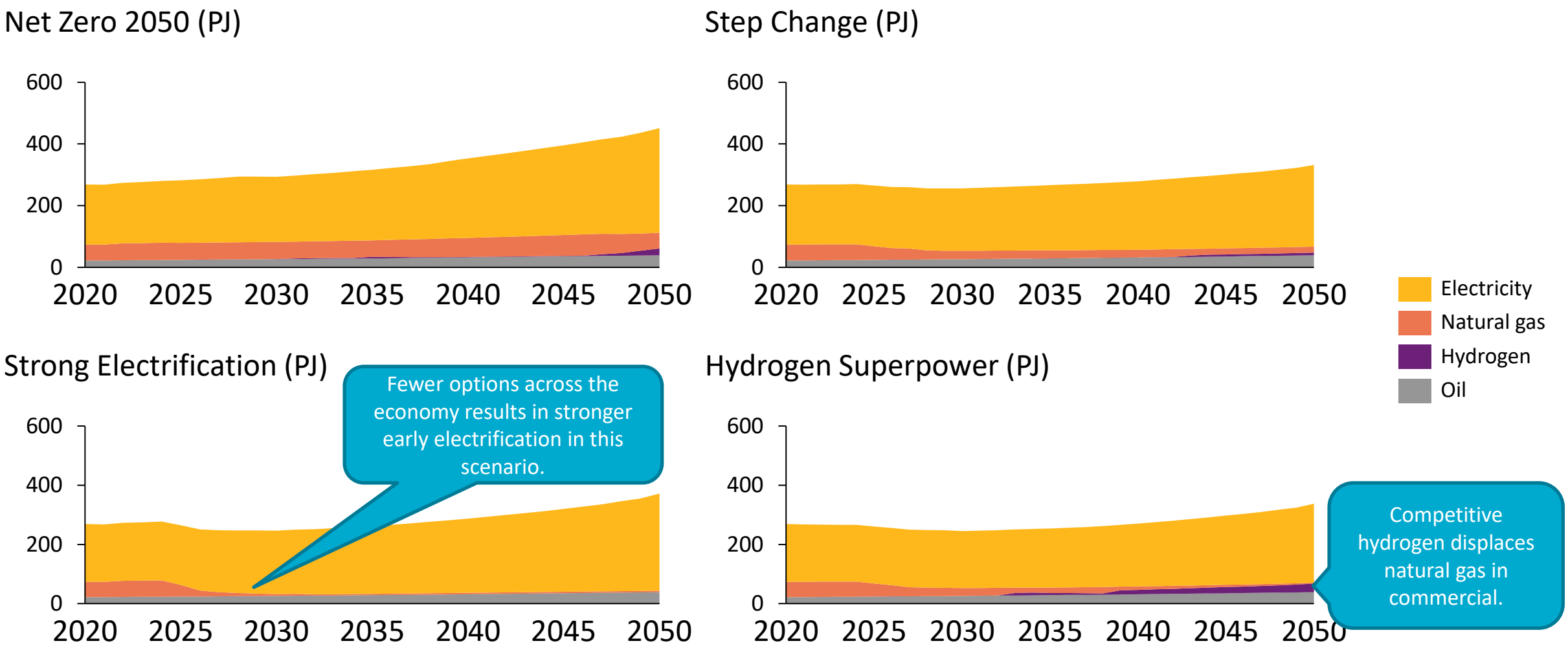
## Industry fuel use



# *Fuel switching from natural gas to electricity expected in residential buildings…*

## Residential fuel use



# *Electricity use remains dominant in commercial buildings…*

## Commercial fuel use