2023 draft gas consumption, peak day and LNG forecasts

30 November 2022 FRG Meeting

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Purpose and agenda

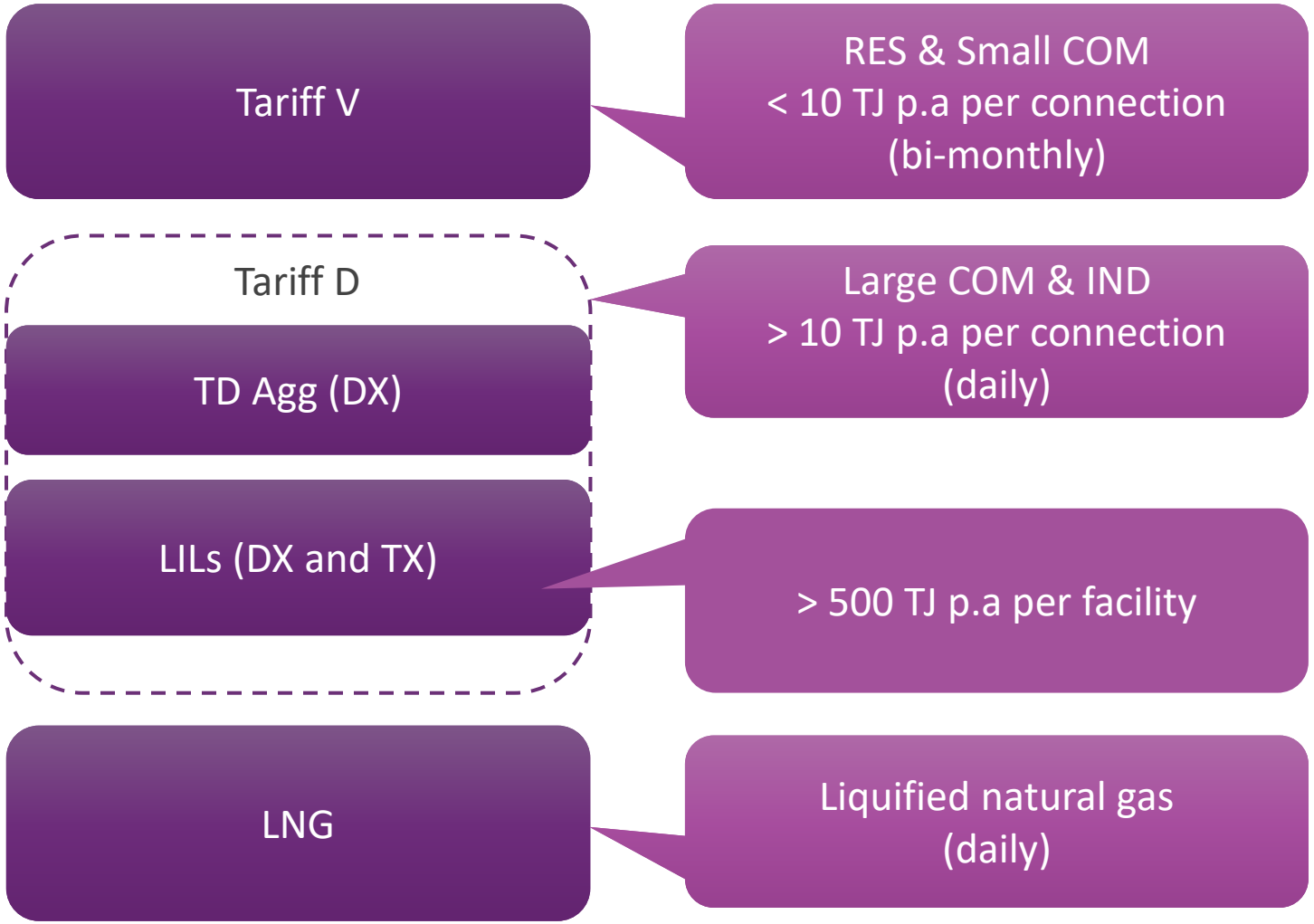
The purpose of this presentation is to *consult* with the FRG on draft gas consumption and demand forecasts for use in the 2023 Gas Statement of Opportunities (GSOO)

Today's Agenda includes:

- GSOO 2023 scenario overview
- Key changes and updates
- Draft consumption outlook
- Peak day forecast - initial insights
- LNG consumption forecast
- Discussion

Timing	Relevant topic	Responsible
Jan 2022	Discussion on 2022 GSOO forecasts	AEMO
Sept 2022	Discussion on Multi-sectoral modelling outputs	CSIRO, Stakeholders
Today	**Draft 2023 gas consumption forecasts**	**AEMO, FRG**
Dec 22 – Feb 23	Draft 2023 IASR consultation	AEMO, Stakeholders
March 2023	2023 GSOO released	AEMO

Natural gas consumption forecasts



LIL: Large industrial load
TD Agg: remaining 'aggregated' TD load
DX: Distribution-connected
TX: Transmission-connected
SMR: Steam methane reforming with CCS
CCS: Carbon capture and storage

Scenario overview

2023 GSOO scenario overview

Driver	Progressive Change	Exploring Alternatives	Step Change	Hydrogen Export
Theme	**Dampened economy** Challenging economic conditions and supply chain disruptions	**Green gas-led** Stronger investment in the gas network	**Consumer-led** Strong consumer uptake of distributed energy resources	**Economy and technology-led** Development of a green energy export economy
Economic growth	Slower growth	Moderate growth	Moderate growth	High growth
Energy efficiency	Low	Moderate	High	High
Electrification (excl. EV)	Moderate	Low	High	Very high
Hydrogen adoption	Allowed Up to 10% hydrogen blending in gas pipelines	Allowed Up to 10% hydrogen blending in gas pipelines	Allowed Up to 10% hydrogen blending in gas pipelines	Faster cost reduction. High production for domestic and export use. Unlimited hydrogen blending in gas pipelines
Biomethane	Allowed	7.5% blending target for reticulated gas by 2030 and around 10% by 2035	Allowed	Allowed
*Representative concentration pathway (RCP)	RCP 4.5 (around 2.6°C temperature rise by the end of the century)	RCP 2.6 (consistent with limiting temperature rise to < 2°C)	RCP 2.6 (consistent with limiting temperature rise to < 2°C)	RCP 1.9 (consistent with limiting temperature rise to 1.5°C)

**RCPs are greenhouse gas concentration trajectories adopted by IPCC.*

Key changes and updates

Changes to model inputs (1/2)

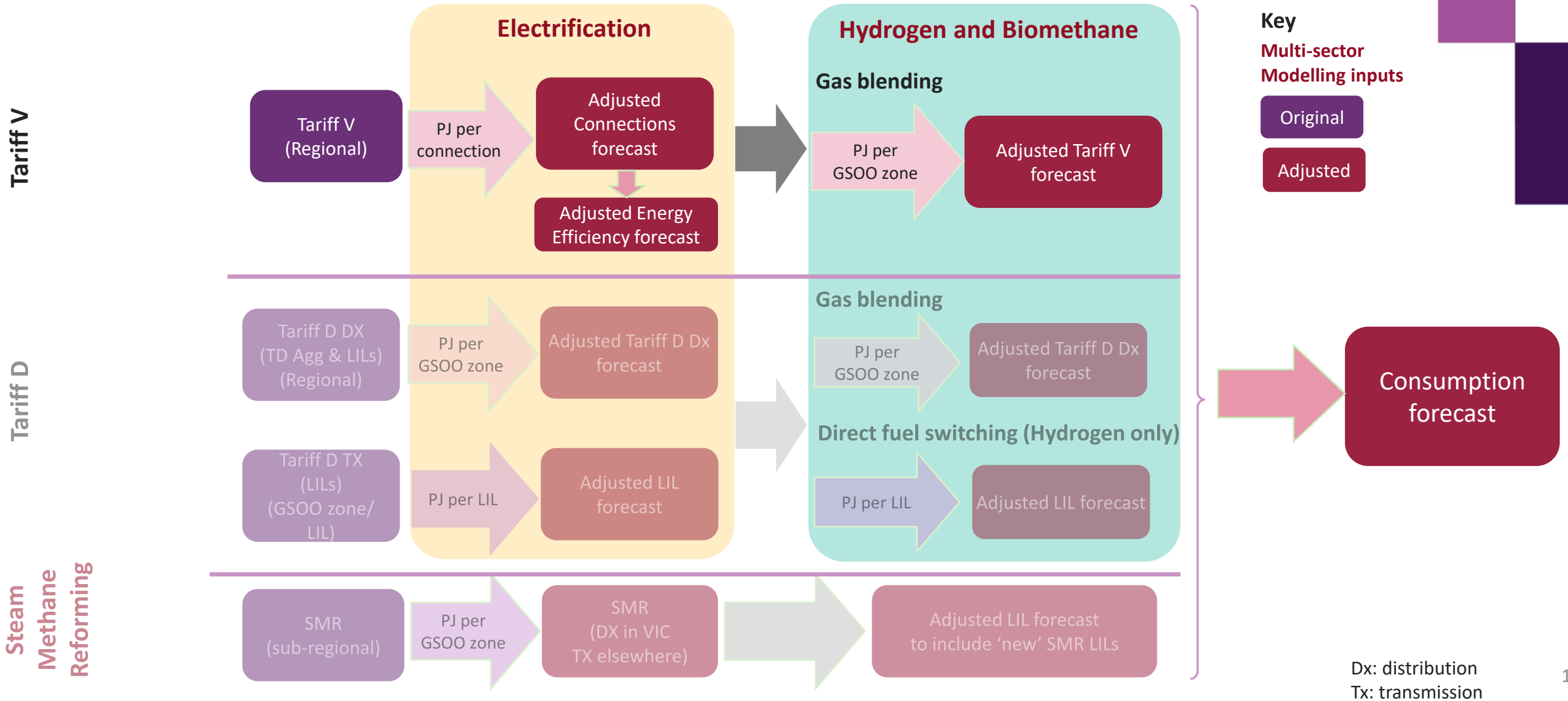
Model inputs	Component forecast	Changes since 2021 ESOO	Status
Connections	TV	Rebased using latest actuals	Final
Distribution surveys	TV	Updated surveys received (to provide RES COM split)	Final
GSP and Population	TD Agg	Updated BIS Oxford Economics	Final
Retail price index	TV and TD Agg	Updated based on Lewis Grey & Associates	Final Draft
Energy Efficiency	TV and TD Agg	Rebased to forecast base year (2022)	Final
LIL surveys	TD	Updated surveys received Targeted interviews in progress	Draft

Changes to model inputs (2/2)

Model inputs	Component forecast	Changes since 2021 ESOO	Status
SMR + CCS	TD LILs	Updated (new natural gas load) CSIRO and ClimateWorks Centre	Final draft
Electrification	TV and TD	Updated (offsets natural gas) CSIRO and ClimateWorks Centre	Final draft
Hydrogen	TV and TD	Updated (offsets natural gas) CSIRO and ClimateWorks Centre	Final draft
Biomethane	TV and TD	Included for the first time (offsets natural gas) CSIRO and ClimateWorks Centre	Final draft

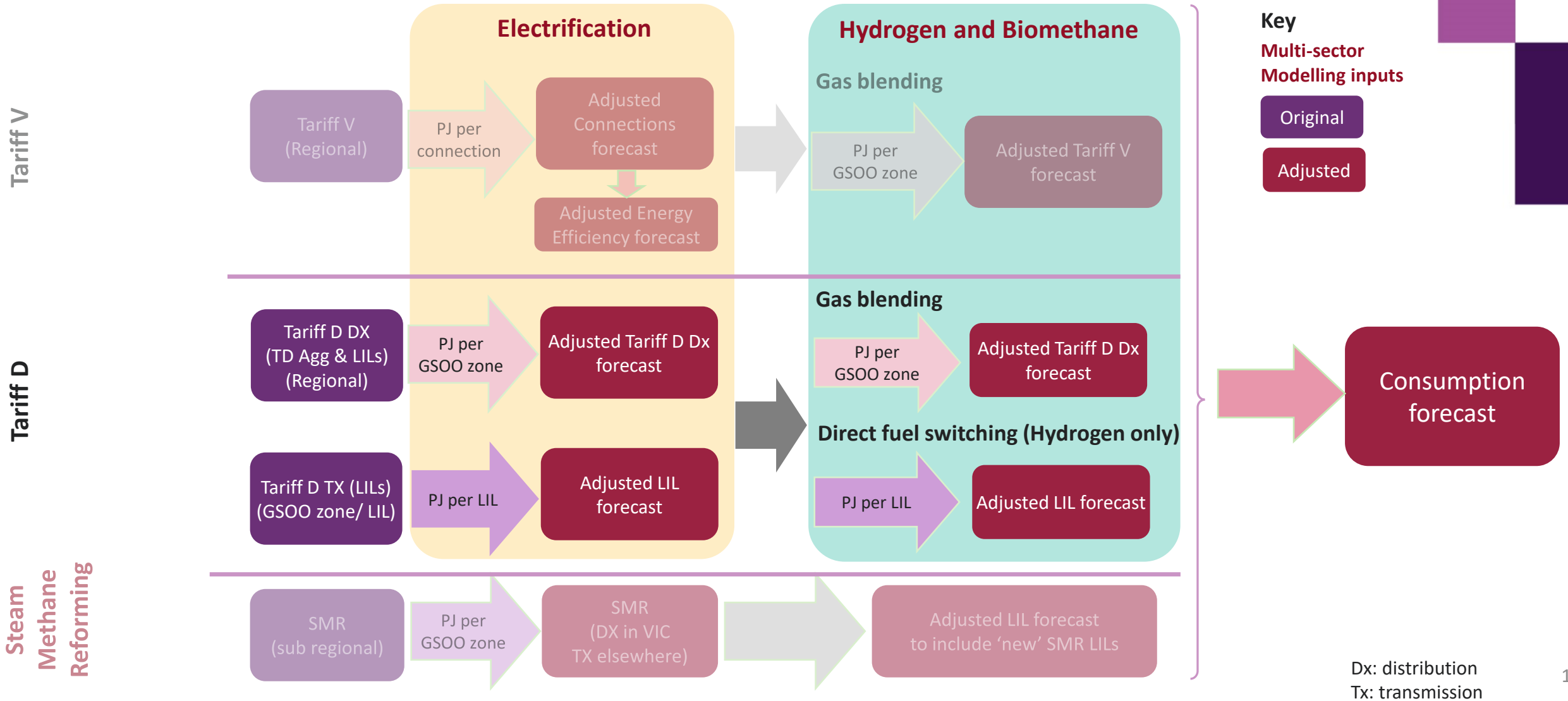
Decarbonisation drivers in the natural gas consumption forecasts

Decarbonisation drivers in gas consumption models



Dx: distribution
Tx: transmission

Decarbonisation drivers in gas consumption models



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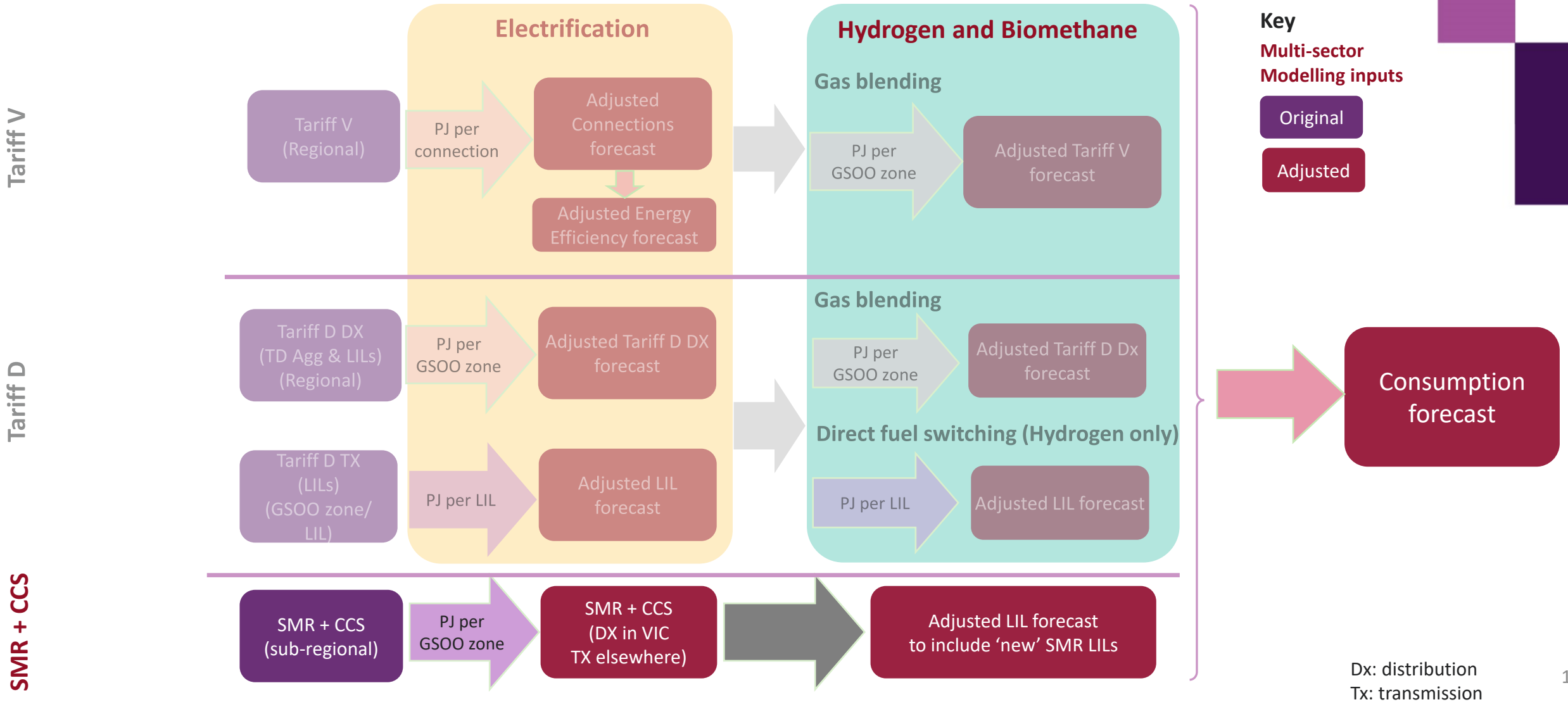
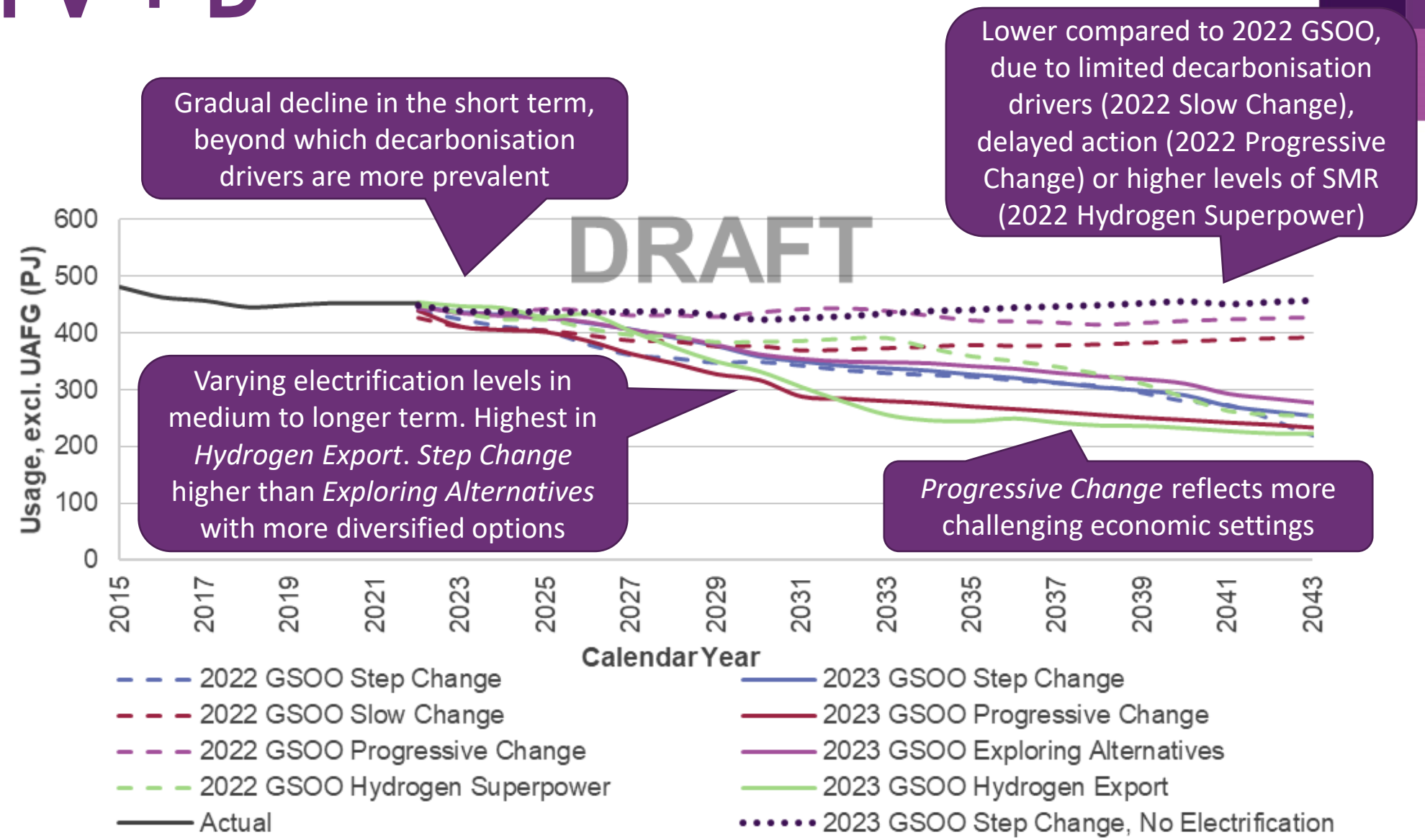
Decarbonisation drivers in gas consumption models



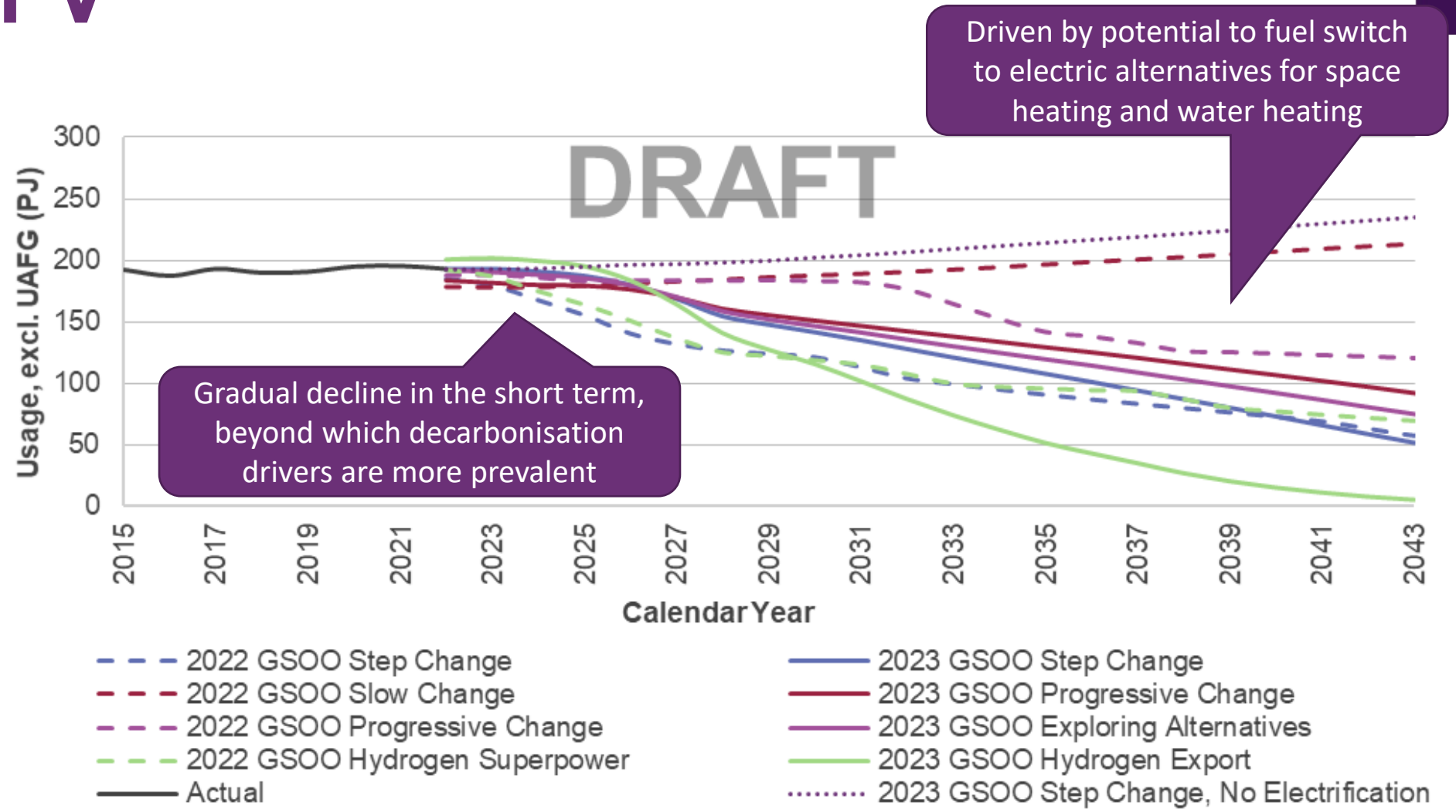
Dx: distribution
Tx: transmission

Draft consumption forecasts

Tariff V + D


Gradual decline in the short term, beyond which decarbonisation drivers are more prevalent
Lower compared to 2022 GSOO, due to limited decarbonisation drivers (2022 Slow Change), delayed action (2022 Progressive Change) or higher levels of SMR (2022 Hydrogen Superpower)
DRAFT
Varying electrification levels in medium to longer term. Highest in *Hydrogen Export*. *Step Change* higher than *Exploring Alternatives* with more diversified options
Progressive Change reflects more challenging economic settings
Usage, excl. UAFG (PJ)
600
500
400
300
200
100
0
2015
2017
2019
2021
2023
2025
2027
2029
2031
2033
2035
2037
2039
2041
2043
Calendar Year
2022 GSOO Step Change
2022 GSOO Slow Change
2022 GSOO Progressive Change
2022 GSOO Hydrogen Superpower
Actual
2023 GSOO Step Change
2023 GSOO Progressive Change
2023 GSOO Exploring Alternatives
2023 GSOO Hydrogen Export
2023 GSOO Step Change, No Electrification

Tariff V


Driven by potential to fuel switch to electric alternatives for space heating and water heating
DRAFT
Gradual decline in the short term, beyond which decarbonisation drivers are more prevalent
Usage, excl. UAFG (PJ)
300
250
200
150
100
50
0
2015
2017
2019
2021
2023
2025
2027
2029
2031
2033
2035
2037
2039
2041
2043
Calendar Year
2022 GSOO Step Change
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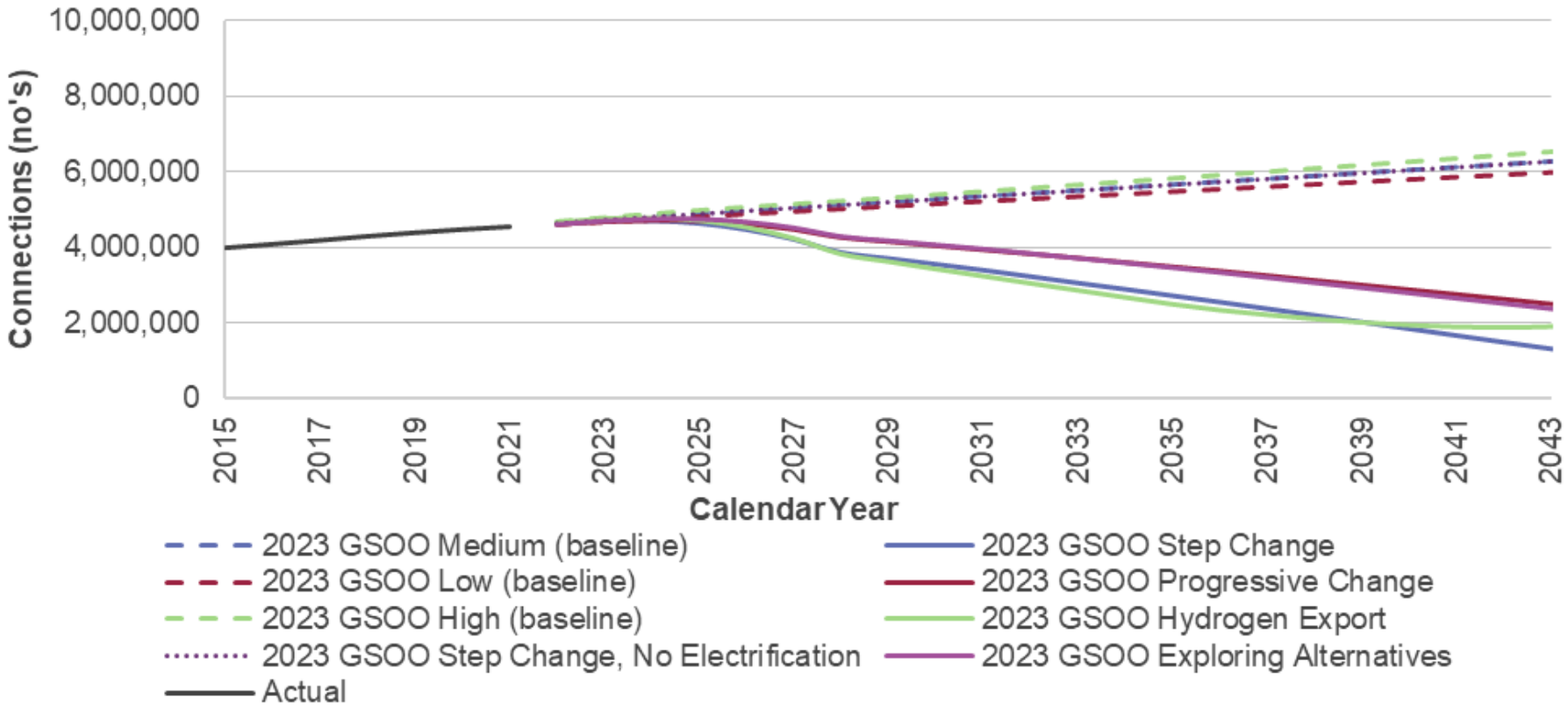
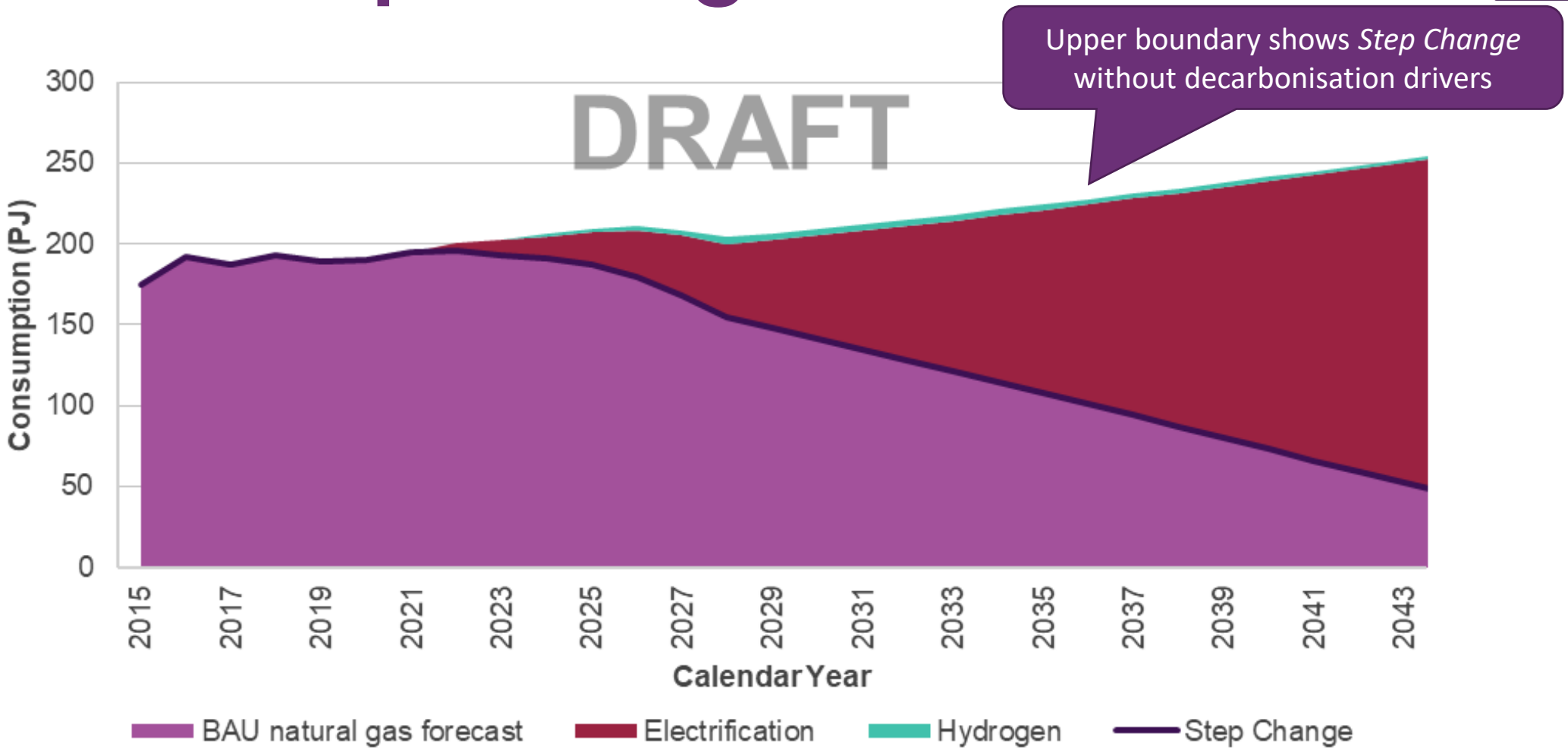
2022 GSOO Hydrogen Superpower
Actual
2023 GSOO Step Change
2023 GSOO Progressive Change
2023 GSOO Exploring Alternatives
2023 GSOO Hydrogen Export
2023 GSOO Step Change, No Electrification

Tariff V MIRN forecast

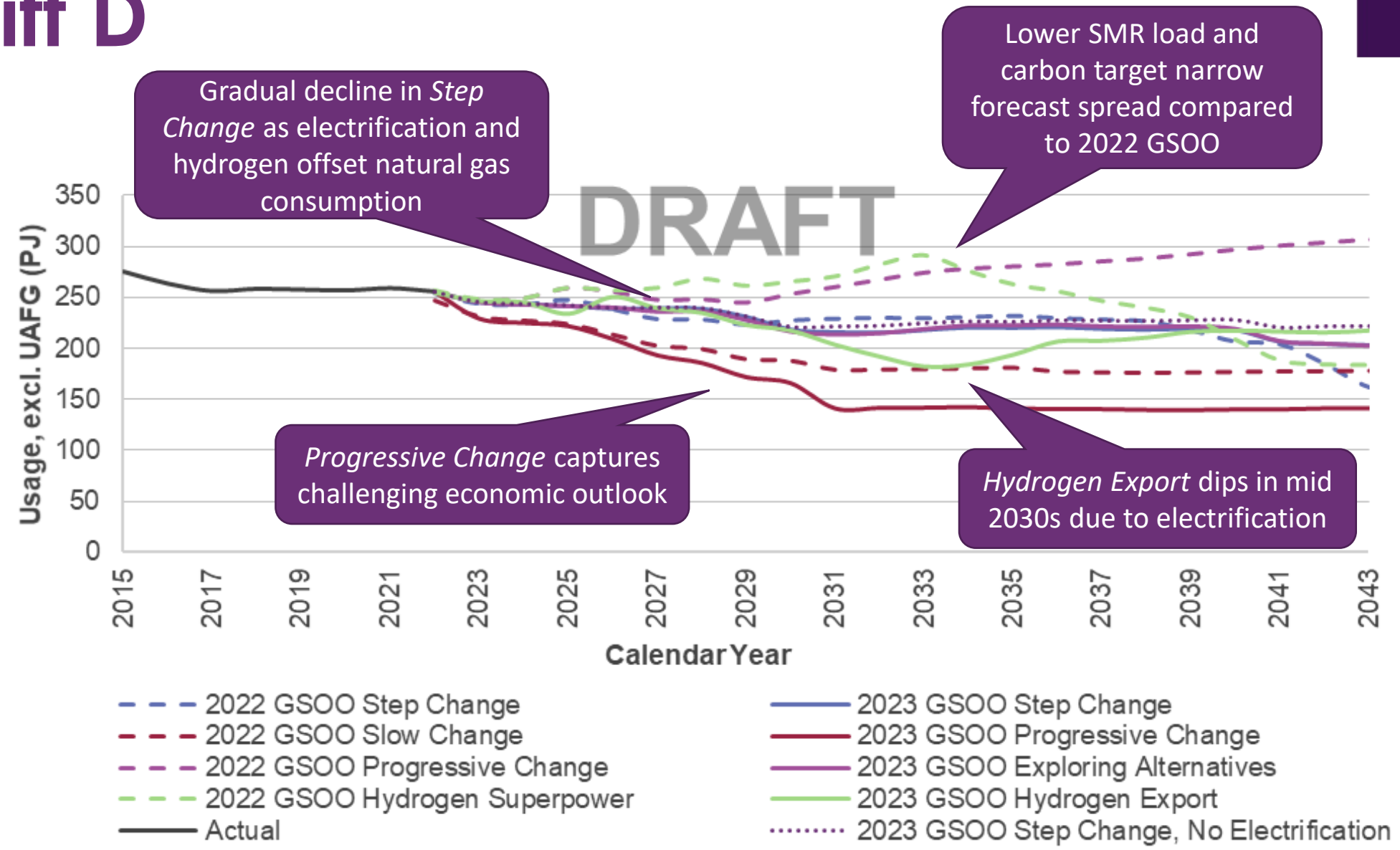
Meter Installation Registration Number connections



Tariff V Step Change



Tariff D


Gradual decline in *Step Change* as electrification and hydrogen offset natural gas consumption
Lower SMR load and carbon target narrow forecast spread compared to 2022 GSOO
DRAFT
Progressive Change captures challenging economic outlook
Hydrogen Export dips in mid 2030s due to electrification
Usage, excl. UAFG (PJ)
350
300
250
200
150
100
50
0
2015
2017
2019
2021
2023
2025
2027
2029
2031
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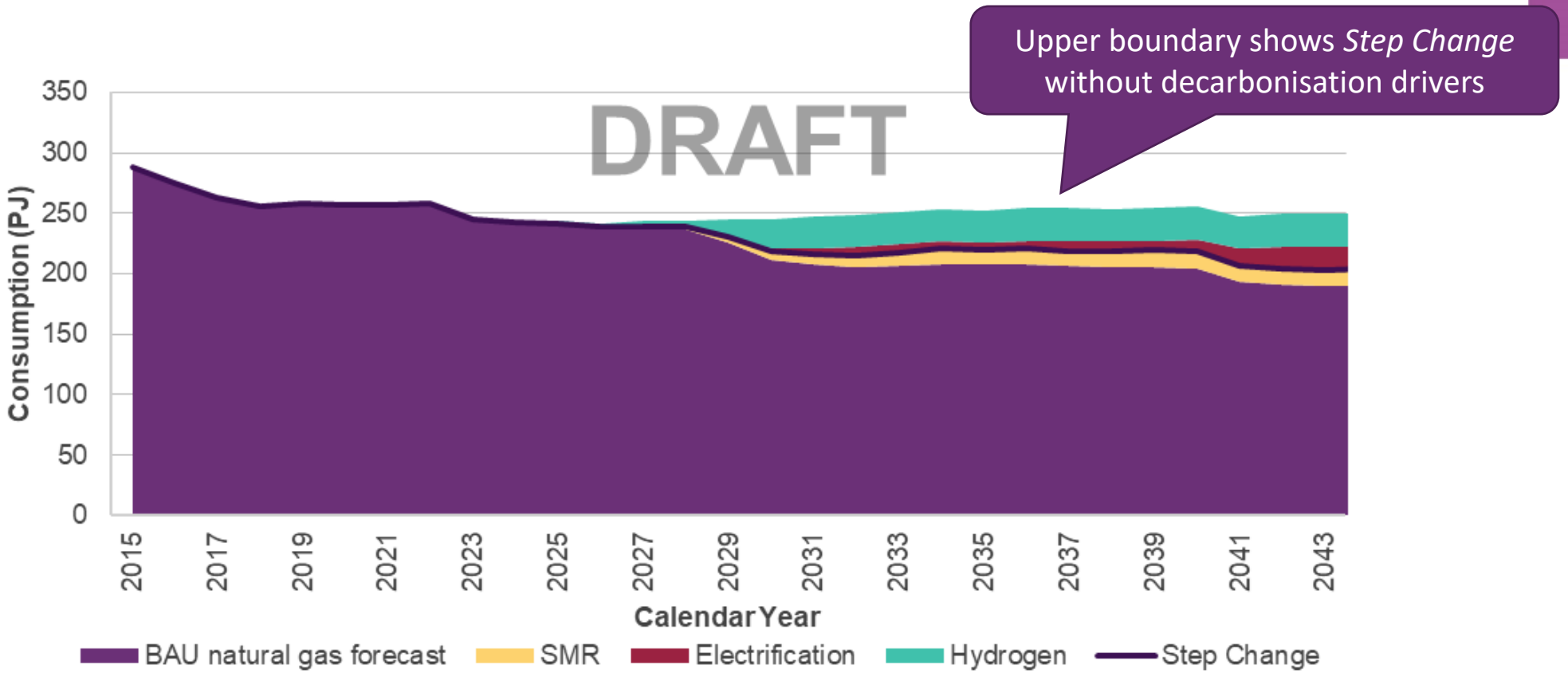
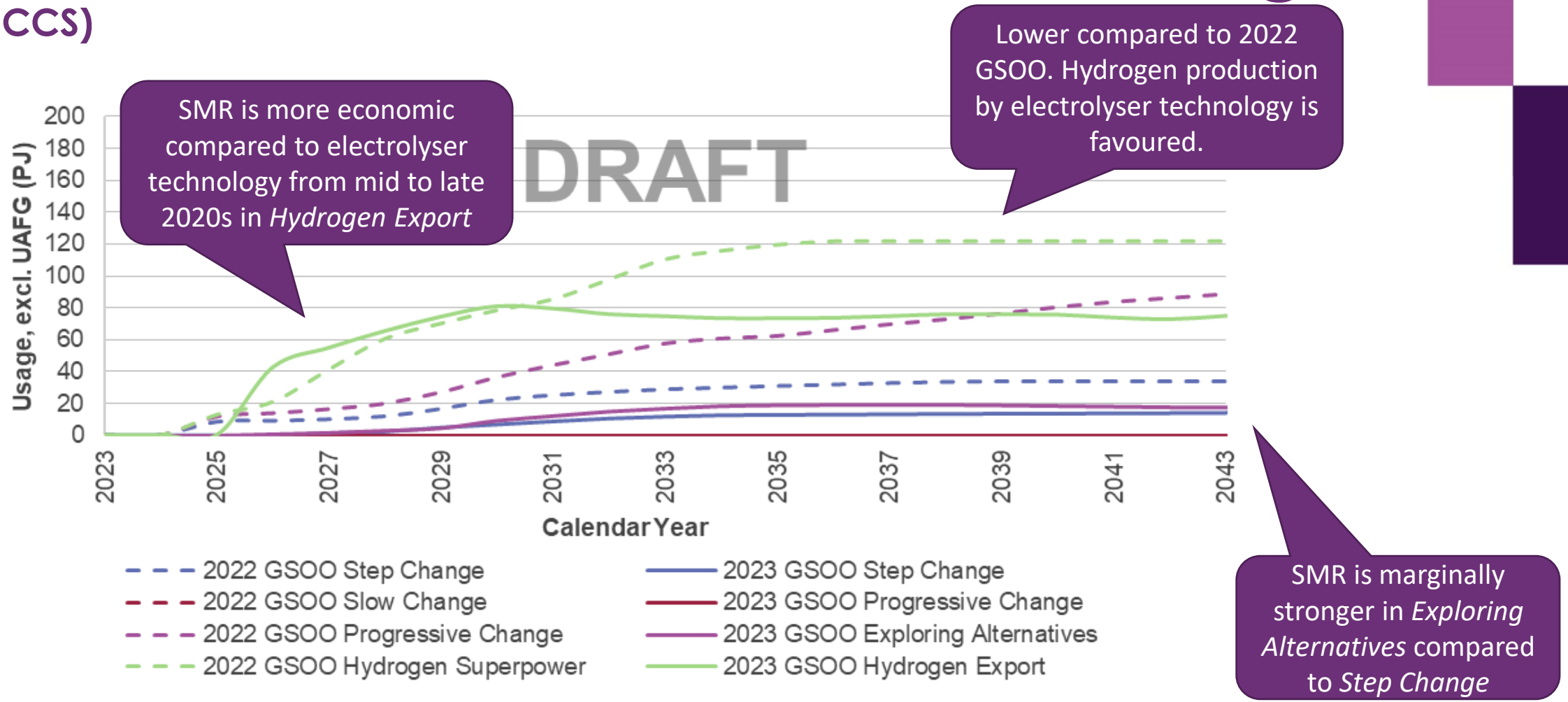
Actual
2023 GSOO Step Change
2023 GSOO Progressive Change
2023 GSOO Exploring Alternatives
2023 GSOO Hydrogen Export
2023 GSOO Step Change, No Electrification

Tariff D Step Change



Tariff D – Steam Methane Reforming

(with CCS)



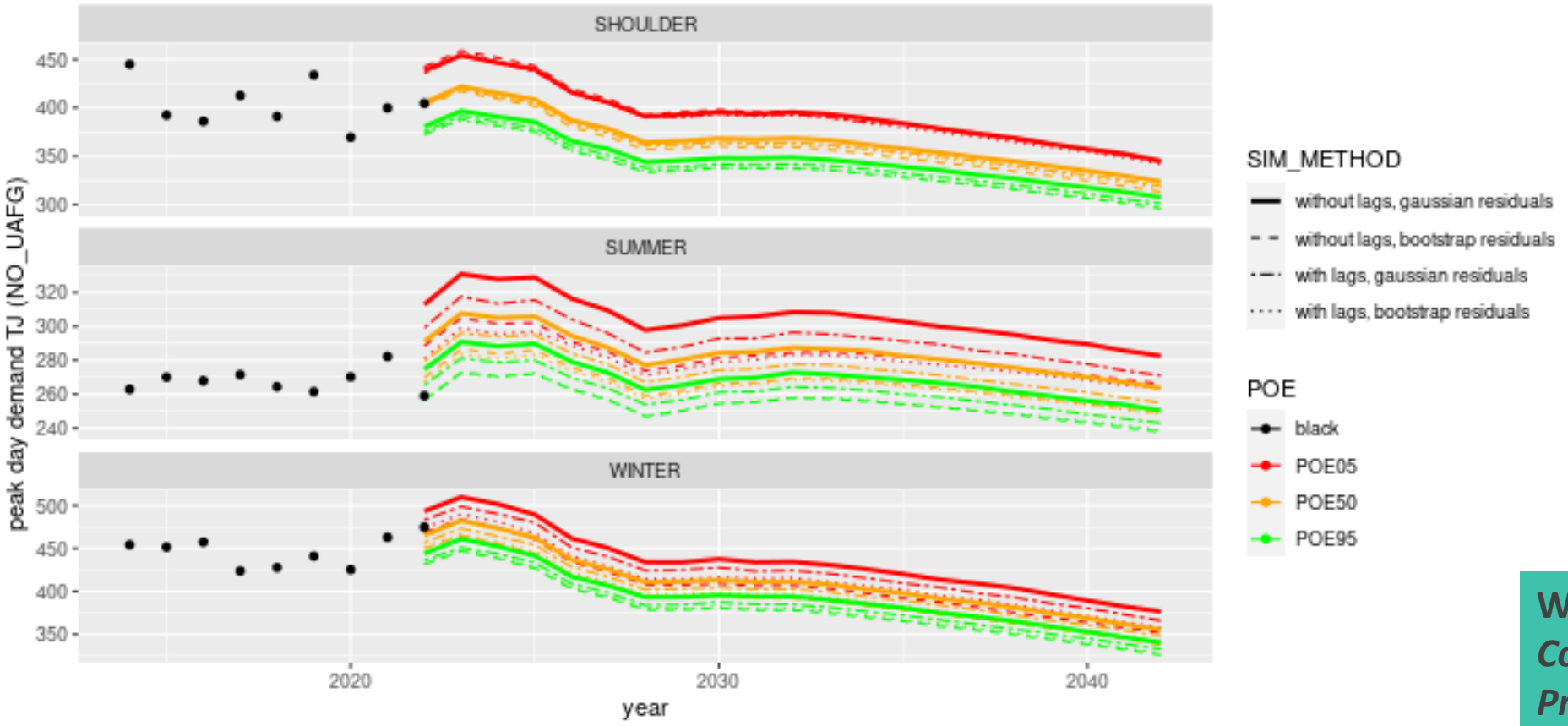
Draft GSOO/VGPR peak day forecast

Peak day forecast

- The GSOO peak day forecast being developed for:
  - 1-in-20 years (5% POE)
  - 1-in-2 years (50% POE)

- Improvements considered for the 2023 GSOO:
  - Investigated improvements to model formulation, including a lag operator to address autocorrelation showing up in the residual.
    - This reflects the impact of a multi-day cold snap.
  - Also tested improvements to the residual compared to the Gaussian distribution currently used.

Investigations example: NSW (Tariff V+D)



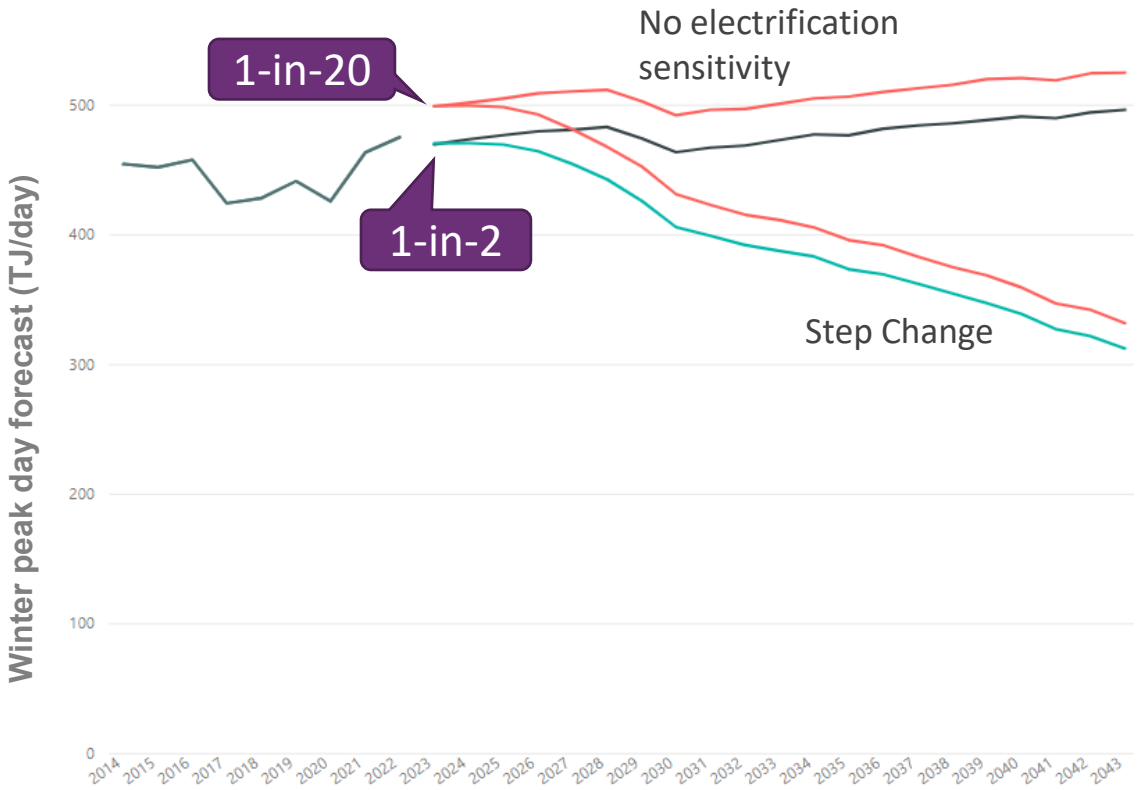
SIMULATION METHOD	SHOULDER	SUMMER	WINTER
without lags, gaussian residuals	54.2	137.9	176.3
without lags, bootstrap residuals	39.5	133.0	198.8
with lags, gaussian residuals	45.2	134.6	188.6
with lags, bootstrap residuals	40.7	133.4	203.2

What does the *Continuous Ranked Probability Score* mean?

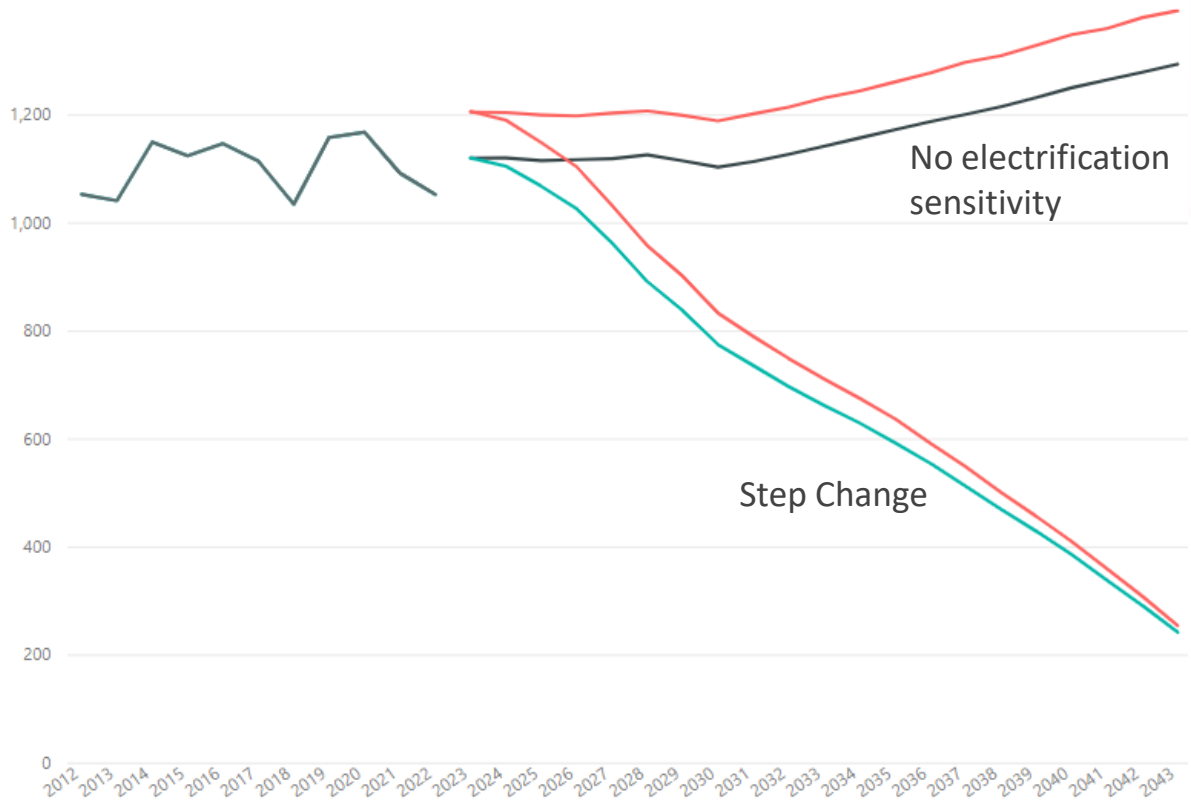
A measure of how good the probabilistic forecasts are to capture the observed outcome. The Lower the score, the better the forecasts are

Winter peak day forecast – initial view

New South Wales – Tariff V+D



Victoria – Tariff V+D



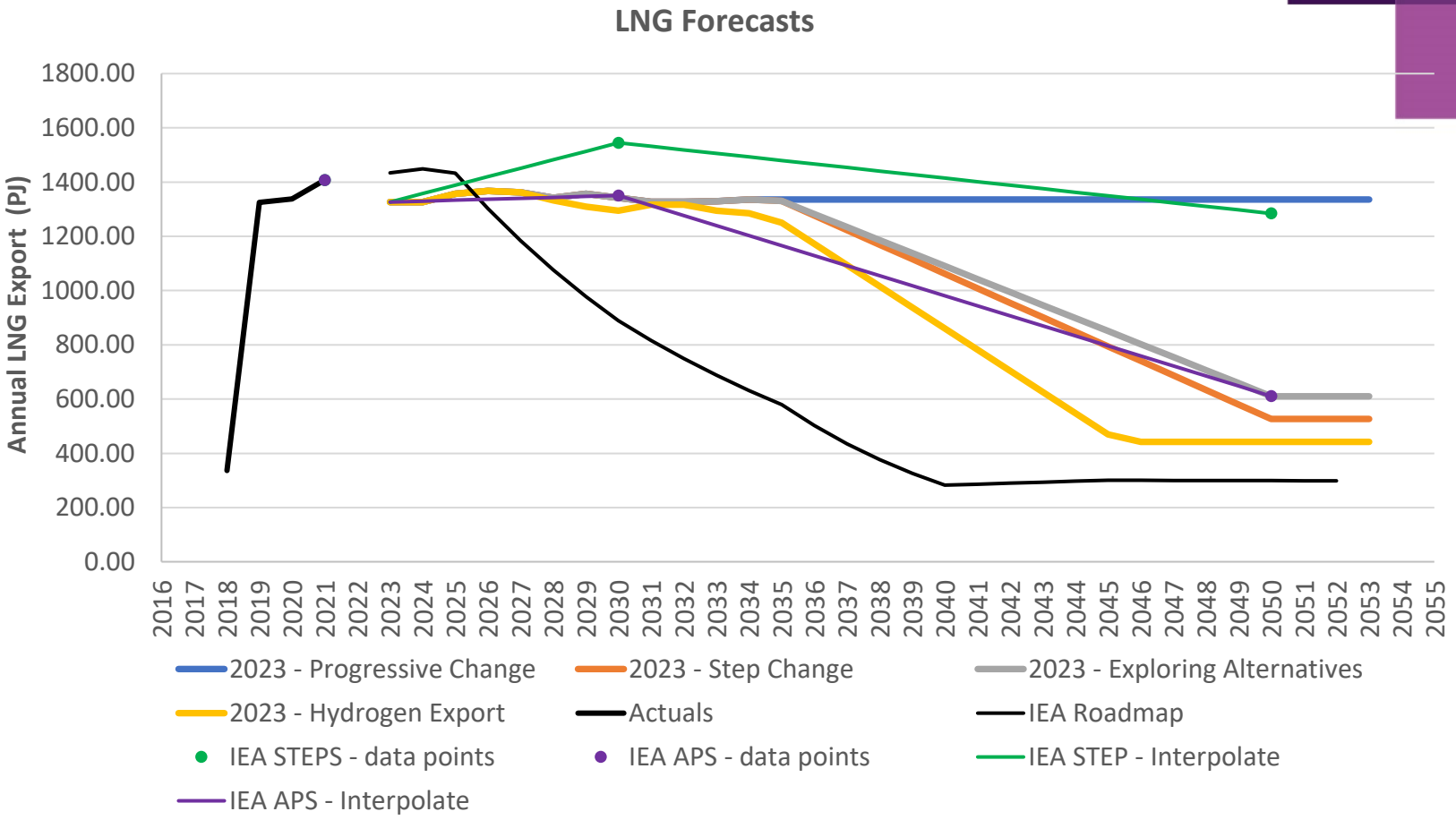
GSOO/VGPR peak day forecast status and next steps

- Draft forecast of base year completed
- First draft of projections to 2043 undertaken – Step Change
- Custody Transfer Meter (CTM) forecast completed (non-coincident)
  - Coincident forecasts to be completed, once GSOO forecast is finalised
- Gas demand and LNG demand traces by GSOO zone to follow

LNG annual consumption forecasts

LNG Forecasts – Comparison to IEA

- The IASR aligns AEMO scenarios to IEA scenarios. SDS assumed to be half-way between APS and NZE.
- IEA LNG forecasts have been estimated based on publicly available data.
- LNG forecast proposal combines IEA forecasts and data received from LNG exporters.
- The forecast for the Hydrogen Export scenario diverges from the NZE scenario to account for participant data and expected rate of decline of export volumes.



Draft 2023 IASR Scenario setting	Progressive Change	Exploring Alternatives	Step Change	Hydrogen Export
IEA 2021 World Energy Outlook scenario	STEPS	APS	SDS	NZE

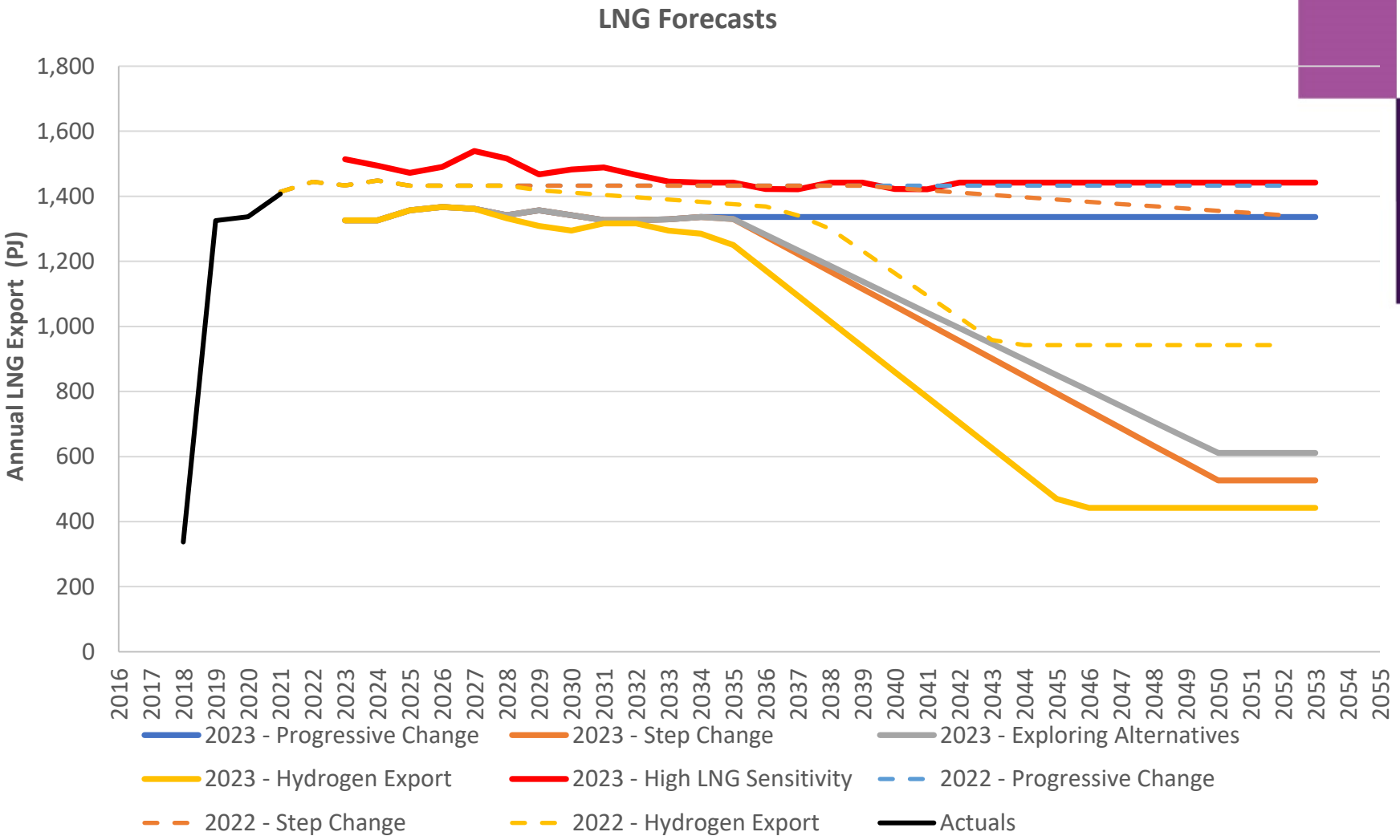
IEA report available at: https://www.iea.org/reports/world-energy-outlook-2021

LNG Forecasts – Comparison to 2022 GSOO

Compared to the 2022 GSOO there is lower forecast consumption due to:

- Reduced short-term LNG export expectations informed by survey data, considering global economic conditions
- A change to better align LNG forecasts to IEA predictions, noting that the IASR scenarios are mapped to IEA scenarios.

As LNG export is a major component of demand, the spread of forecasts across scenarios allow for more insightful conclusions regarding potential gas shortfalls in the long term.



Question: will studying the High LNG sensitivity add value to the 2023 GSOO?

AEMO

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