Future Energy Scenarios: ESO Pathways to Net Zero 2024

Key changes and modelling assumptions

17 July 10am

ESO

Agenda

10am	Welcome:	Lauren
	Framework Changes	Christopher
	Modelling changes	Christopher
	Assumptions & impacts	Cameron
	Conclusion	Cameron
	Q&A	
	Re-cap and close	

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Key Message and actions:

Decisive action is needed within the next two years to deliver the fundamental change required for a fair, affordable, sustainable and secure net zero energy system by 2050.

Actions:

1. Accelerate the delivery of whole system infrastructure through a strategic approach to network investment and introduction of planning reforms.
2. Deliver market reform, considering electricity, gas, hydrogen and CO_2, to ensure we have energy markets that provide for and work with a reliable and strategically planned energy system.
3. Prioritise the use of hydrogen for hard-to-electrify applications. Agree business models and kick-start delivery of the hydrogen and CO_2 transport and storage infrastructure needed for system flexibility.
4. Accelerate progress on low carbon heating, including faster rollout of heat pumps irrespective of a decision on hydrogen for heat.
5. Deliver innovation and build consumer trust in affordable smart technology, enabling consumers to save on energy costs while helping with the management of Great Britain's electricity system.
6. Focus on energy efficiency improvements across all sectors to reduce overall energy demand.
7. Expedite the delivery of clean, low-cost and reliable new technologies and long-duration energy storage connected to the system by reforming the connections process.
8. Invest in supply chain and skills to deliver the low carbon technologies and infrastructure needed for net zero and enable the UK to become a world leader.

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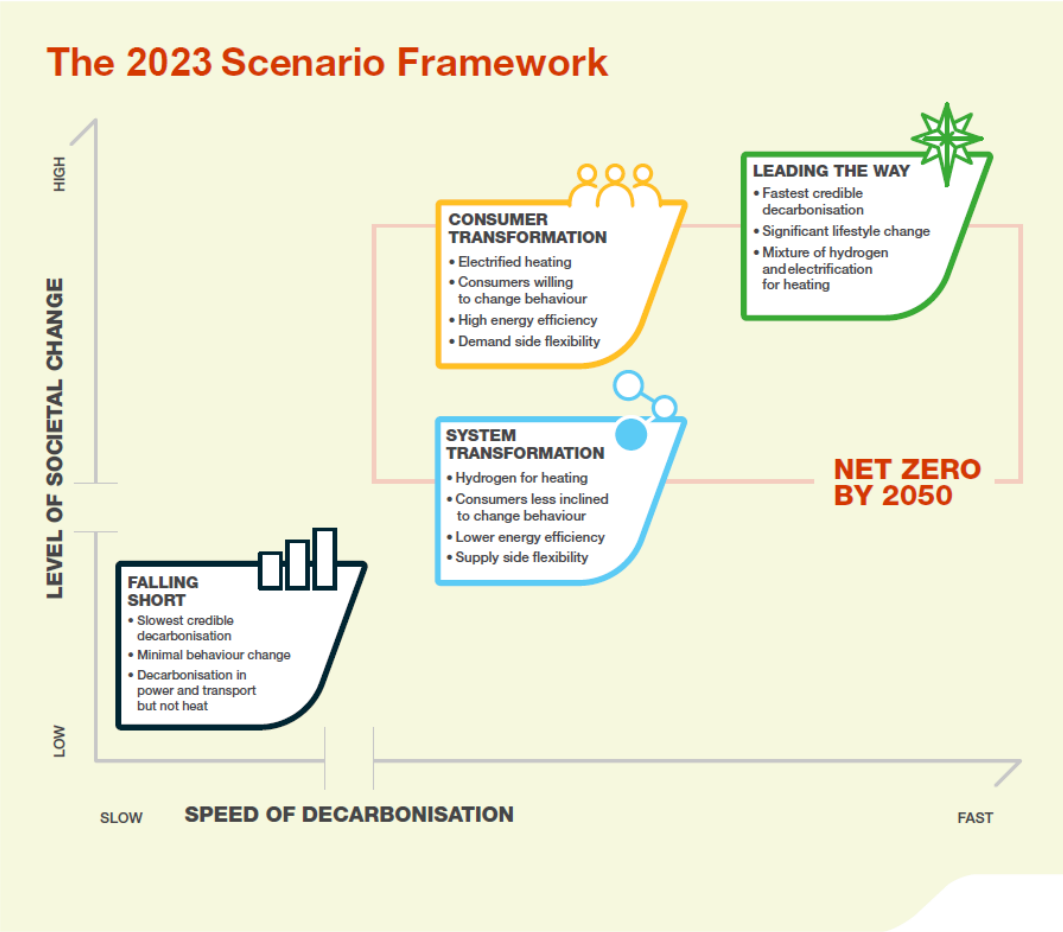
FES 2024: ESO Pathways to net zero

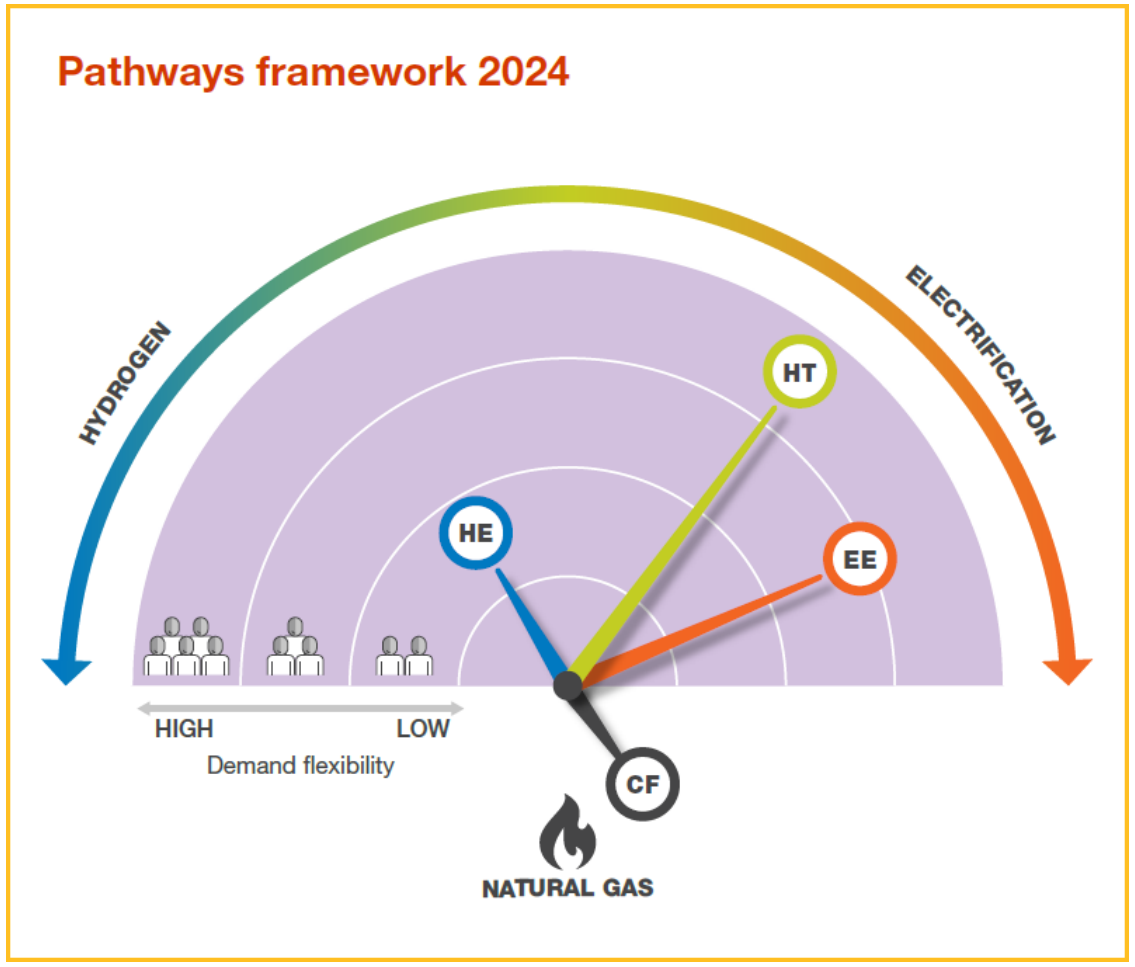
Drivers for change

- Need for strategic network investment
- Ofgem decision on Centralised Strategic Network Planning
- Stakeholder feedback

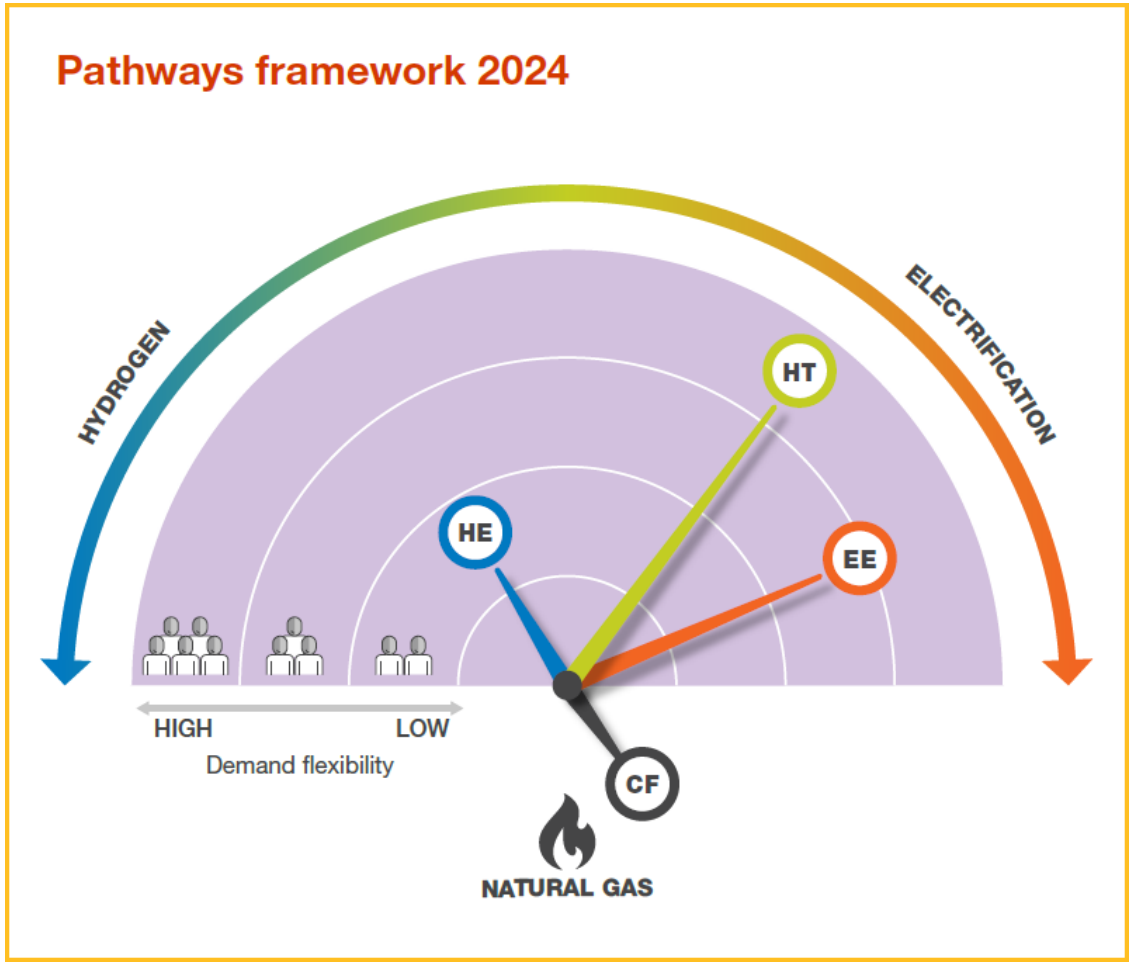
Scenarios		Pathways
Wide range of credible outcomes	→	Narrower, strategic routes to net zero
Cost agnostic	→	Brings in additional economic modelling
Interactions between vectors highlighted	→	Models hydrogen and electricity interactions

Changes to the framework





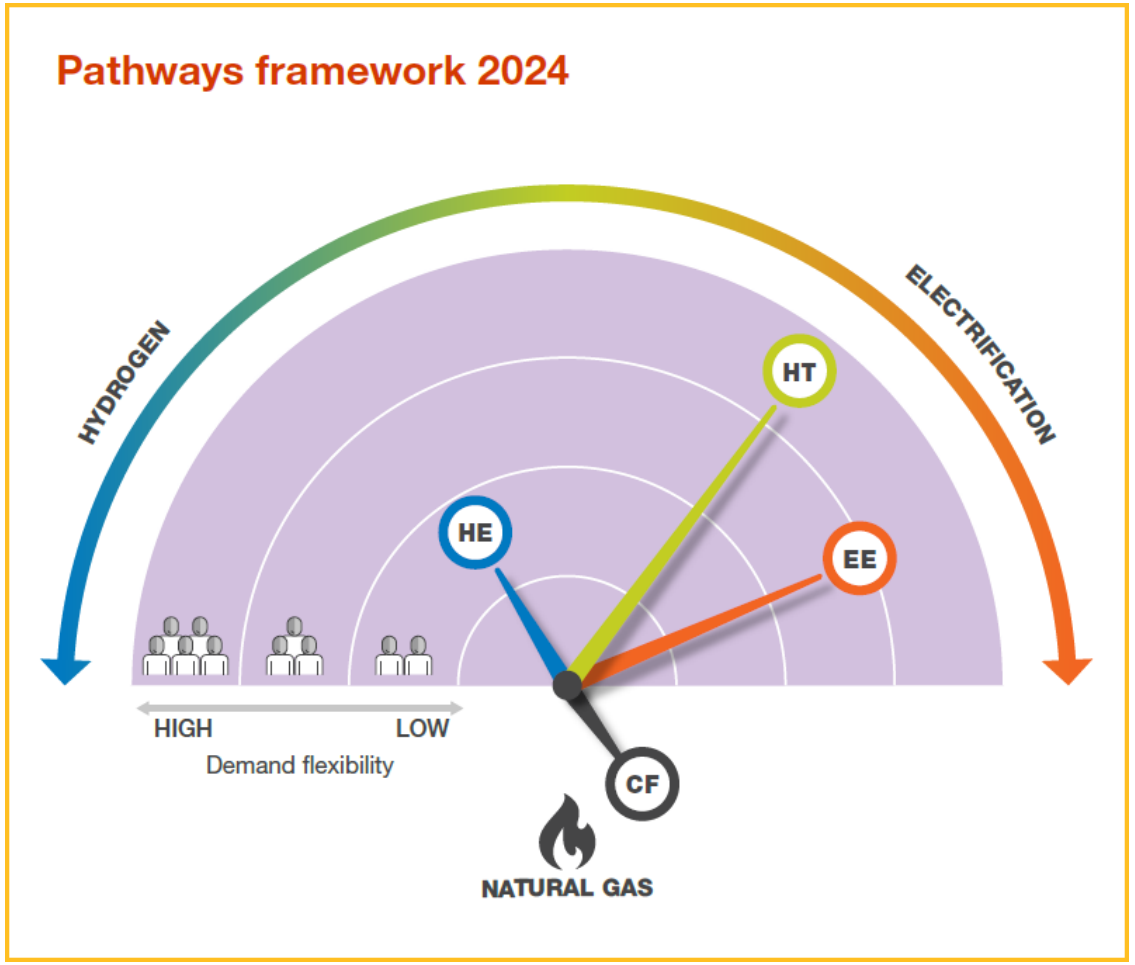
FES 2024: ESO Pathways to net zero



FES 2024: ESO Pathways to net zero

Holistic Transition

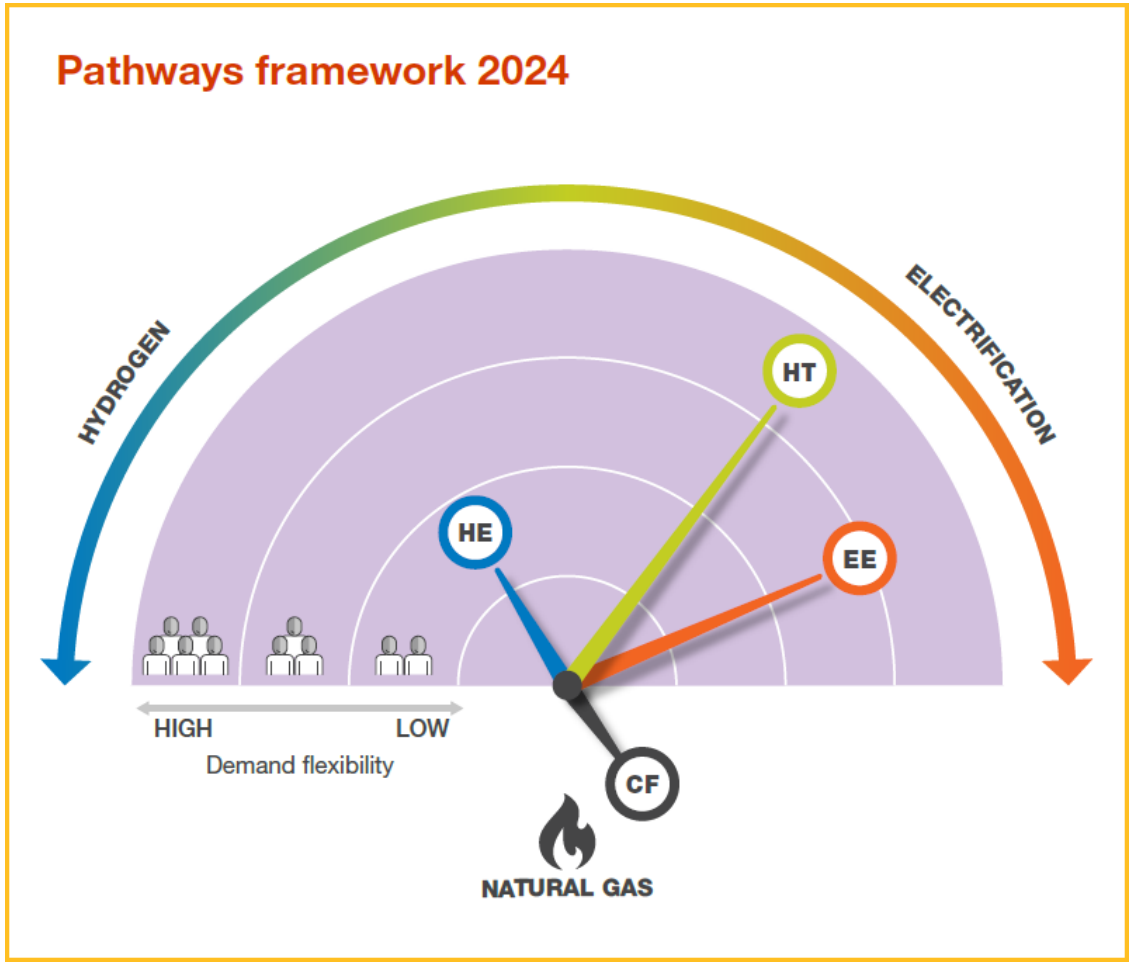
- Net zero by 2050
- Mix of electrification and hydrogen
- Very high consumer engagement in the transition



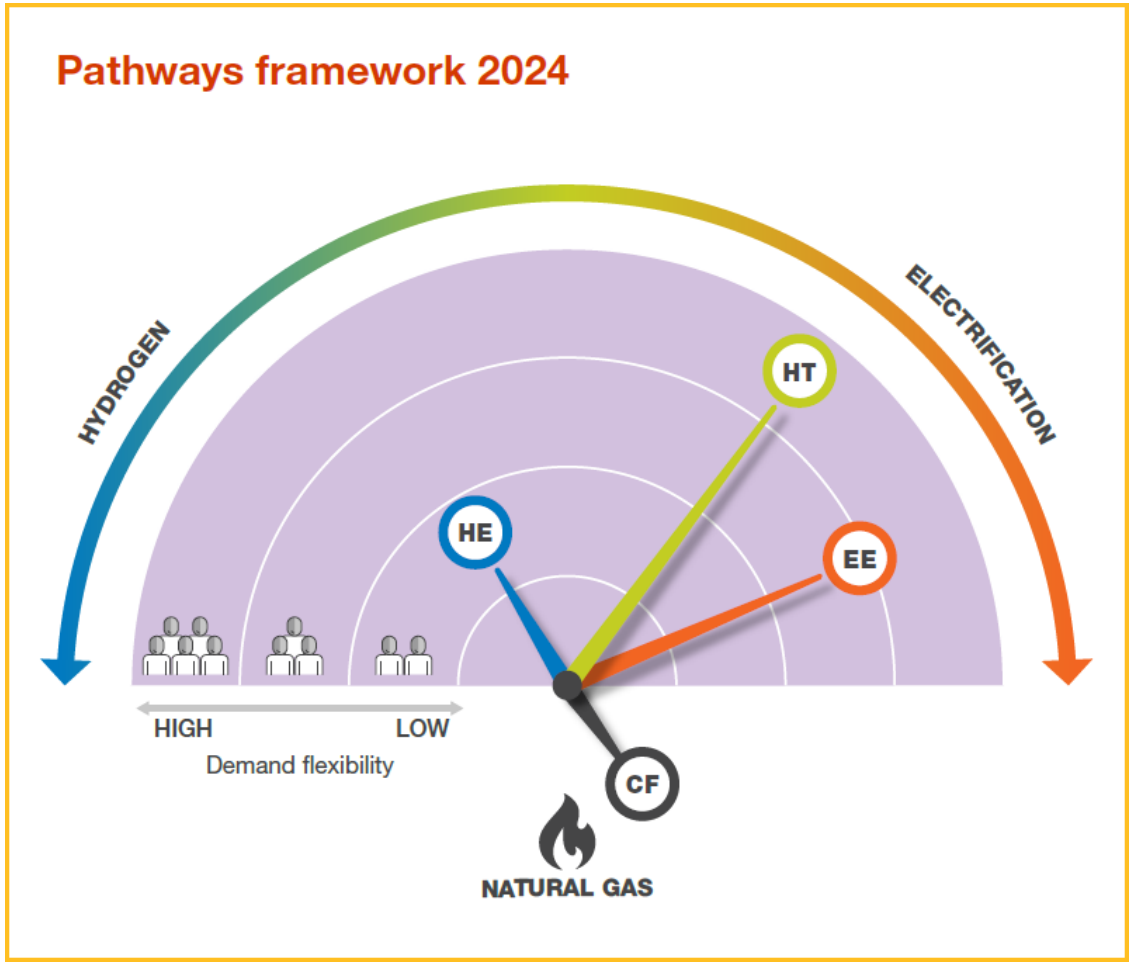
FES 2024: ESO Pathways to net zero

Electric Engagement

- Net zero by 2050
- High levels of electrification
- Strong consumer engagement in the transition



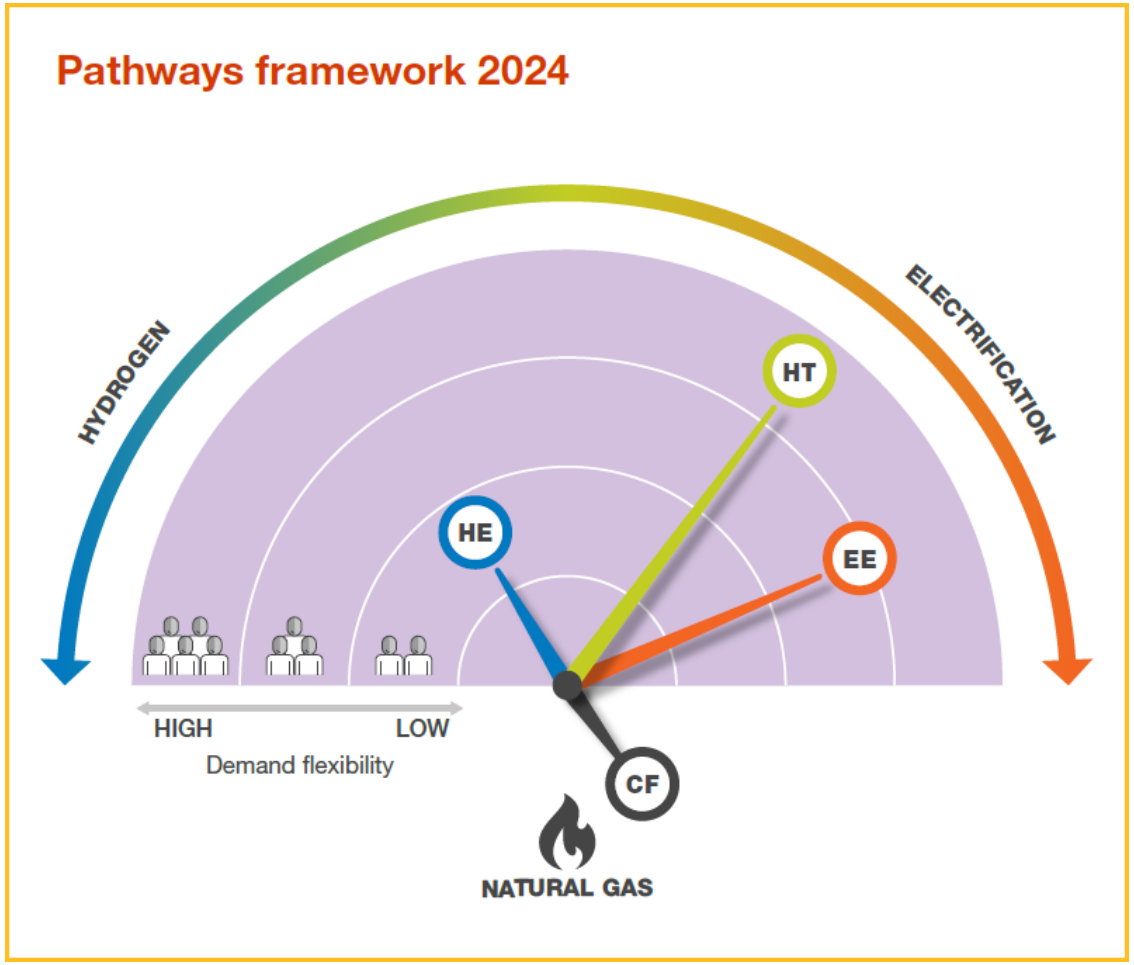
FES 2024: ESO Pathways to net zero



Hydrogen Evolution

- Net zero by 2050
- Fast progress for hydrogen in industry and heat
- Lower levels of consumer engagement

FES 2024: ESO Pathways to net zero



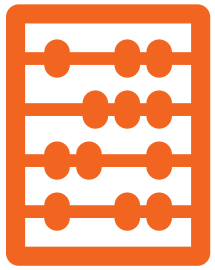
Counterfactual

- Net zero not achieved by 2050
- Some progress is made compared to today
- Heavy reliance on gas across all sectors, particularly power and space heating
- Electric vehicle uptake is slower than the net zero pathways, but still displaces petrol and diesel

Key changes to modelling in 2024

New “Capacity Expansion Modules” for post-2030 electricity and hydrogen supply capacities

Data centre locations and demand growth reflecting increased expectation



Incorporated new data sources into supply modelling

Improved modelling of hydrogen network rollout for heating

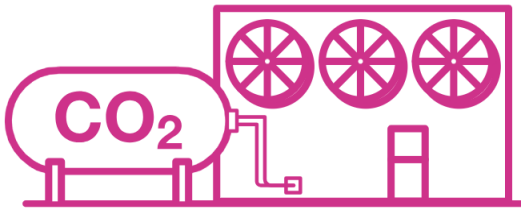
Closer integration of energy supply component interaction

Updated approach to EV charging flexibility

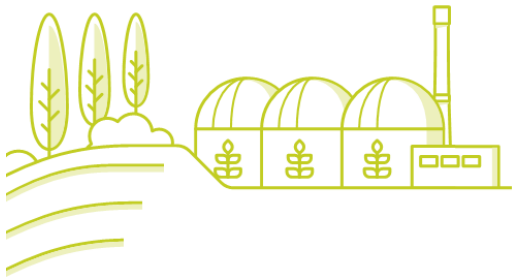
Assumptions

Changes in emissions and bioenergy key assumptions

Non-FES Sector emissions aligned to the Committee on Climate Change's Balanced Pathway



DACCS included in all net zero pathways



Updated use of BECCS essential to meeting Sixth Carbon Budget

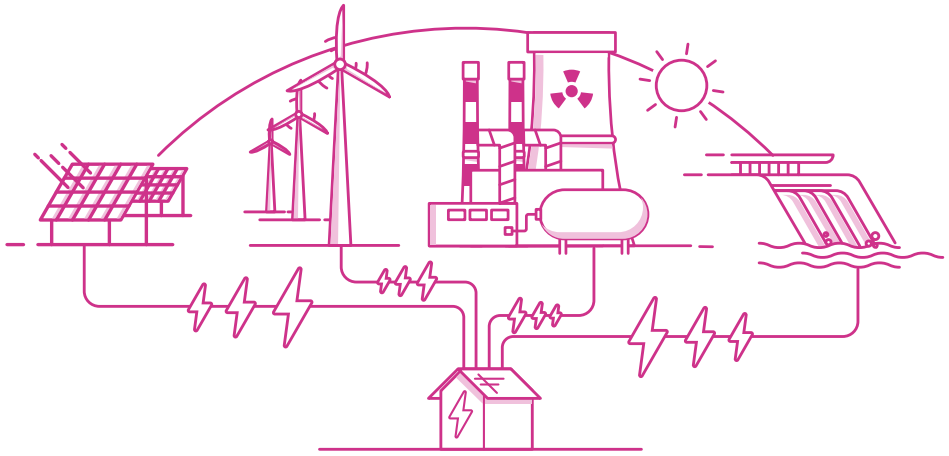
Changes in energy demand key assumptions

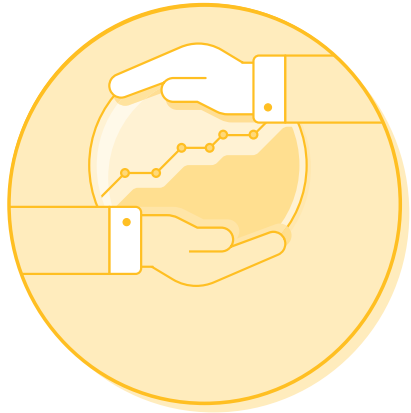
High levels of home energy efficiency in all pathways

Narrowed range on H_2 boiler and heat pump uptake

Battery electric vehicle uptake follows zero emission vehicles mandate

Changes in electricity supply key assumptions



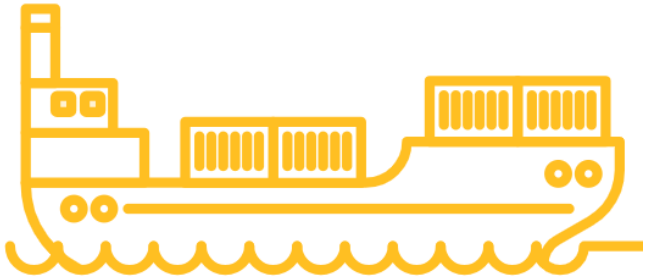


New and more detailed cost and technical input data

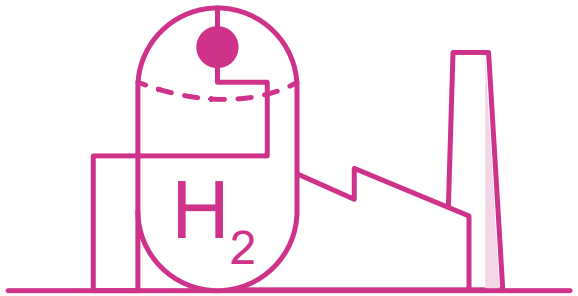
Minimum capacity build rates set in modelling

Refreshed European data set for 2024

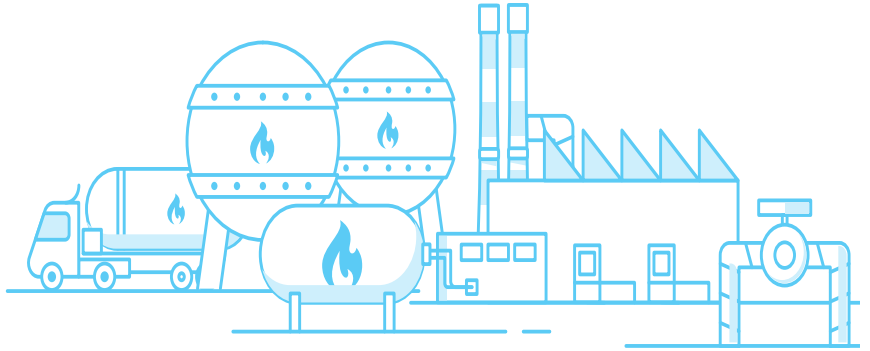
Changes in gas and hydrogen supply key assumptions



Assumed availability of LNG increased in all pathways



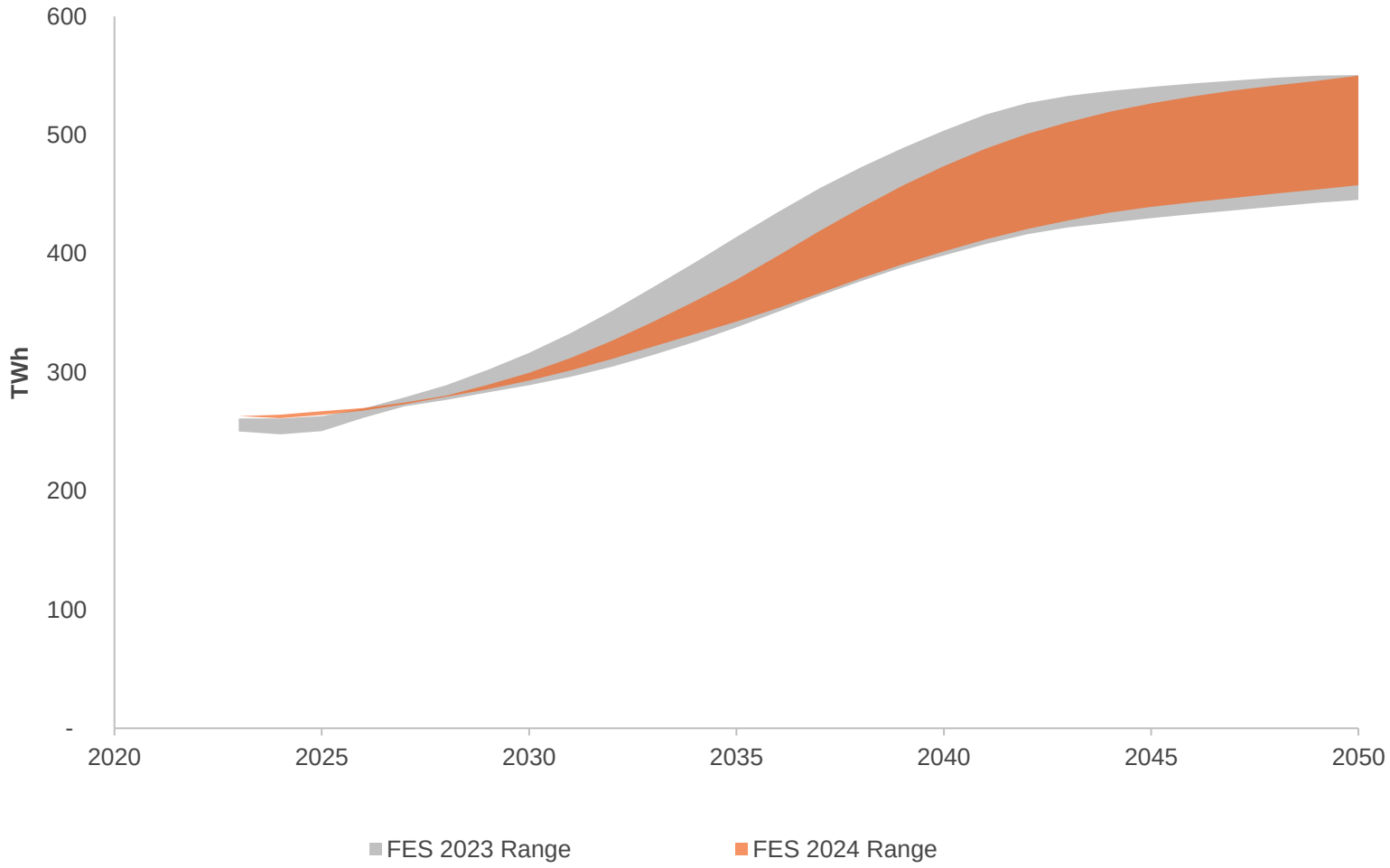
New economic model for hydrogen supply



Industrial demand drives methane reformation

Pathway Ranges

Change in net zero consumer electricity demand range



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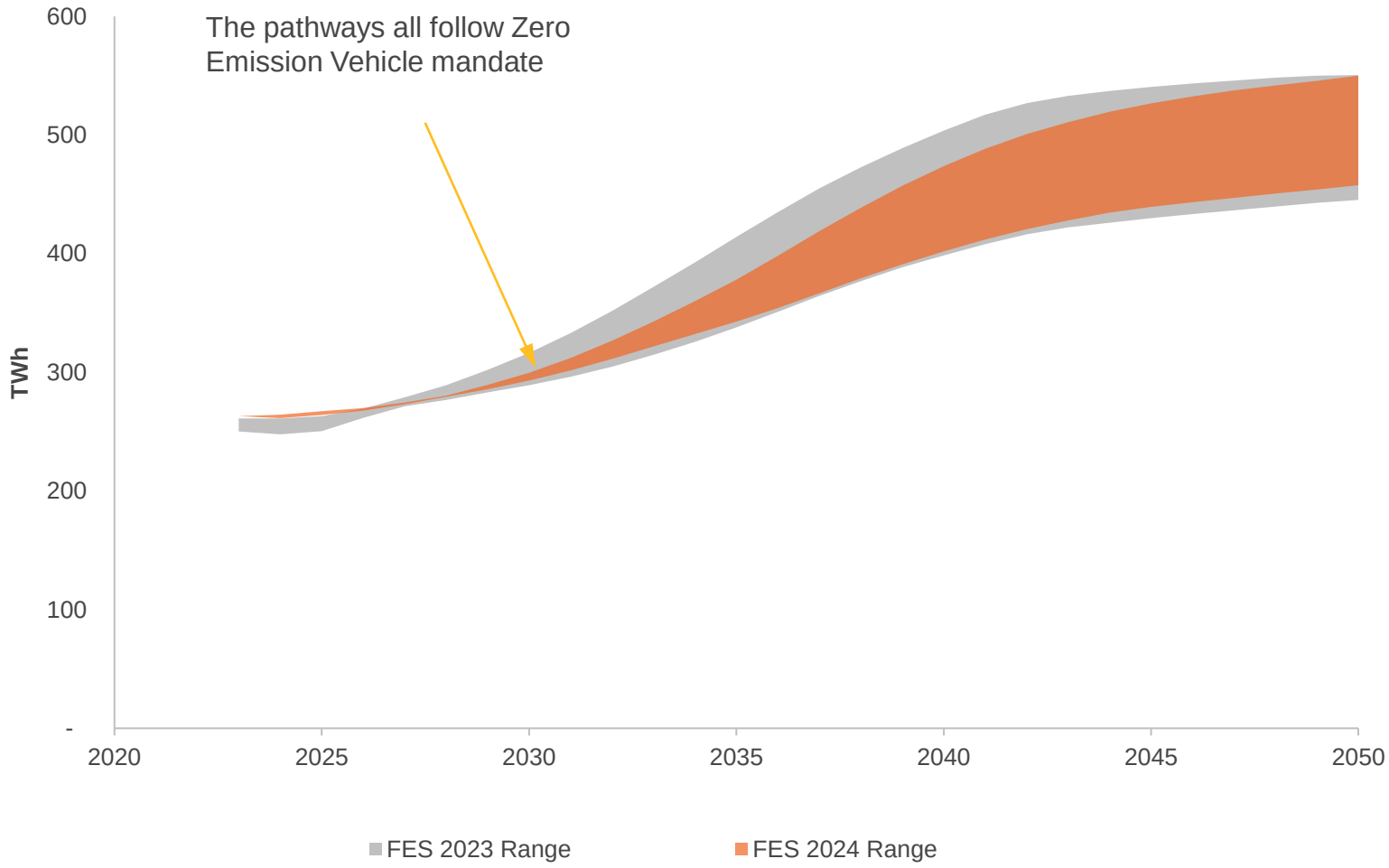

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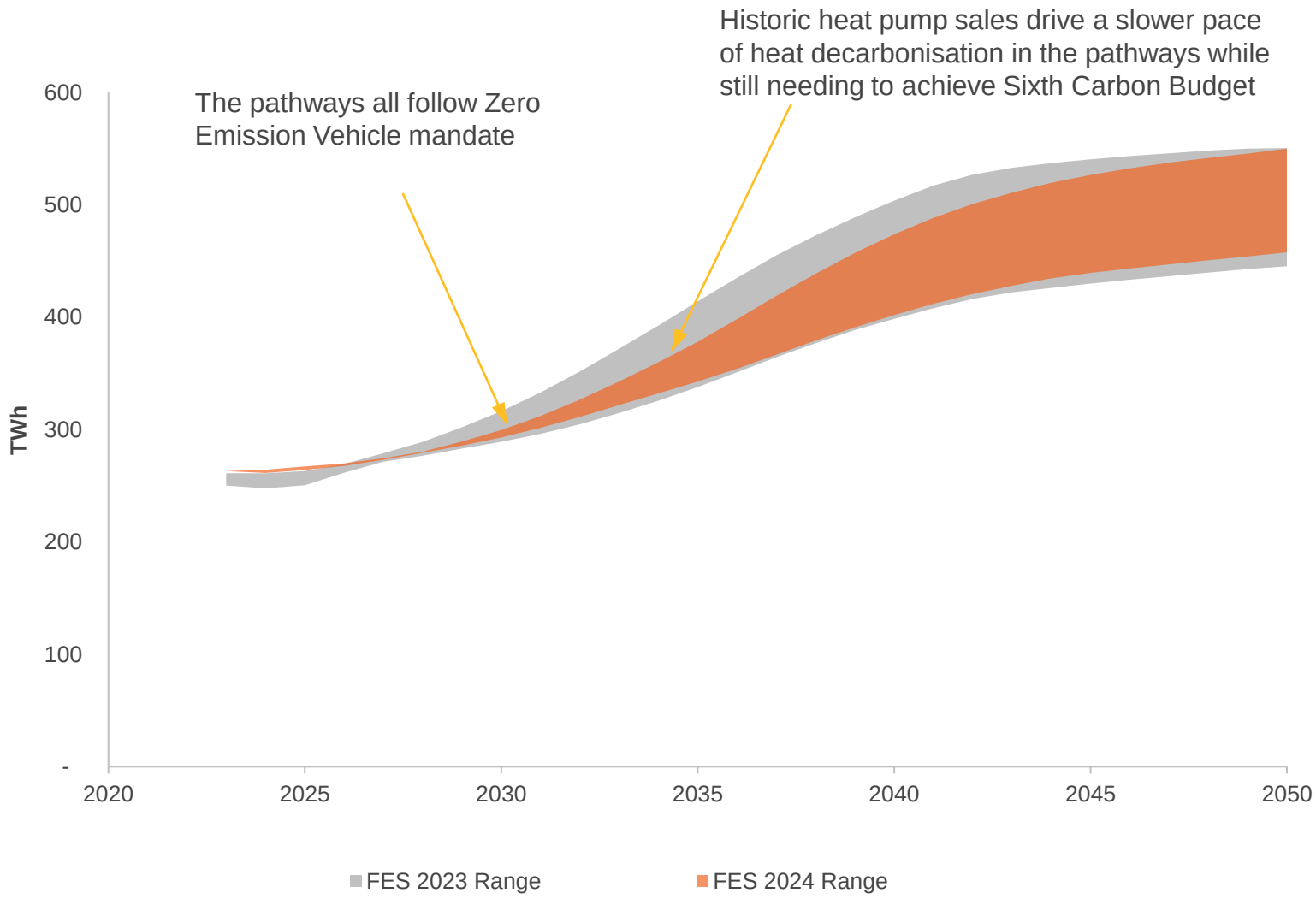

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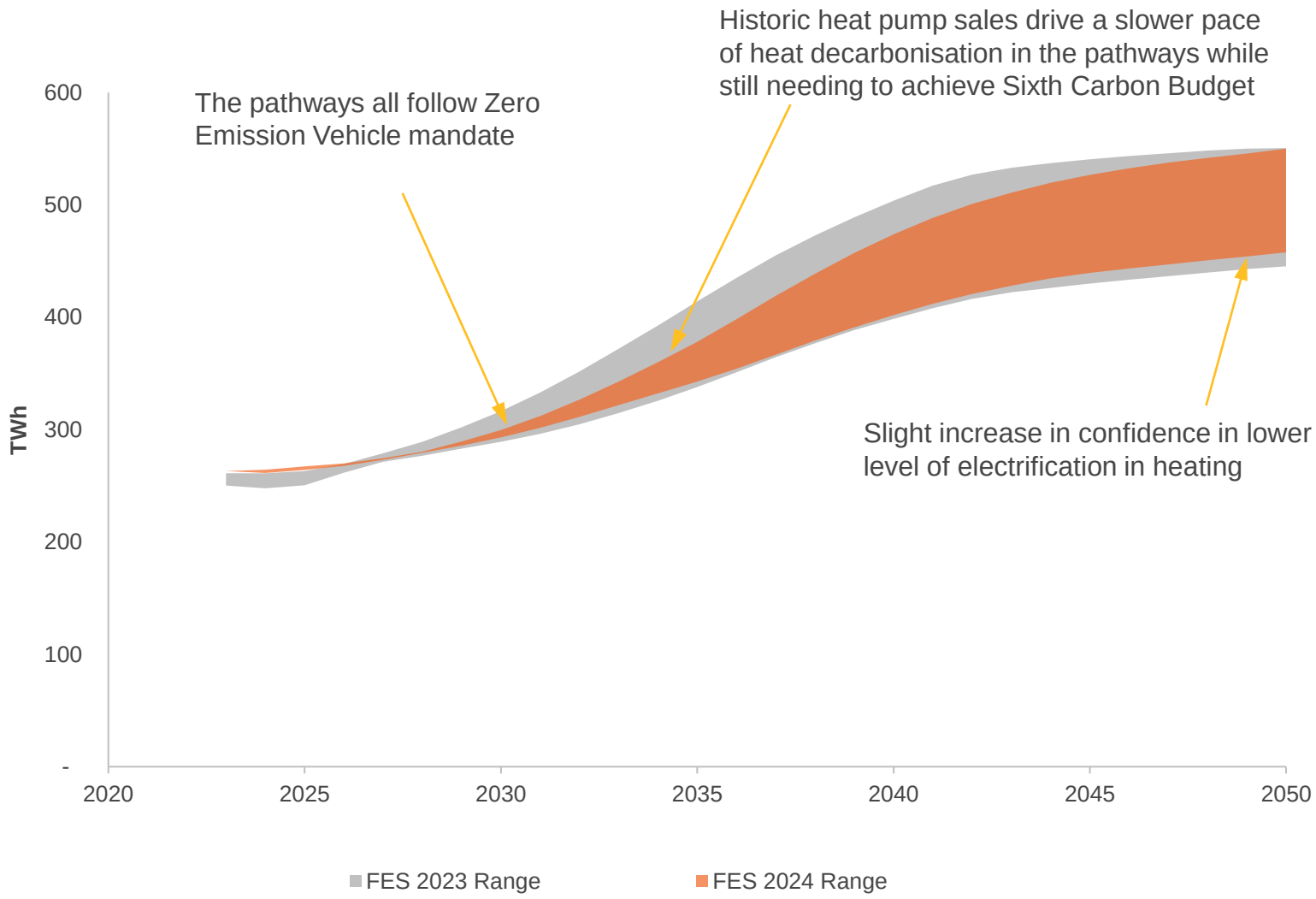
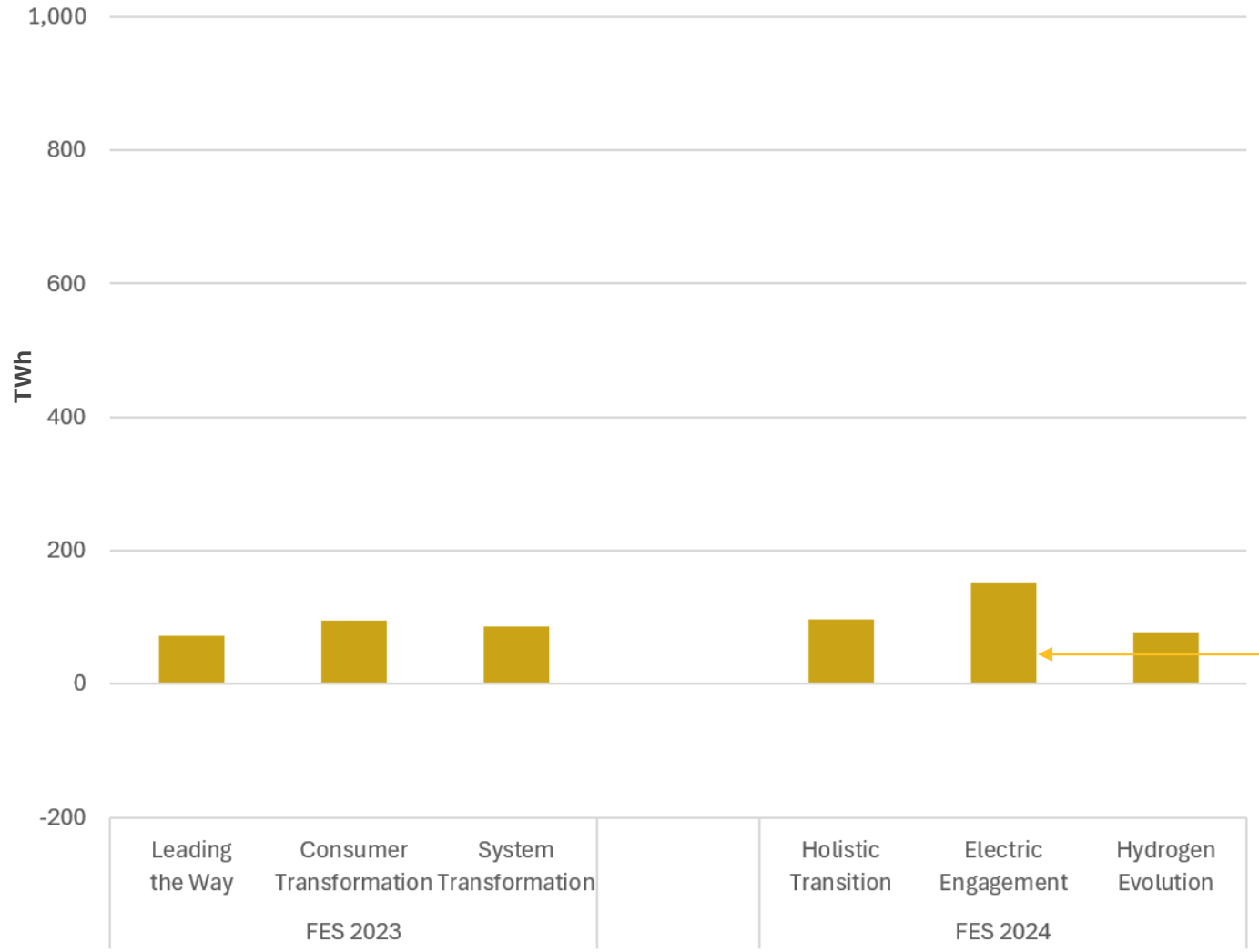
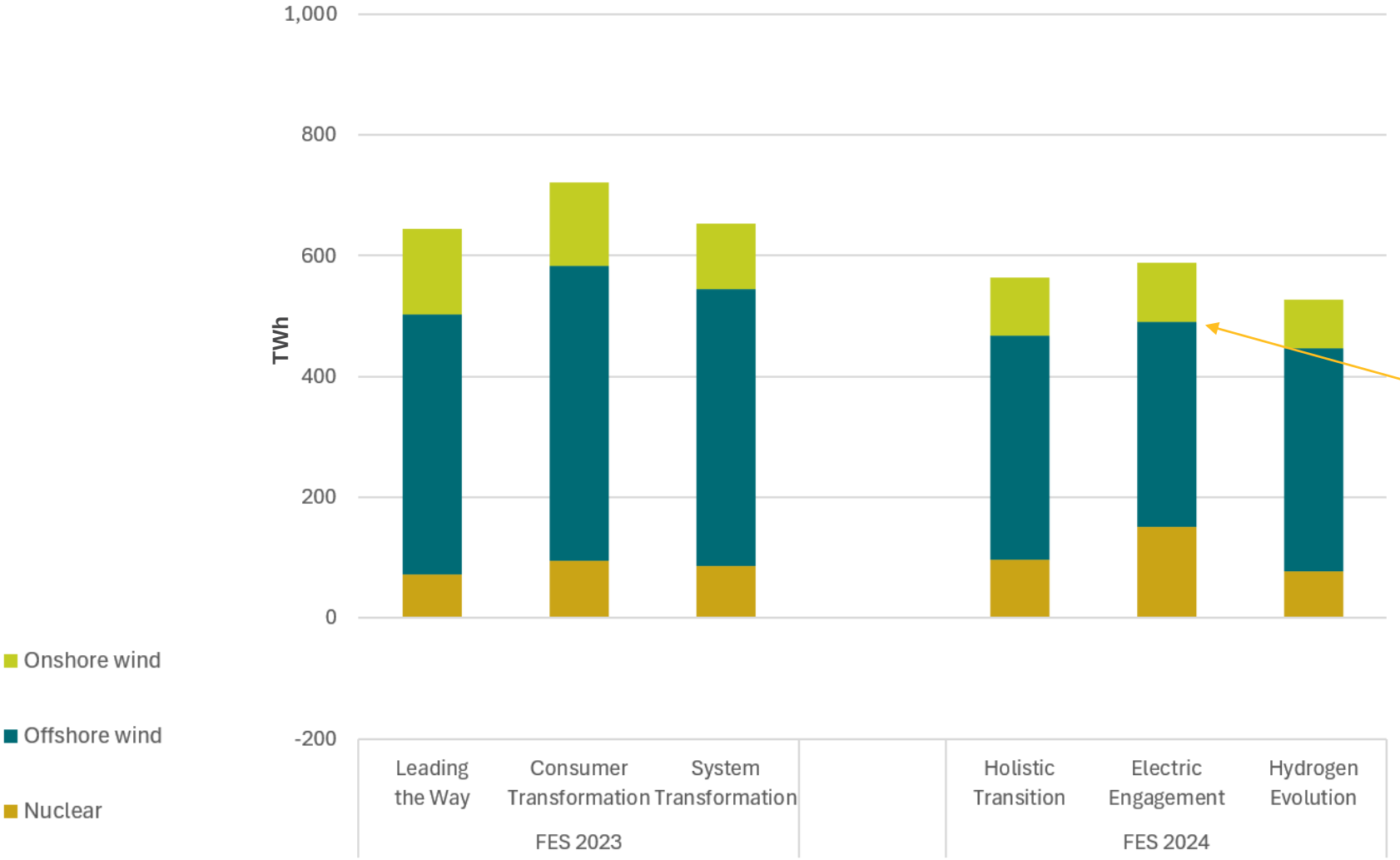


Change in 2050 net zero electricity supply range



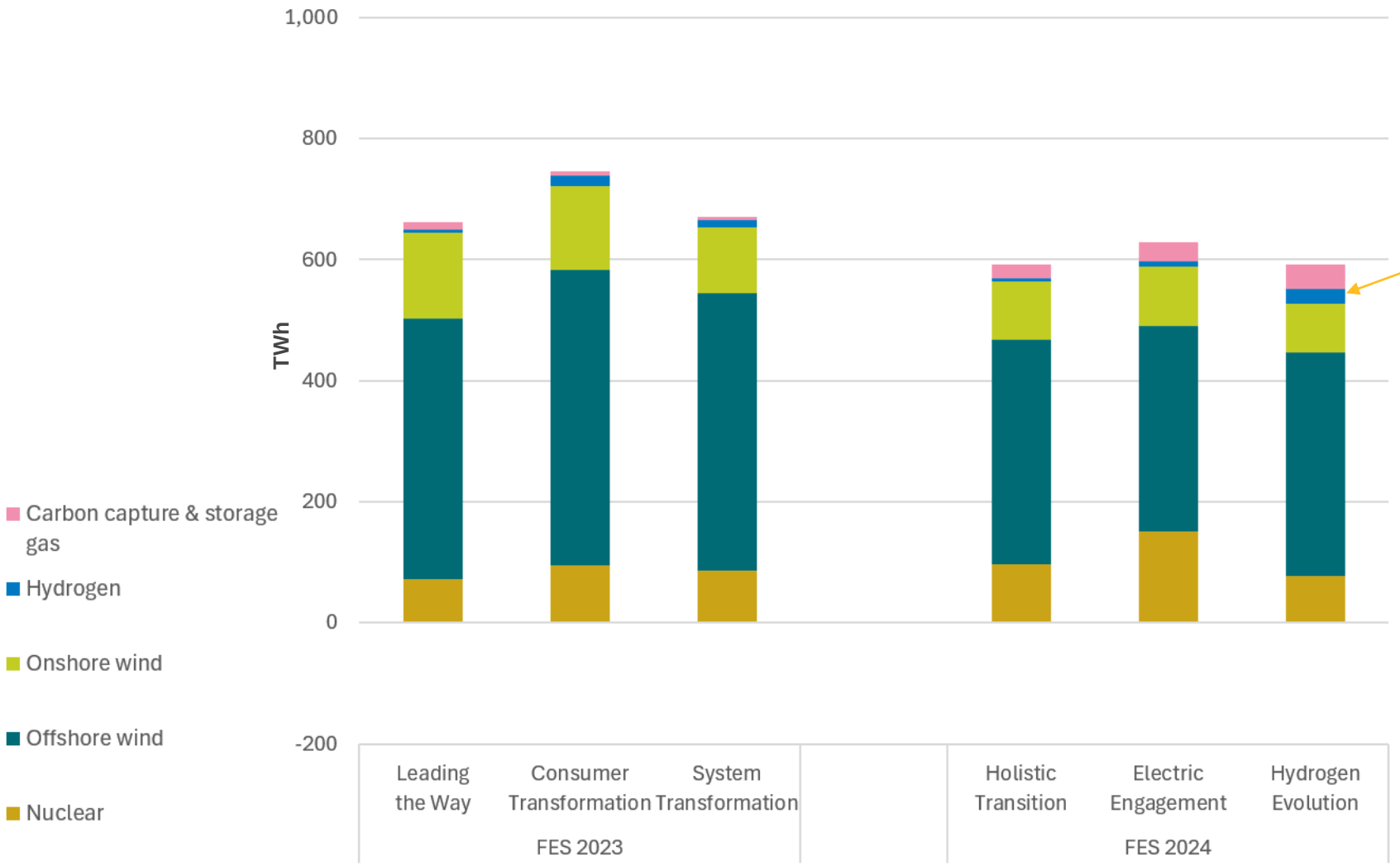
Nuclear has increased on average 23 TWh in FES 2024

Change in 2050 net zero electricity supply range



FES 2024 uses updated wind load factors, which provides an average of 137 TWh less wind than FES 2023

Change in 2050 net zero electricity supply range



FES 2024 sees an increased use of gas CCS and hydrogen to power for security of supply

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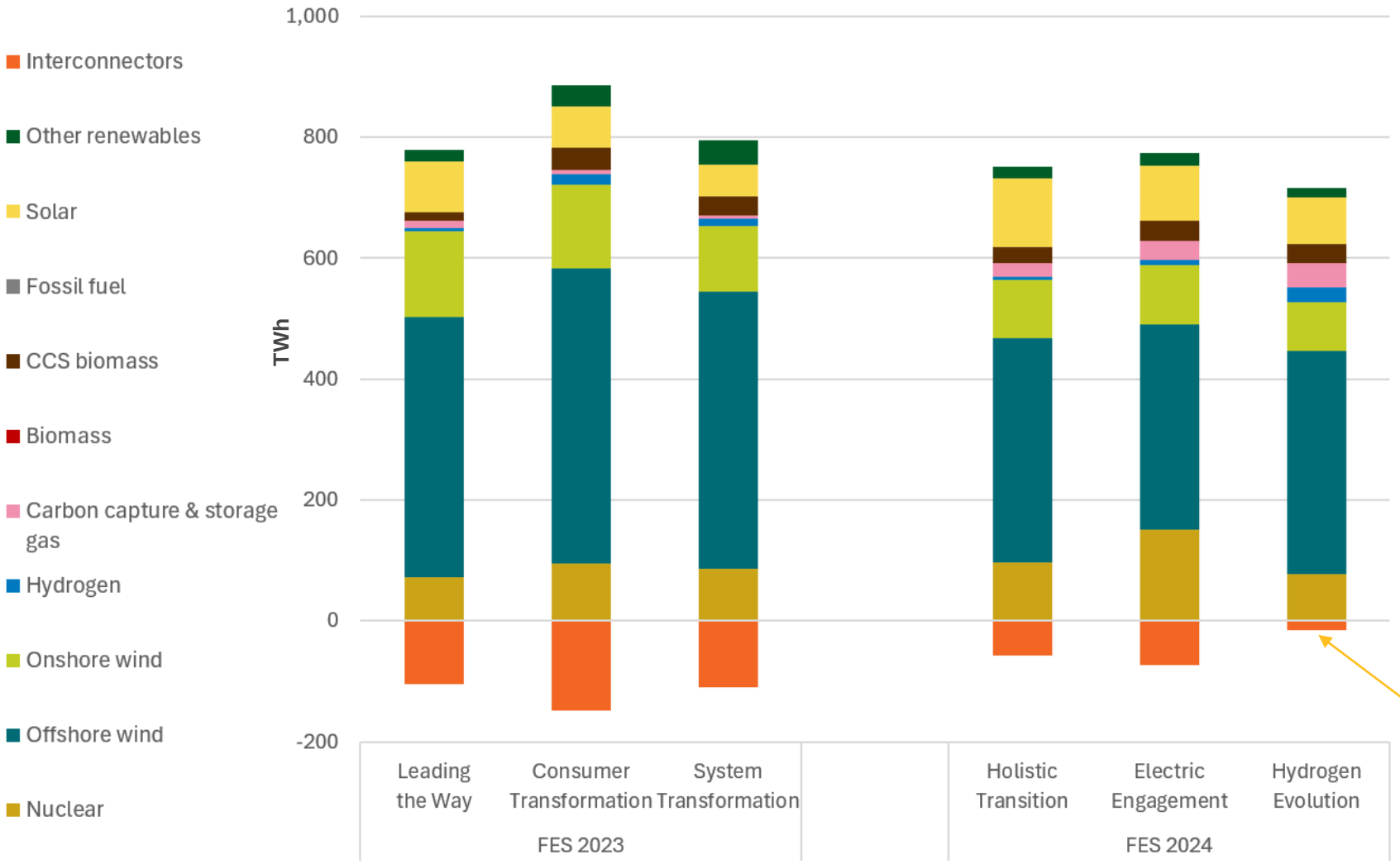
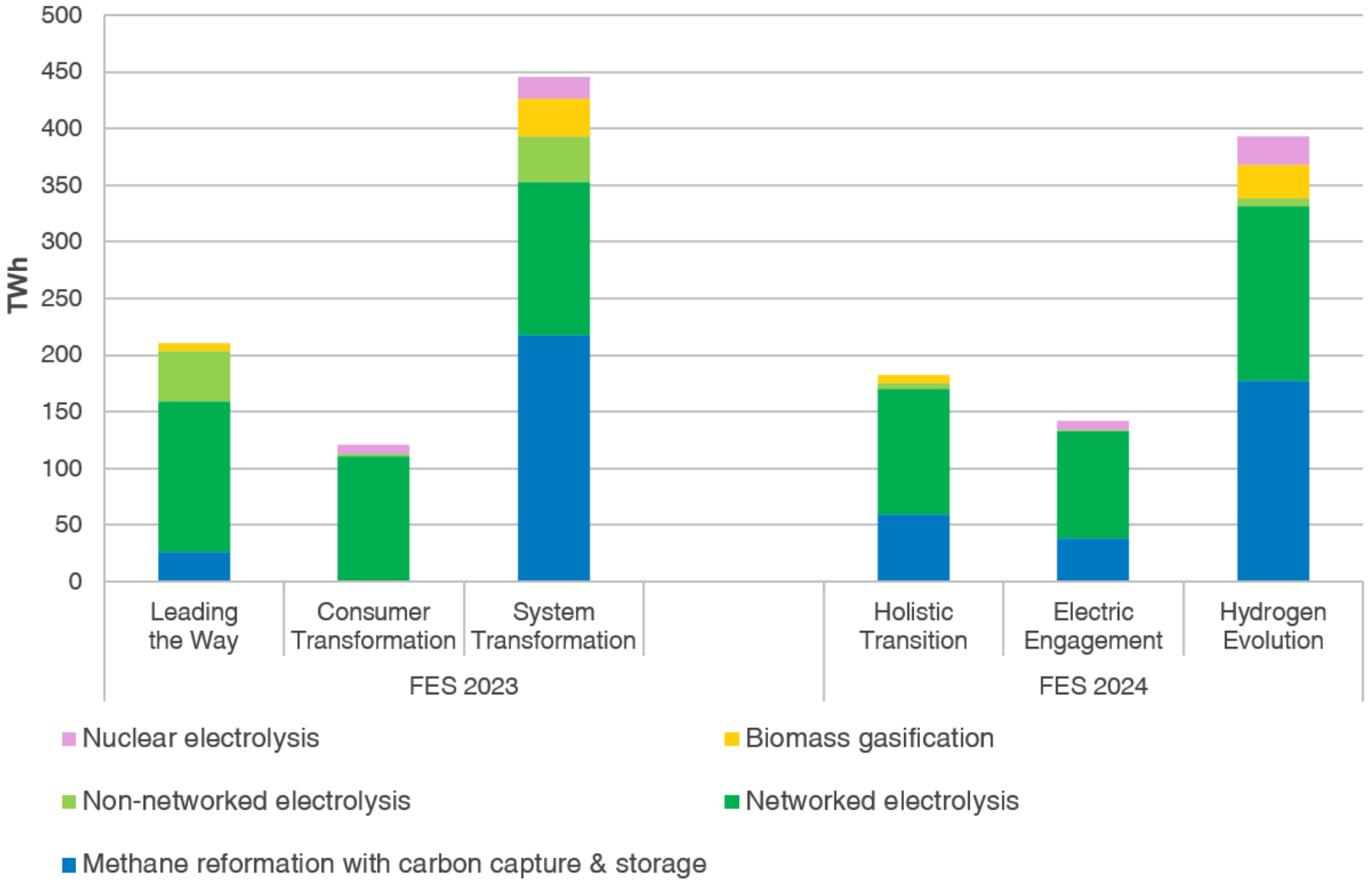
Change in 2050 net zero electricity supply range



Reduced exports, but Great Britain remains net exporter between 15 to 73 TWh in FES 2024

Change in 2050 hydrogen demand and production range



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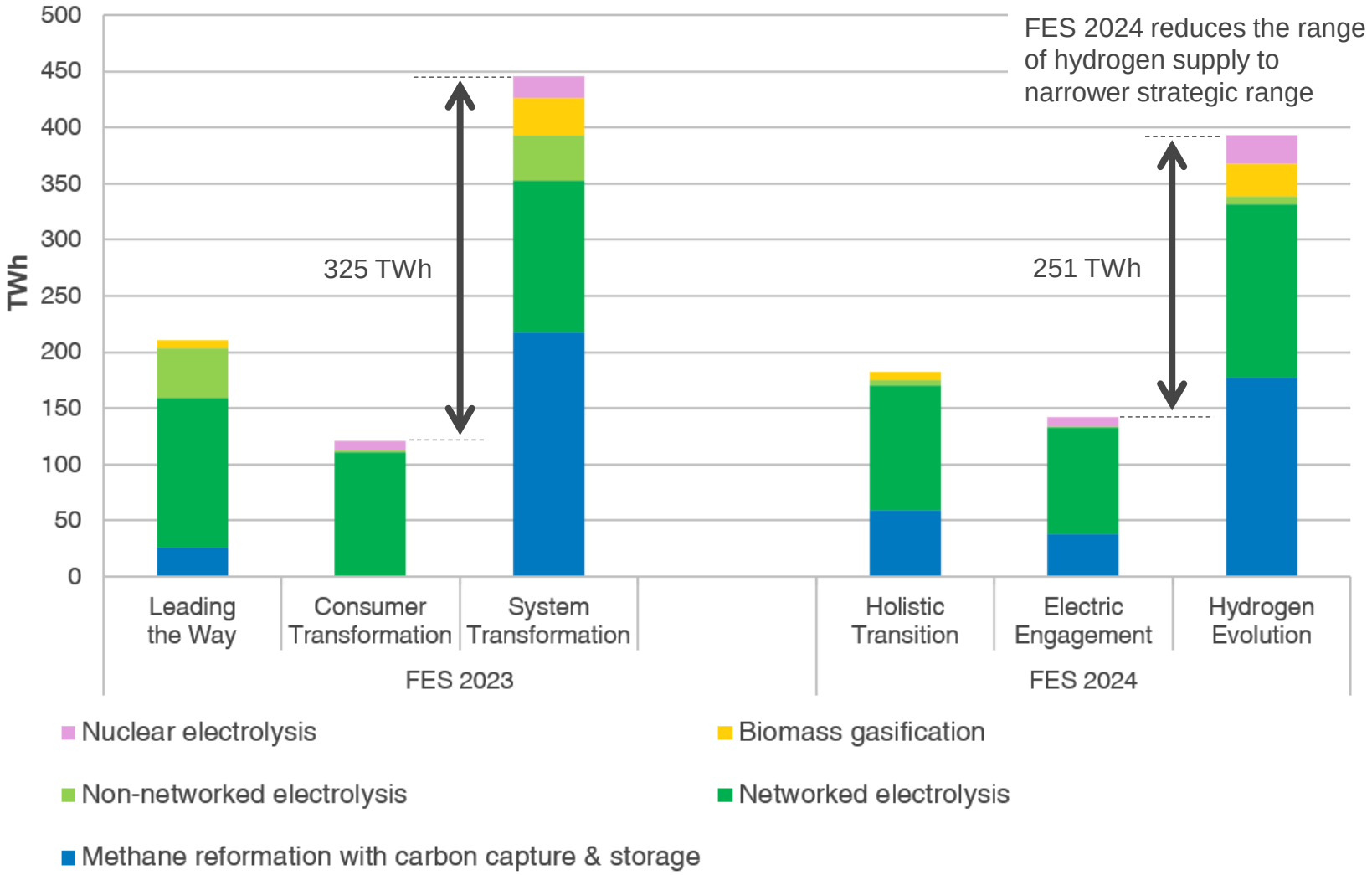
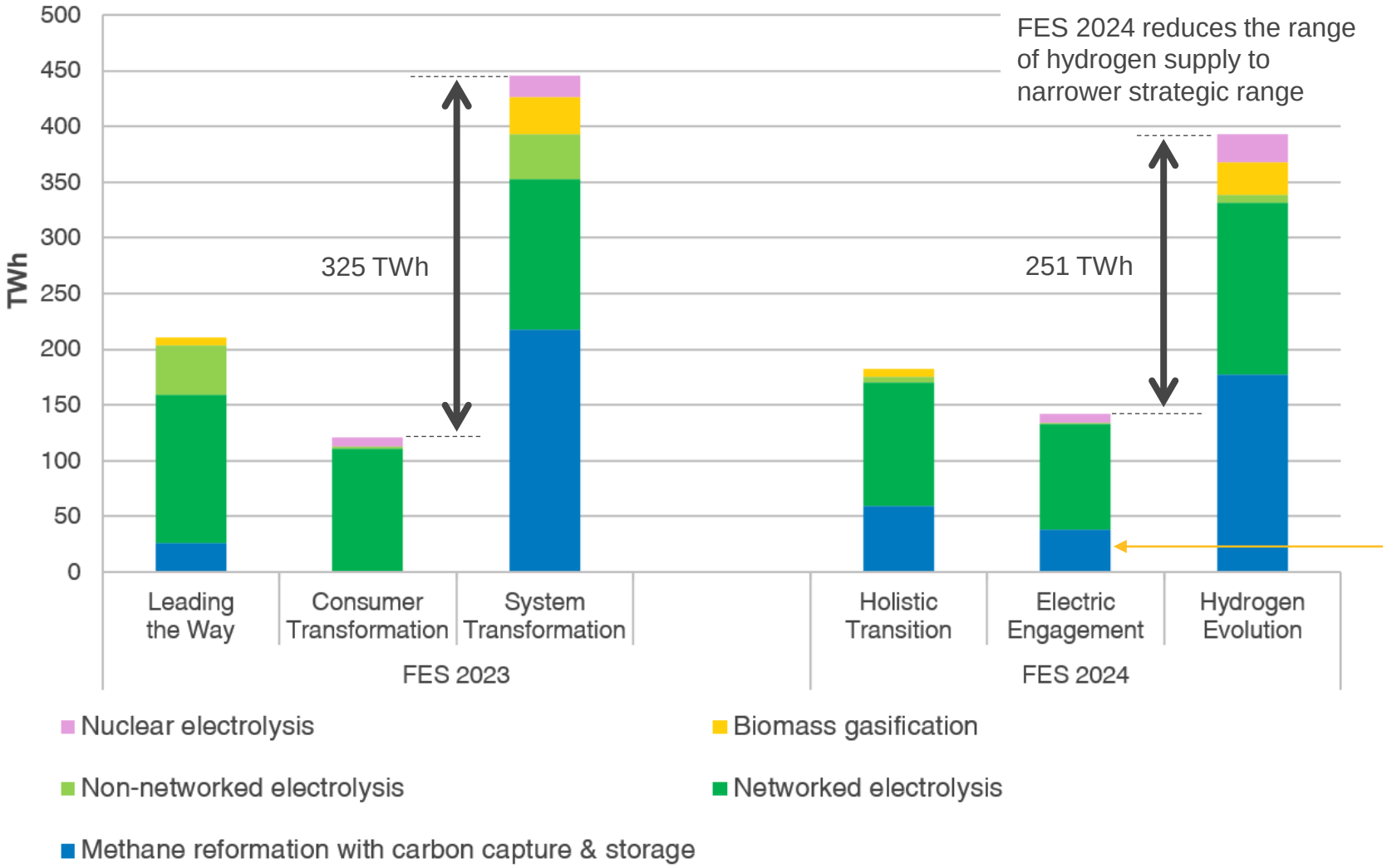


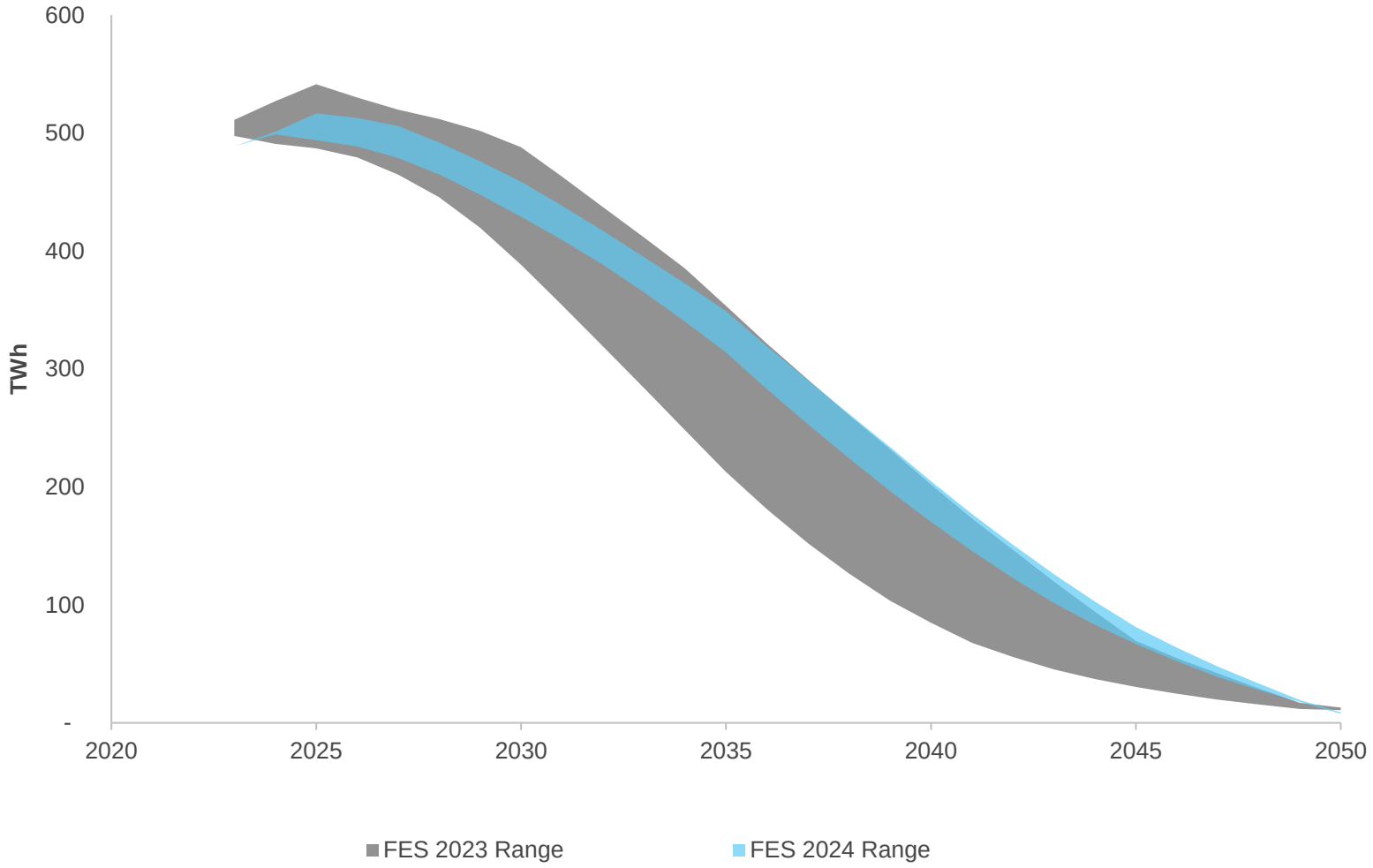
Change in 2050 hydrogen demand and production range



FES 2024 reduces the range of hydrogen supply to narrower strategic range

Higher minimum level of methane reformation in FES 2024 due to more projects in development and its improved near-term dependability

Change in net zero natural gas consumer demand range



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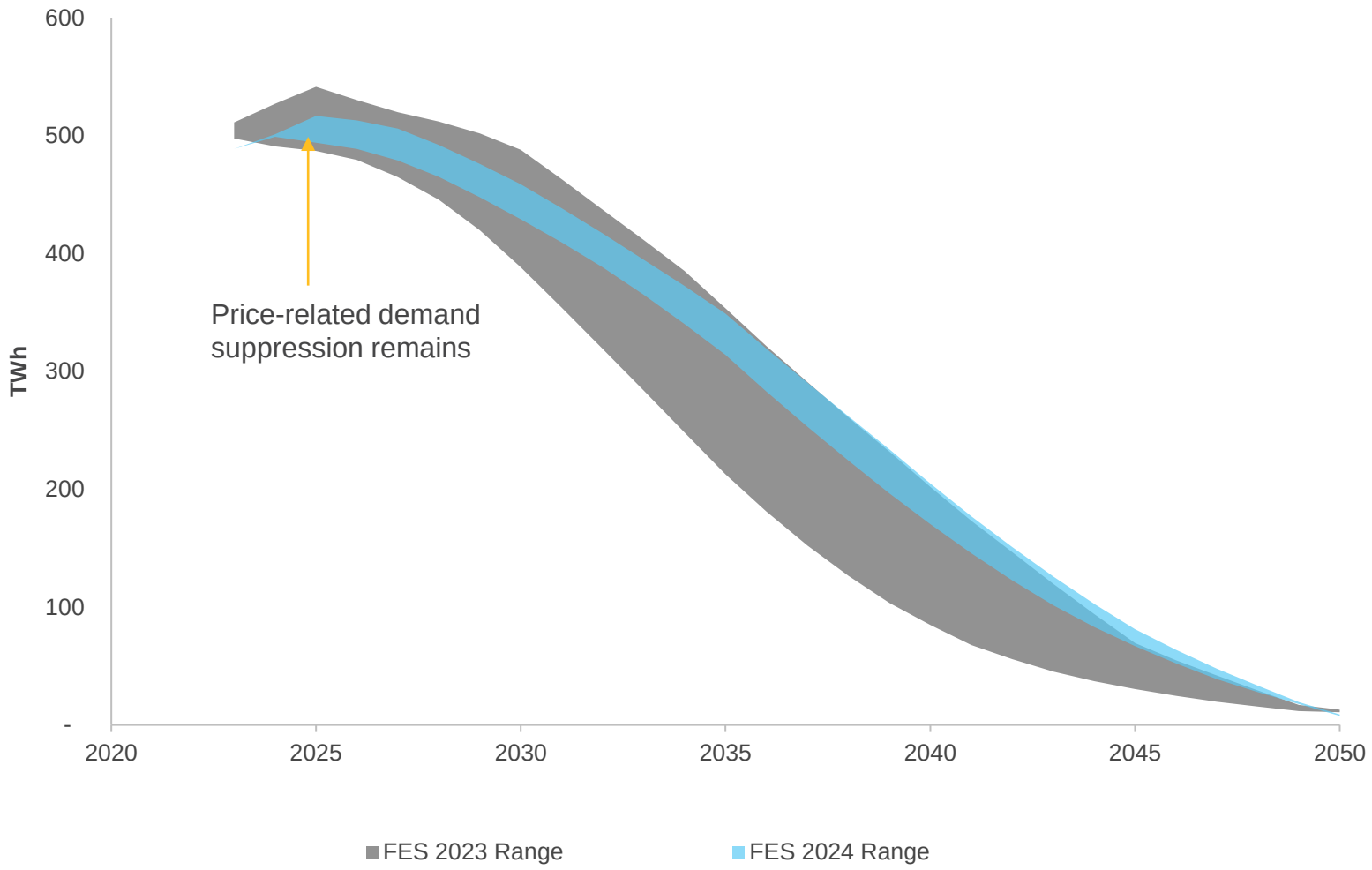

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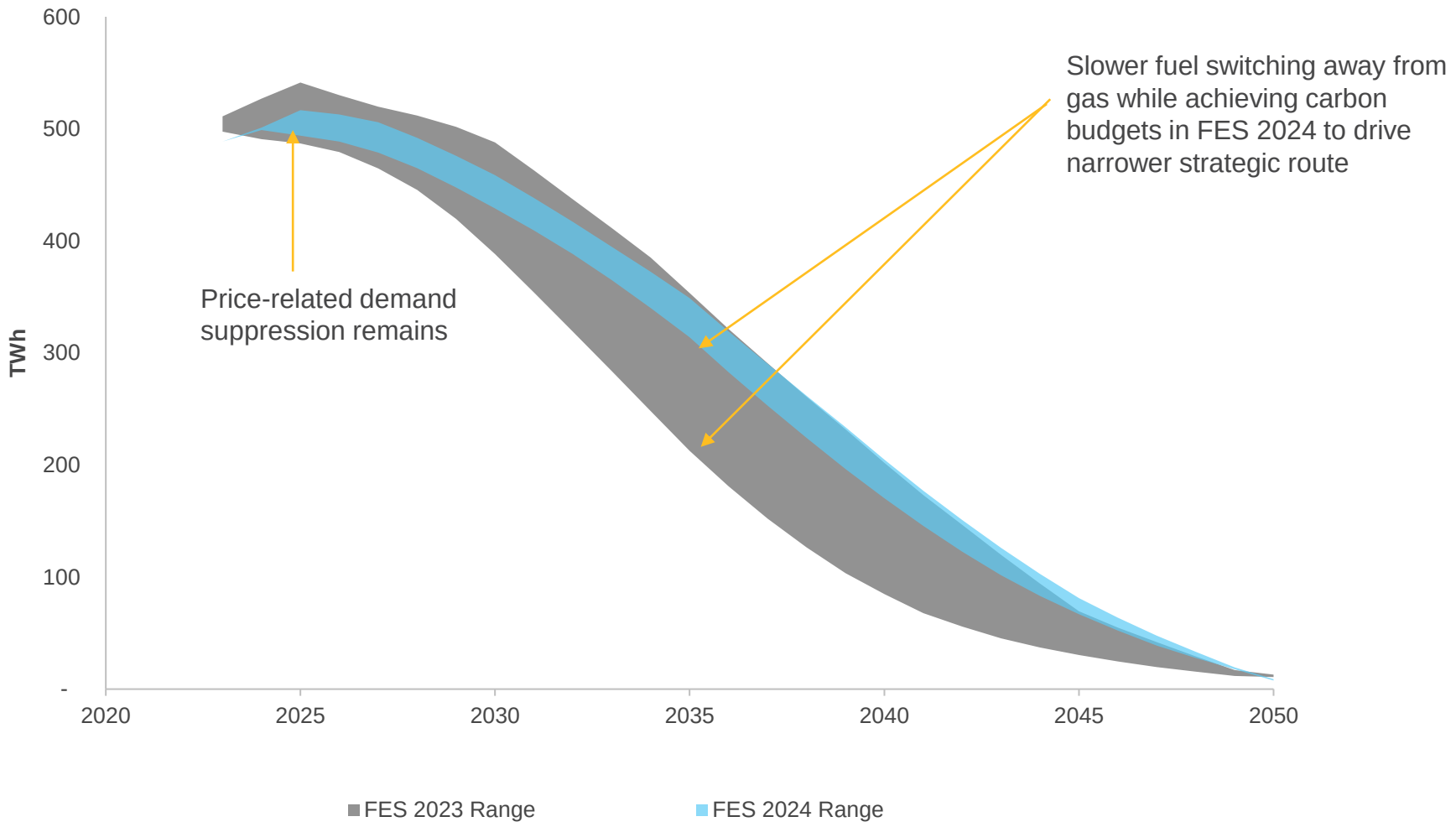

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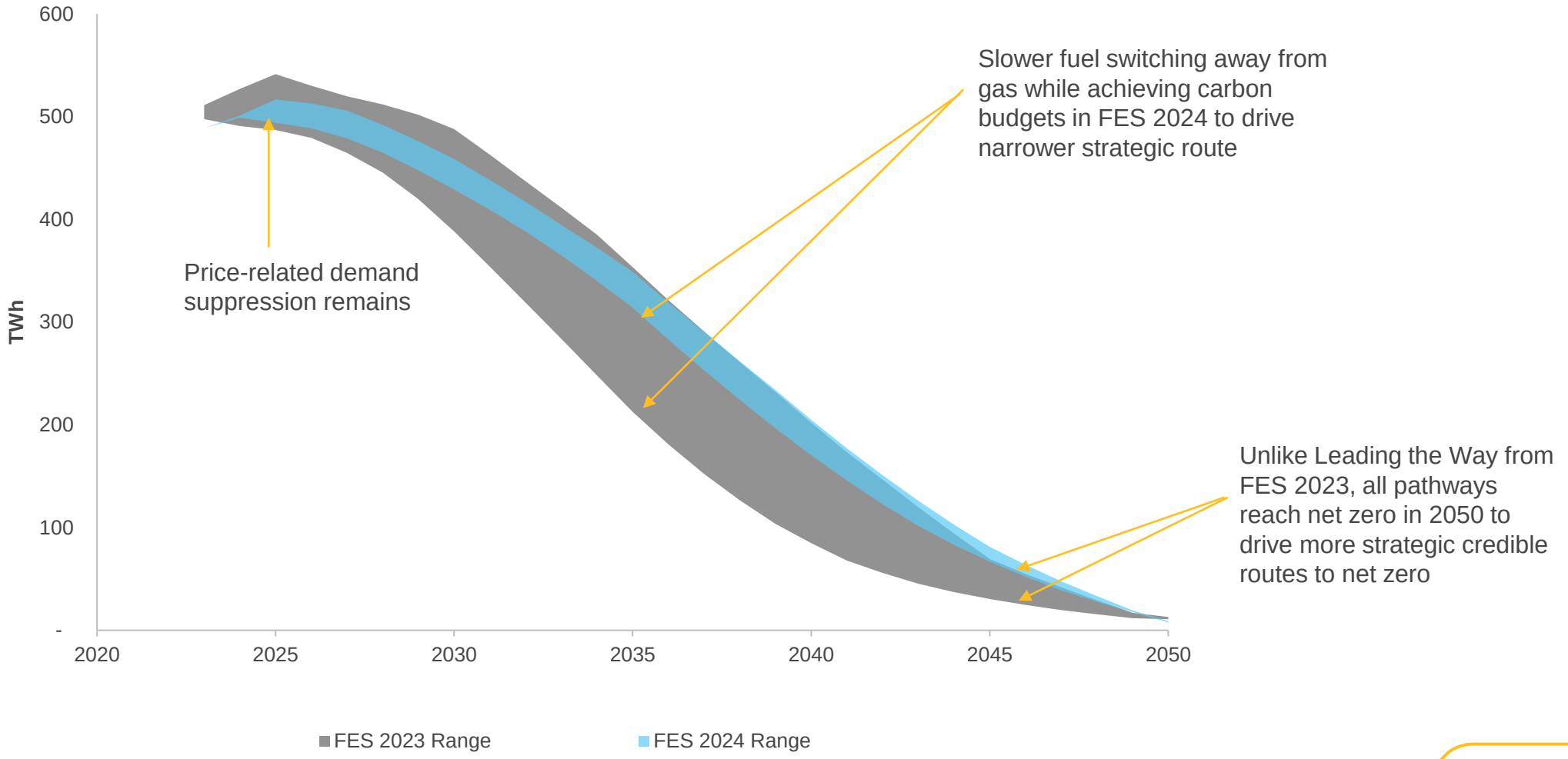
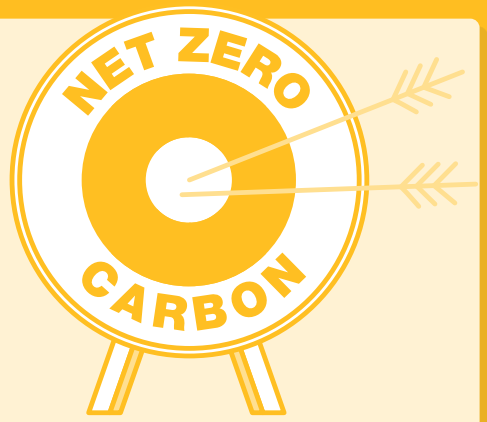


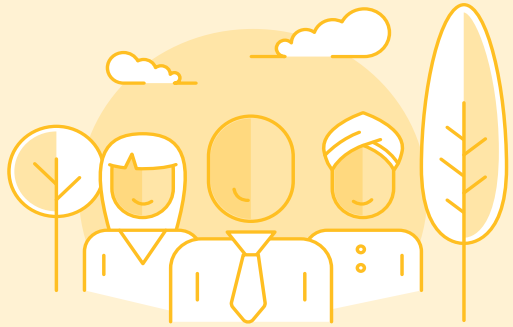
Conclusion

Driving strategic network investment and whole energy markets

A new framework for pathways and improved modelling



Narrowing of the pathway range



Focussed key message and actions

Find out more

The full suite of documents can be found on the Future Energy Scenarios pages of the ESO website:

FES: ESO Pathways to Net Zero

FES: Pathways at a Glance

Energy Background Document

Data Workbook

Assumptions document

Modelling methods

Your feedback matters – please complete the poll on your screens

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