Future Energy Scenarios: ESO Pathways to Net Zero 2024

Energy system and supply side flexibility

18 July 2pm

ESO

Agenda

2pm	Welcome:	Sian Ramirez Bower
	Key actions:	James Whiteford
	Framework:	James Whiteford
	Core content:	Kelly Loukatou and Dave Parfitt
	Conclusion:	Dave Parfitt
	Q&A	
	Re-cap and close	

Key Message:

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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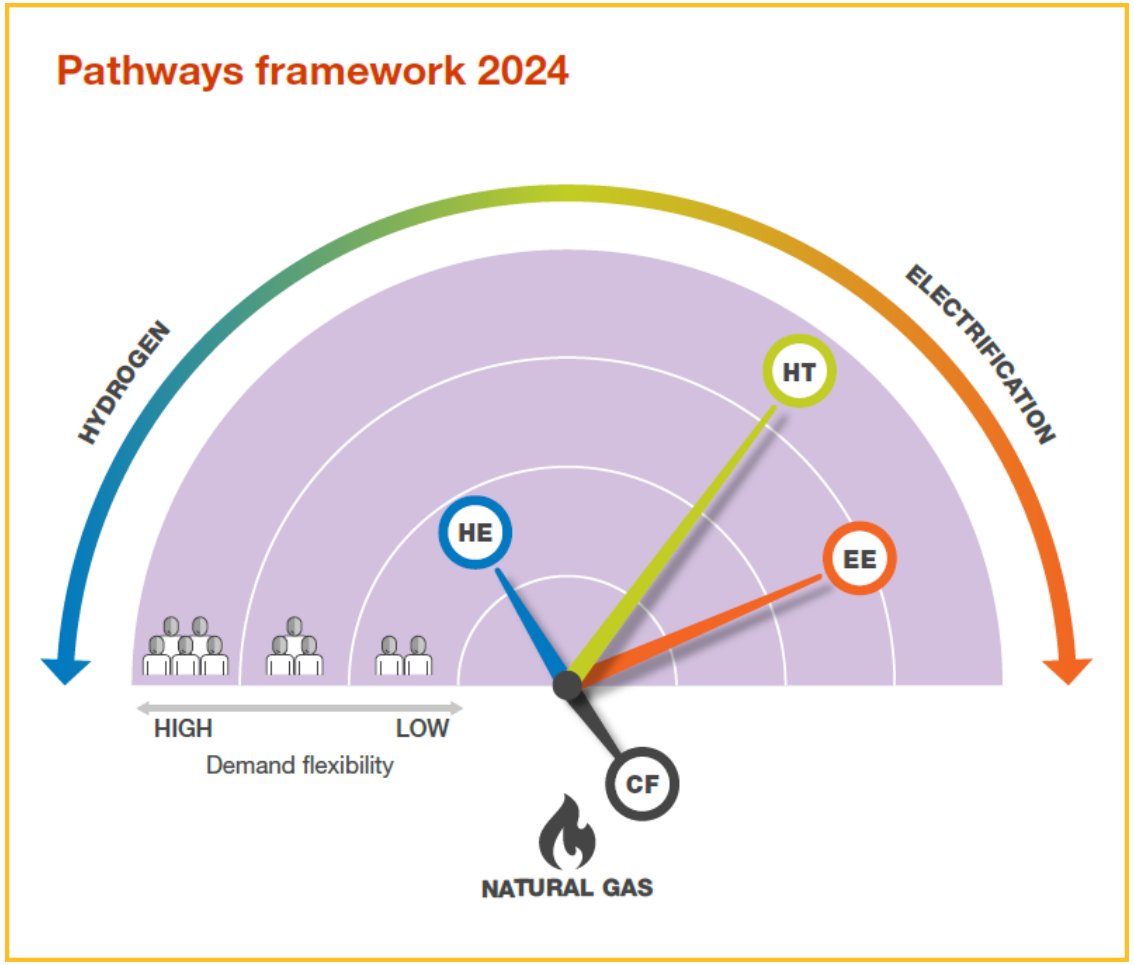
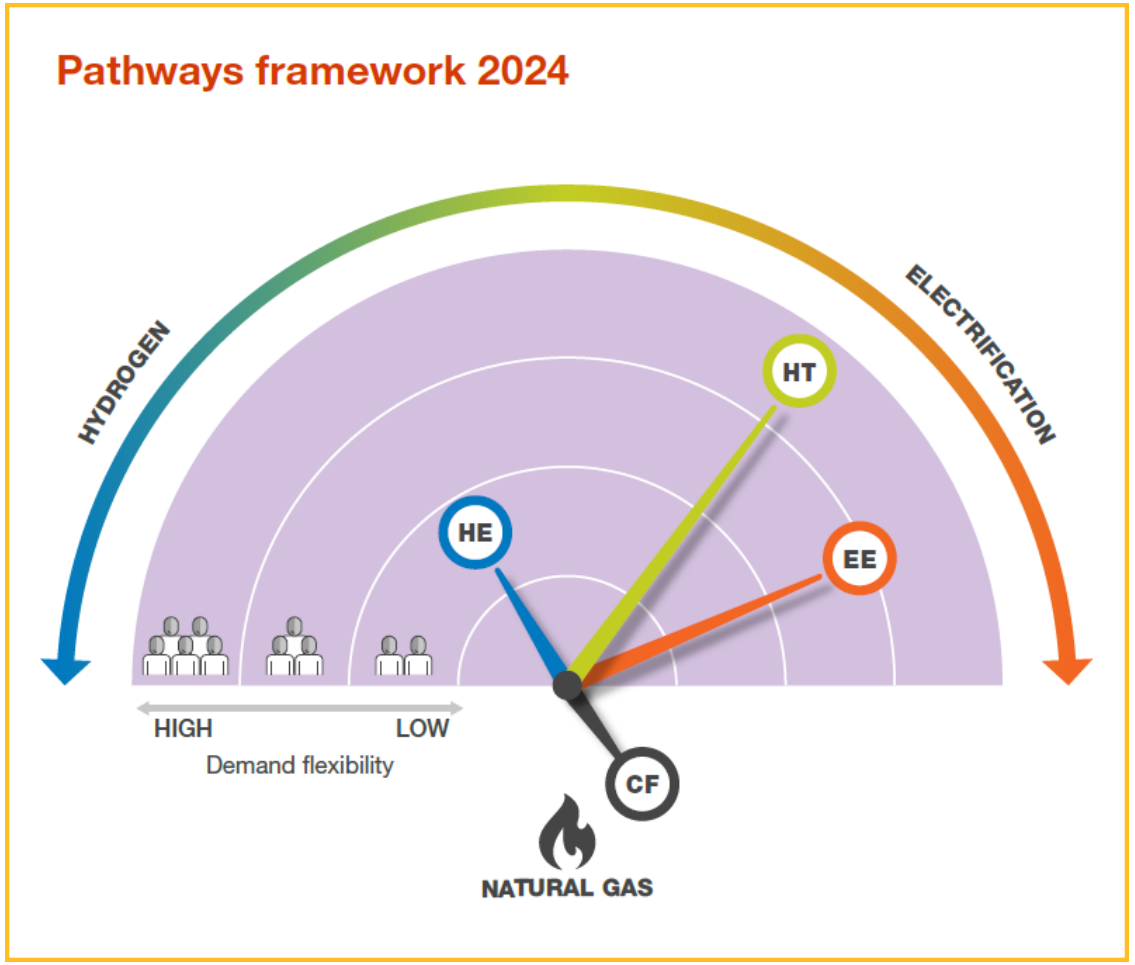
FES 2024: ESO Pathways to net zero



FES 2024: ESO Pathways to net zero

Holistic Transition

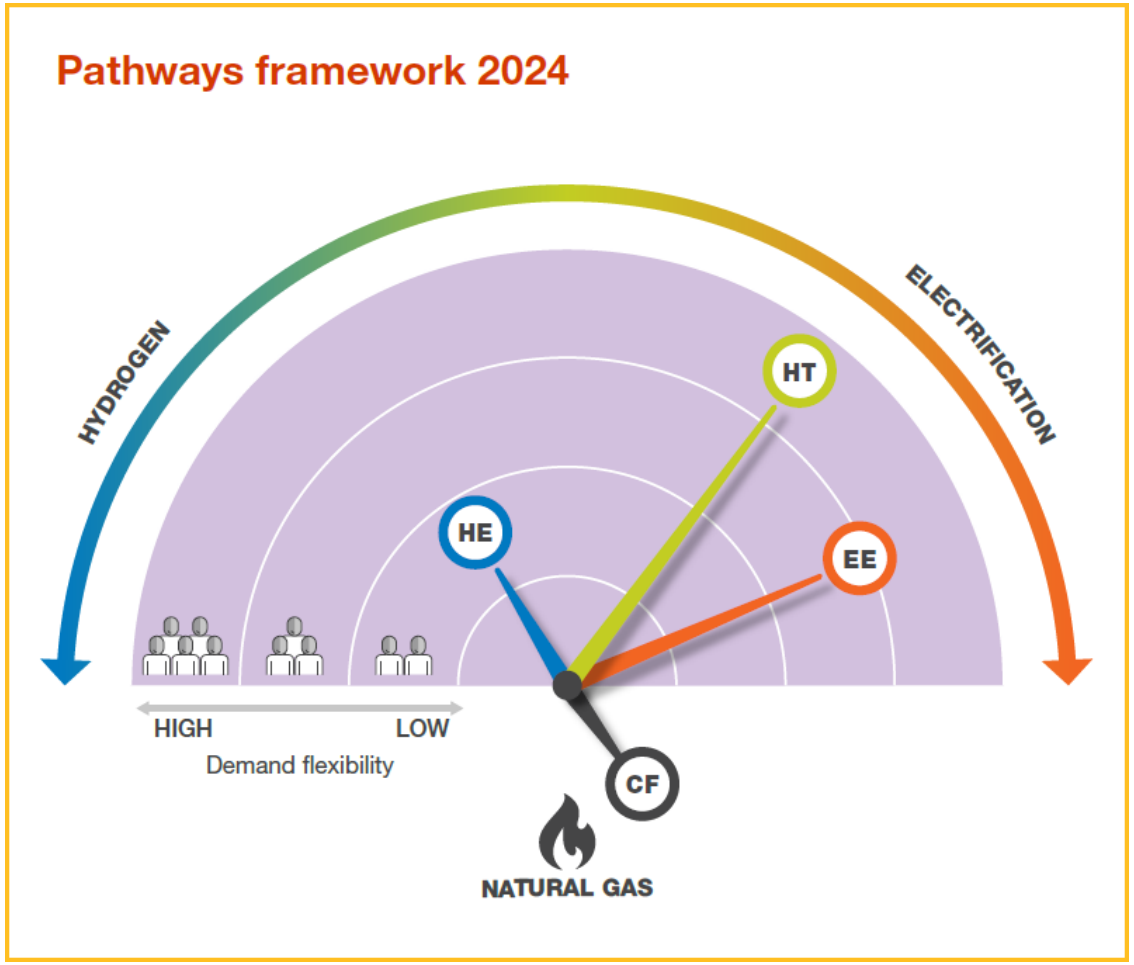
- Net zero by 2050
- Mix of electrification and hydrogen
- Very high consumer engagement in the transition



FES 2024: ESO Pathways to net zero

Electric Engagement

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



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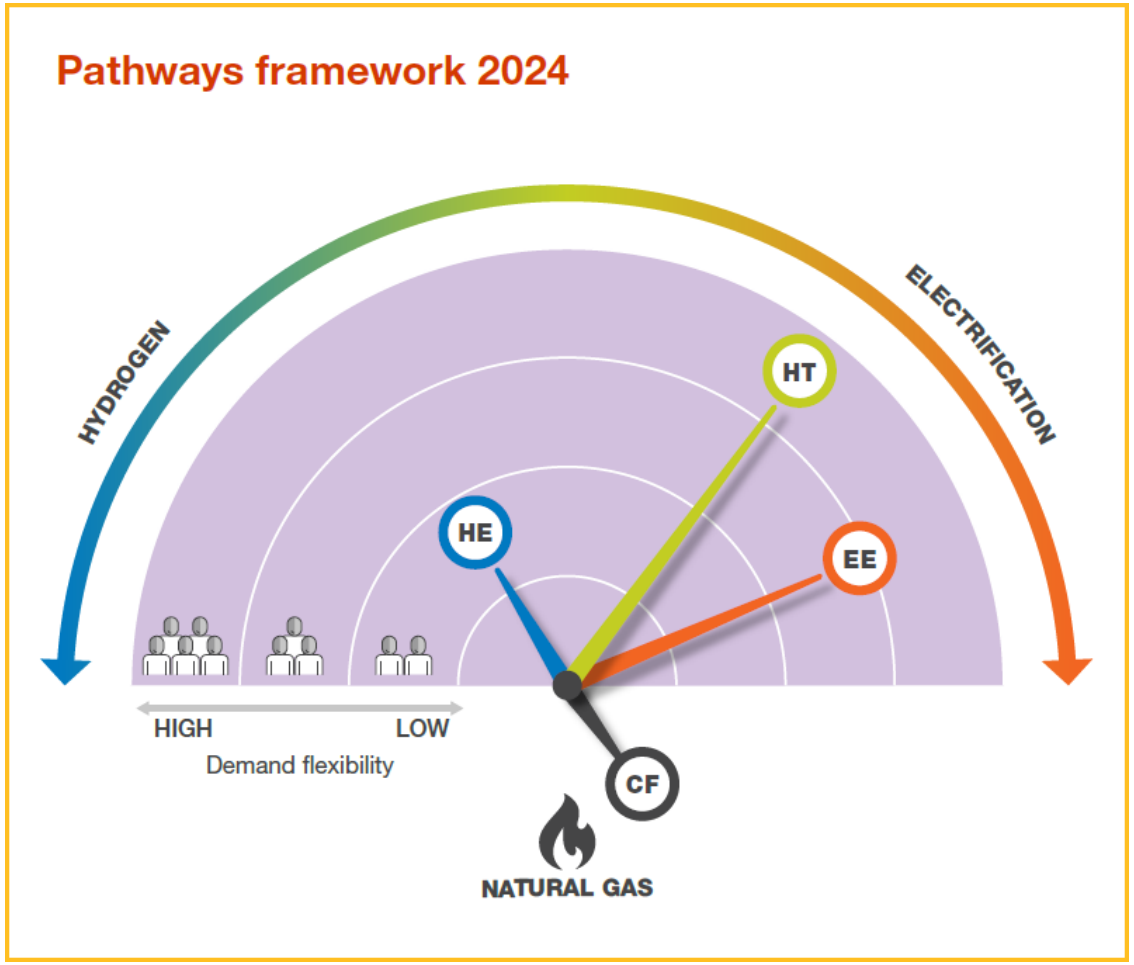
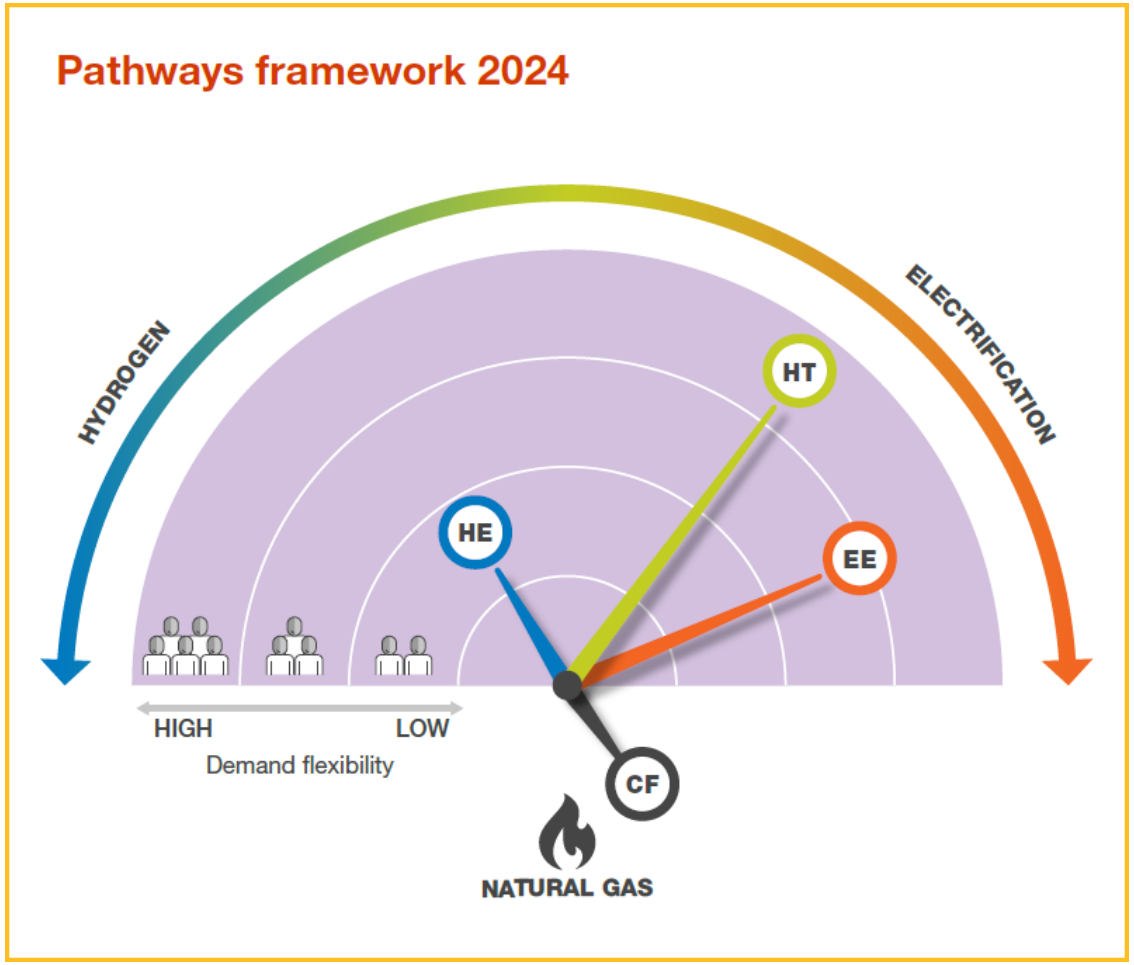


Hydrogen Evolution

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

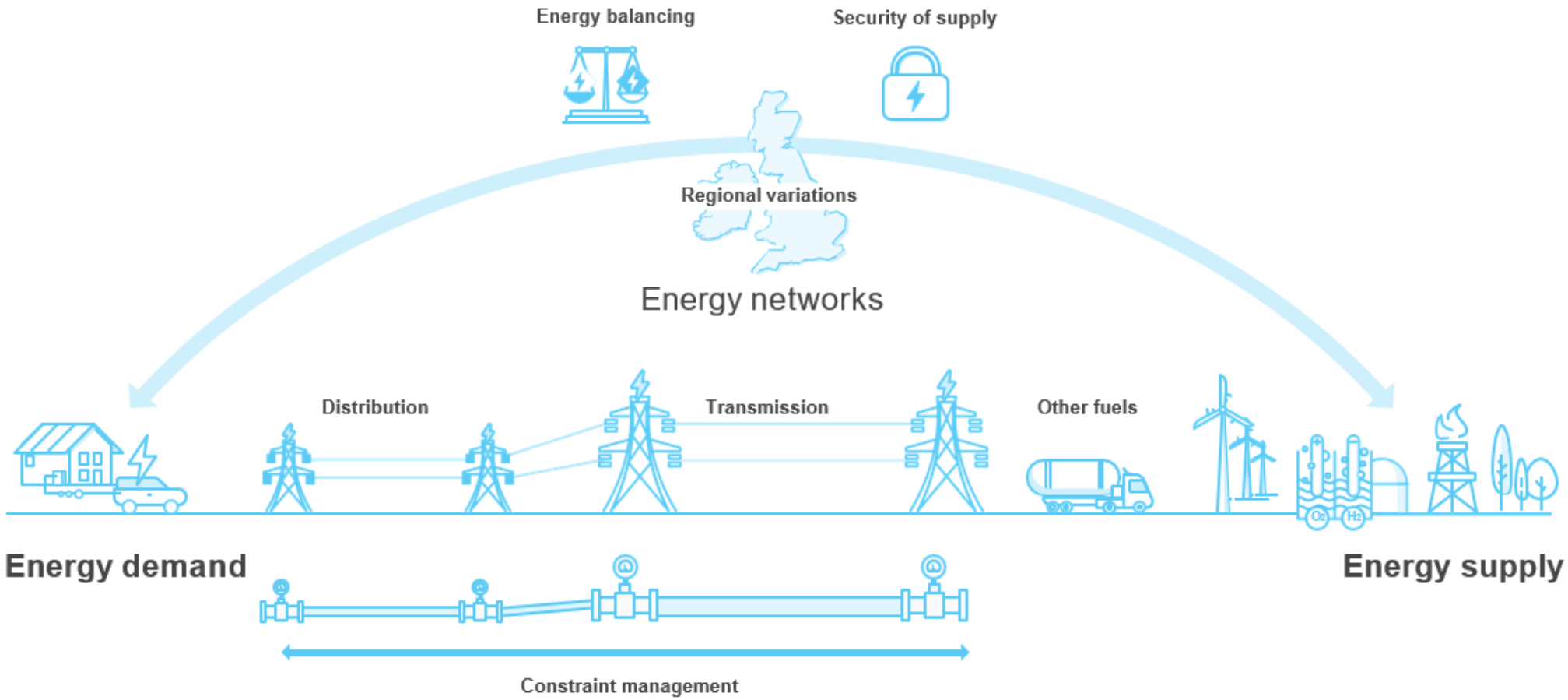
FES 2024: ESO Pathways to net zero



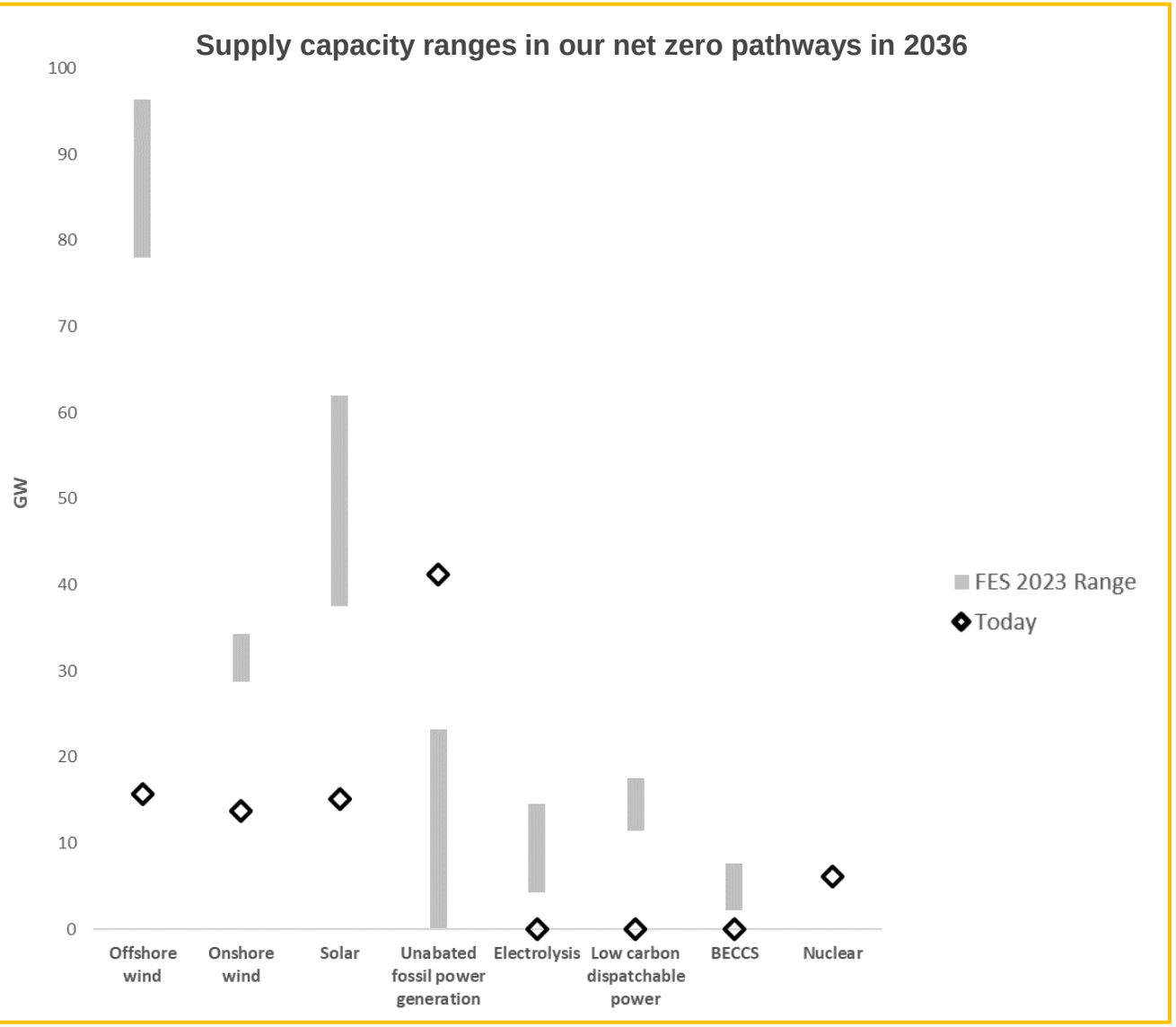
Counterfactual

- 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

The whole energy system



What the change to net zero pathways mean for energy supply



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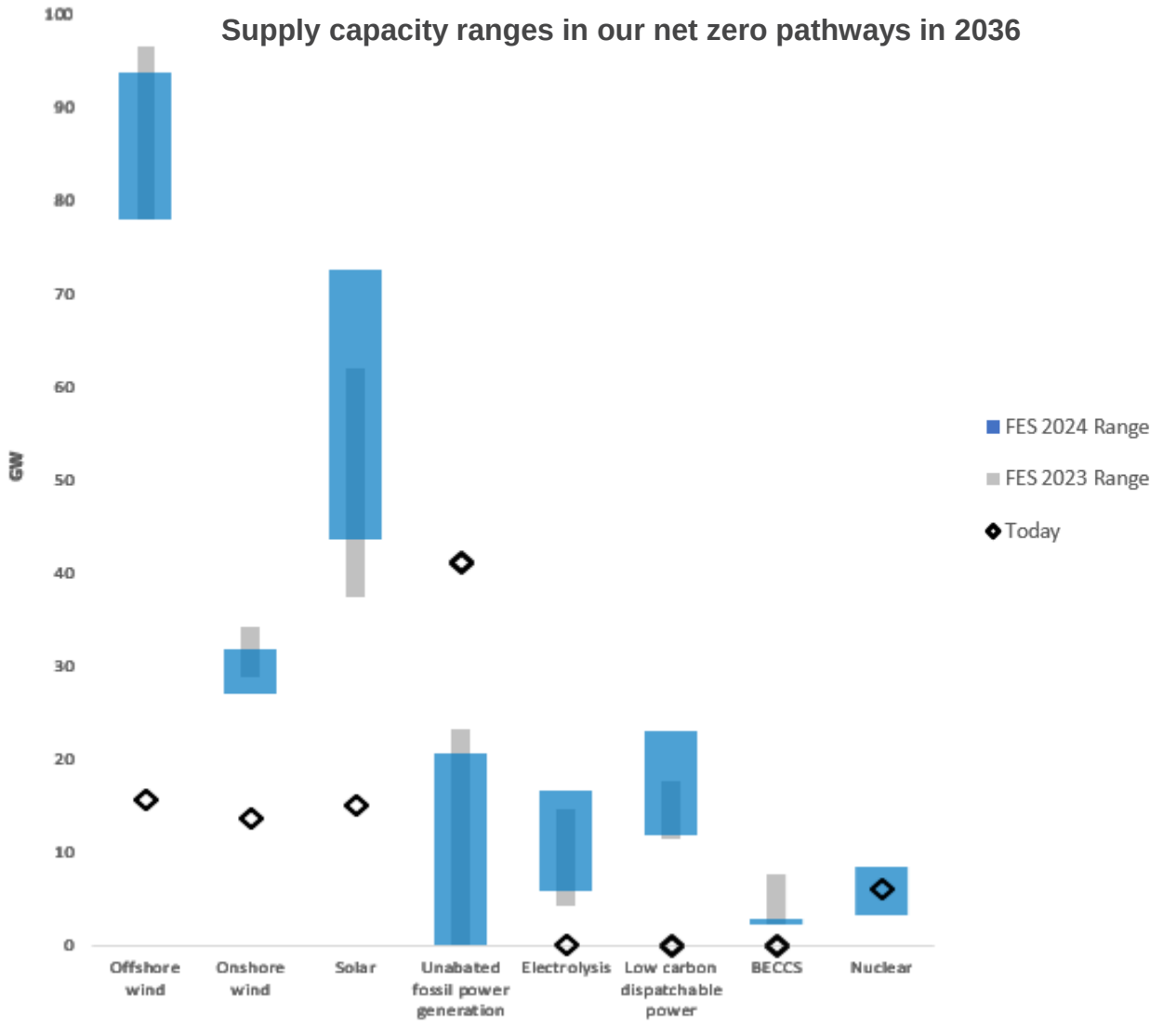
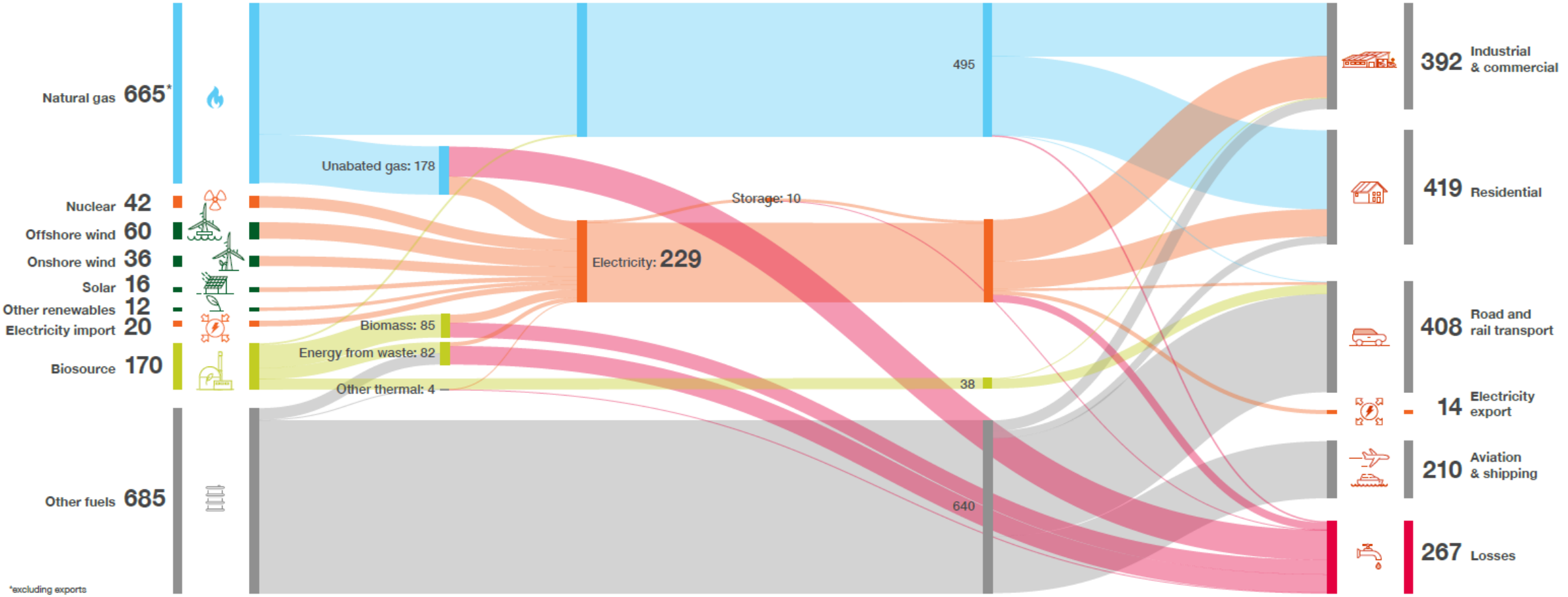
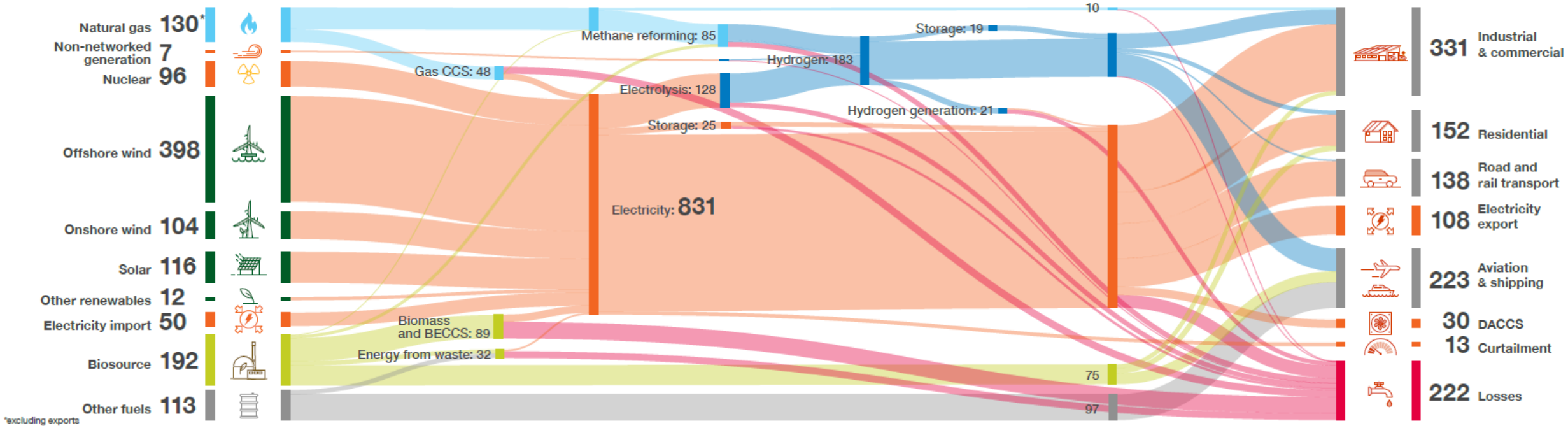


- Narrower wind range reflecting relevant and updated network build rates
- Narrowed fossil fuel range, used as dispatchable power and not generation in the future
- Updated market intelligence and earlier connected BECCS capacity in our pathways
- Narrower range and more strategic siting for electrolysis capacity
- Increased nuclear and low carbon dispatchable power range to account for relevant uncertainty in the area

Energy flows today have limited interactions



Accelerate the delivery of whole system infrastructure



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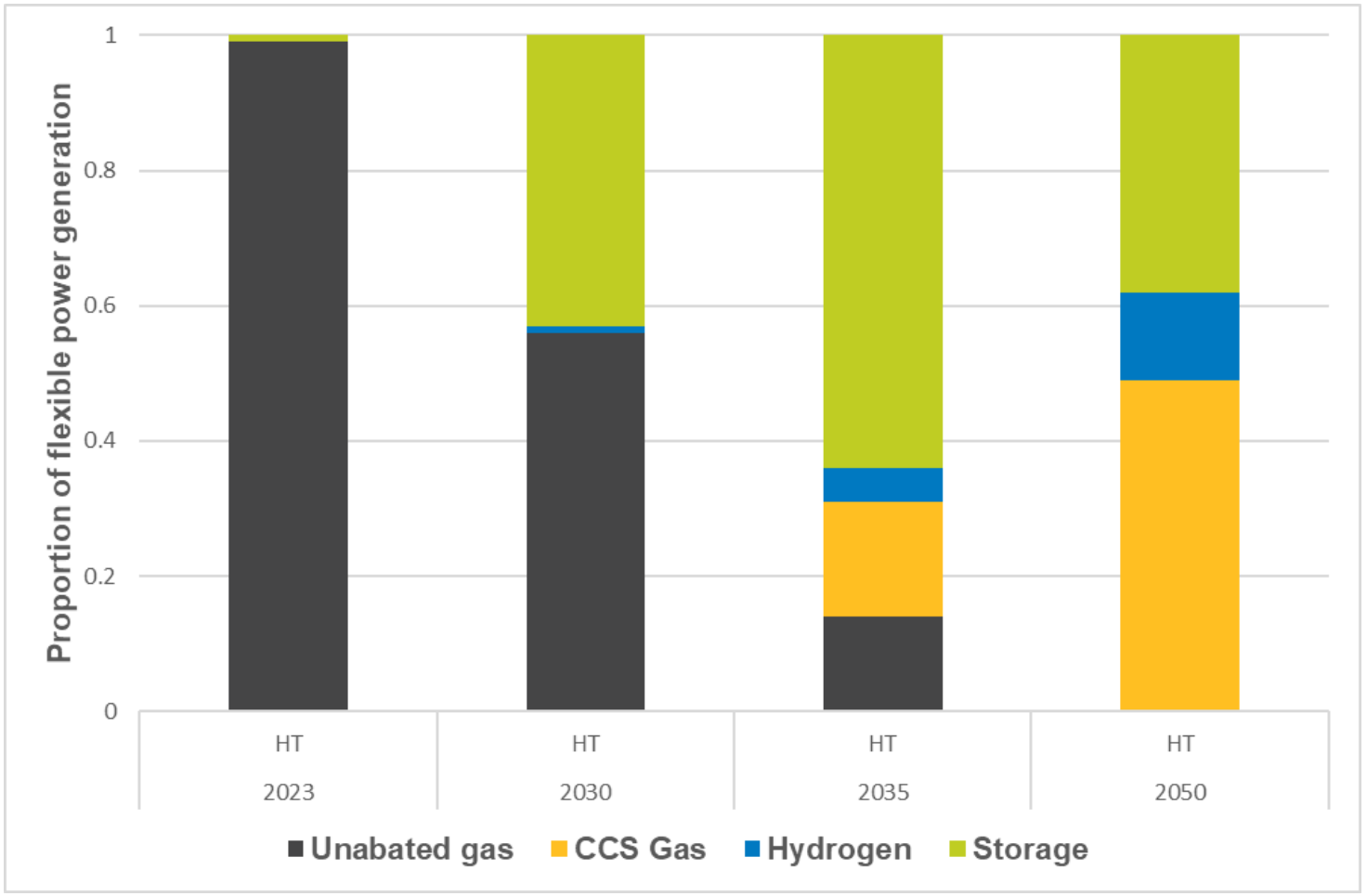
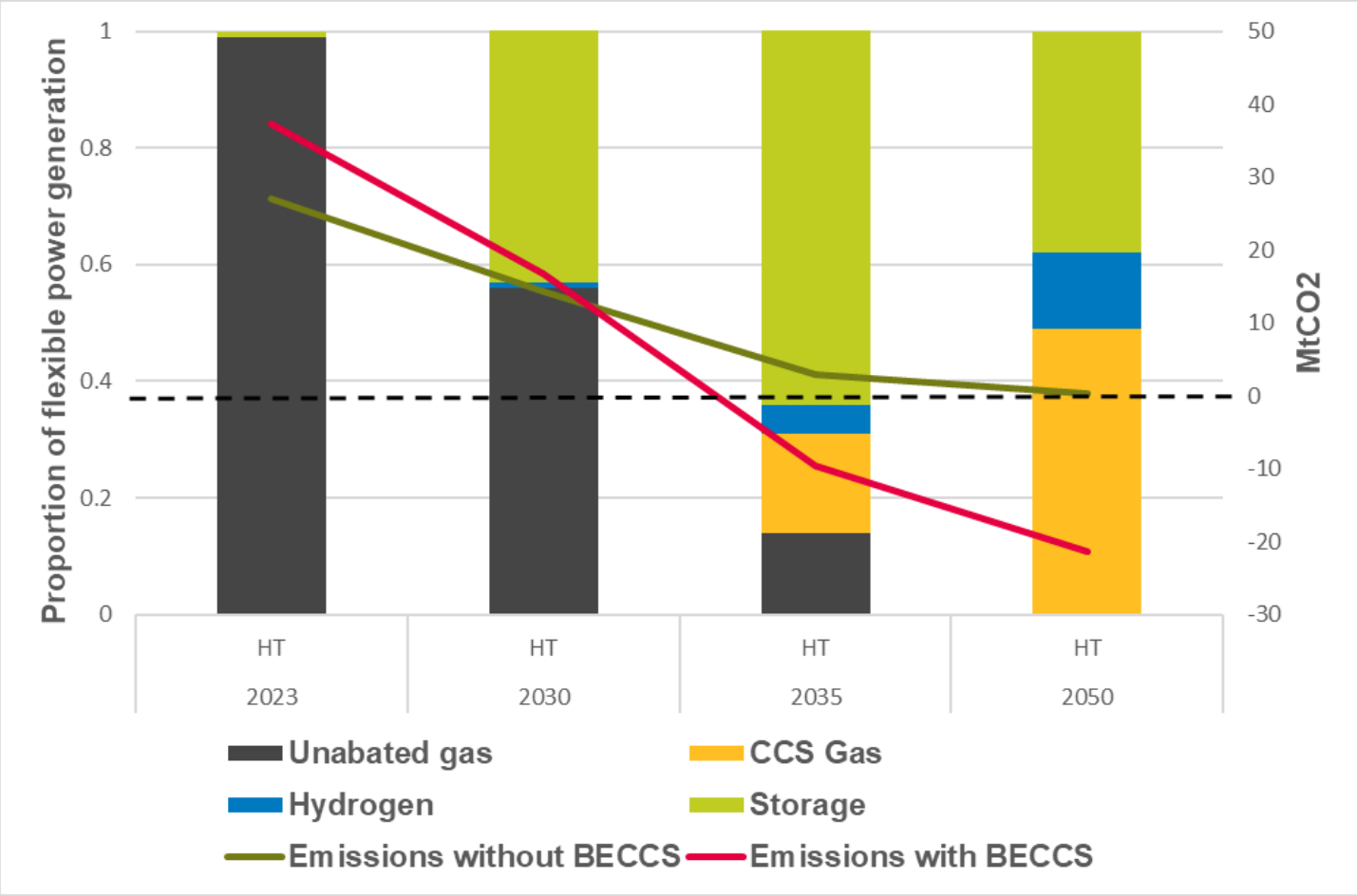
Whole system infrastructure and markets are needed to deliver low carbon flexibility



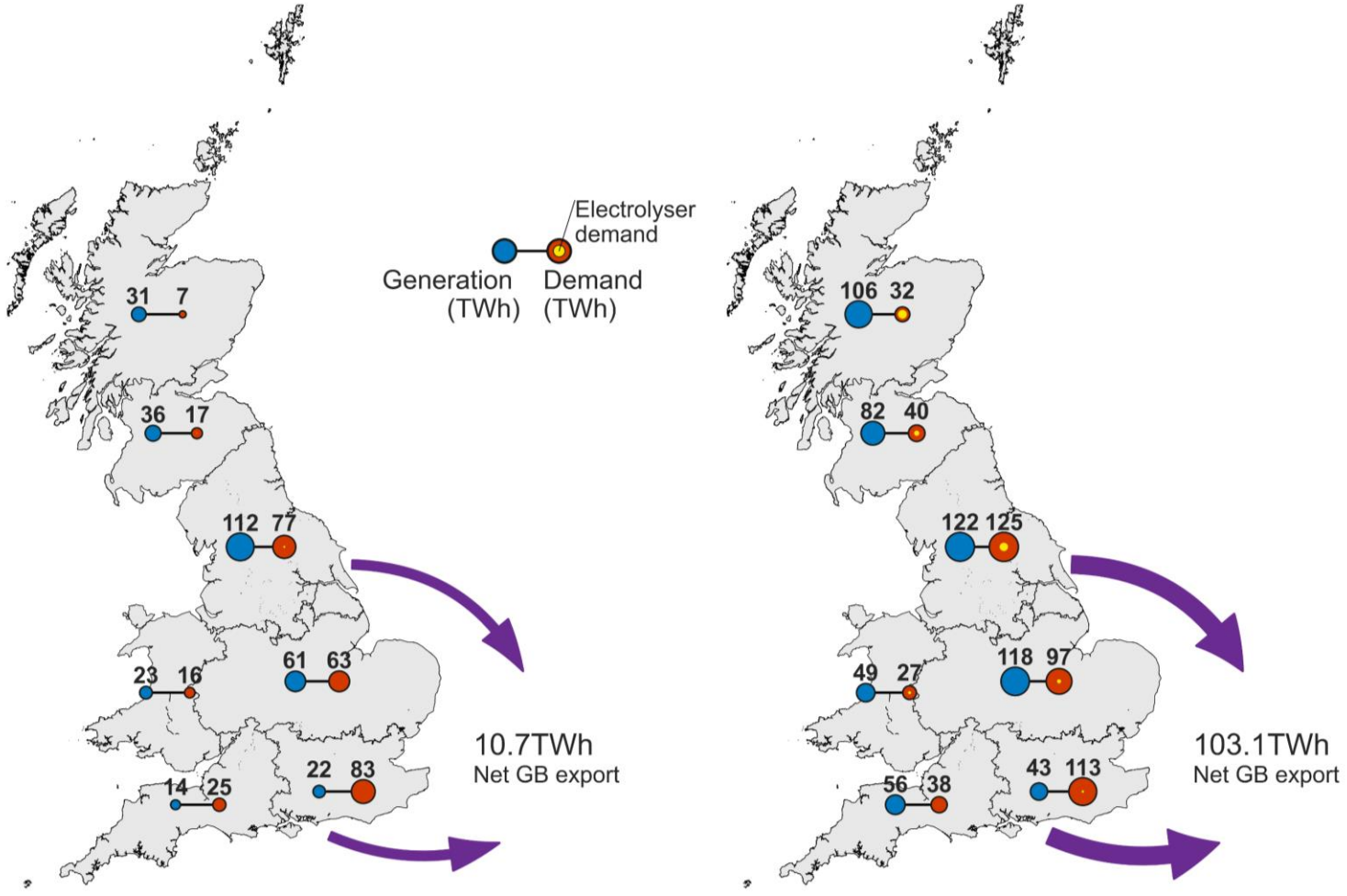
- The energy system landscape is changing
- Significant growth from renewable energy and decline in dispatchable energy from fossil fuels
- Various vectors change role in future years, as we move from unabated to abated generation
- Flexibility from storage and low carbon dispatchable power becomes vital to continuous reductions of emissions to 2050

Negative emissions vital for achieving net zero in 2050



- Energy system can reach zero carbon operation before 2050 without BECCS
- Sectors that cannot fully decarbonise can be offset to meet overall carbon budgets
- Negative emissions technologies, which include BECCS, are needed to achieve net zero

Deliver cross-sector market reform

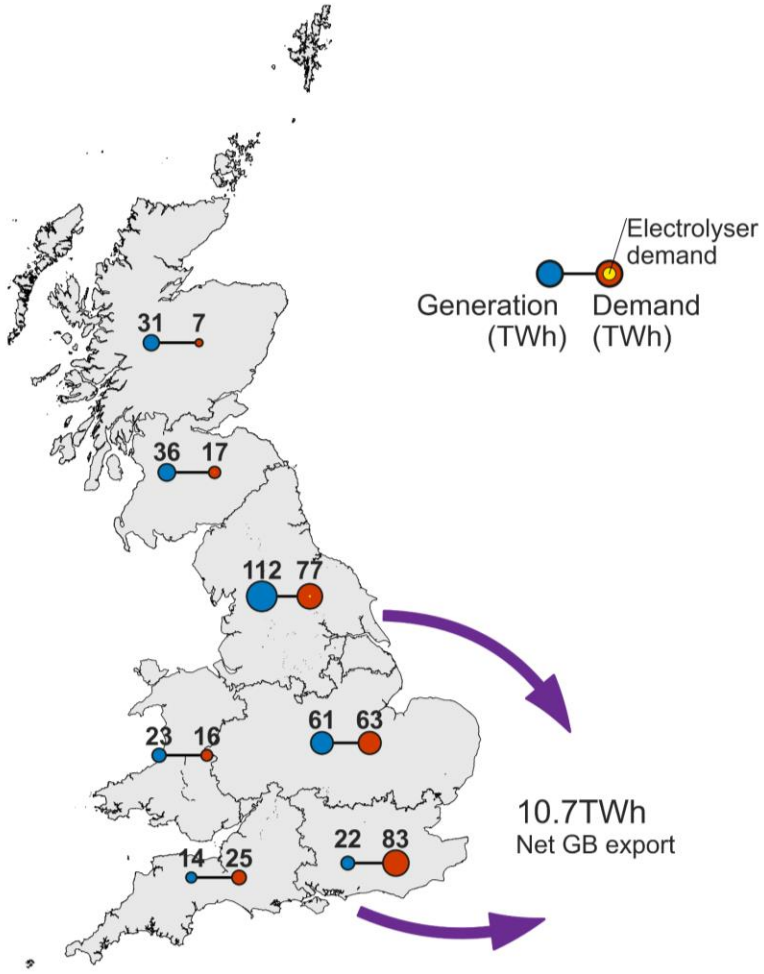


Holistic Transition 2025

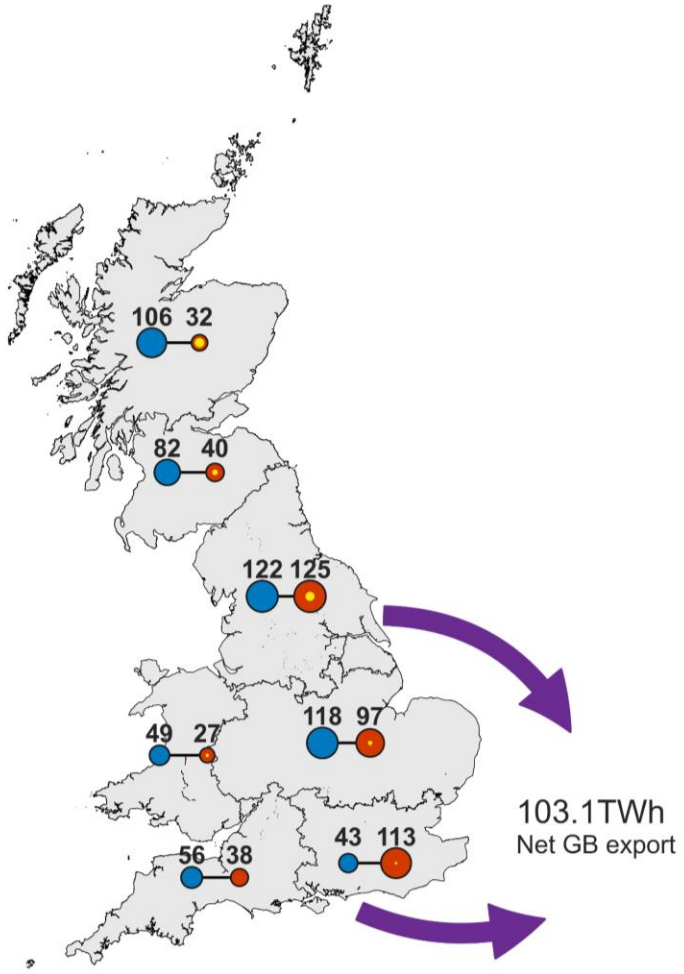
Holistic Transition 2035

- Net generation and demand are set to grow but the regional split will change
- There is an opportunity for additional supply and demand capacity to respond to stronger locational signals
- Locational signalling and market reform are needed to ensure efficient investment, siting and dispatch decisions

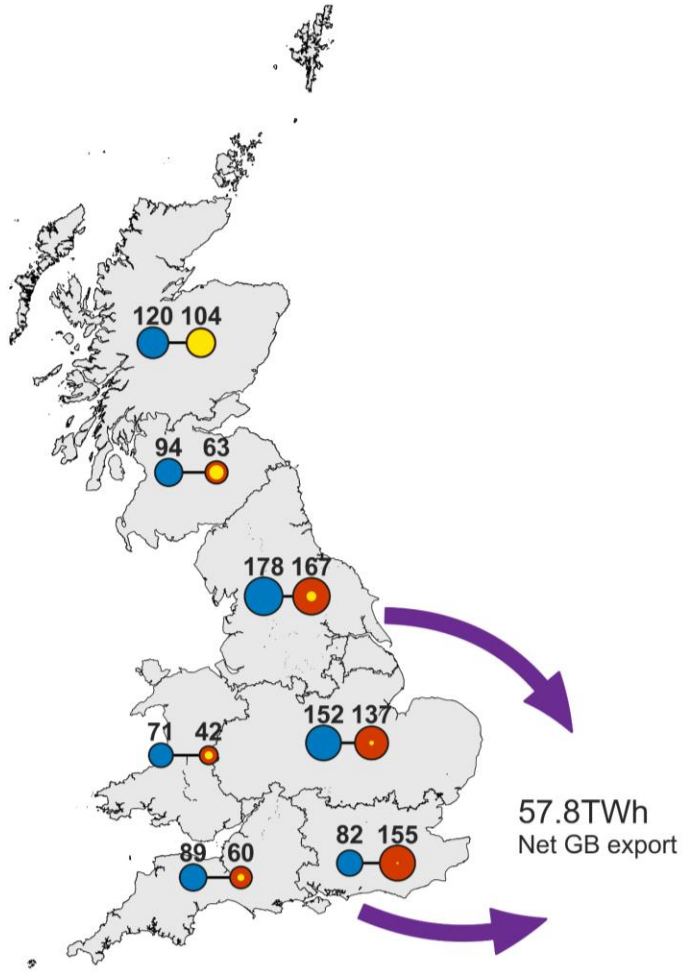
Deliver cross-sector market reform



Holistic Transition 2025

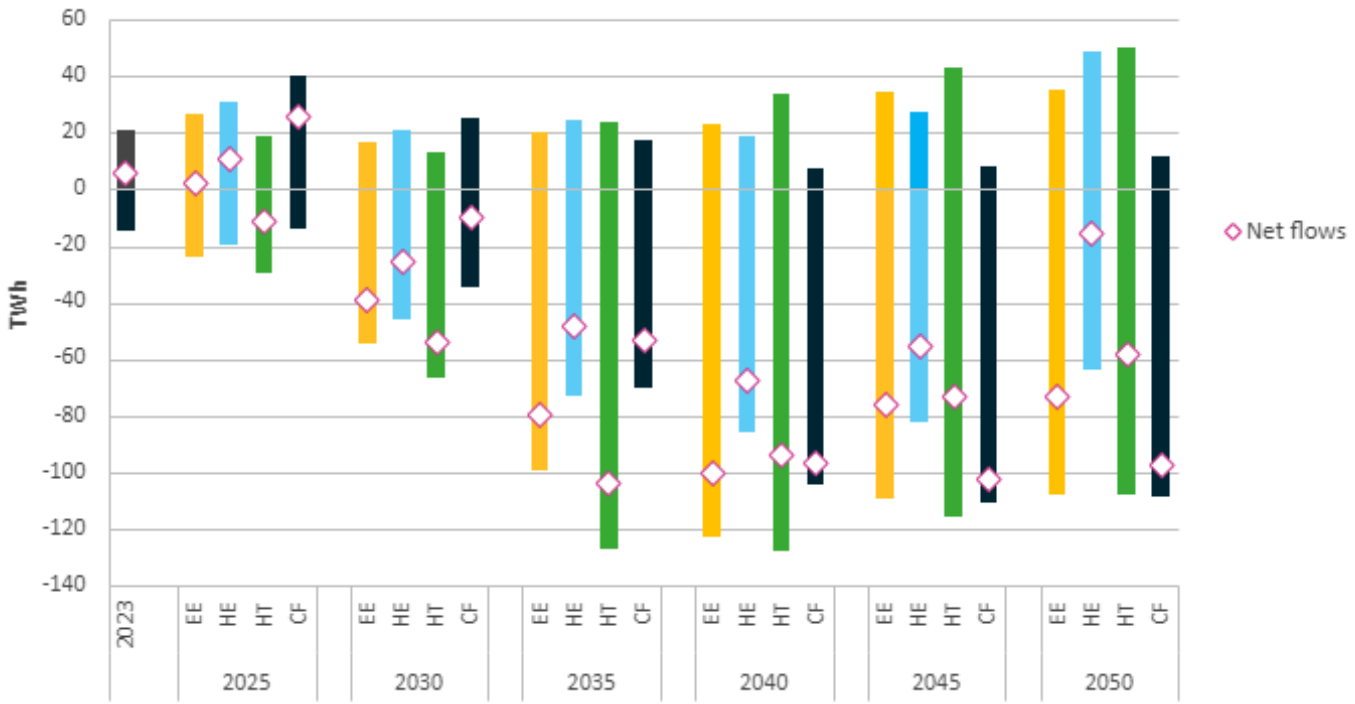


Holistic Transition 2035



Holistic Transition 2050

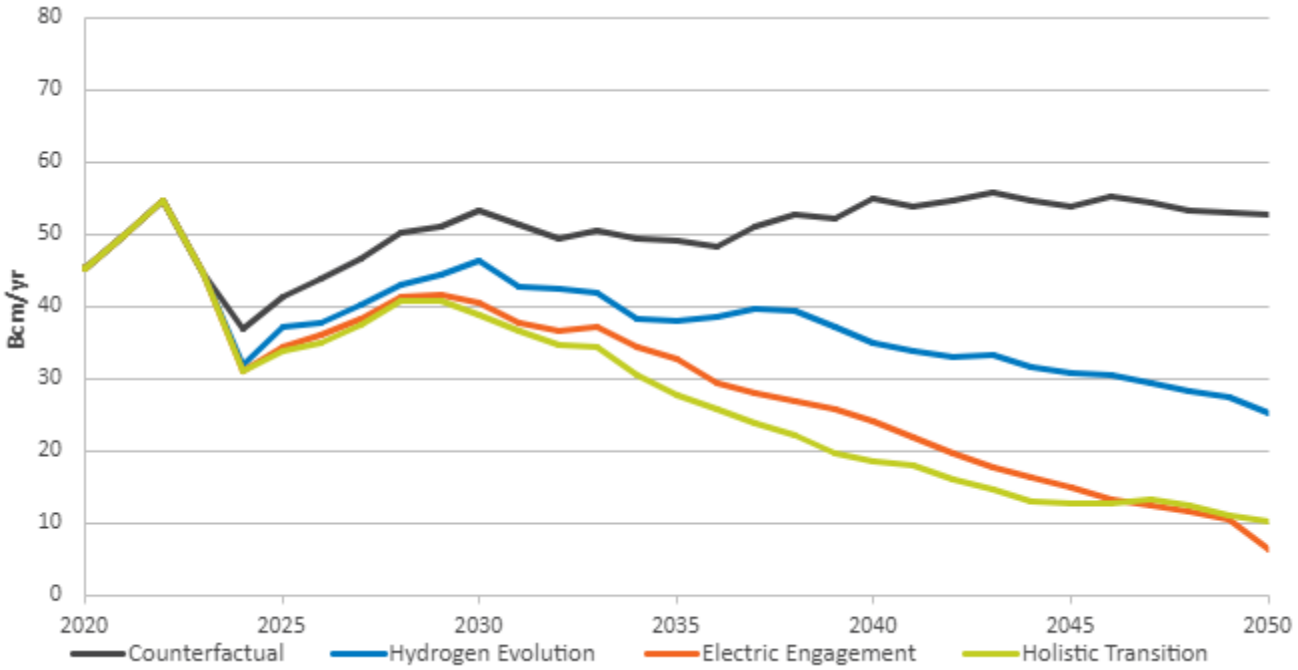
Electricity imports and exports



Imports (positive values)
Exports (negative values)

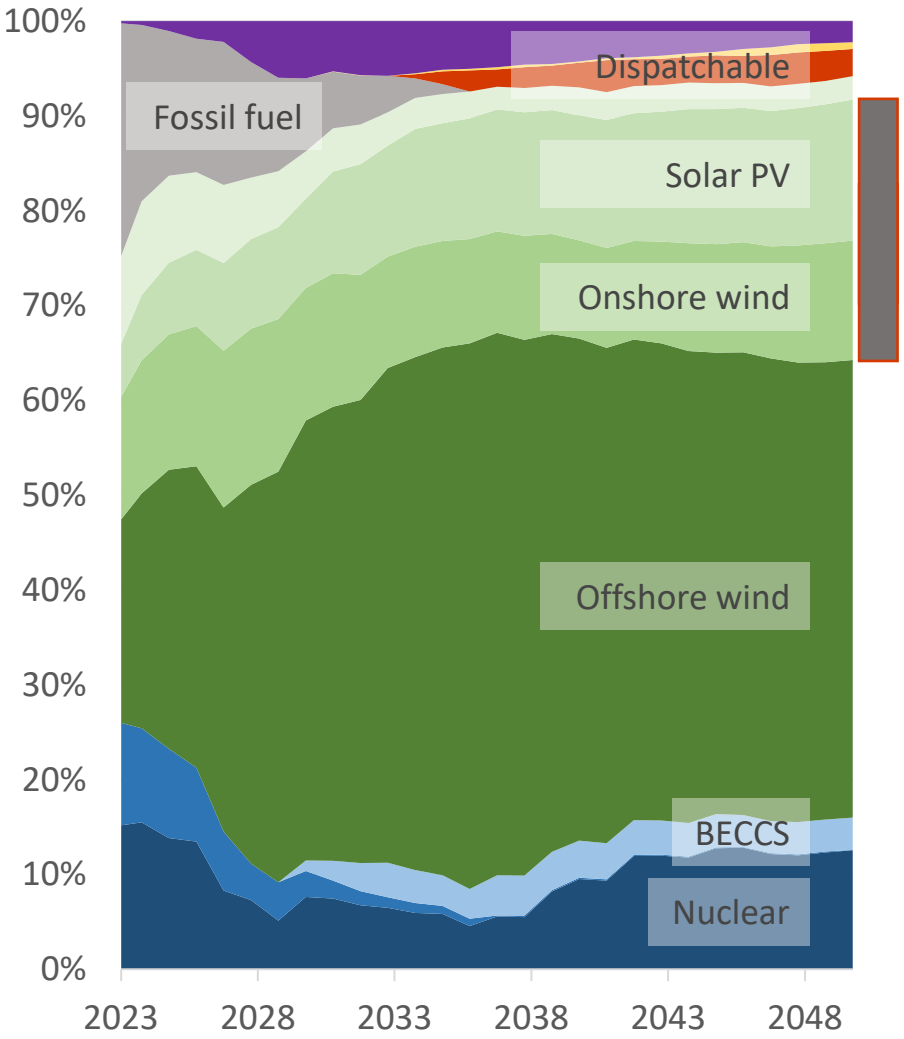
- Electricity net imports reduce across all pathways
- Interconnection remains critical for Great Britain's system flexibility
- Great Britain becomes a net exporter of electricity
- By 2050, electricity imports represent 4.1% of total Great Britain's energy supply in Holistic Transition, compared with 1.2% today

Gas imports



- Gas imports reduce across all pathways
- Gas imports are higher in Hydrogen Evolution due to levels of CCS enabled hydrogen and electricity production
- By 2050, gas imports represent 9% of total Great Britain's energy supply in Holistic Transition, compared with 29% today.

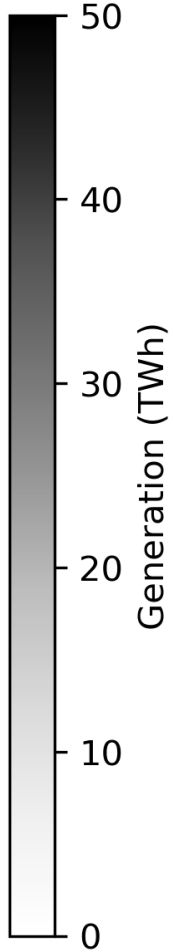
Regional Distribution of Generation in 2050



Holistic Transition

Onshore wind

Solar PV



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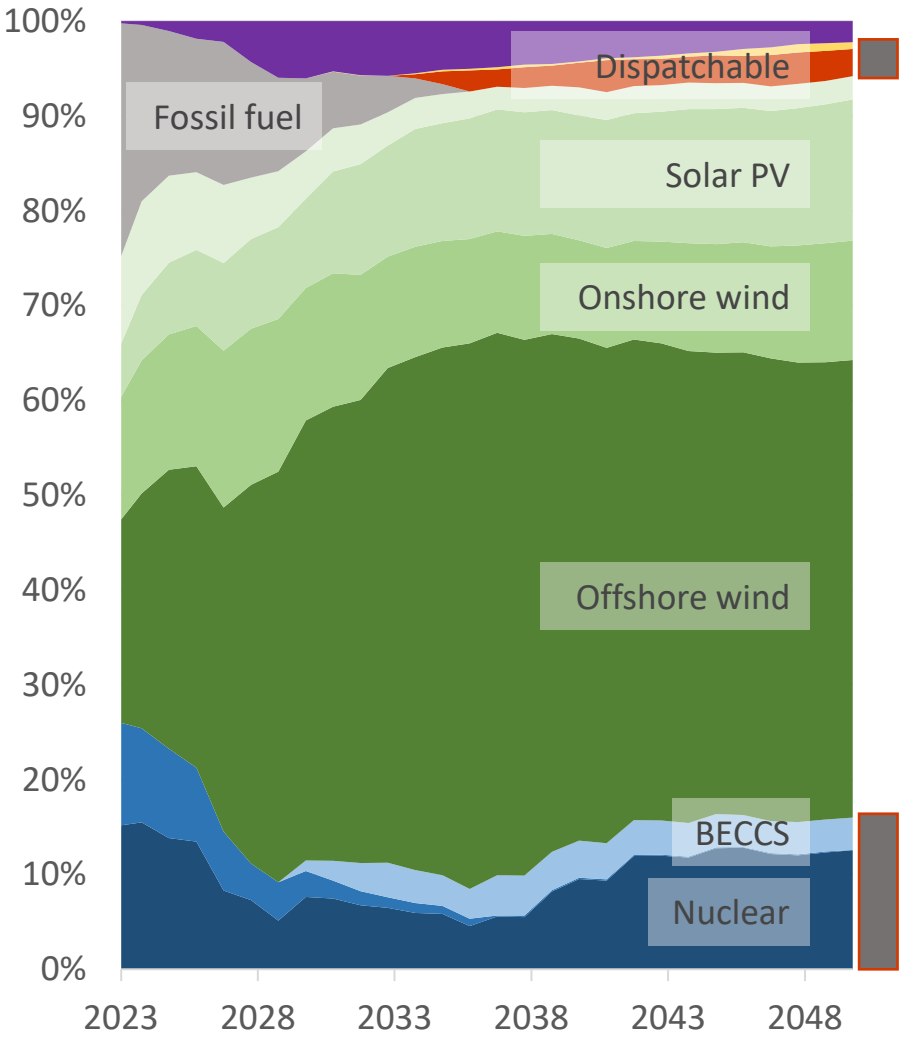
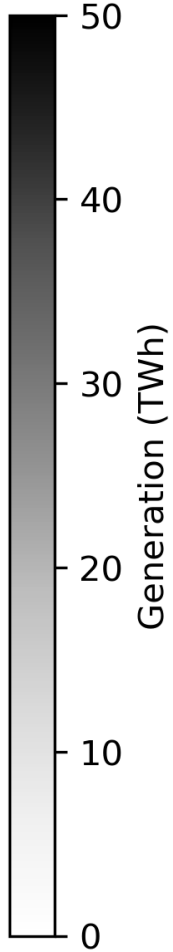


Holistic Transition

BECCS & nuclear

Low carbon dispatchable



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Conclusion

Renewable generation will increase in the future years

Strategic whole system network investment is needed

Cross-vector flexibility will be vital to manage adequacy needs

Policy support will be crucial to enable the deployment of certain tech types

Thank you for joining us today

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