A Changing Policy Landscape for Hydrogen Storage

Nov 2024 - Feb 2025

Dr Andrew Cavanagh

UK Energy Storage Conference, 17 April 2025

Sunak ministry

“We are now entering a period of unprecedented growth for the UK hydrogen economy. With the largest number of commercial scale electrolytic hydrogen production projects announced at once anywhere in Europe, the UK is a world leading place to invest in hydrogen.”

Rt Hon Claire Coutinho MP, 24 Feb 2024

Secretary of State for Energy Security and Net Zero, 31 August 2023 – 5 July 2024

House of Lords Select Committee

“Since 2023, the Government has had a Department for Energy Security and Net Zero. Long-duration energy storage is critical for ensuring the UK can have both… Storage needs urgent support to scale up in time. Major decisions must be made and coordinated effort is needed to unlock investment and to ensure a strategic reserve.”

”Time is running out for the UK to secure that brighter future. We urge the Government to take action now.”

“The Government should focus on ‘pace not perfection’ in delivering no-regrets projects… [to] bring forward its support schemes and no-regrets investments as soon as possible.”

Long-duration energy storage: *get on with it* – Science & Technology, 13 March 2024

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Starmer Ministry

“The UK government is in something of a bind. As the cost of its borrowing has risen since the autumn, the chances of meeting its main self-imposed fiscal rule — to borrow only for investment by the end of the decade — have dwindled. The setback has been met with fierce rhetoric from the Prime Minister and his chancellor.”

Sentiment has improved in bond markets over the past week, but many are yet to be convinced… This reflects a broader concern in financial markets that a gap exists between tough fiscal rhetoric and the reality of UK budgetary policy.” FT, 22 Jan 2025

Regulatory risk

“Low carbon hydrogen faces high regulatory risk because it is entirely dependent on government intervention — whether subsidies or targets — to support its business case. It therefore needs to demonstrate that it is good value for money in terms of reducing emissions.”

If low carbon hydrogen fails to demonstrate this, it risks losing the government support it needs for companies to invest in the sector.” OIES, June 2024

HSBM regulations pushed

2030 targets at risk

- The Fifth Carbon Budget, 57% (2015)
- NDC 68% below 1990 levels (2020)
- 5 Mtpa of engineered CDR (2021)
- Up to 10 GW of clean hydrogen (2022)
- 20 to 30 Mtpa of CCUS (2023)

NB: The first three Carbon Budgets have been met. The Fifth Carbon Budget is the last to have been set under an 80% reduction target for 2050. The Sixth Carbon Budget was ruled unlawful, May 2024.

The High Court requires the Secretary of State to produce a new plan within 12 months.

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Hydrogen Strategy, Update to Market 2024

HSBM minded to position published August 2023

HSBM consultation ended February 2024

HSBM final details expected 2025, first allocation in 2026*

- The regulations will determine the meaning of an “eligible” hydrogen storage provider

The Hydrogen Storage Business Model aims to support “up to two” large-scale storage projects by 2030

*NB: DESNZ is the interim planner for transport and storage and intends to transfer this responsibility to NESO in 2026

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Long-term energy storage: The regulations are in place

- Food and Environment Protection Act 1985 (HSE)
- Gas Act 1986 (GEMA)
- Town & Country Planning Act 1990 (WFC)
- Boreholes Safety and Operations Regs 1995 (HSE)
- Gas Safety (Management) Regs 1996 (HSE)
- Pipelines Safety Regs 1996 (HSE)
- Offshore Installations and Wells (D&C) Regs 1996 (HSE)
- Petroleum Act 1998 (NSTA – NB: DGF only)
- European Standard BS EN 1918:1998 (HSE)
- The DSEA Regs 2002 (HSE)
- Marine Works (EIA) Regs 2007 (MMO)
- Energy Act 2008 (DESNZ)
- Planning Act 2008 (DESNZ)
- Marine and Coastal Access Act 2009 (MMO)
- The Planning (HS) Regs 2015 (HSE)
- Control of Major Accident Hazards Regs 2015 (HSE)
- Pressure Equipment (Safety) Regs 2016 (HSE)
- Environmental Permitting Regs 2016 (EA)
- Offshore OGEPUS (EIA) Regs 2020 (NSTA)
- Energy Act 2023 (DESNZ)

Conservative

Labour

Coalition

WFC	Westmoreland & Furness Council
GEMA	Gas & Electricity Market Authority

Coast Protection Act 1949 (MMO)
Health and Safety at Work etc. Act 1974 (HSE)

D&C	Design and Construction
DSEA	Dangerous Substances & Explosive Atmospheres
EIA	Environmental Impact Assessment
HS	Hazardous Substances
OGEPUS	Oil & Gas, Exploration, Production, Unloading & Storage

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Energy Act 2023: The revenue support is missing

Part 2 Carbon dioxide capture, storage etc and hydrogen production, transport and storage

Part 2 | Chapter 1 Revenue support contracts

Hydrogen storage

63. Designation of hydrogen storage counterparty

- Power of designation: SoS appoints the hydrogen storage counterparty
- Definition: “hydrogen storage revenue support contract”
- SoS must ensure the transfer of all rights and liabilities when a designation ceases
- Definition: “hydrogen storage provider” is defined in relation to United Kingdom storage activities
- Definition: United Kingdom includes onshore and offshore areas
- Definition: storing hydrogen includes specified compounds of which hydrogen is an element

64. Direction to offer to contract with eligible hydrogen storage provider

- SoS may direct a hydrogen storage counterparty to offer to contract with a hydrogen storage provider
- Revenue support regulations are anticipated to furnish the required detail
- The regulations will determine the meaning of an “eligible” hydrogen storage provider
- The regulations may make provision by reference to standards or other published documents

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Select Committee, 15th Jan, Q346-Q406

Q359: Last week we had two power plants charging, according to some reports, up to 100 times the market price for gas. Should they be able to do this?

Ed Miliband: First, I want to quote the NESO. They said at no point were electricity supplies less than anticipated demand... Secondly, on the issue of gas storage, National Gas said the overall picture across Great Britain's eight main gas storage sites remains healthy… Ofgem will obviously look at the high price.

Q363: Do you think the new cap-and-floor mechanism on its own is going to be enough to deliver the long-duration electricity storage we need by 2030?

Ed Miliband: First, long-duration storage has an important role to play in our mission… No long-duration storage capacity has been built in a number of decades… The clean power action plan has an important role for long-duration storage. The model we are finalising with Ofgem… We have more work to do.

Q364: What impact do you think the support for battery storage systems will have on the cost of the mission to have clean power by the end of 2030?

Ed Miliband: It is interesting that you ask this question... I think that batteries, long-duration storage… will play a much bigger role in the energy system than maybe some people anticipate… Often it is going to be grid-scale batteries.

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NESO, National Energy System Operator

- Buy-out of National Grid, £630 million, 13th Sept 2024
  - Part 5 | 162 of the Energy Act 2023
  - Independent System Operator and Planner (ISOP)

- Responsible for:
  - balancing supply and demand
  - strategic network planning
  - forecasting and market strategy

- Clean Power in 2030 report published on 5th Nov 2024

NESO: Clean Power in 2030

- Gas+CCS and H_2 as dispatchable power, 0-3% of supply
- Two pathways identified: New Dispatch and Further Flex
  - FF: 50 GW offshore wind, no new dispatchable power (0.3 GW)
  - ND: 43 GW offshore wind, 2.7 GW of dispatchable power (3 GW)
- Feasibility: CCS and hydrogen described as FOAK risks
  - ”Large-scale hydrogen storage appears unlikely before 2030 and relative costs… are uncertain.”
- Increase in battery storage from 5 GW to “over 22 GW”

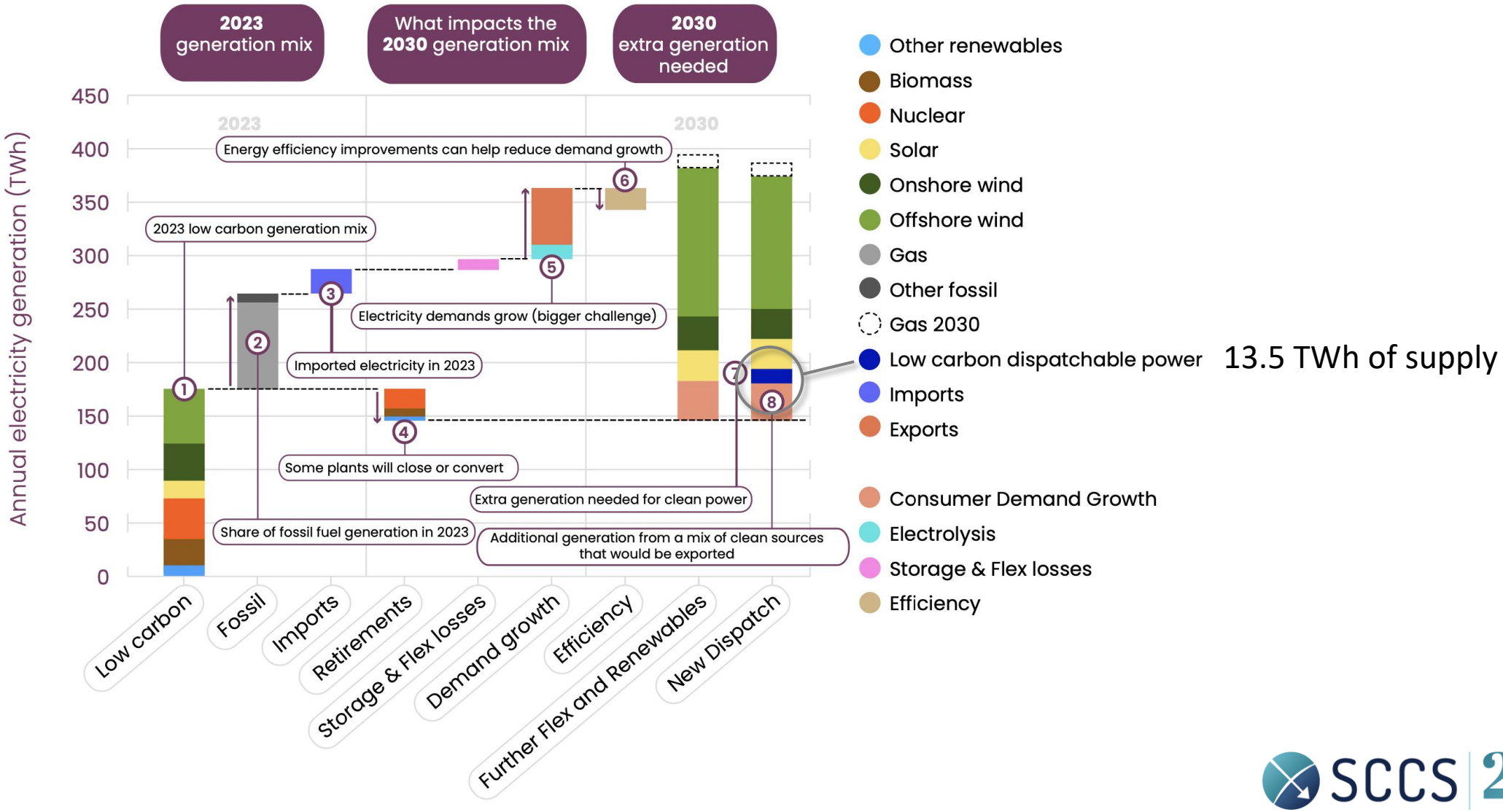
NESO: Clean Power in 2030

"The New Dispatch pathway would leave the British system somewhat more exposed to volatile international gas prices."

"Gas would still be used in 47% of periods, rather than around 15% in the Further Flex and Renewables pathway."

"Under current market arrangements, this would feed through to wholesale price setting in those periods."

NESO: Clean Power in 2030



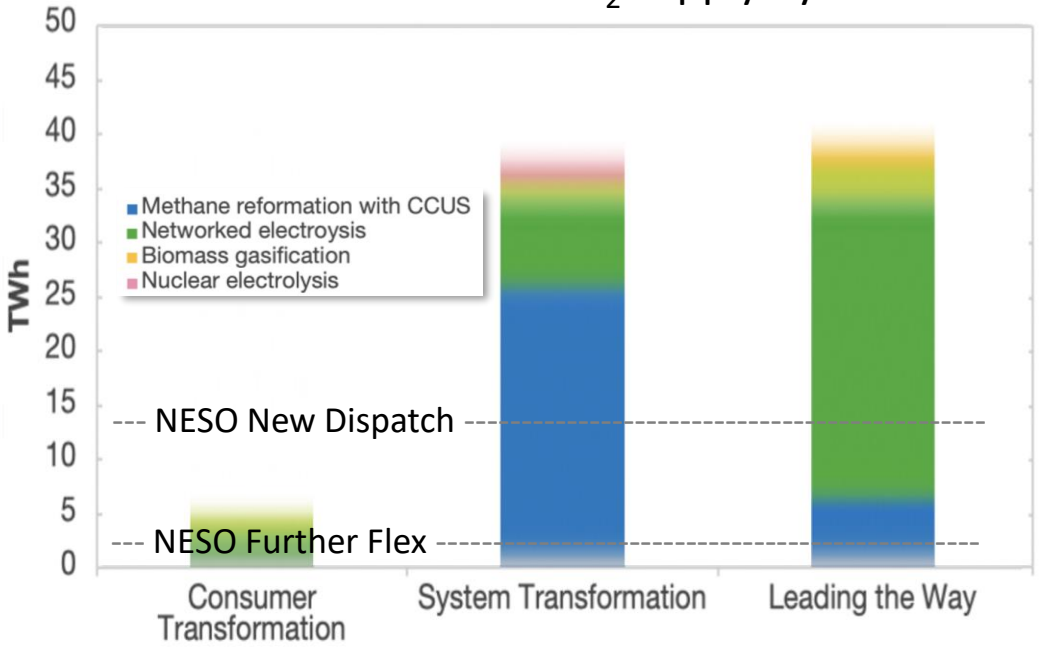
13.5 TWh of supply

National Grid Future Energy Scenarios

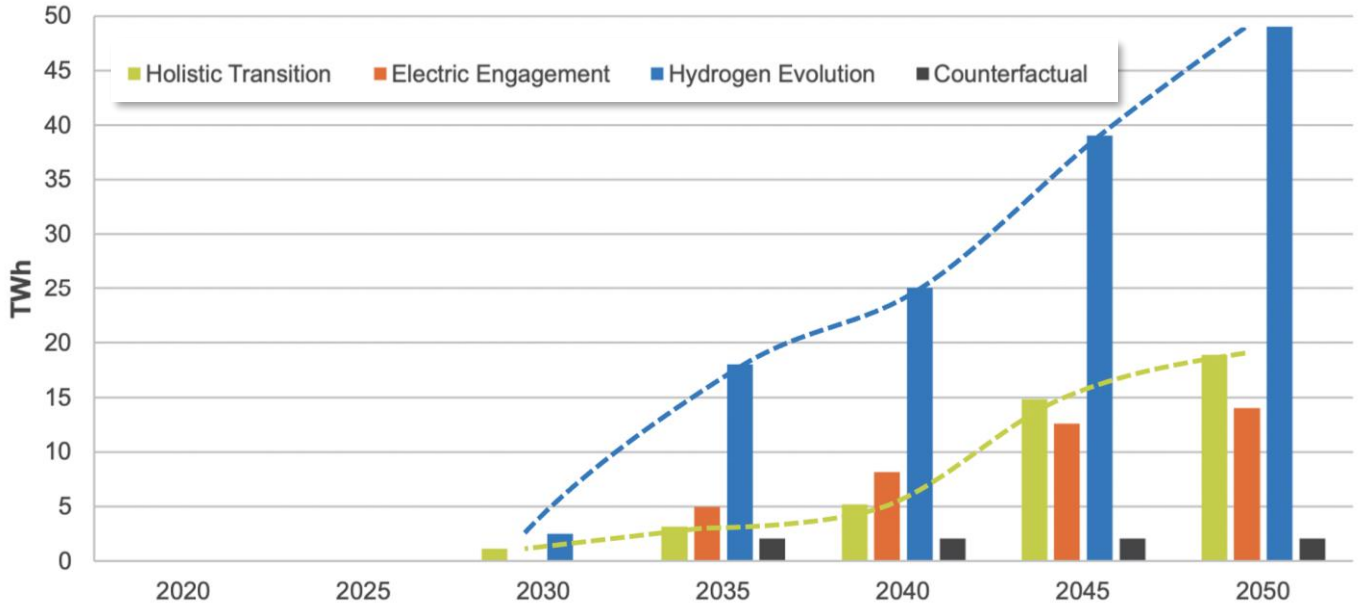
FES 2015: Hydrogen storage first mentioned

FES 2018: “There is also the potential for excess hydrogen to be stored and burnt separately for electricity generation (although we have not currently modelled this in the scenario).”

FES 2022: 5-40 TWh of H_2 supply by 2030



FES 2024: 1-2.5 TWh of H_2 storage by 2030* (HT-HE)



*Aldbrough and KGSP: 0.6 to 2.3 TWh of onshore storage

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Hydrogen Strategy, Update to Market 2024

• HAR1: 11 green hydrogen projects		0.125 GW
• Track-1: 2 blue hydrogen projects		
- HPP1, HyNet	354 MW	
- H2Teesside, ECC	708 MW	1.062 GW
• HAR2: oversubscribed, 87 applications		0.875 GW
- All applications add 1.9 GW (HPP2, 1 GW)		
- Delivery from 2026 to 2029		
• 10 GW target dropped, now “2-7 GW”		2.062 GW

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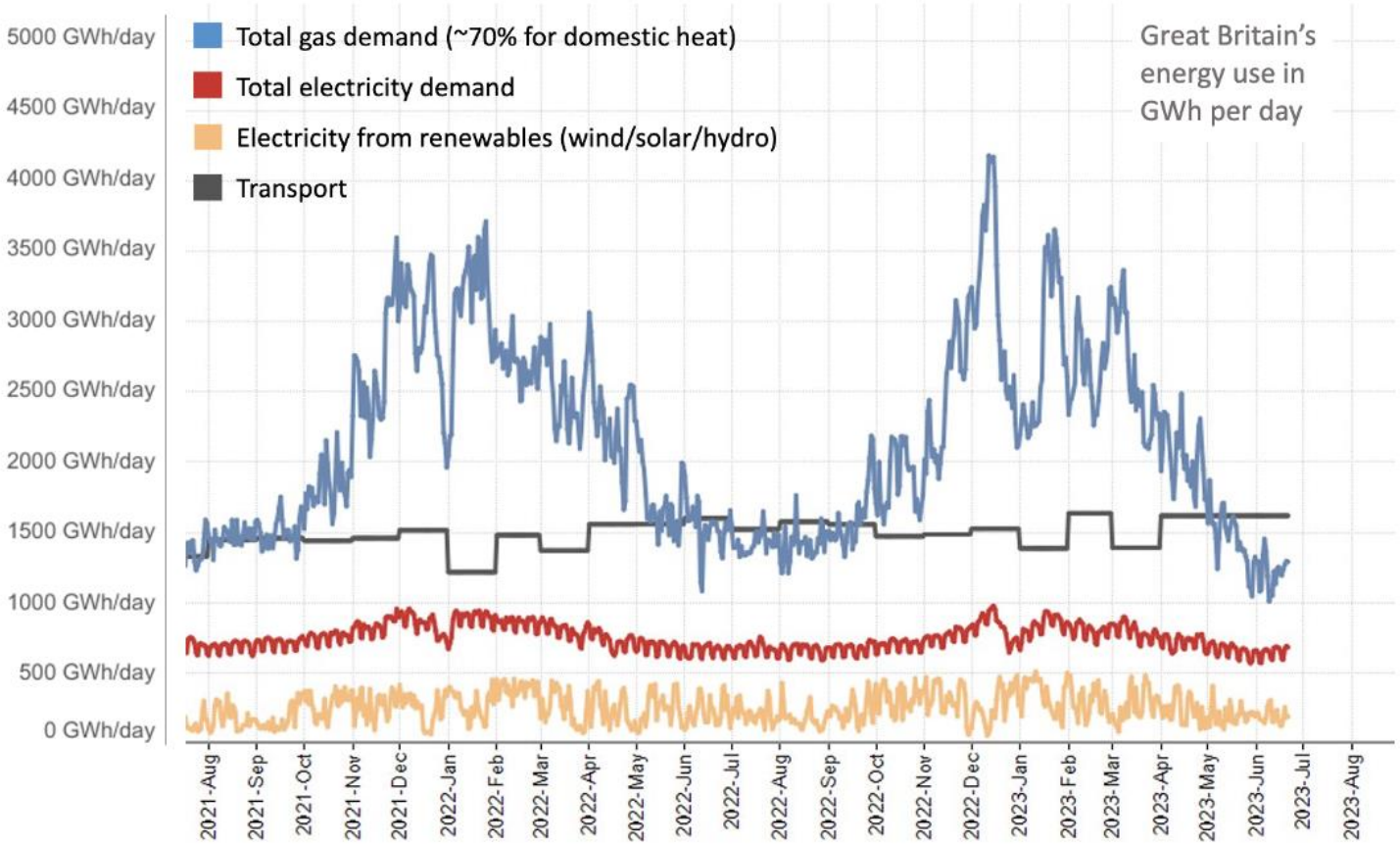
Balancing the energy sector

SCCS CPD on Hydrogen for the Scottish Government



- ❖ Energy demand increases by 2 TWh/day from summer to winter (delivered by gas)
- ✓ Increase variable renewable electricity to meet existing electricity demand
- ❖ Transport has a daily demand of 1.5 TWh almost entirely delivered by fossil fuels
- ✓ Swap H_2 for gas and electricity for oil

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What next… no regrets or low regrets?

The House of Lords calls for 'no regrets' investments; while DESNZ are more comfortable with 'low regrets' decisions. Both need long-term policy signals.

NESO: The new system operator. NESO are now the de facto strategy lead for DESNZ on hydrogen, resetting the Future Energy Scenarios.

DESNZ: Watch for the High Court required update to the Sixth Carbon Budget which is due May 2025. This will set the legally binding 2035 obligation and will be scrutinised for realistic and deliverable actions

CCC: The Seventh Carbon Budget, Feb 2025, aligns with the Sixth Carbon Budget and NDC 81% target for 2035, with clear advice on policy priorities for course correction. This anticipates <1, 2, 3 TWh of H_2 storage 2030-2040

DESNZ: The "H2P: Market Intervention Consultation Response" (DESNZ, December 2024), is the most detailed indication of the new direction set by the ministry in close consultation with NESO, Ofgem, and the CCC.

Box 1
Definition of low regrets decisions

Low regrets decisions are introduced in the UK Government Net Zero Strategy[6] and defined as 'actions that are cost-effective now and will continue to prove beneficial in the future'. This paper builds on this, providing more detail on the factors that must be considered to ensure a decision is low regrets. As such, we define low regrets decisions as urgent decisions that must and can be made now to have a significant impact on decarbonisation. Low regrets decisions typically unlock pathways towards the net zero target, providing options and flexibility rather than blocking off options. They can build flexibility, reduce costs for the future, can have social, economic and environmental co-benefits, and make best use of limited resources. These properties of low-regrets decisions are formalised into a set of criteria in this report (see **Table 1**).

Royal Academy of Engineering, 2023

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