Briefing

Why the government's upcoming Hydrogen Strategy should focus on demand

January 2026

Summary

The government will publish an updated Hydrogen Strategy shortly. The previous 2021 strategy focused on establishing hydrogen production and supply. Since, we have gained much greater understanding of the relative benefits of hydrogen and electrification in different sectors, and some of the initial hype has proven to be misplaced.

The upcoming strategy provides an excellent opportunity, five years on, for a reset. It must instead focus on hydrogen demand, ensuring we target its most economical and efficient use and limiting risks of wider environmental harm through leakage.

The government should:

- Set out a hydrogen use hierarchy to steer its use to industries where it can be well managed and is most needed for decarbonisation.
- Use the hierarchy to focus the upcoming Hydrogen Strategy on demand.
- Commission research on hydrogen leakage rates in its production, storage, transport and use; and require hydrogen producers, suppliers and users that receive government support to monitor and mitigate leaks.

Focusing on hydrogen demand is important

The government's 2021 Hydrogen Strategy and the focus since has been largely aimed at scaling up the production and supply of low carbon hydrogen. Low carbon hydrogen encompasses 'green hydrogen', produced using renewable energy, and 'blue hydrogen', produced using natural gas with carbon capture and storage (CCS).[1] The government ambition under the 2021 strategy was to produce 1GW of low carbon hydrogen by the end of 2025

and target 10GW of low carbon hydrogen by 2030, with at least half being green hydrogen.[2]

Since the strategy launched, 21 hydrogen projects have received government support.[3] Of these, 11 are green hydrogen projects, awarded contracts under the 2023 government's Hydrogen Allocation Round (HAR) 1, totalling 125MW operating capacity by 2028.[4] The next green hydrogen contracts will be allocated this year.[5] But, the projects awarded under HAR 1 have a variety of intended end uses, including those that are now not advisable, such as the Bradford facility which intends to supply hydrogen for buses.[6]

Five years on from the first strategy, we know much more about the relative efficiency and costs of electrification and hydrogen in different sectors.

Much of the hype that accompanied early discussions of the hydrogen economy has also diminished, leaving space for a more considered discussion. An example of this has been the push to co-blend hydrogen and natural gas in the national gas grid as a route to decarbonisation, including for home heating. However, this has been shown to be a costly and inefficient use of hydrogen that will not lead to decarbonisation to any meaningful extent.[7]

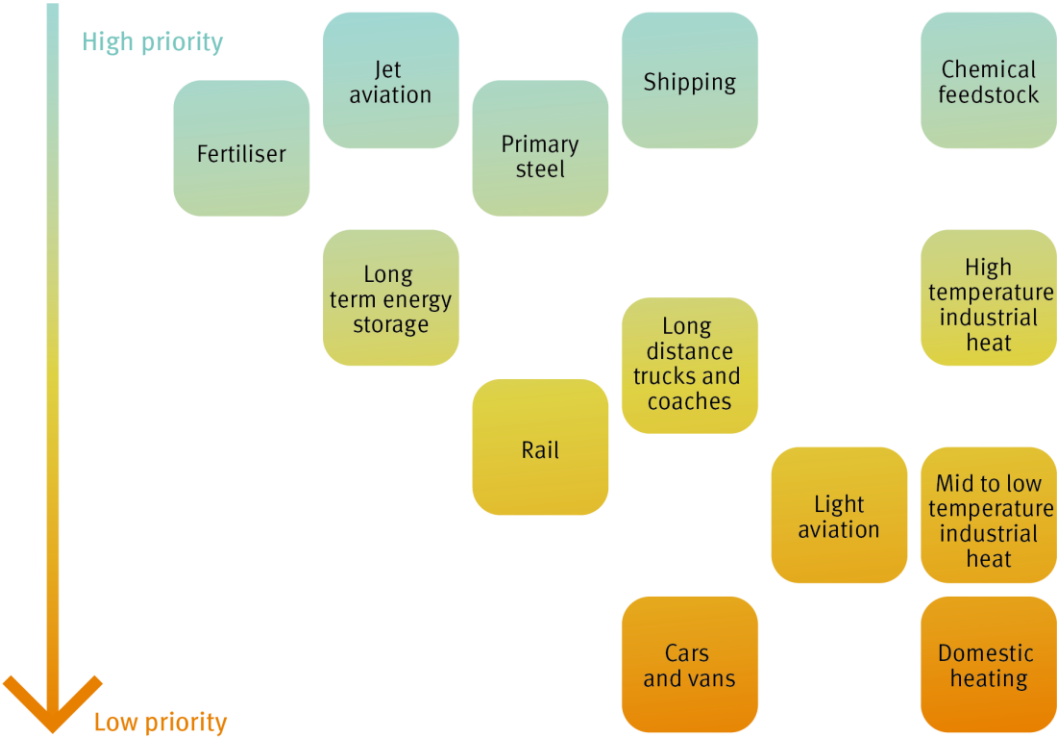
Continuing the current production-focused approach risks directing government attention and money into projects that have no clear end use or those that are inefficient, costly and harmful to the environment. The result could be failure to develop the UK hydrogen economy even where it is clearly needed. This lack of focus on matching supply and demand is threatening progress, with examples of planned developments being scrapped because of insufficient demand.[8]

Which industries need hydrogen to decarbonise?

Direct electrification will be the primary decarbonisation method for most sectors. The Climate Change Committee (CCC) and the government both recognise that, for most processes, it will be cheaper and more efficient than displacing natural gas with low carbon hydrogen.[9,10] It will also reduce the chance of exacerbating climate change risks. Electrification of surface transport, which is three to eight times more efficient than using hydrogen, and home heating are gaining momentum.[11,12,13]

However, low carbon hydrogen will have a critical role to play in decarbonising some energy intensive industries.

Prioritising use[14]



Chemicals

Hydrogen is both a fuel and a critical feedstock for chemical manufacturing. The hydrogen atoms in fossil fuels are a key building block for almost all chemical products, including plastics, detergents, fertiliser, lubricants and rubbers.

Fossil fuel derived chemicals could be replaced with e-chemicals, created using low carbon hydrogen and captured carbon, to decarbonise their production.[15] But the cost and energy requirements for e-chemicals are high and there will be competition for hydrogen and direct air capture from other industries. The CCC expects chemical sector demand for hydrogen to grow consistently, rising from 0.6TWh in 2030, to 1.3TWh in 2035 and 4TWh in 2050.[16]

Aviation

Decarbonising aviation with synthetic e-fuel, a form of sustainable aviation fuel (SAF) and moving to genuinely zero carbon emission flight both require hydrogen.[17,18] But they are still a long way from commercialisation at scale. The CCC expects demand for hydrogen for SAF to take off from 2035, reach 8TWh by 2040 and 26TWh by 2050. It does not project demand for zero carbon emission flights before 2050, though they may start serving domestic and shorter international routes in the 2030s.[19]

Shipping

Ammonia produced using green hydrogen is widely considered to be the primary fuel that will decarbonise shipping.[20] But its adoption has been delayed by the International Maritime Organization's failure to adopt its Net-Zero Framework and because of concerns about the environmental impacts of an accidental spill. The CCC estimates ammonia demand will reach 1.4TWh by 2030 and 3.4TWh by 2035.[21]

Primary steel

Most UK steel production will use scrap steel and electric arc furnaces.[22] A limited amount of primary steel (from iron ore) could be made using hydrogen as a reducing agent in place of coal, which is the cause of most of the sector's current emissions. However, the government should be cautious about pursuing domestic UK ironmaking with hydrogen. It should consider other technological options and the potential to partner with countries to produce and import green iron.[23] That would have minimal impact on national security and allow more investment in jobs further down the value chain. The CCC expects 0.1TWh of hydrogen demand in the sector by 2030, rising to 0.6TWh in 2035, peaking at over 1.1TWh in the 2040s.[24]

Long term energy storage

By converting excess renewable power into hydrogen, energy can be stored in large quantities for long durations and later used to generate electricity when there are extended periods of high demand and low renewable generation, ensuring grid stability. The CCC expects electricity generation from hydrogen to increase to 3.3TWh by 2030, and peak in 2035 at 16.7TWh.[25]

High temperature industrial heat

Direct electrification of heat will be the primary decarbonisation route for many sectors that require high temperature industrial heat, including ceramics and glass. However, some processes will require combustion of hydrogen as an alternative to fossil fuels, such as some glass and ceramics subsectors. The CCC predicts hydrogen use in glass making, for example, to scale up quickly to 4.4TWh by 2030, and to 6.9TWh by 2050.

Hydrogen leakage can be a climate problem

A significant drawback of hydrogen is the climate impact of its leakage. Unburnt hydrogen released into the atmosphere is a short lived climate pollutant. This is in part because hydroxyl radicals break down methane, a potent greenhouse gas, but hydrogen reacts with hydroxyl radicals leaving fewer available, resulting in methane remaining in the atmosphere for longer.[26]

Hydrogen molecules are incredibly small, making hydrogen prone to leakage during transport, storage and use. But current leakage rates are unknown and technology to detect leaks is not yet widely available. If hydrogen leakage exceeds 19 per cent, its impact on climate change can be higher than burning natural gas.[27]

Transporting hydrogen long distances and a wider range of uses increases the likelihood of leakage, undermining its decarbonisation potential. Prioritising hydrogen's use for industries that cannot decarbonise through direct electrification or other, less risky means, is important to tackle climate change. Its use should be limited to industries where it will be operated by professionals throughout its use and requires minimal transportation to its point of use, eg in chemical manufacture, aviation, shipping and energy storage. It should not be widely distributed or be used directly by the public for home heating and road transport, for example.[28]

Recommendations

The government should:

- Set out a hydrogen use hierarchy to steer its use to industries where it can be well managed and is most needed for decarbonisation.
- Use the hierarchy to focus the upcoming Hydrogen Strategy on demand.
- Commission research on hydrogen leakage rates within its production, storage, transport and use; and require hydrogen producers, suppliers and users that receive government support to monitor and mitigate leakage.

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Endnotes

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