

Hydrogen hype – which ambitions are realistic, and which are less so?

We believe hydrogen will play a vital role in some places, but that it may be overhyped in others.



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economically efficient than hydrogen, such as passenger transport and home heating. However, the goal for the UK - and ultimately the world - is to reach net zero. There are some processes for which electrification is not viable, and for these hydrogen will be needed.

Conventional hydrogen is generally produced by reacting steam (H₂O) with methane (CH₄) which leads to material CO₂ emissions. This “brown” hydrogen is then captured.

Green hydrogen comes from electrolysis of water using electric energy from a clean source. Blue hydrogen seeks to capture and store the CO₂ that is released in the production of brown hydrogen.

The most obvious case is to use blue or green hydrogen where hydrogen is already in use today, such as in the petrochemical industry.

Future uses include aviation and shipping where its energy density (or that of its related chemicals ammonia or methanol) make it a plausible replacement for fossil fuels. These sectors account for approximately 4.5% of global greenhouse gas emissions and, to meet net zero, a cleaner, high energy density alternative to fossil fuel must be found.

The most likely use case is clean ammonia or methanol – which is derived from clean hydrogen – as a fuel for shipping. They can be stored relatively easily and are already transported in bulk by sea, unlike hydrogen which has been known to leak through lead.

Other substantial carbon footprint industries such as steel and cement

can also be decarbonised using hydrogen. In these processes, hydrogen is used for its reducing effect in the chemical reactions, as well as its energy value. Steel and cement account for c.16% of global CO₂ emissions in aggregate, and it is difficult to imagine a modern economy without these basic materials. While some electrification is possible (electric arc furnaces, for example) hydrogen is likely to play a significant role in decarbonising these sectors. It is also worth noting that these sectors are important “anchor” elements of any industrial strategy, given the scale and investment in high skilled engineering jobs that they require.

Where we have our doubts

We are unconvinced that it will be cost effective to use hydrogen for domestic heating. Producing clean hydrogen at the scale needed, and upgrading the transmission network just doesn’t stack up.

Electrification, through heat pumps, is likely a more efficient and cost-effective solution, although the thermal efficiency of the building stock will need to be improved materially.

Similarly, we do not believe hydrogen can play a significant role powering cars and other road vehicles. Electric vehicles are the clear winner here already.

Homes already have electricity connections to power lithium-ion batteries. While there are (solvable) challenges in ensuring enough electrons are available at the right time, this is more surmountable

than the distribution of hydrogen. In addition, it is simply inefficient to take green electricity, use it to produce green hydrogen, transport the hydrogen, then use the hydrogen to power a vehicle.

Uses for hydrogen should be focused on those tasks for which clean hydrogen is the only choice.

Where to next?

What is certain is that there will be significant deployment into hydrogen-related assets over the medium to long-term and this is essential to meeting UK net zero targets. This will expand beyond the production of hydrogen, and encompass investment opportunities in storage and ammonia/methanol production.

The UK government is already reviewing a number of projects, and will not want to fall behind in the race against other European countries. Buying-in technologies manufactured elsewhere, is not appealing.

We are currently looking at a number of projects in this regime. If successful, we would be awarded contracts that contractually provide protections against operational costs and provide UK government supported inflation-linked revenues. There are similar projects coming to market across Europe, and given our scale and network of relationships we expect to participate in them.



James Samworth
Partner

Hydrogen is a flexible energy source. It can provide electricity, fuel for land transportation, aviation & shipping, heat, long-term power storage and chemical feedstock for industrial processes. It can be stored as a gas or a liquid and can be converted into ammonia or methanol for longer term storage.

This flexibility has gained hydrogen the moniker of “Swiss army knife” in the energy transition.

Despite its flexibility though, hydrogen is not a panacea. There is a big difference between the realistic roles we think hydrogen can play, and where we are more sceptical.

The role of hydrogen in reaching net zero in the UK

Many of hydrogen’s possible uses are already being met by other fuels or technologies. In many cases, electrification, with an ever-lower carbon grid, will be more

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