

# SPOTLIGHT ON THE ROLE OF HYDROGEN AND CARBON CAPTURE IN CORPORATE DECARBONISATION



**ENERGY TRANSITION**  
Part of the Horizon Scanning series



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## DECARBONISATION AS A BOARDROOM AGENDA ITEM

Intergovernmental agreements and national decarbonisation targets are translating into regulation aimed at requiring decarbonisation across the global economy. In the UK and EU, measures impacting business range from sustainability disclosures, transition plans and supply chain scrutiny to national or regional carbon pricing, and carbon border taxes.

But the drivers to decarbonise are not just regulatory. Customers, investors and lenders are increasingly conscious of the environmental and social impact of their activities. And businesses themselves are also increasingly reassessing their purpose and viewing their ESG strategy as a way to drive value and to attract the best talent. 2024 will continue to see the corporate world seeking solutions to become more sustainable.

## ENERGY PROCUREMENT STRATEGY IS AT THE HEART OF DECARBONISATION PLANS

Decarbonisation is primarily an energy issue. As a result, deploying energy efficiency measures, electrifying sectors of the business - for example moving to a fleet of electric vehicles - and switching to a pure renewable energy supply are a key part of many decarbonisation strategies.

Procuring renewable power can be done in a number of ways. Many organisations opt to buy power using green tariffs. However, in the UK for example, the rules which allow the use of renewable energy guarantees of origin to be used by suppliers of green tariffs to “green” fossil fuel-derived power are coming under increasing criticism. As a result, organisations are increasingly opting to pursue direct procurement strategies, such as corporate renewable power purchase agreements (CPPAs). We expect interventions by governments and regulators focused on encouraging the further use of CPPAs in some markets: for example the EU’s third Renewable Energy Directive (RED III), approved in autumn 2023, aims to address some of the barriers to CPPAs.

## TACKLING EMISSIONS THAT ARE HARD TO ELECTRIFY

Where electrification is not feasible, businesses are increasingly considering carbon capture, usage and storage, low carbon hydrogen and derivative fuels as part of their decarbonisation strategy. This is particularly relevant for sectors which are hard to electrify such as aviation, shipping, heavy goods transportation, and in industrial processes such as steel, cement and chemicals production. Data from the International Energy Agency in 2019 estimates that these sectors account for around 30% of global CO<sub>2</sub> emissions.

### Carbon capture technology is an established, multi-use technology

Carbon capture technology can be applied to facilities to ensure that most of the carbon emitted is captured and permanently stored using carbon dioxide transportation and storage networks (CO<sub>2</sub> T&S networks). In markets exposed to carbon pricing or where a carbon border tax applies to exported goods, the avoidance of carbon costs can be a significant driver for investment. CCUS can also be used to remove CO<sub>2</sub> from the atmosphere – a process known as Direct Air Capture – resulting in emissions reductions, generating carbon offsets. However, despite being a proven technology, deployment of carbon capture at scale to date has been limited, and costs remain high.

A significant barrier to investment is the availability of, and reliance on CO<sub>2</sub> T&S networks. They are key for the success of a carbon capture project – if the network is delayed or suffers an outage, the captured carbon must be vented, exposing the capture business to carbon costs and, in the event of prolonged outages, a stranded asset. These networks are not generally established yet, meaning businesses seeking to deploy carbon capture technology will also need to assess the deliverability of the CO<sub>2</sub> T&S network.

As a result, carbon cost avoidance may not be sufficient incentive for investment. Some governments, such as the UK, are seeking to intervene via support packages for initial projects offering both financial incentives and mitigation of co-dependency risks. Other jurisdictions, such as the USA, leave CO<sub>2</sub> T&S network risks to be managed between project developers, but offer more generous subsidies to compensate firms for the higher level of risk involved.

### The role of hydrogen is still emerging but is gaining traction

Today, around 98% of the hydrogen produced is derived from fossil-fuels with the resulting carbon dioxide emissions being released into the atmosphere. This fossil-fuel derived hydrogen is used primarily in industry (e.g., refining, chemicals and steel) and represented around 2.5% of global energy-related carbon emissions in 2019. By contrast low carbon hydrogen can be made using a number of methods including by capturing the emissions from natural gas-derived production (known as blue hydrogen). Another method uses electrolysis of water using renewable or low carbon electricity (known as green hydrogen). As well as displacing the use of existing fossil-fuel derived hydrogen, low carbon hydrogen is also seen as a replacement for natural gas in heavy industry or as a fuel more generally.

When combined with recycled carbon, it may also be used in the production of drop-in, synthetic fuels, which has the potential to decarbonise aviation and shipping.

Production of and demand for low carbon hydrogen is expected to grow in the coming years. In the EU, demand is expected to be stimulated by RED III which sets a target of 60% of hydrogen used in industry to be from renewable fuels of non-biological origin by 2035 and a target of 29% of fuel used in transport to be renewable transport fuels by 2030. The UK is targeting 10 GW of low carbon hydrogen production by 2030.

We are already seeing a scale up of low carbon hydrogen production. Regions like Australia, Africa and the Middle East are gearing up to become net exporters: for example, Slaughter and May are advising on a multi-billion US\$ green hydrogen project between the Republic of Namibia and Hyphen Hydrogen Energy. This project is geared towards exports. In the longer-term, we expect to see the development of an international hydrogen market. Distinct import markets are already emerging. For example, Germany and Japan are expected to be net importers of hydrogen: Germany has pioneered H2Global, an organisation that aims to support hydrogen imports.

## MAKING THE BUSINESS CASE FOR INVESTMENT

Whilst there are risks associated with early investment in new sectors, there are government support schemes which can make these investments a viable option for corporates' decarbonisation strategies. The UK government, for instance, offers broad support, ranging from grants for development activities, to capex and operating support. These are available to companies producing low carbon hydrogen, as well as companies seeking to introduce carbon capture technology in their operations. For example, in December 2023, the first hydrogen allocation round has seen 125MW of electrolytic hydrogen production awarded £2bn of revenue support.

The EU is also incentivising decarbonisation using green hydrogen. It is aiming to reduce the price gap between renewable and fossil-fuel derived hydrogen, reducing risk for entrants and stimulating the formation of a market with the launch of the European Hydrogen Bank. The first pilot auction opened in November 2023, which is expected to allocate support to renewable producers located in the European Economic Area in the form of a fixed premium per kilogram of hydrogen produced. H2Global (which has recently joined forces with the European Hydrogen Bank) is facilitating green hydrogen imports into the EU, pioneering a central buyer model and acting as an intermediary between producers who require long-term offtake agreements, and buyers who prefer short-term contracts.

Initiatives are also underway to ensure finance is available to projects, despite their novelty. For example, UK Infrastructure Bank has a mandate to provide financing solutions (e.g., credit enhancements, senior debt and senior debt guarantees) to enable the government to meet its ambition to build four CCUS clusters, capturing 20-30 million tonnes of CO<sub>2</sub> per year by 2030. A similar fund has recently been launched in Canada, the Canadian Growth Fund.

## KEY TAKEAWAYS

CCUS, hydrogen and e-fuels are expected to play an important role in decarbonisation strategies in 2024 and beyond. The drivers to decarbonise mean that challenges to investment must be addressed, whether in regulation, via government support or via commercial agreement. Those interested in investing in these innovative schemes will need to evaluate their decarbonisation pathways, assess what government support is available and stay ahead of shifting regulatory regimes.

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