

UK Hydrogen Strategy

Top Ten Takeaways

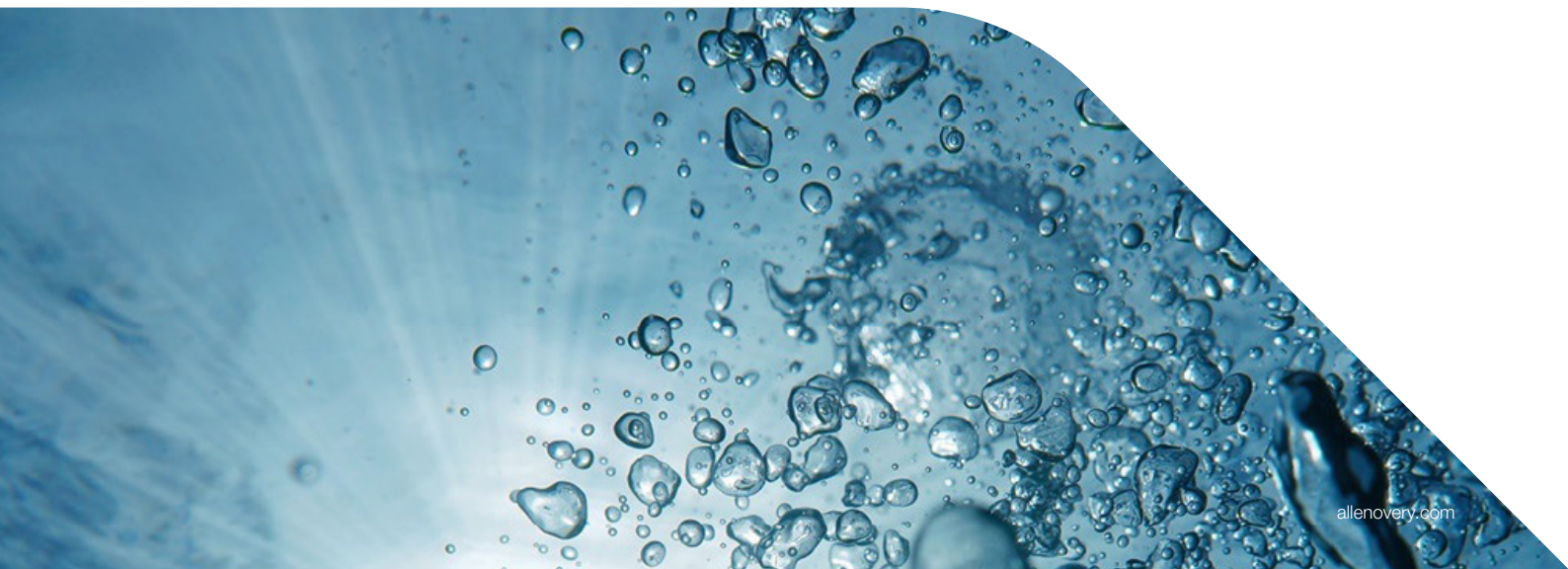
The **UK Government's Hydrogen Strategy** (the **Strategy**) finally landed on 17 August 2021. It was much-delayed and highly anticipated. When it arrived, it promised a hydrogen revolution: an integrated and holistic hydrogen economy in the UK by the end of the decade. We set out here our top ten takeaways from the Strategy and consultations that accompanied it.

1. Learning by doing

Due to a currently nascent hydrogen market, the Strategy takes a “learning by doing” approach. That is, to promote what is practicable now and in the next 5 years, and to foreshadow what is anticipated and targeted in the longer-term without making quantifiable or specific commitments. The main target is 5GW production capacity installed by 2030 and rapid further growth thereafter to meet the 6th Carbon Budget target by 2035 and net zero by 2050. The Strategy includes numerous statistics of estimated demand and required production capacity by each of 2030, 2035, and 2050, but the estimated ranges are large (between 250-460 TWh by 2050), reflecting the significant levels of uncertainty across the hydrogen value chain such as the needs and suitability of hydrogen for heat and transport.

2. Twin-track technology focus

While officially technology-agnostic (leaving room for a role for nuclear and other sources for hydrogen production in the future), the initial focus set by the Strategy is clear – a “twin track approach” of “blue” hydrogen and “green” hydrogen. There is a reliance on blue hydrogen (autothermal reformation with CCUS) and retrofitting existing facilities (steam methane reformation with carbon capture), especially in the mid-2020s, in order to start up the hydrogen economy and develop the networks that will facilitate larger-scale green hydrogen projects in the late 2020s and 2030s. The early goals for green hydrogen are modest – <100MW green hydrogen during the 2020s, with larger-scale projects to follow when the economy is better adapted to the influx of hydrogen production. It is notable that the Strategy uses the colour labels sparingly, preferring the term “low carbon” hydrogen to coningle blue and green (and other colours), although this has not escaped the attentions of critics of the Strategy's support for blue hydrogen.



3. On-going business model innovation

The Government business model proposed in the **Low Carbon Hydrogen Business Model** consultation (the Business Model Consultation) is production-focused and contemplates a similar structure to the contracts for difference schemes used for UK renewable electricity, but is not yet developed in sufficient detail for investors to really assess its acceptability. Its design has been heavily influenced by a desire to reduce support both over the life of an allocated contract and over the course of future competitive allocation rounds as the hydrogen economy matures. It has also clearly been influenced by a belief that early hydrogen production plants will most likely attract “strategic investors” that are already familiar with the UK energy sector.

The Business Model Consultation proposes a technology-agnostic producer-led model taking the form of a private law contract with an (as yet) unknown counterparty (with (as yet) unknown financial sources), for an (as yet) unknown duration. Under the framework business model the producer in respect of a new build hydrogen production facility (of any size) that produces hydrogen meeting the “low carbon hydrogen standard” will be paid a variable premium, being the difference between:

- a) a reference price set at the higher of (i) the natural gas market price (which would act as a floor to the reference price); and (ii) the hydrogen sale price actually achieved by the producer; and
- b) an agreed “strike price”, which is bilaterally agreed between the producer and BEIS to reflect the overall value of a unit of hydrogen that the producer needs to achieve to cover their fixed and variable costs of production (including input fuel and any associated costs such as carbon transport and storage for CCUS-enabled projects), financing costs and equity return and subject to indexation (following an (as yet) unknown methodology),

subject to:

- i) (as yet) unknown additional contract mechanisms to provide an incentive for the producer to achieve a price higher than the natural gas market price (eg a gain share); and
- ii) adjustment under a volume risk sliding scale (on an on-going, continuous basis) that ensures the producer is paid a higher unit price if there are lower demand volumes.

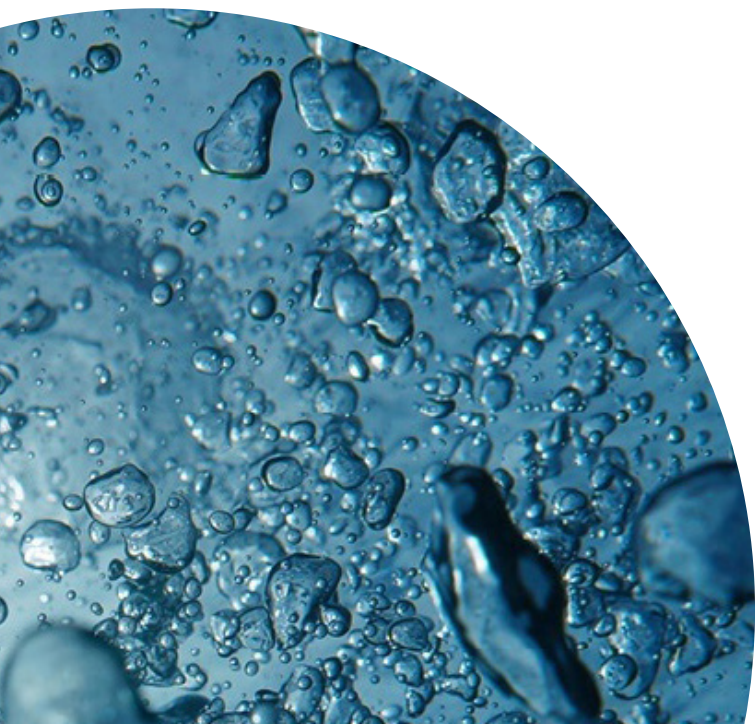
4. Key risks already apparent

The devil will be in the detail, some of which will come in the response to the consultation expected in Q1 2022. However, key risks and issues for hydrogen producers (and their investors) can already be identified, such as the following.

- a) It is recognised that selecting a reference price in the absence of an established market reference point is challenging and that there are no perfect solutions. The preferred choice means projects that are unable to sell hydrogen for at least the natural gas market price will not be kept whole and there may not be sufficient incentive for fuel switching away from natural gas where carbon policies are not aligned. A model based on actual sale prices also has the potential to be cumbersome and require the sharing of sensitive information to an as yet unknown counterparty, which may be of concern to producers and their investors.
- b) The sliding-scale volume support means residual volume risk may be significant for first-of-a-kind projects and projects without alternative offtake options. There is no reference to producers on early projects being able to access contingent government support for stranded assets where there are no viable demand volumes, and in the absence of a clear answer for non-localised transport and storage, the potential to mitigate through backup offtakers is potentially limited (and may impact the reference price).
- c) The producer is to bear the risk of the availability and price of input energy. Given the proportion of production costs represented by these costs, projects will therefore need to demonstrate robust strategies for managing those risks in order to be bankable.
- d) There is no offer of contingent government support for CAPEX or OPEX overruns, or other low probability/high impact events despite hydrogen development at scale being technologically immature and thus the risk of contingency inflating strike prices. Technology risk will be a key consideration for investors in hydrogen production projects, in particular the risk that hydrogen produced does not meet the also immature “low carbon hydrogen standard”. The ability to pass such risks down an immature supply chain will be constrained so technical due diligence will be crucial.
- e) Early projects may benefit from support for localised project specific transport and storage solutions, but there will be no support for the costs of larger, shared networks.

5. Limited proposal on transport and storage infrastructure

The approach to hydrogen transport and storage offers some support for localised transport, but is generally under-developed and the Strategy asks readers to “watch this space” in relation to large-scale shared transport and storage networks. A standalone hydrogen developer may have access to support through clustered network projects, and though it is implied that technological and market maturity should be sufficiently advanced by 2050, it may not be possible for national-level distribution to take place within the next 30 years.



6. Complex interfaces and parallel support schemes

Both blue and green hydrogen production projects will include a complex interface with other infrastructure; either carbon capture, transport and storage infrastructure or renewable electricity generation. The extent of project on project risk and approach to such interfaces will differ depending on the particular project perimeter. It is expected that one or more low-carbon support schemes may need to work in parallel for hydrogen developments fulfilling relevant criteria. For new build blue hydrogen, this means the hydrogen business model alongside the carbon transport and storage regulated investment model, whilst for retrofit blue hydrogen support is via the industrial carbon capture support mechanisms. For green hydrogen, this means assessing the interface between the hydrogen business model, renewable CfD and potentially other schemes such as the Capacity Market. There is also an array of different funding schemes available to support innovation, front-end design and other activities that will be relevant to hydrogen projects.

7. Demand side measures emphasise industry and power uses

The need to cultivate both supply and demand is a novel challenge and uses of hydrogen are also explored. The Strategy places emphasis on steps to support industrial use of low carbon hydrogen, including the phasing-out of carbon intensive hydrogen production and numerous steps to encourage industrial fuel switching, especially in the 2020s for CHPs and boilers, on clusters and a clear focus on the steel industry. The power sector is another area of importance, with a focus on the potential use of hydrogen for system flexibility in the 2020s to aid “sector coupling”, provision of stable hydrogen offtake volumes, and more flexible peaking generation from 2030 onwards. There remains considerable uncertainty on the viability of hydrogen’s long-term role in heating buildings and transport, although a “hydrogen village” is targeted by 2025, with a potential pilot “hydrogen town” by 2030. The Strategy contemplates strategic decisions in the mid-2020s with milestones set in relation to the key decisions on the blending of hydrogen into the gas grid (2023) and whether to support the use of hydrogen for heating (2026).

8. Market creation is holistic but iterative

Market creation is approached candidly. There is recognition that it is impossible to design a fully functioning market for 2050 now; the process must be iterative and the market starting point may bear little resemblance to the developed holistic hydrogen economy. The first steps in market support are the Net Zero Hydrogen Fund and hydrogen business model, however the Strategy signposts the actions also expected on wider regulatory alignment.

The Net Zero Hydrogen Fund will, through a series of competitions starting in early 2022 until 2024-2025, provide capital grants from a total fund of GBP240 million for development activities and construction costs relating to new-build hydrogen projects, which would accelerate progress towards the goal of a holistic hydrogen economy this decade. The goal of the Net Zero Hydrogen Fund is to provide upfront capital and development cost support for first movers in order to lower the overall project costs, filling the investment hiatus gap for new technologies, and facilitating the achievement of a final investment decision on more projects earlier. In light of the weight of the Government’s ambition, which includes GBP4 billion private sector “co-investment” and 40TWh of low-carbon hydrogen for use across the economy by 2030, the extent and possible reach of the support offered by the fund is questionably small.

9. A standard for low-carbon hydrogen will be developed

The Government's expectation as set out in the **UK Low Carbon Hydrogen Standard** is that a variety of different production methods may be used when producing hydrogen at scale, and it has therefore chosen to adopt the single label of "low-carbon". The concept is that all production methods that meet the greenhouse gas threshold (as yet unconfirmed) will fall within the standard. The standard is intended to be finalised in early 2022, ahead of the Net Zero Hydrogen Fund competition opening, and is expected to take a position on whether the standard could be developed into a certification or guarantee of origin scheme to underpin deployment of low carbon hydrogen production, which would potentially facilitate international trade in hydrogen and confirm the "green" credentials of the hydrogen for domestic consumers and industrial users.

10. Pursuit of wider economic and social benefits

The Government predicts that in a high hydrogen scenario, up to 100,000 jobs and GBP13bn of gross value-added could be generated from the UK hydrogen economy by 2050. As part of this aspiration, deeper supply chains will be developed (learning lessons from opportunities missed in offshore wind in particular) and knowledge will also be shared with other nations to further their own efforts to reaching net-zero and generate opportunities for the UK to export its new-found competences. However, the most acute social impact of the Strategy, the impact of the Strategy on consumer or taxpayer pockets, is left for another day.

Next steps

As is becoming typical, the Strategy package signposts a vast number of further consultations, publications and announcements expected over the next 3 to 12 months. The Government will need to move quickly to finalise the hydrogen business model, the low-carbon hydrogen standard and the Net Zero Hydrogen Fund, which are all due to be released following the consultation response expected in early 2022. Clearly, there is much work still to do to make the holistic hydrogen economy a reality, and prospective developers may be disinclined to take the plunge before there is greater certainty and commitment to support both first-of-a-kind projects and the entire lifecycle of the assets.

Allen & Overy will be tracking developments closely, and look forward to discussing the themes and issues arising in more depth during our Energy and Infrastructure Client Seminar series session in November. If you would like further details about this event or to register your interest in attending the session, please contact us [here](#).

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