

Energy Transition

UK HYDROGEN STRATEGY: THE TRANSITION FROM - IMAGINING TO BUILDING A MARKET

Authors: Kirsti Massie and Katie Trim

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Introduction

The UK's Hydrogen Strategy landed this month, to some extent making up for its delay with evident enthusiasm underlining the breadth and depth of work undertaken.

There is a strong sense of the challenge faced, which, in short, is to build a market for a product that is currently neither widely produced nor used in the UK – all this to be achieved without the benefit of time to allow for natural market developments with the looming CB6 and 2050 Net Zero targets adding a real sense of urgency.

At times the Strategy highlights the slightly uneasy tension between the need to provide a road map for the 2020s, 2030s, through to 2050 and the acknowledged reality that, in truth, it is difficult to predict with any certainty developments more than a few years out.

The Hydrogen Strategy and accompanying consultation papers (links below) ask at least as many questions as they answer but the message is clear, BEIS is listening and willing to commit to private sector partners in order to reach short term and long term hydrogen market goals.

The Hydrogen Strategy and accompanying papers set out the UK government's 'low regrets' approach (adopted for a number of its other low carbon strategies inc. nuclear, CCUS etc.) evidenced by commitments to a wide range of support across different industries and technologies with stimulus packages to support the simultaneous build out of supply and demand. With the self-proclaimed aim of 'keeping options open', the UK government has declared itself willing to kiss a few frogs in order to find its hydrogen market prince.

Goals

The Hydrogen Strategy sets out a number of goals for the UK hydrogen market many of which are familiar from previous publications (notably the Ten Point Plan). The goals as stated are:

1. to achieve **5GW of low carbon hydrogen production capacity by 2030** for use across the economy;
2. to create 'green jobs' – the Strategy cites evidence that a UK economy could **support 9,000 jobs by 2030** and up to **100,000 jobs by 2050** across key industrial heartlands in the UK;
3. for hydrogen to account for **20-35% of UK final energy consumption by 2050**; and

4. to seize opportunities to be a global **exporter of technology and expertise** in the hydrogen space (as it has for offshore wind) as well as possible opportunities for **physical export of hydrogen to its north sea neighbours**.

Supply

The Strategy acknowledges that today there is virtually no low carbon hydrogen produced in the UK with most hydrogen currently produced from natural gas without carbon capture. Unlike many of its European neighbours, the UK is pursuing a **'twin-track'** of support for both blue and green hydrogen with the blue hydrogen market closely linked to the development of carbon capture technologies also being supported through the CCUS business models.¹

1. A LOW CARBON HYDROGEN STANDARD

Alongside the Hydrogen Strategy, a consultation was published on the development of a UK Low Carbon Hydrogen Standard that will set out the methodology for calculating greenhouse gas emissions and as well as maximum acceptable levels of emissions associated with low carbon hydrogen. Development of the standard is key to defining which projects will be entitled to benefit from the support measures being put in place and for the integrity of the market and attainment of emissions reduction targets.

The consultation seeks views on a range of issues including: (i) the scope of the standard (use, coverage across production methods and geographic location); (ii) the system boundary of the standard (i.e. where the standard should be applied - at the point of production or use?), as well as chain of custody, purity and pressure, emission and global warming potential factors; (iii) a threshold for GHG emissions; and (iv) delivery and administration of the standard.

The consultation closes in October 2021 and a government response is expected in early 2022.

2. A £240M NET ZERO HYDROGEN FUND (NZHF)

The launch of the NZHF (originally announced in the Ten Point Plan) is expected in 2022 with the aim of supporting the commercial deployment of new low carbon hydrogen projects in the 2020s in order to meet the 2030 5GW of production target.

The fund's aim is to provide capital co-funding (alongside the private sector) as well as support for feasibility, FEED and possibly post-FEED studies for multiple production technologies including CCUS-enabled hydrogen and electrolytic hydrogen that have a realistic prospect of production this decade. It is anticipated that funding will be made available to projects that may also look to benefit from the hydrogen business model as well as those that will not.

A consultation on the fund's design was launched alongside the Hydrogen Strategy. The consultation looks for input on: (i) the proposed scope of the fund; (ii) which technologies are capable of meeting the eligibility criteria; (iii) effectiveness of capital grant funding (alongside the revenue support offered by the business model); (iv) the eligibility criteria to be adopted by the fund; and (v) the types of projects (and their stage) that might look to benefit from the fund.

3. HYDROGEN BUSINESS MODEL

As expected, a consultation paper on the proposed hydrogen business model was also published alongside the Hydrogen Strategy. The goal of the hydrogen business model is the provision of long

¹See also our article on CCUS cluster sequencing: <https://www.energyforward.law/2021/05/ccus-a-summary-of-beis-cluster-sequencing-for-carbon-capture-usage-and-storage-deployment-phase-1/>

term revenue support to stimulate investment in hydrogen production (with the UK government seeing initial investment support alone as insufficient to attract private sector investors).

The producer focused proposal aims to mitigate price and volume offtake risks. Similar to the CfD regime used for offshore wind, the proposal is for top up payments to be made by the UK government based on the difference between a strike price (representing the price that the producer needs to achieve to cover its production costs) and a reference price (representing the market value of hydrogen). For initial projects where there is no market benchmark price for low carbon hydrogen to act as a reference price, the proposal envisages using the highest of two proxies – the natural gas price and the actual achieved sale price.

Unlike for the offshore wind CfD (where an already established market for the power produced exists), the hydrogen CfD proposal also aims to address the risk of low demand (at least for early stage projects) with a 'sliding scale' price being considered with a higher level of support paid on initial volumes to allow the producer to recover fixed costs at relatively low offtake volumes.

The consultation seeks views on the 'minded to proposals' which are presented alongside alternative options along with the rationale for discounting such options. Further, the paper looks for input on aspects of the model at earlier stages of discussion and for which fully developed proposals have not yet been set out e.g. the length of revenue support contracts, accommodations needed for different technologies or end users, allocation of support and the model's interaction with other support packages.

Interested parties have until October of this year to respond, with a further update from BEIS expected in Q1 2022. It is expected that the first contracts for support will be allocated from Q1 2023.

Existing hydrogen production facilities will not be permitted to benefit however such facilities may look to the CCUS business model for support where production facilities are retrofitted with CCUS technology.

4. LOW CARBON HYDROGEN SUPPLY COMPETITION

Seeking to build on the success of its Low Carbon Hydrogen Supply (HS1) competition, the UK government recently launched a £60m Low Carbon Hydrogen Supply 2 competition with an updated design to reflect domestic and international developments. The competition has a wide scope looking across the full hydrogen value chain (rather than production only).

Streams 1 and 2 of the competition will provide targeted support to technologies at different stages of development/readiness.

Demand

Today most UK hydrogen demand is concentrated in the chemicals and refinery industries, with production and use typically taking place on the same site.

The Hydrogen Strategy recognises the huge challenge of matching supply and demand in a nascent market. It is acknowledged that, for much of this decade, the expectation is that smaller scale production projects will match with an identified user base. At the same time the UK government is looking to invest in demand growth across a number of sectors with the Strategy setting out current and future schemes.

1. INDUSTRY

Carbon heavy industries will be supported to decarbonise through the ICC CCUS (for existing projects to be retrofitted with CCUS technology) and hydrogen business models (for new

production facilities) and later this year a call for evidence is expected for interventions needed to phase out carbon intensive hydrogen.

A £315m Industrial Energy Transformation Fund is supporting the uptake of technologies that improve efficiencies and reduce emissions associated with industrial processes with hydrogen projects among those to have benefited to date. A £20m Industrial Fuel Switching Competition aimed to stimulate investment in fuel switching processes and technologies across cement, refineries, glass and lime has been established, with 4 hydrogen projects moving forward from feasibility studies to demonstration (supported by a further £55m phase of funding) as part of the competition.

2. POWER

Low carbon hydrogen is seen as having a role in flexible power generation. Electrolytic hydrogen production is also seen as contributing to grid flexibility by drawing on 'excess' renewable electricity that would otherwise be curtailed. It is recognised that a key part of hydrogen's role in the power sector goes hand in hand with the development of hydrogen storage options, discussed separately in the Strategy.

To better understand opportunities for hydrogen in power and the support needed a number of calls for evidence have been made and a 'watch this space' issued anticipating further engagements with the power industry.

3. HEATING

The Strategy summarises ongoing pilot schemes and future plans to develop the use of hydrogen in domestic heating. The UK government is: (i) exploring up to a 20% blend of hydrogen in the gas network; (ii) trialling pure hydrogen heating starting with a series of demonstration projects (including a hydrogen neighbourhood by 2023, a hydrogen village by 2025, and a possible hydrogen town before 2030); and (iii) supporting development of 'hydrogen ready' appliances e.g. boilers.

4. FUEL/TRANSPORT

Already hydrogen is being used (at small volumes) across the UK in cars, trucks, buses and marine vessels. It is recognised that particular opportunities for hydrogen in transport rest with larger vehicles, shipping and aviation where electric batteries are currently unsuitable for the size of vehicles and distances involved.

The UK government intends to further support small scale development with a number of local trials for hydrogen powered buses and trains. There is also support for (i) hydrogen in shipping e.g. through HySeas III a final development stage programme for a design to deliver the world's first sea-going vehicle and passenger ferry to employ carbon-free hydrogen as its energy source; and (ii) hydrogen in aviation through work with projects like HyFlyer I and II, FlyZero and H2GEAR.

Networks/ Transport and Storage

Unlike CCUS, there is no single, clearly defined road map for the transport and storage of hydrogen.

The hydrogen business model contemplates that, for early stage projects at least, the costs of any transport infrastructure or arrangements will be built into the project costs and recovered as part of the same support model. It is acknowledged that private sector players are already investing in the development of localised transport and storage infrastructure and the UK government appears to want to reserve its position on whether more co-ordinated public sector support/intervention will be

needed choosing not to adopt the CCUS T&S business model approach in looking to initially identify a limited number of owners and operators.

1. TRANSPORT

The UK government intends to explore and develop a range of pipeline and non-pipeline transport channels supporting projects including: (i) Project Union which looks at the development of a UK hydrogen network to join industrial clusters spanning up to 200kms (by repurposing 25% of the current gas transmission lines); (ii) H21, a series of projects which test pure hydrogen in pipelines and connecting infrastructure; and (iii) FutureGrid which aims to create a representative transmission network to trial hydrogen.

Further, Cadent Gas is exploring options for future gas billing methodologies to reflect changes to gas blends.

2. STORAGE

Development of hydrogen storage options (including specialist tanks and vessels, underground salt caverns, depleted gas or oil fields and carriers (e.g. ammonia)) are being further considered.

The UK government has provided support to storage development through the £33m initial phase of the Hydrogen Supply Competition (which supported Project Centurion a hydrogen salt cavern storage demonstration project) with a £60m second phase to be launched. A £68m Longer Duration Energy Storage Demonstration competition has been launched to accelerate the commercialisation of storage projects to complement renewable power generation.

Export

The Hydrogen Strategy identifies key export opportunities for skills and technology developed as part of a government-supported and world-leading hydrogen market. Although development of a domestic hydrogen market is the primary focus, the Strategy also identifies possible opportunities for export to neighbouring countries whilst acknowledging the challenges in building the infrastructure and setting of common standards that would be required.

The viability of export of unsupported low carbon hydrogen remains to be seen, especially when faced with competition from the export of green hydrogen from regions with much lower costs of renewable power generation e.g. the Middle East and South America. Perhaps understandably, given the focus on an interconnected domestic market, not much space is given to opportunities for the development for ammonia 'cracking' and ports infrastructure, key to benefitting from the import of low carbon hydrogen to reduce emissions.

Conclusion

The Hydrogen Strategy, together with accompanying consultation papers, highlight the important role hydrogen is expected to play in achieving a net zero economy and the resulting need for timely investment in the growth of a hydrogen market and production facilities. The UK government has sent a strong message to industry players that it is listening and willing to commit. It remains to be seen however whether this will be enough to stimulate the widespread and rapid growth needed for a net zero fairy tale ending.

Links

UK HYDROGEN STRATEGY:

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1011283/UK-Hydrogen-Strategy_web.pdf

HYDROGEN ANALYTICAL ANNEX:

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1011499/Hydrogen_Analytical_Annex.pdf

DESIGNING THE NET ZERO HYDROGEN FUND CONSULTATION:

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1011468/Designing_the_Net_Zero_Hydrogen_Fund.pdf

CONSULTATION ON A UK LOW CARBON HYDROGEN STANDARD:

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1011500/Consultation_on_a_UK_Low_Carbon_Hydrogen_Standard.pdf

LOW CARBON HYDROGEN BUSINESS MODEL: CONSULTATION ON A BUSINESS MODEL FOR LOW CARBON HYDROGEN:

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1011469/Consultation_on_a_business_model_for_low_carbon_hydrogen.pdf

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