

Energy UK Response – APPG on Hydrogen Inquiry into how the UK's Hydrogen sector can help support the UK's economic recovery

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The Existing and Potential Role of Hydrogen in the UK

The UK is well-placed to be a global leader in hydrogen. The extensive gas distribution network in the UK is currently being upgraded and will be 'hydrogen ready' nationwide by 2032¹. Further to this, the UK has an electricity generation mix with an increasing proportion of intermittent renewables and analysis has shown that up to 30GW of wind and solar may need to be curtailed on some days in 2030². The availability of this low cost power creates a significant opportunity for green hydrogen to be produced via renewable-powered electrolysis. Nuclear power can also be used to produce low-carbon hydrogen via electrolysis.

The UK is currently leading the world in the development of business models for CCUS. It also has extensive technical offshore expertise and favourable underground Geology, all of which combine to place the UK in 4th on the Global CCS Institute's CCS readiness index³. CCUS is essential to enabling blue hydrogen production, and a world leading UK CCUS industry would create significant opportunities for blue **hydrogen** production and exports. The focus should now be on ensuring that the UK's genuine potential to be a global leader in **both** green and blue hydrogen production is unlocked by supporting both technologies to commercial viability. Near-term action is needed to capitalise on this potential, and such action will deliver benefits in the early 2020s. Those benefits include job creation, emissions reduction and Gross Value Added (GVA), all of which are central to a green recovery.

Hydrogen is not a new fuel in the UK energy system. Town Gas, which was phased out in 1988, consisted of 50% hydrogen by volume, and the UK reached peak hydrogen production in 1969 at around 33TWh⁴. The UK is currently responsible for around 1.4% (27 TWh) of global annual hydrogen production⁵. Low-carbon hydrogen production is currently limited, highlighting the need for deployment of Carbon Capture Usage and Storage (CCUS) and electrolysis technologies.

Hydrogen is an energy vector much like electricity and therefore can be used in all sectors of the UK economy. The zero end-point emission fuel is likely to be particularly useful in tackling hard-to-decarbonise sectors such as industry and heavy transport, where other decarbonisation options are limited and costly. To give a flavour of the importance of hydrogen in reaching Net Zero, at present the combined emissions from these hard-to-decarbonise sectors is 112 MtCO₂e or 25% of current UK emissions⁶. Hydrogen may also play an important role in decarbonising heating, alongside electrification. Hydrogen can also play a role in the power sector, complementing intermittent renewables by providing highly flexible low-carbon generation for use in times of low-generation and/or high-demand.

The Importance of Hydrogen in reaching Net Zero

Hydrogen is likely to be a key part of a cost-effective Net Zero pathway. In its Net Zero report to Parliament, the Committee on Climate Change (CCC) noted that moving from an 80% target to net zero moved hydrogen from being an option to an integral part of the new strategy⁷. In particular, the CCC highlighted that hydrogen has the potential to replace fossil fuels where electrification may reach limits of feasibility and cost-effectiveness.

A ten-fold increase in hydrogen production may be needed by 2050. In its 2019 Net Zero report, modelling by the Committee on Climate Change suggested hydrogen production levels of ~270TWh/year in 2050⁸. This is a ten-fold increase on the current level of production and would require a production capacity build rate of 2-3GW per annum. Building a low-carbon hydrogen economy capable of deployment at this rate will require investment in hydrogen production facilities, networks and storage.

This investment should be underpinned by a clear hydrogen strategy that sets out the policy support and regulatory framework that will facilitate a low-carbon hydrogen economy.

Hydrogen: Growth, Employment & Upskilling Opportunities for the UK

Hydrogen can support the levelling up agenda. At present, the majority of the low-carbon hydrogen development is taking place in the industrial clusters that have formed around the country. These clusters are located in the Humber, Teesside, Scotland, the North-West and South Wales. Exploration of electrolytic hydrogen production options is also taking place in a wide range of locations around the UK including in Sheffield, the Humber Region and in Scotland. This geographical diversity is aligned with the government's current ambition to drive investment in areas outside of London and specifically in industrial regions that have experienced a decline in recent years.

A hydrogen economy could deliver hundreds of thousands of jobs and £billions in GVA. Focusing on blue hydrogen, a recent Summit Power report found that developing a network of CCUS projects along the East Coast of the UK, capturing 75 million tonnes of CO₂ per year, would provide £163 billion of economic benefits and 225,000 jobs, cumulatively, through to 2060⁹. The report highlights that near-term development of the industrial clusters (i.e. early 2020s) is crucial to achieving these numbers. A further report by the Offshore Wind Innovation Hub found that the transition to green hydrogen could deliver investment levels between £4-12 billion per year between 2040 and 2090¹⁰. There is further job and value potential in the creation of hydrogen via thermochemical splitting using waste heat from nuclear reactors.

Export opportunities could create thousands of additional jobs and £millions more in GVA. In its October 2019 report to BEIS, Vivid Economics found that the business opportunities associated with export of hydrogen equipment and fuel cells may add £1.2bn in GVA and 9,600 jobs per annum by 2050. In order to capitalise on these opportunities it is key that the UK moves fast in kick-starting a hydrogen economy as other countries have already stolen a march and published hydrogen strategies¹¹¹²¹³.

Near-term & Long-term Actions for Developing a Hydrogen Economy

A clear and ambitious hydrogen strategy is needed. A UK hydrogen strategy will send a strong signal to the domestic and international investment community, confirming that the UK is committed to developing low-carbon hydrogen. Forward visibility will help developers secure investment and will encourage the development of a UK based supply chain. A UK hydrogen strategy should include the following:

- **Targets:** Government should set interim targets for volume of low-carbon hydrogen production at 2030 and 5-year intervals thereafter. There should be an ambition for a future hydrogen economy to have net zero emissions by 2050, in line with the economy wide Net Zero target.
- **Regulatory reform:** For example, regulations should be amended to allow blending of hydrogen in the gas networks. The HyDeploy project at Keele University has shown that 20% hydrogen can be blended into the network without the need to change gas appliances¹⁴.
- **Further trials:** Government has already created a number of innovation funds to support hydrogen trials but further support is needed to demonstrate technological readiness in a number of areas such as, hydrogen ready power generation turbines, hydrogen ready appliances (boilers, cookers etc.), electrolytic hydrogen production, use in HGVs and shipping and the use of ammonia to store and transport low-carbon hydrogen.
- **Support mechanisms:** Government should work with industry to develop appropriate financing mechanisms for **both** green and blue hydrogen. Consideration will also need to be made on end user subsidies or obligations to encourage hydrogen uptake in end use sectors. This should be underpinned by a market-based carbon price with a net zero trajectory, and mechanisms to encourage the lowest carbon forms of hydrogen production across the full life cycle.
- **A large-scale UK based testing site:** The creation of a large scale UK-based testing site could help the UK to attract developers to test their technologies.
- **A public engagement strategy:** It is crucial that the public are informed of the benefits of hydrogen and educated on some of the myths. A recent report carried out as part of the H21 project found that 68% of respondents were indifferent or undecided about low carbon energy technologies such as hydrogen¹⁵.

Should you have any questions regarding this consultation response then please do not hesitate to get in touch via the details below.

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Energy UK

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We represent the diverse nature of the UK's energy industry with our members delivering almost all (90%) of both the UK's power generation and energy supply for over 27 million UK homes as well as businesses.

The energy industry invests over £13.1bn annually, delivers around £85.6bn in economic activity through its supply chain and interaction with other sectors, and supports over 764,000 jobs in every corner of the country.

¹ HSE Iron Mains Replacement Programme: <https://www.hse.gov.uk/gas/supply/mainsreplacement/enforcement-policy-2013-2021.htm>

² LCP analysis of opportunities for flexible assets: <https://insight.lcp.uk.com/acton/attachment/20628/f-cba9a24b-1020-40b4-9404-5f3d6fc42752/1/-/-/-/-%20analysis%20of%20opportunities%20for%20flexible%20assets.pdf?sid=TV2:xisYd1XX0/LCP%27s%20analysis%20of%20opportunities%20for%20flexible%20assets.pdf?sid=TV2:xisYd1XX0>

³ Global CCS Institute – CCS Readiness Index: <https://co2re.co/ccsreadiness>

⁴ UK Gov – Historical Gas Statistics: <https://www.gov.uk/government/statistical-data-sets/historical-gas-data-gas-production-and-consumption-and-fuel-input>

⁵ Energy Research Partnership Report: <https://erpuk.org/wp-content/uploads/2017/01/ERP-hydrogen-report-oct-2016.pdf>

⁶ BEIS – Final UK GHG emissions statistics 1990-2018 – Table 3: <https://data.gov.uk/dataset/9568363e-57e5-4c33-9e00-31dc528fcc5a/final-uk-greenhouse-gas-emissions-national-statistics>

⁷ CCC – Net Zero Report: <https://www.theccc.org.uk/publication/net-zero-the-uks-contribution-to-stopping-global-warming/>

⁸ CCC – Net Zero Technical Report: <https://www.theccc.org.uk/publication/net-zero-technical-report/>

⁹ Summit Power, Clean Air – Clean Industry – Clean Growth: <http://www.ccsassociation.org/news-and-events/reports-and-publications/clean-air-clean-industry-clean-growth/>

¹⁰ Offshore Wind Innovation Hub – Future offshore wind energy integration:

https://offshorewindinnovationhub.com/industry_insight/future-offshore-wind-energy-integration-outlook-analysis/

¹¹ Netherlands Hydrogen Strategy: <https://www.government.nl/documents/publications/2020/04/06/government-strategy-on-hydrogen>

¹² Japan Hydrogen Strategy: https://www.meti.go.jp/english/press/2019/0918_001.html

¹³ Germany Hydrogen Strategy: <https://www.bundesregierung.de/breg-en/search/wasserstoffstrategie-kabinett-1758982>

¹⁴ HyDeploy: <https://hydeploy.co.uk/about/news/uks-first-grid-injected-hydrogen-pilot-gets-underway/>

¹⁵ H21 – Leeds Beckett University hydrogen study: <https://www.h21.green/news/uk-public-being-left-behind-in-green-energy-discussion-leeds-beckett-university-hydrogen-study-reveals/>