Energy UK Response – Environmental Audit Committee Inquiry into Technological Innovations and Climate Change: Hydrogen

26th June 2020

About Energy UK

Energy UK is the trade association for the energy industry with over 100 members spanning every aspect of the energy sector – from established FTSE 100 companies right through to new, growing suppliers and generators, which now make up over half of our membership.

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.

Executive Summary

The importance of hydrogen in reaching Net Zero

The emissions reduction required under the Net Zero legislation means that decarbonisation will have to be economy wide, including sectors that will be harder to decarbonise. Hydrogen has been identified as a technology that can provide a solution not only for these sectors but also for areas where there are barriers, either technical or economic, to decarbonisation using other technologies.

Energy UK supports the view from the Committee on Climate Change (CCC) that the move from government to increase the emissions reduction ambition from 80% below 1990 levels to net-zero emissions by 2050, moves hydrogen from being an option to an integral part of the new strategy[1].

Certain sectors that are difficult to fully decarbonise without hydrogen, such as industry, transport and space heating combine to account for 40% of current UK emissions. Whilst we see a key role for electrification, specifically in heating and transport, studies indicate that full electrification of these sectors is unlikely to be the optimal route to Net Zero[2]. Hydrogen, therefore, is likely to play a key role in a net-zero UK economy by 2050. In order for that future to materialise, we believe government action is needed now.

The UK is well-placed to be a global leader in all forms of hydrogen production

Interest in low-carbon hydrogen production has intensified in recent times, initially as a result of the Net Zero legislation, and more recently due to the potential role of hydrogen in the COVID-19 economic recovery. Interest in low-carbon hydrogen production has also been fuelled by the competitive advantages that the UK has in terms of offshore wind capacity, CCUS potential and existing gas infrastructure.

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 2032[3]. Further to this, the UK has an electricity generation mix with an increasing proportion of intermittent renewables and

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

[2] CCC – Net Zero Technical Report: https://www.theccc.org.uk/publication/net-zero-technical-report/

[3] HSE Iron Mains Replacement Programme: https://www.hse.gov.uk/gas/supply/mainsreplacement/enforcement-policy-2013-2021.htm

analysis has shown that up to 30GW of wind and solar may need to be curtailed on some days in 2030[4]. The availability of this low-cost power will create a market for off-takers that will include renewable hydrogen producers, however, we believe such a market should be technology neutral and renewable hydrogen production will have to compete against other flexibility providers. 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 subsurface geology for CO_2 storage, all of which combine to place the UK in 4th on the Global CCS Institute's CCS readiness index[5]. 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. Continuing with announced funding and ambitions to establish multiple low-carbon industrial clusters in strategic locations by 2030 is essential to realising this.

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 COVID-19 recovery.

A UK Hydrogen Strategy is needed now

Energy UK urges government to commit to developing a clear and ambitious UK hydrogen strategy. Such a strategy would ensure that innovation funding is targeted in the right areas and proportionate to the overall low-carbon hydrogen production ambition in the UK, which should be set out in the strategy. It would also send a strong signal to the domestic and international investment community, confirming that the UK is committed to developing low-carbon hydrogen.

Hydrogen can be applied to multiple sectors due to the versatility of the zero-emission energy vector. Through sector coupling enabled by hydrogen[6], deployment in one sector will create opportunities and co-benefits in other sectors and therefore, Energy UK believes that systems thinking is required in the development of a hydrogen strategy. Systems engineers can identify cross-sector opportunities, co-benefits and potential impacts, and determine the most optimal sequencing in terms of sector development and associated government interventions. We recommend that government works with industry and the Energy Systems Catapult to incorporate systems thinking into the development of a UK hydrogen strategy.

The multi-sector applicability of hydrogen creates a further challenge in terms of where the responsibility for hydrogen sits within government and how hydrogen development across different government departments is co-ordinated. We recommend that a UK hydrogen strategy includes the introduction of a new ministerial post with responsibility for the co-ordination of hydrogen development across all relevant government departments.

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

[5] Global CCS Institute – CCS Readiness Index: https://co2re.co/ccsreadiness

[6] Aurora – Hydrogen for a Net Zero GB: https://www.auroraer.com/wp-content/uploads/2020/06/Aurora-Hydrogen-for-a-Net-Zero-GB-An-integrated-energy-market-perspective.pdf?eid=pJfo29jrmoKI8jDxPeVX9g%3D%3D#gf_25

Response to Questions

1. How effective has the Government's investment in hydrogen projects such as the Low Carbon Hydrogen Supply competition, the UK Hydrogen Mobility Programme and Hy4Heat been in moving the sector towards becoming an integral part of a low-cost, low-carbon economy and boosting the productivity and competitiveness of the UK energy sector?

Energy UK supports the move from government to provide competition funding to help accelerate the development of the low-carbon hydrogen sector. The low-carbon hydrogen space is in its infancy and therefore innovation funding to facilitate demonstration of technological readiness is important. Energy UK encourages government to announce further similar funds or greater ambition in existing funds to accelerate low-carbon hydrogen development as part of the UK's economic recovery from the COVID-19 pandemic. We are, however, concerned at the apparent lack of an overarching strategy to underpin the design and allocation of grants and competition funding.

Energy UK believes that a clear and ambitious UK hydrogen strategy is needed. Such a strategy would ensure that innovation funding is targeted in the right areas and proportionate to the overall low-carbon hydrogen production ambition in the UK, which should be set out in the strategy. It would also 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:** Regulations should be amended, for example, 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 replace or adjust gas appliances[7].
- **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 **all forms** of low-carbon hydrogen production. 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 hydrogen[8].

[7] HyDeploy: https://hydeploy.co.uk/about/news/uks-first-grid-injected-hydrogen-pilot-gets-underway/
[8] 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/

2. What level of output can the sector deliver in the UK, and what Government support would be needed to achieve this? How does the potential for hydrogen differ by end-use?

A ten-fold increase in hydrogen production may be needed by 2050, with some analysts suggesting that nearly half of the UK's total energy demand could be met by hydrogen[9]. In its 2019 Net Zero report, modelling by the CCC suggested hydrogen production levels of ~270TWh/year in 2050[210]. 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.

Hydrogen potential is typically related to the availability of other decarbonisation options in different end-use sectors. Hydrogen 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. For example, in industry, hydrogen is needed to provide high-temperature heat for industrial processes, and is also vital where the process requires a flame to come into contact with the product being made, for example glass and ceramics. There is existing industrial hydrogen demand, although the hydrogen is not currently low-carbon. In transport, hydrogen can be used in cars, trucks, buses, trains and ships, however, the zero emission fuel is particularly suited to heavy transport where battery capacity is a limitation and hydrogen refuelling times are faster.

3. How realistic is industry's claim of widespread applicability of hydrogen technology in transport, heating and other sectors? Is hydrogen a cost-effective, feasible solution towards a low-carbon economy?

Energy UK believes hydrogen technologies are applicable across a wide range of applications and sectors. Hydrogen is an energy vector much like electricity and therefore could be used in all sectors of the UK economy. This does not, however, mean that the UK can expect that hydrogen will be the answer to every decarbonisation challenge. It is important that we begin production at scale and target end-use at those sectors where hydrogen is the most appropriate solution. Only once this has begun will we garner some understanding of the potential production capacity of the UK and gather a degree of certainty over how much of a contribution hydrogen is able to make.

Hard-to-decarbonise sectors such as industry and heavy transport, where other decarbonisation options are limited and costly, will benefit from immediate focus. At present, the combined emissions from these hard-to-decarbonise sectors is 112 $MtCO_2e$ or 25% of current UK emissions[11].

Once the UK has begun to produce hydrogen at scale, there will be a role for hydrogen in the power sector, complementing increasing amounts of intermittent renewables by providing highly flexible low-carbon power generation. Hydrogen may also play an important role in decarbonising heating, alongside electrification and other low carbon gasses, whether in the national gas network or through its use in heat networks.

Hydrogen is likely to be a key part of a cost-effective Net Zero pathway. In its Net Zero report to Parliament, the CCC noted that moving from an 80% target to net zero moved hydrogen from being an option to being an integral part of the new strategy[1]. In particular, the CCC highlighted that hydrogen has the potential to replace fossil fuels where electrification may reach limits of feasibility and cost-effectiveness.

[9] Aurora – Hydrogen for a Net Zero GB: https://www.auroraer.com/wp-content/uploads/2020/06/Aurora-Hydrogen-for-a-Net-Zero-GB-An-integrated-energy-market-perspective.pdf?eid=pJfo29jrmoKI8jDxPeVX9g%3D%3D#gf_25

[11] 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

4. What are the different implications of hydrogen produced from fossil fuels versus from renewables in terms of cost, scale, and emissions, and in terms of meeting the UK's net zero targets?

There are different ways of producing hydrogen but given the level of hydrogen ambition that is required to satisfy net zero emissions by 2050, Energy UK believes that all forms of low-carbon hydrogen production should be developed. Previous research has suggested that electrolysis could be cost competitive with steam methane reformation by 2030[12], if not sooner.

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 2032[13]. 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 2030[14]. 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 index[15]. 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.

5. How feasibly can hydrogen technology be applied in various sectors, from transportation, to energy generation and industrial processes, whilst maintaining the highest safety standards?

Hydrogen is an energy vector much like electricity and therefore could be used in all sectors of the UK economy. Energy UK believes the responsibility for maintaining the highest safety standards lies primarily with the Health and Safety Executive (HSE). The HSE already has a number of work streams focused on ensuring any transition to hydrogen is done in a safe manner. A recent piece of work concluded that concentrations of hydrogen in methane of up to 20% by volume was unlikely to increase risk from within the gas network or from gas appliances to consumers or members of the public[16].

If the UK does begin to inject hydrogen into the gas network, or to utilise hydrogen as a transport fuel, Energy UK urges government to work with industry on a public engagement strategy to educate consumers on the benefits and safety of hydrogen. 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 hydrogen[8].

[12] E4Tech for CCC – Scenarios for deployment of hydrogen in contributing to meeting carbon budgets and the 2050 target: https://www.theccc.org.uk/wp-content/uploads/2015/11/E4tech-for-CCC-Scenarios-for-deployment-of-hydrogen-in-contributing-to-meeting-carbon-budgets.pdf
[13] HSE Iron Mains Replacement Programme: https://www.hse.gov.uk/gas/supply/mainsreplacement/enforcement-policy-2013-2021.htm
[14] LCP analysis of opportunities for flexible assets: https://insight.lcp.uk.com/acton/attachment/20628/f-cba9a24b-1020-40b4-9404-5f3d6fc42752/1/-/-/-/-/LCP%27s%20analysis%20of%20opportunities%20for%20flexible%20assets.pdf?sid=TV2:xisYd1XX0
[15] Global CCS Institute – CCS Readiness Index: https://co2re.co/ccsreadiness
[16] HSE – RR1047 Injecting hydrogen into the gas network – a literature search: https://www.hse.gov.uk/research/rrhtm/rr1047.htm

6. How might the UK take advantage of further advances in hydrogen technology, such as hydrogen boilers and innovative storage and distribution solutions?

There is a wealth of innovation across the UK hydrogen value chain, with numerous Advanced Conversion Technology (ACT) options emerging, electrolytic production from nuclear being explored, and several storage and transport solutions in development.

ACTs for hydrogen production can lead to efficiency gains that could reduce the cost of gas reformation by £7/MWh[17]. On the transport side, ammonia has the potential to act as a low-cost hydrogen energy carrier. Ammonia is a liquid fuel at temperatures of below -33C or a pressure above 10 atmospheres, and is thus easier and less costly to transport than liquefied hydrogen, due to the higher temperatures and lower pressure required. Early movement on these technologies will allow the UK to establish itself as a world leader and reap the benefits from the associated export opportunities. Energy UK urges government to capitalise on the UK's strength in academia and provide support to research projects to further development in the most innovative hydrogen technologies.

It should also be noted that the UK currently benefits from domestic manufacturing of boilers, many of which are exported to Europe. This segment of industry is already looking to the future and developing and testing a range of hydrogen-ready appliances in the UK as part of the Hy4heat programme[18]. Adapting these supply chains to produce hydrogen-ready appliances will aid in GB decarbonisation, but also be vital to continued UK exports to those European and global nations which transition to hydrogen to address heating decarbonisation.

7. What support does the sector require to keep pace with the most cutting-edge innovations, such as in hydrogen fuel cells, using Small Modular Reactors for hydrogen production, and in end use applications?

In order to progress understanding of and capability across hydrogen innovations, the UK should capitalise on existing innovation focus and develop an attractive business proposition for investors. Utilising all available tools to drive UK demand for hydrogen, including spending, taxation, and regulation, will further ensure that the UK actually applies those technologies domestically.

Energy UK firmly believes that it is too early to attempt to choose between the technologies that will underpin a future UK low-carbon hydrogen industry. There are many routes to low-carbon hydrogen production, most of which have been mentioned earlier in this submission, and we believe that all of these options should be explored and ultimately able to compete in technology neutral markets. Maintaining optionality is key whilst there is still uncertainty around the cost, sustainability and resource potential of different technologies and also creates the opportunity for hydrogen exports to other countries that do not possess the competitive advantages of the UK.

Energy UK sees low-carbon gas playing a key role in future and we believe that hydrogen solutions should be accelerated in sectors with limited decarbonisation alternatives such as industry and heavy transport. In sectors where there are other decarbonisation solutions, such as space heating, further trials are needed to assess the options and consumer acceptability.

In order to assess the validity of different decarbonisation solutions, we urge government to launch a number of pathfinder projects whereby a number of cities in the UK are selected to pursue a range of specific technologies. We also encourage government to align at least one of these projects with the rapid decarbonisation of an entire town or city using a range of technologies. This trial approach would explore how these technologies can be integrated under a single decarbonisation approach and expose as-of-yet undefined costs and benefits.

Volume of deployment should be driven forward using targets across a range of sectors, beginning with industry, but with high levels of ambition across each section. For example, the government could commit the UK to installing hydrogen heating in 1 million homes and electric heating in 1 million homes. This will provide government with statistical and social evidence that can then be used to inform a wider national heat decarbonisation strategy.

[17] CCC – Hydrogen in a low-carbon economy: https://www.theccc.org.uk/publication/hydrogen-in-a-low-carbon-economy/
[18] Hy4Heat: https://www.hy4heat.info/

8. What is the UK industry doing to scale up green and blue hydrogen production by using its offshore wind capability and developing feasible, cost-effective Carbon Capture and Storage technologies?

Through the BEIS Hydrogen Expert Group, UK industry is currently working with government to develop business models to support the rollout of large-scale green and blue hydrogen production. The technologies involved are well understood and there are working examples, however, a route to market is needed to underpin the transition from R&D scale projects to commercial scale. Cost reduction is a function of deployment and therefore, whilst we welcome recent innovation funding provided by government, we believe the development of routes to market should be accelerated now so that the first large-scale low-carbon hydrogen production projects can commission from the mid-2020s. The main cost drivers for some of the different low-carbon hydrogen production methods are outlined below.

The main cost drivers for hydrogen production from electrolysers

Cost Driver (in order of impact)	**How this is reducing with deployment**
Cost of electricity	Renewable energy costs are reducing with their own deployment
Cost of finance	As experience is gained, investors will reduce the risk premium
Cost of electrolysers	Technology improvement, factory production methods, economies of scale
Cost of installation	Learning by doing
Cost of compression	New electrolyser designs that work at pressure (it is much easier to pressurise liquid water than gaseous hydrogen)

The main cost drivers for hydrogen production from methane reformation

Cost Driver (in order of impact)	**How this is reducing with deployment**
Gas price	Long-term gas price depends on many factors and is difficult to forecast
Cost of finance	As experience is gained, investors will reduce the risk premium
Cost of SMR/ATR equipment	Already a proven technology but further technology improvement and improved factory production methods can be unleashed through economies of scale
Cost of installation	Already proven technology but further learnings to be gained from accelerated rollout
Transport & storage fee for CO_2	Subject to CCUS regulatory treatment and established business model

9. Given hydrogen's potential cross-sector application, how coordinated is the Government's approach to policy and regulatory development of hydrogen?

Energy UK welcomes recent funding that government has set aside for hydrogen development, however, we firmly believe that the approach must now change from a focus on R&D to commercial deployment underpinned by a comprehensive national hydrogen strategy. A carefully thought through

strategy, to establish both production and demand side policy, is key for developing hydrogen due to the fact that the technology is applicable to multiple sectors.

Hydrogen deployment in one sector will create opportunities and co-benefits in other sectors and therefore, we believe that systems thinking is required in the development of a hydrogen strategy. Systems engineers will be able to identify these cross-sector opportunities, co-benefits and any impacts and determine the most optimal sequencing sector development and associated government interventions. We recommend that government work with the Energy Systems Catapult as well as industry to incorporate systems thinking into the development of a UK hydrogen strategy.

The multi-sector applicability of hydrogen creates a further challenge in terms of where the responsibility for hydrogen sits within government and how hydrogen development across different government departments is co-ordinated. We recommend that a UK hydrogen strategy includes the introduction of a new ministerial post with responsibility for the co-ordination of hydrogen development across all relevant sectors.

10. How well has the Government raised awareness amongst industry, public officials and the general public of the potential for hydrogen to support a low-carbon economy?

Government efforts to raise public awareness on hydrogen have been limited to date. Recent research found that 52% of respondents claimed to know nothing at all about hydrogen and only 8% felt that the UK Government was doing enough to educate the public on this energy source[19]. One way to improve public awareness of hydrogen is to accelerate the rollout of hydrogen buses and trains. This will increase public familiarity and acceptance of hydrogen and therefore reduce the potential for consumer opposition as hydrogen is rolled out in other sectors.

We recommend that BEIS include hydrogen as one of the technologies in future waves of its Public Attitudes Tracker. This will establish a baseline of public awareness/acceptance and allow government to track trends in response to public engagement campaigns and the increasing prevalence of hydrogen in the day-to-day lives of the public.

11. To what extent has the UK established, or can establish, any early adopter advantage in the use of hydrogen in research, applied science or industrial processes? Which countries are at a similar or more advanced stage than the UK in exploring applications for hydrogen in helping deliver net-zero targets?

Whilst the UK has fallen behind other countries in publishing hydrogen strategies and establishing national ambitions, progress has been made in other sectors that will be key to the large-scale deployment of hydrogen. The UK has seen good progress in the constituent parts of a hydrogen industry, especially in terms of supply, with the world's largest installed capacity of offshore wind generation and CCUS business model development.

The UK has a rich history in research, applied science and industrial processes, and the expertise in these area should be leveraged to design efficient and cost effective hydrogen systems that can be exported. More specifically, reflecting on the goods and services exported today, the UK has a competitive strength in service exports of engineering, procurement and construction management (EPCM) within the oil and gas industry, which could be expanded to hydrogen as well. Furthermore, the UK also has existing research strength in gasification-based routes for hydrogen, fuel cell technology and bioenergy, which may support competitiveness within the hydrogen sector[20]. Germany, United States and China are some of the larger competitors in hydrogen expertise. Germany, for example, has a strong competitive position in electrolysis and the United States in gasification[21].

[19] Siemens – Hydrogen Energy Research Results: https://assets.new.siemens.com/siemens/assets/api/uuid:144b2d19-9d51-4215-8f68-b5578f24f0ad/uk-hydrogen-research.pdf

[20] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/845658/energy-innovation-needs-assessment-hydrogen-fuel-cells.pdf

[21] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/845658/energy-innovation-needs-assessment-hydrogen-fuel-cells.pdf

12. What can the UK hydrogen sector learn from other countries' hydrogen strategies?

A number of countries have already published hydrogen strategies including Australia, Canada, China, Japan, Netherlands, Norway and South Korea. On 10 June, Germany published its hydrogen strategy as it focuses on kick-starting a green hydrogen economy as part of the COIVD-19 economic recovery. The German strategy focuses heavily on hydrogen production via the electrolysis of renewable energy, however, there is a recognition that domestic electrolytic hydrogen will only produce 1/6 of the forecast hydrogen demand at 2030 due to the availability of renewable electricity. A key point in the German hydrogen strategy is the expectation that blue hydrogen will play a role in other European hydrogen markets and can be imported to Germany.

Energy UK believes that the UK is particularly well placed for the production of both green and blue hydrogen given its world-leading offshore wind sector and CCUS potential. This creates a real opportunity for the UK to be a net exporter of hydrogen in future, especially to European neighbours such as Germany where hydrogen production may be constrained by a limited offshore wind resource and limited potential for CO_2 storage.

The key learnings from the hydrogen strategies already published are:

1. The UK has competitive advantages in the hydrogen space. These advantages are mentioned in more detail through this submission, but things such as the existing gas network, offshore engineering expertise, a world-leading offshore wind sector and favourable underground Geology, all combine to create significant production potential and foundations for hydrogen to fuel multiple sectors.
2. The UK is behind in the global race for hydrogen market share. Jobs and factories will go to the countries where hydrogen markets are first established. The current lack of a UK hydrogen strategy places us behind other countries and introduces the risk that the UK misses out on a genuine opportunity to be a world leader and net exporter.