



DEBATE PACK

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UK Hydrogen Economy

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Summary

This briefing has been prepared ahead of the Westminster Hall debate on the UK hydrogen economy scheduled for Thursday 17 December at 3pm. Alexander Stafford MP will lead the debate.

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The House of Commons Library prepares a briefing in hard copy and/or online for most non-legislative debates in the Chamber and Westminster Hall other than half-hour debates. Debate Packs are produced quickly after the announcement of parliamentary business. They are intended to provide a summary or overview of the issue being debated and identify relevant briefings and useful documents, including press and parliamentary material. More detailed briefing can be prepared for Members on request to the Library.

1. Background

The Government has legally binding targets under the *Climate Change Act 2008* to reach 'net zero' greenhouse gas emissions by 2050.

Background information is available from the [Library webpage on Climate Change: an overview](#).

In order to meet the net zero target, the use of fossil fuels (without abatement such as carbon capture, usage and storage (CCUS))¹ across the economy will need to be almost entirely phased out by 2050.^{2,3}

Hydrogen gas is regarded as an energy option to help decarbonisation, especially for sectors that may be more challenging to decarbonise.⁴

These sectors include heating, transport (including heavy goods, shipping, and aviation) and some industrial processes.⁵

1.1 Production and Supply

Hydrogen is a fuel that does not contain carbon and therefore does not produce carbon dioxide (CO₂ – a key greenhouse gas that contributes to climate change) when burned. However, some current methods of producing hydrogen do themselves result in the production of CO₂ although the different methods produce a wide variation in carbon footprints. It is estimated that around 50 million tonnes of hydrogen is produced globally each year for various industrial uses (see section 1.2), of which the UK produces around 0.7 Mt.⁶ The key methods for producing hydrogen are:⁷

- **Steam methane reforming (SMR)** produces hydrogen and CO₂ from methane via high temperature processing. SMR accounts for around half of global hydrogen production. Natural gas is the most cost-effective source of methane, but energy is lost in the process so natural gas demand could increase by between 15% and 66% if hydrogen from SMR were to replace natural gas for heating. If exploited without carbon capture, usage and storage (CCUS)⁸ then this would be more carbon intensive than the direct burning of natural gas, but with CCUS estimates say between 71% and 92% of the carbon emissions can be captured (resulting in what is called "blue" hydrogen)⁹. Further information is

¹ Further information is available in the Library briefing paper on [Carbon Capture Usage and Storage](#), March 2020

² CCC, [Net Zero - The UK's contribution to stopping global warming](#), May 2019

³ National Grid, [Future Energy Scenarios 2020](#)

⁴ Sectors can be harder to decarbonise for many reasons, but a key reason is that the energy these sectors use cannot easily be replaced with electricity (an energy source with many low carbon generation options such as a renewables).

⁵ CCC, [Hydrogen in a low-carbon economy](#), November 2018

⁶ CCC, [Hydrogen in a low-carbon economy](#), November 2018

⁷ Parliamentary Office of Science and Technology (POST), [POSTnote 565: Decarbonising the Gas Network](#), November 2017

⁸ Sometimes referred to as just CCS i.e. without the "utilisation" or "usage" but key parts of the process remain the same.

⁹ The colours used to describe hydrogen vary, but in short blue hydrogen is produced through SMR using CCS, green hydrogen is produced through electrolysis, and grey or brown hydrogen relates to production with different fossil fuels. See for example this article in Power Technology, [What colour is your hydrogen?](#) July 2020

available in the Library briefing paper on [Carbon Capture Usage and Storage](#) (March 2020).

- **Gasification** converts organic material to hydrogen through a multi-step process. Gasification of coal and oil account for roughly 48% of global hydrogen production, although a small number of plants have begun using biomass as a lower carbon alternative. Gasification using biomass has an estimated carbon footprint around half that of natural gas and with CCUS it can have negative carbon emissions.¹⁰
- **Electrolysis** (known as green hydrogen) uses electricity to separate water into oxygen and hydrogen. It is estimated to account for 4% of global production. Electrolysis is currently expensive relative to other methods of producing hydrogen, although cost reductions are anticipated. Electrolysis can be very low carbon, but depends on the carbon footprint of the electricity used to produce it, e.g. using renewable electricity is lower carbon than using electricity produced from fossil fuels.¹¹ This method could have additional benefits for electricity grids by using surplus electricity at times when supply is high (e.g. sunny or windy days) but demand is low. Supply and demand must always be balanced on electricity grids and maintaining this balance is a key challenge for decarbonising electricity.^{12,13}

1.2 Uses of hydrogen

The current UK hydrogen industry is focused on non-energy uses of hydrogen; for example, it is a feedstock in the Haber process to make ammonia, which is used in many fertilisers.¹⁴ However there has been widespread interest in producing hydrogen as an alternative fuel for various sectors, including heating, transport, and industry. These uses were summarised by the International Energy Agency's (IEA- an autonomous intergovernmental organisation) 2019 report on the [Future of Hydrogen](#):

- Hydrogen use today is dominated by **industry**, namely: oil refining, ammonia production, methanol production and steel production. Virtually all of this hydrogen is supplied using fossil fuels, so there is significant potential for emissions reductions from clean hydrogen.
- In **transport**, the competitiveness of hydrogen fuel cell cars depends on fuel cell costs and refuelling stations while for trucks the priority is to reduce the delivered price of hydrogen. Shipping and aviation have limited low-carbon fuel options available and represent an opportunity for hydrogen-based fuels.
- In **buildings**, hydrogen could be blended into existing natural gas networks, with the highest potential in

¹⁰ Negative emissions are due to the fact the biomass absorbed carbon when growing, and then the carbon released when the biomass is converted to hydrogen is captured and stored, resulting in a net removal of carbon from the atmosphere.

¹¹ Sustainable Gas Institute, [A greener gas grid: what are the options?](#), July 2017, section 3.1

¹² Policy Connect, [Next Steps for the Gas Grid: Future Gas Series Pt 1](#), September 2017, p. 34

¹³ For more information, see the Library briefing paper on [Electricity Grids](#).

¹⁴ CCC, [Hydrogen in a low-carbon economy](#), November 2018

multifamily and commercial buildings, particularly in dense cities while longer-term prospects could include the direct use of hydrogen in hydrogen boilers or fuel cells.

- In **power generation**, hydrogen is one of the leading options for storing renewable energy, and hydrogen and ammonia can be used in gas turbines to increase power system flexibility. Ammonia could also be used in coal-fired power plants to reduce emissions.

1.3 Government support

Successive Governments have announced various policies to support the research, development, and commercialisation of hydrogen. A hydrogen strategy is expected in spring 2021 but the Government has already made its support for hydrogen clear. Existing policies are summarised below.

The Ten Point Plan

In November 2020, the Government published [The Ten Point Plan for a Green Industrial Revolution](#) included a commitment to a hydrogen strategy to be published in 2021. The plan's summary on hydrogen states:

Hydrogen is the lightest, simplest and most abundant chemical element in the universe. It could provide a clean source of fuel and heat for our homes, transport and industry. The UK already has world-leading electrolyser companies, and unparalleled carbon capture and storage sites that we can maximise. Working with industry the UK is aiming for 5GW of low carbon hydrogen production capacity by 2030. Hubs where renewable energy, CCUS and hydrogen congregate will put our industrial 'SuperPlaces' at the forefront of technological development. We are also pioneering hydrogen heating trials, starting with a Hydrogen Neighbourhood and scaling up to a potential Hydrogen Town before the end of this decade.¹⁵

The plan includes a timeline of next steps:

2021 - Publish our Hydrogen Strategy and begin consultation on Government's preferred business models for hydrogen

2022 - Finalise hydrogen business models

2023 - Work with industry to complete testing necessary to allow up to 20% blending of hydrogen into the gas distribution grid for all homes on the gas grid

2023 - By 2023 we will support industry to begin hydrogen heating trials in a local neighbourhood

2025 - We hope to see 1 GW of Hydrogen production capacity

2025 - Will support industry to begin a large village hydrogen heating trial, and set out plans for a possible pilot hydrogen town before the end of the decade.¹⁶

¹⁵ Gov.uk, [The ten point plan for a green industrial revolution](#), 18 November 2020

¹⁶ Gov.uk, [The ten point plan for a green industrial revolution](#), 18 November 2020

Reaction to the Ten Point Plan

In response to the Ten Point Plan, Carbon brief, a policy news and analysis site, set out a [summary of media reaction](#) to all the proposals, including a section on hydrogen.¹⁷

Some commentators have said the proposals on hydrogen are “among the most radical,” of the plan’s proposals, and welcomed the possibilities for use in heating and transport.

However, there was disagreement on whether the Government should be more or less ambitious on hydrogen. On the one hand, some criticised the amount of funding when compared with international examples for example the €7bn hydrogen strategy published by the German Government. Conversely, some stakeholders expressed concern that hydrogen was unproven and more established alternatives in some sectors do exist. For example, some argued that commitments, such as heating an entire town with hydrogen by 2030, should await the outcome of smaller trials, and that for homes, the focus should be on energy efficiency and proven heating technologies such as heat pumps.¹⁸

Energy White Paper

In addition to the Ten Point Plan, in December 2020 the Government published an [Energy White Paper](#). This repeated the commitment to publish a hydrogen strategy in early 2021 and reiterated the support for hydrogen set out in the Ten Point Plan with further details. For example in relation to hydrogen appliances such as boilers, the Government said that subject to the results of ongoing work through the Hy4Heat programme (see below - a programme assessing the use of hydrogen gas for heating UK homes and businesses, which began in 2017 and runs until 2021) the Government plan to issue a call for evidence in 2021 to seek views from stakeholders on converting to hydrogen.

The Energy White Paper also included more information on technologies relevant to the production of hydrogen, and therefore important to its increasing use, such as carbon capture, utilisation and storage. The Government has committed £1 billion up to 2025 to facilitate the deployment of CCUS in two industrial clusters by the mid 2020s, and a further two by 2030. Further information on CCUS is available in the Library briefing paper on [Carbon Capture Usage and Storage](#) (March 2020).

Reaction to the Energy White Paper

The Energy White Paper was first promised in November 2018 by the then Secretary of State Greg Clark MP.¹⁹ Stakeholders have in general welcomed the publication as an important step in setting out the path to meet the net zero target. However there are mixed views on specific

¹⁷ Carbon Brief, [Media reaction: Boris Johnson’s ‘10-point’ net-zero plan for climate change](#), November 2020

¹⁸ Professor Jim Watson, Research Director UCL Institute for Sustainable Resources, [letter to The Times](#), 19 November 2020

¹⁹ Gov.uk, [After the trilemma – 4 principles for the power sector](#), 14 November 2018

policies, such as support for new nuclear, and many policy and strategy announcements (including the hydrogen strategy) remain awaited.

A summary of stakeholder views is available in the Business Green (login required) article on [Energy White Paper: The green economy reacts](#).

Previous announcements

Below are links to some of the existing policies the Government has announced to support the development of hydrogen in several sectors:

- BEIS Press release: [£90 million UK drive to reduce carbon emissions](#) , 18 February 2020
A £90 million package announced to tackle emissions from homes and heavy industry – including funding for Europe’s first large scale, low carbon hydrogen plants on the Mersey and near Aberdeen, and a project to develop technology to use offshore wind off the Grimsby coast to power electrolysis and produce hydrogen.
- BEIS announcement: [Hydrogen Supply Competition Phase 2 successful projects](#), updated 18 February 2020. The link above sets out the list of successful projects. BEIS announced the [Hydrogen Supply Competition](#) in May 2018 and [Phase 2](#) in September 2018. The Hydrogen Supply programme aimed to accelerate the development of low carbon bulk hydrogen supply solutions in various sectors.
- BEIS also ran the [Industrial Fuel Switching competition](#). The 3 phase Industrial Fuel Switching competition allocated funding to stimulate early investment in fuel switching processes and technologies.
[Industrial Fuel Switching competition phase 3: successful projects](#), updated 18 February 2020, includes projects which investigate the use of hydrogen as a clean alternative fuel in various production processes.
- BEIS Research and analysis: [Hydrogen supply chain: evidence base](#), 30 November 2018
An assessment of evidence relating to the range of infrastructure that would be required for a future delivery chain for hydrogen for heat. It considers various aspects of a potential hydrogen system for heat and industrial applications: production; transmission; distribution; end use; storage; carbon capture usage and storage (CCUS).
- The Secretary of State for BEIS made a written statement on [Clean Steel Fund and Low Carbon Hydrogen Production Fund](#) on 3 September 2019. The announcement included a £100 million competition to enable greater supply of low carbon hydrogen for use across the economy to help businesses decarbonise.
- DfT announcement 10 September 2019: [Government backs cutting-edge tech to drive down shipping emissions](#). Projects include a project in Orkney exploring how to directly inject

hydrogen into the fuel supply of ferries, reducing CO2 emissions.

- BEIS also announced the [Hydrogen for heating project](#) (also known as Hy4Heat) on 1 October 2017 to run until 2021. This project explores the potential use of hydrogen gas for heating UK homes and businesses. It aims to define a hydrogen quality standard, and to explore, develop and test domestic and commercial hydrogen appliances. BEIS has invested £25 million funding in the project.

1.4 What do others say about hydrogen?

Hydrogen is widely seen as having significant potential to help decarbonisation, particularly in hard to treat sectors. Supporters of hydrogen argue the Government should set out a clear strategy and funding to allow the development of hydrogen production and to pilot its use across various sectors.

Conversely, some stakeholders have expressed concern that hydrogen is unproven and more established alternatives in some sectors, such as energy efficiency and heat pumps in homes, should be the focus.

The Climate Change Committee

The Climate Change Committee (CCC - who advise the Government on decarbonisation) published in November 2018 a report titled [Hydrogen in a low-carbon economy](#). This found that hydrogen:

- is a credible option to help decarbonise the UK energy system but its role depends on early Government commitment and improved support to develop the UK's industrial capability
- can make an important contribution to long-term decarbonisation if combined with greater energy efficiency, cheap low-carbon power generation, electrified transport and new 'hybrid' heat pump systems, which have been successfully trialled in the UK
- could replace natural gas in parts of the energy system, where electrification is not feasible or is prohibitively expensive, for example in providing heat on colder winter days, industrial heat processes and back-up power generation
- is not a 'silver bullet' solution; the report explores some commonly-held misconceptions, highlighting the need for careful planning²⁰

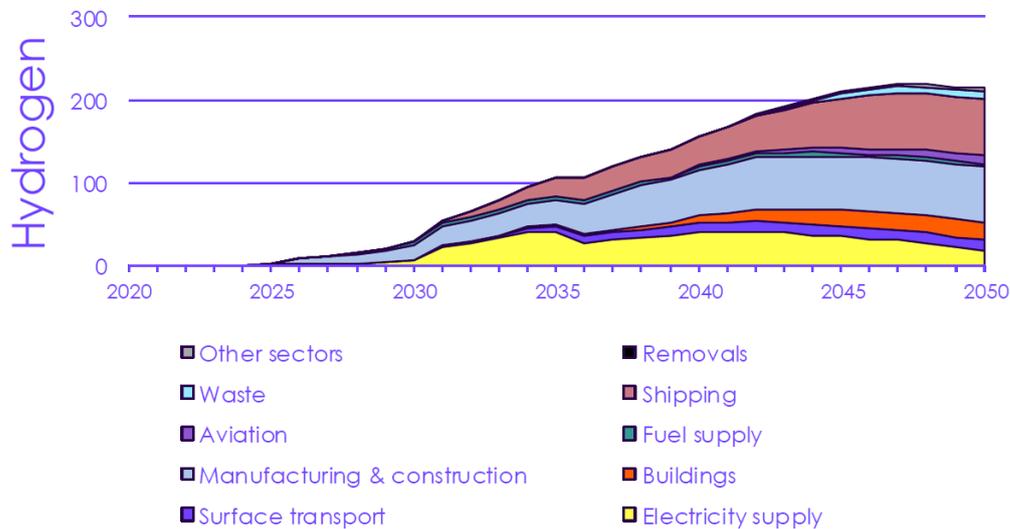
The Committee's recent [Sixth Carbon Budget report](#) set out a 'balanced pathway' for reaching net zero by 2050. On hydrogen this projected:

From the 2030s onwards a hydrogen economy develops from virtually zero use in the energy system today, to a scale that is comparable to existing electricity use by 2050.²¹

²⁰ CCC, [Hydrogen in a low-carbon economy](#), November 2018

²¹ CCC, [Sixth Carbon Budget](#), 9 December 2020

The possible growth of hydrogen and its uses under this scenario is summarised in the following chart, reproduced from the CCC report²² showing energy demand in TWh from now until 2050:



The Committee recommended the Government’s Hydrogen Strategy [expected in spring 2021] should “set out a vision for hydrogen’s role in meeting Net Zero in the longer term, together with the actions, regulations and incentives across end-use applications and hydrogen supply to develop hydrogen’s role over the next decade.”²³

International Energy Agency

The International Energy Agency (IEA- an autonomous intergovernmental organisation) published a report on [The Future of Hydrogen](#) in 2019 at the request of Japan under its presidency of the G20. The report concluded “now is the time to scale up technologies and bring down costs to allow hydrogen to become widely used.”²⁴

In addition to setting out a series of challenges for hydrogen (such as cost of production, limited infrastructure, the use of fossil fuels to produce hydrogen, and limiting regulations), and opportunities to boost hydrogen (such as use industrial ports, build on existing infrastructure such as for natural gas, expand hydrogen in transport, and launch hydrogen shipping routes) the report made the following seven recommendations:²⁵

1. **Establish a role for hydrogen in long-term energy strategies.** National, regional and city governments can guide future expectations. Companies should also have clear long-term goals. Key sectors include refining, chemicals, iron and steel, freight and long-distance transport, buildings, and power generation and storage.

²² CCC, [Sixth Carbon Budget](#), 9 December 2020

²³ CCC, [Sixth Carbon Budget](#), 9 December 2020

²⁴ IEA, [The Future of Hydrogen](#), 2019

²⁵ Recommendations are aimed at energy systems around the world and are not UK specific.

2. **Stimulate commercial demand for clean hydrogen.** Clean hydrogen technologies are available but costs remain challenging. Policies that create sustainable markets for clean hydrogen, especially to reduce emissions from fossil fuel-based hydrogen, are needed to underpin investments by suppliers, distributors and users. By scaling up supply chains, these investments can drive cost reductions, whether from low-carbon electricity or fossil fuels with carbon capture, utilisation and storage.
3. **Address investment risks of first-movers.** New applications for hydrogen, as well as clean hydrogen supply and infrastructure projects, stand at the riskiest point of the deployment curve. Targeted and time-limited loans, guarantees and other tools can help the private sector to invest, learn and share risks and rewards.
4. **Support R&D to bring down costs.** Alongside cost reductions from economies of scale, R&D is crucial to lower costs and improve performance, including for fuel cells, hydrogen-based fuels and electrolyzers (the technology that produces hydrogen from water). Government actions, including use of public funds, are critical in setting the research agenda, taking risks and attracting private capital for innovation.
5. **Eliminate unnecessary regulatory barriers and harmonise standards.** Project developers face hurdles where regulations and permit requirements are unclear, unfit for new purposes, or inconsistent across sectors and countries. Sharing knowledge and harmonising standards is key, including for equipment, safety and certifying emissions from different sources. Hydrogen's complex supply chains mean governments, companies, communities and civil society need to consult regularly.
6. **Engage internationally and track progress.** Enhanced international co-operation is needed across the board but especially on standards, sharing of good practices and cross-border infrastructure. Hydrogen production and use need to be monitored and reported on a regular basis to keep track of progress towards long-term goals.
7. **Focus on four key opportunities to further increase momentum over the next decade.** By building on current policies, infrastructure and skills, these mutually supportive opportunities can help to scale up infrastructure development, enhance investor confidence and lower costs:
 - Make the most of existing industrial ports to turn them into hubs for lower-cost, lower-carbon hydrogen.
 - Use existing gas infrastructure to spur new clean hydrogen supplies.
 - Support transport fleets, freight and corridors to make fuel-cell vehicles more competitive.
 - Establish the first shipping routes to kick-start the international hydrogen trade.

2. Press articles

Please note: the Library is not responsible for either the views or accuracy of external content.

Energy Voice, 10 December 2020

[Balancing demand and supply on the road to Scotland's hydrogen future](#) – Opinion

North Wales Chronicle, 3 December 2020

[£100k boost to develop Holyhead hydrogen hub](#)

Carbon Brief, 30 November 2020

[In-depth Q&A: Does the world need hydrogen to solve climate change?](#)

BBC Future Planet, 13 November 2020

[The new fuel to come from Saudi Arabia](#)

The Herald Scotland, 3 November 2020

[Clean energy revolution of the North Sea is worth 40,000 more jobs and £20bn to the economy in 30 years](#)

New Scientist, 12 October 2020

[Microwaving plastic waste can generate clean hydrogen](#)

Aberdeen Evening Express, 28 September 2020

[Aberdeen chosen as home for the 'world's first' offshore floating facility to produce green hydrogen](#)

The Guardian, 16 September 2020

[Scottish green hydrogen scheme gears up to fuel ferries, buses and trains; Wind and solar farms will produce the gas alongside Scottish Power, ITM Power and BOC](#)

Guardian, 14 Sep 2020

[UK must become global leader in tackling climate crisis, says CBI](#)

Investors Chronicle, 27 August 2020

[The fuel of the future](#)

Belfast Telegraph, 24 August 2020

[Call for major investment in hydrogen hub to help sector thrive in Northern Ireland](#)

Energy Voice, 4 August 2020

[Making households net-zero should be the priority, not hydrogen](#)

The Northern Echo, 8 July 2020

[Redcar MP: Government must move quickly on hydrogen or risk being left behind](#)

Economist, 4 July 2020

[After many false starts, hydrogen power might now bear fruit](#)

Greentech Media, 25 June 2020

[UK Government's Advisers Urge It to Back Hydrogen Economy in Stimulus Plans](#)

Energy Voice, June 23, 2020

[Has the hydrogen economy been thought through?](#)

Utility Week, 9 June 2020

[Now is the time for action on building Britain's hydrogen economy](#)

Herald Scotland, 15 May 2020

[Anger as hydrogen buses plan backers challenge Grant Shapps](#)

Greentech Media, 14 October 2019

[10 Countries Moving Toward a Green Hydrogen Economy](#)

It's early days for renewable hydrogen, but the potential is enormous, and several nations have an eye on the driver's seat.

The Royal Society, 12 June 2017

[Clean energy and the hydrogen economy](#)

3. Press releases

APPG on Hydrogen

[APPG on Hydrogen Report Launch - Government must move quickly on hydrogen or risk being left behind](#)

The APPG on Hydrogen's [latest report](#) urges the Government to move quickly on hydrogen and set ambitious policies to unlock investment, create employment opportunities and support the UK's net-zero targets.

The APPG on Hydrogen's report, developed as part of its inquiry into 'How the UK's hydrogen sector can help support the UK's economic recovery', sets out 15 recommendations to support and accelerate the growth of the UK's hydrogen sector.

These include:

- 1 Developing a cross-departmental hydrogen strategy between Government and industry
- 2 Using regulatory levers to unlock private sector investment required, including amending the GSMR and expanding the remit of the Bus Service Operator Grant
- 3 Setting interim targets for low-carbon hydrogen production by 2030 alongside the introduction of a Low Carbon Obligation to enable investment in low carbon forms of heating such as hydrogen
- 4 Mandating hydrogen-ready boilers by 2025
- 5 Creating greater incentives in hydrogen alternatives to support organisations and customers who produce, purchase or use hydrogen HGVs, buses and trains
- 6 Working with local and regional authorities exploring hydrogen's potential to support the uptake and commercialisation of existing projects
- 7 Setting more ambitious policies and financial targets on hydrogen to meet net-zero by 2050 ahead of other international competitors
- 8 Ensuring the UK hydrogen industry plays a major role at COP26, allowing the UK to inspire other nations and sell its products and services
- 9 Delivering funding models to create investment and economic jobs directly to the UK
- 10 Implementing measures similar to Offshore Wind, such as Contracts for Difference to incentivise industry and scale-up a hydrogen economy.



**Chair of the APPG on Hydrogen,
Jacob Young MP said:**

"The benefits of delivering a hydrogen economy are clear. From reducing carbon emissions, improving air quality to developing the UK's green economy through the creation of skilled green jobs and strengthening our energy security, hydrogen can play a key role in shaping our future economy and our ability to meet our net-zero targets.

"The UK is a global leader in hydrogen technology and innovation, but with many countries now pressing ahead with national hydrogen strategies, the UK must act quickly or risk falling behind.

"From my own constituency in Redcar, to Aberdeen, Ballymena and Fife, many businesses are ready to invest in a hydrogen economy, decarbonising industry, power, heat and transport. With the potential to create and sustain hundreds of thousands of high-quality jobs across the country, with the right policies, regulation and support from Government, we have the opportunity to build a hydrogen sector for the future."



All Party Parliamentary Group on
Hydrogen

ABOUT THE INQUIRY

Launched in May this year, the inquiry heard from industry leaders, including across the energy, transport and manufacturing sectors as they outlined the short term and long term steps required to grow the UK's hydrogen sector and enable the transition from innovation and commercialisation.

The APPG received almost 100 responses to its call for evidence and held three oral evidence sessions focusing on industry, local, regional and Government priorities. The Group listened to organisations contributing to a greener future on what steps need to be taken to ensure that hydrogen can play a more prominent role in this.

Renewable UK

[Government urged to set cost reduction target for renewable hydrogen to provide cheap energy](#)

23 September 2020

A report published today by RenewableUK urges the Government to help energy consumers by supporting the rapid development of green hydrogen, generated using renewable electricity, as a cheap energy source for the future.

The study, "*Renewable Hydrogen - Seizing the UK Opportunity*" says the renewables sector is confident that it can repeat the success of our world-leading offshore wind industry by driving down the cost of green hydrogen over the course of this decade.

This technology can also play a key role in the UK's long-term green economic recovery, creating significant new economic opportunities for the UK, particularly in coastal communities and industrial cities which need levelling-up most.

To ensure we build the UK's R&D and manufacturing strength in green hydrogen, RenewableUK is calling for the Government to publish a hydrogen strategy, including a roadmap to 2050, setting out how renewable hydrogen will grow from a niche technology to the central pillar of the UK's energy system. This should include a plan to deliver the first gigawatt of electrolyser capacity in the UK, identifying potential projects and funding to drive innovation and investment.

RenewableUK also recommends setting a target of 5GW of renewable electrolyser capacity by 2030 and 10GW by 2035, along with a cost reduction target of £2 per kilogram of green hydrogen by 2030, down from £8/kg today. This would mean that by 2030, green hydrogen would be cost-competitive, or could even cost less to produce than blue hydrogen which is made from fossil fuel (methane) with carbon capture and storage (CCS). Clean hydrogen would also help us to reach net zero faster, as current CCS technology fails to capture up to a fifth of all carbon emissions.

The report highlights the fact that the UK already has a head start in the global race to commercialise green hydrogen, with major trials underway such as the Gigastack project in the Humber. This is set to use renewable energy from offshore wind farms to make clean hydrogen by a process known as electrolysis - splitting water into hydrogen and oxygen. World-leading manufacturers of electrolysers such as ITM Power and Siemens are already based in the UK.

To track this progress, RenewableUK's Project Intelligence database is now monitoring green hydrogen projects around the UK at all stages of their development, including those already operating, for example powering ferries in Orkney and buses in Aberdeen. Our database shows a pipeline of 27 renewable hydrogen projects which are operational, under construction, consented or in planning, with a capacity of 33MW.

The global market for renewable hydrogen is expected to be worth \$2.5 trillion by 2050, so the UK has a major export opportunity in the decades ahead. A joint report by the Offshore Renewable Energy Catapult and the Offshore Wind Industry Council published this month shows that up to 120,000 jobs could be created across offshore wind generation, the manufacturing of electrolysers and logistics.

Renewable hydrogen can be used as a zero-carbon gas to heat homes and factories, as well as powering freight transport on land and sea. Renewable hydrogen also offers flexibility to the UK's energy system as it can be made using electricity from wind farms and other clean energy

sources when there is plentiful generation and then stored for when it is needed.

RenewableUK's Director of Future Electricity Systems Barnaby Wharton said: "Renewable hydrogen is the next big global industry in the decades ahead. The UK is well placed to lead this new industry, with plentiful renewable resources and world leading hydrogen companies. We can drive down costs fast, replicating our spectacular success in offshore wind cost reduction, offering consumers cheaper energy. We can't let this opportunity slip through our fingers if the UK wants to stay at the cutting edge of innovation in renewable energy, with all the economic benefits that will bring. We're urging Government to come on board with us by setting out a strategy to secure a multi-billion-pound prize which will create tens of thousands of jobs around the country, especially in areas which need levelling up, as a key part of the UK's green economic recovery".

An industry webinar briefing on renewable hydrogen will take place on **Friday 2nd October** (11.00am-12.15pm). The Offshore Wind Industry Council (OWIC), Offshore Renewable Energy (ORE) Catapult and RenewableUK will provide an update on critical work coming out of the Offshore Wind Sector Deal towards delivering green hydrogen from offshore wind, including an in-depth analysis of the OWIC/ORE Catapult report "[Offshore Wind and Hydrogen: Solving the Integration Challenge](#)", RenewableUK's report "[Renewable Hydrogen - Seizing the UK Opportunity](#)", and next steps to delivering this huge opportunity and vital step towards meeting the UK's net zero emissions commitments.

Energy UK

[Energy UK responds to the Prime Minister's announcement on investment in hydrogen and CCUS](#)

22 July 2020

Responding to the [Prime Minister's announcement](#), Energy UK's chief executive, Emma Pinchbeck said:

"The Committee on Climate Change advises that the UK needs hydrogen and CCUS to achieve Net Zero, particularly for sectors that are difficult to decarbonise like heavy industry, so the Government's announcement today is welcome.

"Our [recent report](#) on the Green Recovery, highlighted the role of hydrogen and CCUS and found that Government investment would create jobs across the UK and give us a global "early mover" advantage on these low carbon technologies.

"Hydrogen and CCUS are a part of the bigger Green Recovery. If Government invests in low carbon energy technologies and businesses, we are confident that it will massively benefit the economy, environment and society."

4. Parliamentary material

4.1 Statement

[Clean Steel Fund and Low Carbon Hydrogen Production Fund](#)

Moving to net zero greenhouse gas emissions for the UK economy requires transformation across all sectors of the economy and unprecedented levels of investment in green and low carbon technologies. The UK is a world leader in clean growth and in setting our ambitious, legally binding, target of achieving net zero emissions across the economy by 2050 we have demonstrated our commitment to maintain this position.

A vibrant steel sector is of vital importance to the UK economy. The sector employs 32,000 people and supports up to a further 40,000 jobs through its supply chains. With longstanding expertise in steel making, the UK is well positioned to demonstrate international leadership in clean steel and realise domestic growth and export opportunities in associated products and technical knowledge.

Today, the UK steel sector is a significant source of emissions contributing 15% to industrial greenhouse gas emissions. The integrated steel works at the British Steel site in Scunthorpe and the Tata Steel UK site Port Talbot are the two largest industrial sources of emissions in the UK.

We believe the time is right to provide dedicated support to our steel industry, to help put it on a pathway to decarbonisation in line with our net zero commitments. As a signal of that support, on 29th August, Government announced a £250 million Clean Steel Fund.

There are a range of different decarbonisation options for steel production: switching to lower carbon fuels, including hydrogen; industrial carbon capture; and energy and material efficiency. In order to better understand the needs of the steel sector and which pathways best meet our objectives we issued a call for evidence alongside the fund's announcement to inform its future design. We will work with the steel sector and other stakeholders to develop timelines for the fund and to identify how to maximise the economic and environmental benefits of these decarbonisation options.

Recognising that availability of low carbon hydrogen at scale is a constraint to large industrial users considering fuel switching, Government has also announced a new £100 million Low Carbon Hydrogen Production Fund. The fund will support the deployment of low carbon hydrogen production capacity and encourage private sector investment. This could enable a pathway to lower carbon steel production and support broader efforts to reduce emissions across the energy system, including transport, other industry, power and potentially heat in buildings. The Government intends to consult on the shape of the Fund during 2020 with a view to launching the Fund for bids in 2021.

Together these funds will be a vital part of transforming UK industry and allow us to seize the opportunities of clean growth, which are at the heart of our modern Industrial Strategy.

03 Sep 2019 | Written statements | House of Commons | HCWS1807

Member: Andrea Leadsom

Department: Department for Business, Energy and Industrial Strategy

4.2 Debate

[Hydrogen Transport](#)

26 Nov 2020 | Adjournment debates | House of Commons | 684 cc1087-1096

Lead member: Stafford, Alexander | **Answering member:** Maclean, Rachel

4.3 Parliamentary Questions

[Hydrogen Energy](#)

Dr James Davies (Vale of Clwyd) (Con)

What steps his Department is taking to support the development of hydrogen energy. (910294)

Duncan Baker (North Norfolk) (Con)

What steps his Department is taking to support the development of hydrogen energy. (910309)

The Secretary of State for Business, Energy and Industrial Strategy (Alok Sharma)

Both the Prime Minister's 10-point plan and our energy White Paper, which we published yesterday, set out our bold ambition for the UK to be a world leader in low-carbon hydrogen. As set out in the White Paper, we are determined to make tangible progress in this important sector, including by investing £240 million through the net zero hydrogen fund and supporting industry to begin a hydrogen heating trial in an entire neighbourhood by 2023. We will publish a comprehensive hydrogen strategy early next year.

Dr James Davies

The development of hydrogen energy can lead to thousands of new jobs UK-wide, including an estimated 6,000 in my region through the HyNet project. Will my right hon. Friend do all he can to help HyNet access industrial decarbonisation challenge funding to allow it to progress?

Alok Sharma

My hon. Friend is absolutely right: this is all about jobs—high value-added jobs. He, along with other colleagues in the House, makes the case at every opportunity for the HyNet project, and it is very lucky to have him as a champion. As he will know, HyNet has already received

funding through phase 1 of the industrial decarbonisation challenge, as well as £13 million of support through the Department for Business, Energy and Industrial Strategy energy innovation programme. We will announce the winners of the next phase of the industrial decarbonisation challenge in spring next year.

Duncan Baker

Bacton gas terminal in my constituency harbours a significant percentage of the natural gas intake into the UK. What assessment has my right hon. Friend made of the potential opportunities presented for the manufacture of blue hydrogen at Bacton, creating low-carbon jobs for the east of England?

Alok Sharma

My hon. Friend again raises the issue of jobs. Of course, creating these low-carbon jobs across the country is a priority for the Government. As I have set out, in our 10-point plan and the energy White Paper we have put forward policies for the creation of a significant number of jobs. The Oil and Gas Authority is currently conducting an in-depth feasibility study into blue hydrogen at the Bacton gas terminal. I very much welcome that work, and my officials and, indeed, Ministers would be very happy to engage further with my hon. Friend on this matter.

Dr Alan Whitehead (Southampton, Test) (Lab)

I am pleased to see that the net zero hydrogen fund that the Secretary of State just mentioned will support, among other things, the production of hydrogen. Will he commit today to using that fund to prioritise the production of green hydrogen, as opposed to blue hydrogen, in the future?

Alok Sharma

We will have to look at what bids come in in respect of how that funding is used, but I say again—I made this point yesterday at the Dispatch Box—that it is not just public money; we are also talking about private sector money coming alongside it. The hon. Gentleman will know that Hydrogen Strategy Now, a campaign group of more than 50 companies, has said that it is ready to invest £3 billion in hydrogen projects, and that was after the publication of the 10-point plan.

15 Dec 2020 | Oral questions - Lead | Answered | House of Commons | 910294 | 686 cc121-2

[Hydrogen: Garages and Petrol Stations](#)

Asked by: Stafford, Alexander | **Party:** Conservative Party

To ask the Secretary of State for Business, Energy and Industrial Strategy, what steps he is taking to support the installation of hydrogen refuelling points on garage forecourts in the UK.

Answering member: Kwasi Kwarteng | **Party:** Conservative Party | **Department:** Department for Business, Energy and Industrial Strategy

The Government's £23m Hydrogen for Transport Programme is increasing the uptake of fuel cell electric vehicles (FCEVs) and growing

the number of publicly accessible hydrogen refuelling stations. The programme is delivering new refuelling stations, upgrading some existing stations as well as deploying hundreds of new hydrogen vehicles. Government has also been supporting public and private sector fleets to become early adopters through the £2m FCEV Fleet Support Scheme.

15 Dec 2020 | Written questions | Answered | House of Commons | 126184

[Hydrogen Projects](#)

Jacob Young (Redcar) (Con)

What steps his Department is taking to support hydrogen projects in Scotland.

The Parliamentary Under-Secretary of State for Scotland

(David Duguid)

As confirmed in the Prime Minister's 10-point plan for a green industrial revolution, the Government are committed to the development of hydrogen as a decarbonised energy carrier for the UK. We are developing our strategic approach to hydrogen and its potential to deliver against our net zero goals, and we will set out our plans shortly.

Jacob Young

SGN has just secured vital funding from Ofgem to progress its landmark trial of green hydrogen in a new domestic gas network. I congratulate everyone at SGN and those working on the project in Fife on achieving that. Does the Minister agree that innovations such as that trial and the H21 project in Teesside, which is led by Northern Gas Networks, prove that the UK is leading the world in the hydrogen economy?

David Duguid

I certainly agree with my hon. Friend, and I congratulate him and the all-party parliamentary group on hydrogen, which he chairs, on their work advancing the hydrogen agenda. I also congratulate SGN on achieving up to £18 million from Ofgem's network innovation competition to support development of a hydrogen demonstration network in Levenmouth, bringing carbon-free energy to around 300 homes from late 2022.

09 Dec 2020 | Oral questions - Lead | Answered | House of Commons | House of Commons chamber | 909872 | 685 cc829-830

[Hydrogen](#)

Asked by: Cunningham, Alex | **Party:** Labour Party

To ask the Secretary of State for Business, Energy and Industrial Strategy, with reference to the Policy paper entitled The ten point plan for a green industrial revolution, updated on 18 November 2020, whether he has made an assessment of the effect of the gas transmission network costs on hydrogen production and transmission capacity.

Answering member: Kwasi Kwarteng | **Party:** Conservative Party |
Department: Department for Business, Energy and Industrial Strategy

Hydrogen could provide a clean source of fuel and heat for our homes, transport and industry and, working with industry, we are aiming for the UK to have 5GW of low carbon hydrogen production capacity by 2030. To support this, work is on-going to consider options for policy support for hydrogen production as well as blending of hydrogen into the gas transmission grid. This is alongside additional work on the long-term future of the gas grid and potential conversion to hydrogen.

08 Dec 2020 | Written questions | Answered | House of Commons | 124748

[Hydrogen: Fife](#)

Asked by: Brown, Alan | **Party:** Scottish National Party

To ask the Secretary of State for Business, Energy and Industrial Strategy, with reference to his Department's Ten Point Plan for a Green Industrial Revolution, published November 2020, how much money from the Net Zero Hydrogen Fund has been allocated to the H100 hydrogen trial to be undertaken in Levenmouth, Fife by Scottish Gas Networks.

Answering member: Kwasi Kwarteng | **Party:** Conservative Party |
Department: Department for Business, Energy and Industrial Strategy

Scottish Gas Networks has proposed the H100 project, a 100% hydrogen network demonstration in the Levenmouth area of Fife, intended to provide the gas to 300 homes over a four-year period. At the end of November Ofgem announced funding of up to £18m to Scottish Gas Networks for the H100 Fife project. Ofgem's decision triggers a further investment of £6.9m from the Scottish Government.

The Net Zero Hydrogen Fund is for capital co-investment in new low carbon hydrogen production. Government will be engaging with industry over the coming months on design of the Net Zero Hydrogen fund, and more details on delivery of the scheme will be published in 2021.

07 Dec 2020 | Written questions | Answered | House of Commons | 124247

[Motor Vehicles: Hydrogen](#)

Asked by: Paisley, Ian | **Party:** Democratic Unionist Party

To ask the Secretary of State for Transport, what steps his Department is taking to promote the use of hydrogen in transport.

Answering member: Rachel Maclean | **Party:** Conservative Party |
Department: Department for Transport

The Prime Minister's Ten Point Plan for a green industrial revolution included ambitious new policies and investment in hydrogen transport projects including:

- £20 million to support the development of cost-effective, zero emission heavy goods vehicles in the UK

- £20 million to help develop clean maritime technology
- £3 million in the recently announced Tees Valley Hydrogen Transport Hub

We will build on those announcements and set out the role for hydrogen in our forthcoming Transport Decarbonisation Plan, which will set out how we intend to reduce emissions and deliver transport's contribution to net zero by 2050.

04 Dec 2020 | Written questions | Answered | House of Commons | 120869

[Hydrogen Fuel in Transport](#)

Sir Roger Gale (North Thanet) (Con)

What steps his Department is taking to promote the use of hydrogen fuel in transport. (909728)

The Parliamentary Under-Secretary of State for Transport

(Rachel Maclean)

The Prime Minister's 10-point plan included ambitious new policies and investment in hydrogen, including in transport projects. This includes £20 million for freight trials to pioneer hydrogen and other zero-emission lorries, and £3 million for the groundbreaking and unique Tees Valley hydrogen transport hub.

Sir Roger Gale

The nation's bus fleet, coaches and double-decker buses are mostly operating on Euro 4 and Euro 5 standards before converting to Euro 6, but Euro 6 is still diesel. Will my hon. Friend look at ways, perhaps working with the Treasury, to achieve an economy of scale that allows us to cut out Euro 6 and move directly from diesel buses to hydrogen-powered buses?

Rachel Maclean

When we leave the transition period, EU vehicle emissions regulators will become part of our retained law in the UK and that does mean that only new vehicles meeting the latest standards can be placed on the market for cars, vans, buses and trucks. This is the Euro 6 standard, but I can reassure my right hon. Friend that this Government are committed to hydrogen production. The Prime Minister set out that we are going to be producing 5 gigawatts of low-carbon hydrogen by 2030, creating 8,000 jobs, and I very much hope some of them will be in Thanet.

03 Dec 2020 | Oral questions - Lead | Answered | House of Commons | House of Commons chamber | 909728 | 685 cc428-9

[Electricity and Hydrogen: Environment Protection](#)

Asked by: Longhi, Marco | **Party:** Conservative Party

To ask the Secretary of State for Business, Energy and Industrial Strategy, what comparative assessment his Department has made of the (a) medium and (b) long term environmental effects of (i) hydrogen and

(ii) electricity as energies across their sourcing dispensing and consumption cycles.

Answering member: Kwasi Kwarteng | **Party:** Conservative Party |
Department: Department for Business, Energy and Industrial Strategy

BEIS has undertaken a number of studies looking at the environmental performance of hydrogen and electricity in a number of scenarios. The comparative environmental advantages of each depend on how they are produced ('green', 'blue' or 'grey' hydrogen and renewable or fossil fuel electricity generation) and the end use for the energy vector (for example in transport or heating applications). The studies do not differentiate between medium and long-term environmental effects.

02 Dec 2020 | Written questions | Answered | House of Commons | 120155

[Business: Electricity and Hydrogen](#)

Asked by: Longhi, Marco | **Party:** Conservative Party

To ask the Secretary of State for Business, Energy and Industrial Strategy, what assessment his Department has made of the potential merits for businesses of using (a) hydrogen and (b) electricity as a fuel source.

Answering member: Kwasi Kwarteng | **Party:** Conservative Party |
Department: Department for Business, Energy and Industrial Strategy

There are a range of fuels and technologies that could play an important role in decarbonising energy use for business and industry including hydrogen, electrification, heat networks and biogas. Our understanding of the respective roles of hydrogen and electricity continues to develop informed by internal and external analysis, innovation and demonstrator projects.

We already have a number of policies and programmes that support business and industry to decarbonise, including Climate Change Agreements, energy audits under the Energy Saving Opportunities Scheme (ESOS), the Industrial Energy Transformation Fund and the Industrial Heat Recovery Support Programme, as well as our wide-reaching Energy Innovation Programme. For example, the £20m Industrial Fuel Switching competition aims to stimulate early investment in fuel switching processes and technologies, such as biomass, hydrogen and electricity, as part of our innovation programme to support the decarbonisation of heavy industry.

02 Dec 2020 | Written questions | Answered | House of Commons | 120154

[Electric Vehicles: Hydrogen](#)

Asked by: Longhi, Marco | **Party:** Conservative Party

To ask the Secretary of State for Transport, whether his Department has made a comparative assessment of the (a) costs and (b) benefits of (i) hydrogen and (ii) electricity as energy sources to power motor vehicles.

Answering member: Rachel Maclean | **Party:** Conservative Party |
Department: Department for Transport

In 2018, the Department for Transport published the outputs of the Transport Energy Model. The model provides a clear assessment of the relative environmental impacts of a range of fuel and powertrain options for cars, vans, buses and heavy goods vehicles over the period to 2050, including battery electric and hydrogen fuel cell vehicles. The Department is further assessing the potential role of hydrogen and electricity in vehicles and this will be published in the Transport Decarbonisation Plan by Spring 2021.

02 Dec 2020 | Written questions | Answered | House of Commons | 120153

[Motor Vehicles: Hydrogen](#)

Asked by: Longhi, Marco | **Party:** Conservative Party

To ask the Secretary of State for Transport, what assessment his Department has made of the viability of existing retail fuel stations (a) to include hydrogen as a fuel dispensed and (b) for hydrogen to replace petrol and diesel as the stored and dispensed fuel.

Answering member: Rachel Maclean | **Party:** Conservative Party |
Department: Department for Transport

The Government is supporting development of the infrastructure for hydrogen fuel cell electric vehicles (FCEVs), recognising that the market is at an early stage. The Government's £23m Hydrogen for Transport Programme is increasing the uptake of FCEVs and growing the number of publicly accessible hydrogen refuelling stations. The programme is delivering new refuelling stations, upgrading some existing stations as well as deploying hundreds of new hydrogen vehicles. Government is supporting public and private sector fleets to become early adopters through the £2m FCEV Fleet Support Scheme.

02 Dec 2020 | Written questions | Answered | House of Commons | 120152

[Motor Vehicles: Hydrogen](#)

Asked by: Longhi, Marco | **Party:** Conservative Party

To ask the Secretary of State for Transport, what assessment his Department has made of the potential merits of hydrogen as a fuel to replace petrol and diesel in (a) motor cars and (b) heavy goods vehicles.

Answering member: Rachel Maclean | **Party:** Conservative Party |
Department: Department for Transport

The transition to zero emission vehicles will help to meet greenhouse gas reduction goals, contribute to reducing poor air quality and contribute to economic growth in the UK by providing skilled jobs in the automotive sector. Our approach to delivering our long-term ambitions for greener transport is technology neutral and we are supporting hydrogen where the market favours its use. The Department's Transport Energy Model provides a clear assessment of the relative environmental

impacts, including on greenhouse gas emissions and air quality, of a range of fuel and powertrain options for cars, vans, buses and heavy goods vehicles over the period to 2050, including hydrogen fuel cell.

02 Dec 2020 | Written questions | Answered | House of Commons | 120151

[Hydrogen Technology: Fiscal Support](#)

Asked by: Michael Fabricant (Lichfield) (Con) | **Party:** Conservative Party

What fiscal steps he is taking to support investment in (a) hydrogen fuel cell usage in the automotive industry and (b) the UK's hydrogen economy; and if he will make a statement.

Answered by: The Exchequer Secretary to the Treasury (Kemi Badenoch) | **Party:** Conservative Party | **Department:** Treasury

The Government are supporting the development of the early fuel cell electric vehicle market through the £23 million hydrogen for transport programme. The spending review confirmed an automotive transformation fund to help industry transition to low-carbon vehicles. At the spending review, the Chancellor also announced £240 million over the next four years to support the aim of 5 GW of low-carbon hydrogen by 2030.

01 Dec 2020 | Oral questions - Lead | Answered | House of Commons | House of Commons chamber | 685 c144 | 909594

[Hydrogen Sector](#)

Asked by: Baroness Meacher (CB) | **Party:** Crossbench

To ask Her Majesty's Government what measures they are taking to support private investment in the hydrogen sector in the United Kingdom.

Answered by: Baroness Bloomfield of Hinton Waldrist (Con) | **Party:** Conservative Party

My Lords, we have announced that, working with industry, the Government are aiming for 5 gigawatts of low-carbon hydrogen production capacity in the UK by 2030—a clear signal of intent. We will support this through a whole range of measures seeking to stimulate private investment, including a £240 million net zero hydrogen fund and provision of a revenue mechanism to be delivered by hydrogen business models on which we will bring forward details early next year.

Baroness Meacher

My Lords, I had the great pleasure of coming to Parliament this morning in very beautiful, absolutely silent hydrogen-powered car. I assure noble Lords that the hydrogen economy is well and truly with us. UK-made, world-first hydrogen boilers, fuel cells, buses, planes, ships and trains all exist—and, importantly, they are safe—and are in use and supporting UK jobs. With hydrogen as point 2 in the Prime Minister's 10-point plan, can the Minister say a bit more about what action the Government are

taking now to bring forward policies to unlock the £3 billion of shovel-ready private investment for UK hydrogen projects?

Baroness Bloomfield

The noble Baroness is right to point out the positive moves that the whole country, the industry and the Government are making in this area. The UK is ideally positioned to benefit from the potential of low-carbon hydrogen, which could unlock up to 100,000 domestic and export jobs by 2050. We have set out a clear ambition and are developing a strong policy package to support it, including the £240 million that I have mentioned, which will speed up deployment of low-carbon production as well as hydrogen business models and the revenue mechanism behind them. It is these initiatives that will stimulate the billions of pounds of private investment that the noble Baroness referred to.

Asked by: Baroness Blackstone (Ind Lab) | **Party:** Labour Independent Party

My Lords, given that the Hydrogen Taskforce estimates that the UK hydrogen economy can create and sustain 75,000 jobs—I note that the Minister mentioned 100,000 jobs just now—what new training programmes are being developed to ensure that there are sufficient highly-qualified people to take these jobs?

Answered by: Baroness Bloomfield of Hinton Waldrist (Con) | **Party:** Conservative Party

I cannot answer that question in specific terms. All I can say is that the money being invested in apprenticeship programmes across industry will help to develop that. If I can get some further information for the noble Baroness, I will write to her with more details.

Asked by: Lord Oates (LD) | **Party:** Liberal Democrats

Does the Minister recognise that leaving it to the market alone to choose between blue and green hydrogen will not deliver the step change in production that is required? Will the Government now set a specific target for the UK's green hydrogen capacity by 2030, as many countries across the world have already done, in order to stimulate private sector investment, drive down costs and deliver on the Government's overall net-zero target?

Oral questions - Supplementary

Answering member: Baroness Bloomfield of Hinton Waldrist (Con) | **Party:** Conservative Party

I think I have answered the bit of the noble Lord's question about what we are doing to stimulate private investment. The Government are reluctant to set targets for the split between blue and green hydrogen, in case that limits the investment in either side; we need both in order to reach zero carbon. The 10-point plan has set out a clear ambition for new low-carbon hydrogen and the UK is ideally placed to bring forward both blue and green hydrogen production methods to grow a strong, resilient UK hydrogen economy. This twin-track approach will enable

production to be brought forward at the necessary scale during the 2020s. The noble Lord will be aware of the Gas Goes Green initiative, which will promote and advance the use of green gases such as hydrogen and biomethane in the gas grid.

30 Nov 2020 | Oral answers to questions | House of Lords | House of Lords chamber | 808 cc495-6

[Hydrogen: Renewable Energy](#)

Asked by: Baroness Meacher | **Party:** Crossbench

To ask Her Majesty's Government what assessment they have made (1) of the levels of investment being committed by (a) Germany, (b) France, (c) other countries, to the production of green hydrogen, and (2) of the impact any such international competition may have on the UK's green hydrogen sector.

Answering member: Lord Callanan | **Party:** Conservative Party | **Department:** Department for Business, Energy and Industrial Strategy

We are following international hydrogen developments from Germany, France and other countries, and participate in a range of international fora, including the Clean Energy Ministerial, the International Partnership for Hydrogen for Fuel Cells in the Economy and Mission Innovation. These offer opportunities to discuss other countries' domestic hydrogen strategies in detail, their levels of investment, including in green hydrogen production and explore opportunities for collaboration.

We plan to publish a UK Hydrogen Strategy in early 2021; this will be informed in part by assessment of international activity and the opportunities and challenges that presents for the UK hydrogen economy.

26 Nov 2020 | Written questions | Answered | House of Lords | HL10307

[Hydrogen: Northern Ireland](#)

Asked by: Shannon, Jim | **Party:** Democratic Unionist Party

To ask the Secretary of State for Northern Ireland, what steps he is taking to support the Northern Ireland hydrogen economy.

Answering member: Mr Robin Walker | **Party:** Conservative Party | **Department:** Northern Ireland Office

The Government is committed to developing hydrogen as a strategic decarbonised energy carrier for the UK. Low carbon hydrogen presents an opportunity for Northern Ireland, and the UK as a whole, to deliver against our clean growth goals – meeting our decarbonisation needs while capturing commercial opportunities. This is especially important as we support our economy to recover from Covid-19.

To realise the opportunities from hydrogen we are undertaking a range of activities:

- investing up to £121m in hydrogen innovation across the value chain;

- developing business models to support the deployment of, and investment in, low carbon hydrogen production; and
- a £100m Low Carbon Hydrogen Production Fund to stimulate capital investment.

The UK Government will be setting out further plans to support hydrogen across the UK in a comprehensive hydrogen strategy, intended to be published in early 2021.

The Secretary of State for Northern Ireland and I have had discussions with Ministerial colleagues about the potential for Northern Ireland to play an important part in a hydrogen economy and I am looking seriously at how the Government can best support this.

Officials from the Northern Ireland Executive, as well as Ryse/Wrightbus based in Northern Ireland, are engaged on the strategy through the Hydrogen Advisory Council – a joint government/industry partnership to inform strategy development and formalise engagement with industry.

18 Nov 2020 | Written questions | Answered | House of Commons | 114887

[Hydrogen: Technology](#)

Asked by: Lord Oates | **Party:** Liberal Democrats

To ask Her Majesty's Government what assessment they have made of the implications of firms owned by the government of China taking significant stakes in UK hydrogen technology companies.

Answering member: Lord Callanan | **Party:** Conservative Party | **Department:** Department for Business, Energy and Industrial Strategy

As an open economy, we welcome foreign trade and investment where it supports UK growth and jobs. All investment must meet stringent legal and regulatory requirements to protect the UK's national interest and security.

The UK has an outstanding innovation base with a number of world leading companies developing the next generation of hydrogen related technologies. As we develop the UK's low carbon hydrogen economy to help meet our legally binding net zero commitments, we will seek to build on existing expertise to develop a prominent position in a growing global hydrogen market.

19 Oct 2020 | Written questions | Answered | House of Lords | HL8752

[Carbon Emissions and Hydrogen](#)

Asked by: Britcliffe, Sara | **Party:** Conservative Party

To ask the Secretary of State for Business, Energy and Industrial Strategy, what plans he has to support decarbonisation pathways; what estimate he has made of the potential extent of hydrogen replacement of natural gas in the next ten years; and what assessment he has made of the potential role of hydrogen alternatives in supporting job (a) creation and (b) investment in the North West.

Answering member: Kwasi Kwarteng | **Party:** Conservative Party |
Department: Department for Business, Energy and Industrial Strategy

The UK has set a benchmark by legislating for net zero, and the adoption of hydrogen as a decarbonised energy carrier will support us in achieving this legally binding target. We will set out our approach to growing the UK hydrogen economy our Hydrogen Strategy, set to be published early next year.

I have been very pleased to see the ambitious plans for hydrogen in the North West, such as the HyNet project, which we are supporting with over £13m funding through our innovation programme. I have talked directly to companies in the North West about how they can support growth of the hydrogen economy, and my officials are in regular discussions with stakeholders in the region.

In November 2019 we published the Energy Innovation Needs Assessment (EINA) for hydrogen and fuel cells. This identified that the future market for all hydrogen technologies could yield around £5.3bn of GVA and create nearly 50,000 jobs by 2050 to meet demand in export and domestic markets. The North West is ideally placed to capture such opportunities.

07 Oct 2020 | Written questions | Answered | House of Commons | 97059

[Hydrogen: Renewable Energy](#)

Asked by: Stafford, Alexander | **Party:** Conservative Party

To ask the Secretary of State for Business, Energy and Industrial Strategy, if he will make an assessment of the potential merits of investing funds from the public purse in electrolyser deployment.

Answering member: Kwasi Kwarteng | **Party:** Conservative Party |
Department: Department for Business, Energy and Industrial Strategy

The Government is committed to developing hydrogen as a strategic decarbonised energy carrier.

We are investing in hydrogen innovation across the value chain. This includes the £33 million Low Carbon Hydrogen Supply competition aimed to accelerate the development of low carbon bulk hydrogen supply solutions and the Storage at Scale Competition, which looked for innovative, replicable large scale energy storage solutions that could provide a market competitive alternative to conventional commercial large-scale energy storage technologies. These included projects supporting electrolysis.

We are considering revenue support delivered by business models to support the deployment of, and investment in, low carbon hydrogen production and developing a £100m Low Carbon Hydrogen Production Fund, announced in August 2019 to stimulate capital investment. Again, electrolysis is included in the scope of this work.

The Government intends to publish a hydrogen strategy early in 2021, which will include discussion around the costs associated with

expansion of the UK hydrogen economy, including scale up of production, and how these might be met.

29 Sep 2020 | Written questions | Answered | House of Commons | 92948

[Hydrogen: Scotland](#)

Asked by: Stafford, Alexander | **Party:** Conservative Party

To ask the Secretary of State for Scotland, what assessment he has made of the role that Scotland can play in the UK's hydrogen strategy; and what discussions he has had with the Secretary of State for Business, Energy and Industrial Strategy on the UK's hydrogen strategy.

Answering member: Mr Alister Jack | **Party:** Conservative Party | **Department:** Scotland Office

I have regular discussions with the Secretary of State for Business, Energy and Industrial Strategy on a range of policy issues of importance to the UK and to Scotland.

The Government is committed to the development of hydrogen as a strategic decarbonised energy carrier for the UK. We are currently developing our strategic approach to hydrogen and its potential to deliver against our net zero goals and we will set out our plans in due course.

Scotland is well placed to play a significant role in the development of the hydrogen strategy and to grow the hydrogen economy. Indeed, two projects based in the north-east of Scotland have already benefitted from the award of contracts worth a total of £5.8m through the £33m Hydrogen Supply competition.

10 Sep 2020 | Written questions | Answered | House of Commons | 86216

[Hydrogen: Wales](#)

Asked by: Smith, Nick | **Party:** Labour Party

To ask the Secretary of State for Wales, what steps he is taking to support the Welsh hydrogen economy.

Answering member: Simon Hart | **Party:** Conservative Party | **Department:** Wales Office

The Government aims to consult on a preferred business model for low-carbon hydrogen production in 2021. This will be key to stimulating the deployment of hydrogen across the UK.

In addition, I am pleased to see that the South Wales Industrial Cluster is being supported by UK Research and Innovation's £170m Industrial Decarbonisation Challenge, which is looking at options for decarbonising the region's industrial base, including using hydrogen.

My officials regularly engage with officials in other departments across the UK Government to raise awareness of the opportunities in Wales for hydrogen energy generation.

07 Sep 2020 | Written questions | Answered | House of Commons | 81770

[Hydrogen Advisory Council](#)

Asked by: Lord West of Spithead | **Party:** Labour Party

To ask Her Majesty's Government whether they plan to expand the Hydrogen Advisory Council as part of the formation of a wider UK hydrogen strategy.

Answering member: Lord Callanan | **Party:** Conservative Party | **Department:** Department for Business, Energy and Industrial Strategy

We are committed to developing hydrogen as a decarbonised energy carrier and are developing our strategic approach to growing the UK hydrogen economy. In order to support this, we established the Hydrogen Advisory Council, which first met on 20th July 2020. The Council will enable Government to work in partnership with Industry to ensure the UK is at the forefront of low carbon hydrogen production and supply, which will have a key role to play in supporting clean growth and tackling climate change.

The Council will initially focus on actions to enable the scale up of hydrogen production, and its membership reflects this. The Council will oversee a range of workstreams in support of its objectives. If deemed appropriate, some of the workstreams may be delivered by working groups, membership of which may come from the organisations represented on the Council and/or more widely according to need.

03 Aug 2020 | Written questions | Answered | House of Lords | HL7187

4.4 Committee Inquiries

Environmental Audit Committee

[Technological Innovations and Climate Change: Hydrogen](#)

The Environmental Audit Committee is conducting an overarching inquiry looking at technological innovations which could contribute to tackling climate change. Each part of the inquiry will look at a specific technology currently in use or in development and consider its potential and how Government policy can facilitate the UK making the best and most cost-effective use of that technology.

This inquiry will be an opportunity to highlight UK-based examples of innovation and excellence, and the Committee is particularly keen to hear from those at the cutting edge of each sector.

Article 10 of the Paris Agreement recognises the central role of innovation in achieving mitigation and adaptation goals. The UK has taken a lead role in the development and deployment of some low-carbon technologies, and has supported international collaboration on a number of others. However technological progress is far from certain – in its 2019 report on Net Zero the Committee on Climate Change identified several technologies which had either not performed as well

as had been envisaged or had not reduced in cost as expected when it conducted its initial modelling in 2008.

Looking to the future, it is difficult to predict how individual technologies will reduce in cost or improve in efficacy, but alongside other changes, technological innovation will be crucial to the UK achieving its emissions reduction goals.

Hydrogen

The second session of this inquiry looks at hydrogen production and distribution. As the country with the largest offshore wind capacity and an extensive gas network, the UK has a comparative advantage in distributing and handling gases and producing 'green hydrogen' via electrolysis using electricity generated from offshore wind. By February 2020, the Government had invested over £90 million in hydrogen projects to enable industries to develop and deploy hydrogen technologies. These projects include the £33 million Low Carbon Hydrogen Supply competition and the UK Hydrogen Mobility Programme. In addition, the Government has announced £70 million of investment in new hydrogen supply and industrial fuel switching projects. This session will consider the opportunities to maximise continued development and effectiveness of this technology, and the challenges faced by the industry in delivering greater capacity.

Hydrogen has the potential to service demands for some industrial processes, to deliver energy-dense applications in HGVs and ships, and to produce electricity and heating in peak periods. Significant development in Carbon Capture and Storage technology and supporting infrastructure will be necessary, if methods such as steam methane reforming, are to be used to scale up low-carbon hydrogen production. Small Modular Reactors are being investigated as another possible way to produce low-carbon hydrogen. The potential for widespread installation of hydrogen boilers and gas distribution networks to be repurposed to hydrogen offer possible ways to contribute to net zero emissions. Related decisions over the balance between electrification and hydrogen in decarbonising heat require exploration now for the UK to find the most cost-effective transition to a low-carbon economy.

As hydrogen has a potential role in electricity generation, transportation, industry and heating fully integrated policy, regulatory design and implementation is crucial.

The development and deployment of hydrogen solutions could protect and create high value jobs in the energy sector. However, depending on how hydrogen is produced, for example, through steam methane reforming or electrolysis of water powered by renewable resources, it too can have negative environmental impacts. In 2018 around 95% of the global production of hydrogen was generated from fossil fuels. There remain significant hurdles to commercialising clean and sustainable means of producing, storing and using hydrogen and so a realistic assessment of the hydrogen option is necessary.

[Read the call for evidence for more information about this inquiry.](#)

[Formal meeting \(oral evidence session\): Technological Innovations and Climate Change: Hydrogen](#)

9 July 2020

Science and Technology Committee

[The role of hydrogen in achieving Net Zero](#)

A key component of the Government's recently announced '[Ten Point Plan for a Green Industrial Revolution](#)' is 'Driving the Growth of Low Carbon Hydrogen'. The plan outlined a range of measures to support the development and adoption of hydrogen, including a £240 million 'Net Zero Hydrogen Fund'. Noting this, and the further £81 million allocated for hydrogen heating trials in the [2020 Spending Review](#), the House of Commons Science and Technology Committee is today launching a new inquiry into the role of hydrogen in achieving Net Zero.

Following [recommendations](#) from the Committee on Climate Change that the Government develop a strategy for hydrogen use and should aim for largescale hydrogen trials to begin in the early 2020s, the Committee seeks to ensure that the Government's intended plan will be suitable and effective. The Committee will also assess the infrastructure required for hydrogen as a Net Zero fuel, and examine progress made so far internationally to determine the viability of hydrogen as a significant contributor to achieving Net Zero.

[Read the call for evidence for more detail about the inquiry.](#)

Business, Energy and Industrial Strategy (BEIS) Committee

[Decarbonising heat in homes](#)

The Business, Energy and Industrial Strategy (BEIS) Committee has launched an inquiry examining the path to decarbonising heating in homes.

The BEIS Committee will examine the Government's 'Buildings and Heat Strategy', due in November, and investigate the policies, priorities and timelines which are needed to decarbonise heating in residential buildings and help ensure the UK gets on track to deliver Net Zero by 2050.

The Committee's inquiry on decarbonising heat follows a successful pitch by Dr Jan Rosenow, Principal and European Programme Director, Regulatory Assistance Project (RAP), at the Committee's ["MyBEIS" evidence hearing in July](#) and is part of the BEIS Committee's ongoing work on net zero and its follow-up to the findings of the Climate Assembly.

The decarbonising heat in homes inquiry is likely to examine areas such as the technological challenges to decarbonising heat including issues related to the future of hydrogen, network capacity and the distribution of costs, incentives, consumer engagement and protection, and how to co-ordinate and deliver low-carbon heating.

Witness details for the Committee hearings will be confirmed at a later date.

The Committee has extended the submission period for this inquiry. The new deadline is Friday 4th December.

[Read the call for evidence for more information about this inquiry.](#)

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