



Department for
Energy Security
& Net Zero

Hydrogen Strategy Update to the Market: August 2023



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Introduction

The announcements in the [Powering Up Britain](#) plan in March 2023 show that the transformation of the UK energy system is well underway. These announcements will help to ensure the provision of cheap, clean and secure British energy, with delivery of a hydrogen economy a crucial area of action. We are promoting growth of the UK hydrogen economy to enable the UK to capitalise on technological development, establishing a route to decarbonise industry and to transition the power and transport sectors, and potentially home heating, to low carbon energy sources. It will also stimulate economic growth and bring in new employment opportunities and investments across the breadth and length of the UK.

The government committed in the [UK Hydrogen Strategy](#) (2021) to provide regular updates on policy development, to keep industry informed of our progress. As outlined in previous updates and in the [British Energy Security Strategy \(BESS\)](#) (2022), the UK government set out its doubled ambition to deliver up to 10GW of low carbon hydrogen production capacity by 2030, subject to affordability and value for money, with at least half of this from electrolytic hydrogen. We also aim to have up to 1GW of electrolytic hydrogen and up to 1GW of CCUS-enabled hydrogen in operation or construction by 2025.

Our ambitions are intended to deliver both energy and economic benefits to the UK. The economic opportunities presented by the future UK hydrogen economy are clearly outlined in the [Hydrogen Sector Development Action Plan](#) and our updated [Hydrogen Investor Roadmap](#). We recognise that the government has a clear role to play in realising these opportunities.

Government plans to deliver a more secure, cleaner energy system, with hydrogen envisaged to play an increasingly important role during and after the transition. In both the [Powering Up Britain - Energy Security Plan](#) and [Powering Up Britain - Net Zero Growth Plan](#), we set out our latest progress in delivering funding support for first of a kind large scale deployment of CCUS-enabled and electrolytic hydrogen production facilities in the UK and outlined key milestones for hydrogen policy developments over the coming years. This August 2023 Hydrogen Strategy Update to the Market summarises these developments as well as progress in designing new support mechanisms such as transport and storage business models, moving forward with negotiations with hydrogen projects across both CCUS and electrolytic allocation, and developing wider policy and market frameworks across the hydrogen value chain.

Since the last Hydrogen Strategy Update to the Market in December 2022, a number of external reports including the [Hydrogen Champion report](#), [Mission Zero: Independent Review of Net Zero](#), as well as reports by the [Science and Technology Committee](#), the [Scottish Affairs Committee](#), [All Party Parliamentary Group on Hydrogen](#), [the UK Hydrogen Policy Commission](#), [Hydrogen UK](#) and the [Climate Change Committee](#) have been published. We place great value on the advice from the stakeholders and parliamentarians involved in producing these reports and will continue to consider their recommendations alongside formal government consultations.

Hydrogen Production

In pursuit of our up to 10GW ambition, alongside the [Powering Up Britain](#) plan we announced the first successful applications to strands 1 and 2 of the Net Zero Hydrogen Fund (NZHF), as well as shortlists of those CCUS-enabled and electrolytic hydrogen projects which were invited to the next stage of the CCUS Cluster Sequencing process (Track-1) and first electrolytic Hydrogen Allocation Round (HAR1) respectively. In addition to funding the development and delivery of early production projects, we have also made advances in the development of detailed, technical policy and regulations, running consultations on a low carbon hydrogen certification scheme and proposals for revenue support regulations in relation to the Hydrogen Production Business Model (HPBM). The Energy Bill, which contains a number of hydrogen measures, also continues to progress through Parliament.

Supporting multiple low carbon hydrogen production technologies

- We announced in the Powering Up Britain plan that we are **developing a hydrogen production delivery roadmap in 2023**, taking forward recommendations made in the [Independent Review of Net Zero](#) and the [Hydrogen Champion report](#). We will continue to work with industry and other stakeholders to develop the roadmap, which will set out how hydrogen production can be scaled up over the coming decade.
- Following the commitment made in the BESS to set up a certification scheme for low carbon hydrogen by 2025, we published a [consultation](#) which **set out our proposals for the design of the scheme**. Certificates would give hydrogen users a reliable, verified description of the emissions intensity of the hydrogen they use, and could create benefits for the entire hydrogen value chain, including those who produce, transport and store hydrogen. Certificates could also help scheme participants to access new low carbon markets, report progress towards decarbonisation targets, or demonstrate compliance with government obligations. The consultation closed on 28 April 2023 and **we will publish a government response later this year**.
- We published an [updated version of the Low Carbon Hydrogen Standard](#) in April 2023. This version includes a number of clarifications, including: the introduction of a materiality threshold to ease the reporting and verification burden; a waste fossil feedstock counterfactual emissions methodology to reflect their system-wide emissions benefits; a revised process for including new technology pathways; and a new chapter on consignments. These updates and clarifications have been informed by industry engagement and feedback, including a questionnaire to stakeholders during January and February 2023.
- We expect to **publish a further Low Carbon Hydrogen Standard update this summer**, which will ensure that the Standard's requirements can be more effectively applied under the HPBM contract.

Hydrogen production funding support

Net Zero Hydrogen Fund

- We announced [15 successful applicants](#) from the **first competition round of strands 1 and 2 of the NZHF** on 30 March 2023. The successful applicants will be allocated a total of £37.9 million to support the development and deployment of low carbon hydrogen production projects, subject to contracts being signed. We also launched a second application round for strands 1 and 2, which closed on 31 May 2023 (strand 1) and 7 June 2023 (strand 2).

Hydrogen Allocation Rounds and the Hydrogen Production Business Model

- We announced a shortlist of 20 projects for HAR1 invited to the due diligence stage (offering joint NZHF and HPBM support) totalling 408MW capacity in March 2023. **We will shortly be announcing the projects which have been invited to negotiations, which will take place alongside continued due diligence, with the aim to award contracts to successful projects in Q4 2023.**
- We will shortly be publishing the **Low Carbon Hydrogen Agreement (LCHA) for initial projects**. The LCHA is the contract underpinning the hydrogen production business model, which is aimed at providing revenue support to hydrogen producers to overcome the cost gap between low carbon hydrogen and high carbon counterfactual fuels.
- Following a [6-week market engagement exercise](#) with industry, we also **intend to launch the second hydrogen allocation round (HAR2) later this year**, with the aim to award contracts of up to 750MW in 2025, subject to affordability and value for money.
- After HAR2, we **intend to transition to annual, price-based competitive allocation for LCHAs by 2025 for electrolytic projects**, and potentially other specified non-CCUS hydrogen production technologies, as soon as legislation and market conditions allow.
- On 17 May 2023 we published a [call for evidence on price-based competitive allocation for low carbon hydrogen production](#) to gather evidence to inform the transition and design of the future competitive allocation policy. We will respond to the call for evidence following analysis of the responses, and intend for any decision on the move to, and design of price-based competitive allocation to be subject to consultation.
- The [Energy Bill](#), introduced to Parliament on 6 July 2022, contains provisions to underpin delivery of the HPBM.
- We recently consulted on proposals for regulations intended to underpin entry into [HBPM \(and Industrial Carbon Capture Business Models\) contracts](#), including proposals relating to eligibility, directions to offer to contract and information publication. The consultation closed on 10 May 2023 and we plan to publish a government response in due course. Subject to Parliamentary approval of the Energy Bill, we intend to deliver this secondary legislation as soon as departmental and Parliamentary timelines allow.

Cluster Sequencing

- We announced the **Track-1 project negotiation list** in the [Powering Up Britain - Energy Security Plan](#) which outlined eight projects, including CCUS-enabled hydrogen and industrial carbon capture and power technologies, to proceed to negotiations for support through the relevant business models. We will launch a process later this year to enable **further expansion of the Track-1 clusters**, beyond the initial deployment, identifying and selecting projects for HyNet and East Coast Cluster – including the Humber – and their associated stores as they become viable, to be operational by 2030.
- In addition, we have launched [Track-2 of the Cluster Sequencing process](#) to identify two additional clusters contributing to our ambition to capture 20-30 Mt CO2 per year across the economy by 2030. The window for submitting Expressions of Interest closed on 28 April 2023.

Hydrogen Production Innovation

- The [five winners of follow-on funding](#) in the Net Zero Innovation Portfolio Low Carbon Hydrogen Supply 2 competition have been announced. They have been allocated a combined total of £19.4 million to demonstrate novel technologies and move them closer to commercial deployment. [Feasibility studies from 22 Phase 1 projects](#) have also been published, showcasing the breadth of work taking place across the UK and the new insights those projects have generated.
- The Net Zero Innovation Portfolio [Hydrogen BECCS innovation programme competition](#) Phase 1 scoping projects concluded in January 2023, with 22 summary reports published in June 2023. Details of the 5 demonstration projects being supported in Phase 2 of the programme were also published in June 2023. 5 project winners have been awarded a total of £21.2 million to turn biomass and waste, such as sewage, into hydrogen with carbon capture.

Hydrogen networks and storage

Hydrogen transport and storage (T&S) infrastructure will be critical enablers for the growth in the hydrogen economy required to meet our up to 10GW hydrogen production ambition, which could support over 12,000 jobs and leverage up to £11 billion in private investment in hydrogen production, distribution and storage by 2030.

The [Independent Review of Net Zero](#) highlighted the importance of government's commitment to hydrogen T&S business models and recommended taking a pragmatic approach to support for key 'no regrets' T&S projects. To bring forward hydrogen T&S business models, we have now introduced **legislative amendments** to the [Energy Bill](#), which will be crucial to designing these new business models by 2025.

The Review also recommended a role for the Future System Operator (FSO) in setting out a system plan for hydrogen. Government has introduced legislation, as part of the Energy Bill, to establish a new, publicly owned FSO. Depending on a number of factors, including timings of the Energy Bill and discussing timelines with key parties, the aim is for the FSO to be operational in 2024.

We published the [Government's response to the consultation on hydrogen T&S business models](#) on 2 August 2023. The response sets out:

- **High-level design options for hydrogen transport and storage business models**, which we committed to developing in the BESS. For the hydrogen transport business model, a RAB-style model combined with a form of revenue support (which may apply jointly or separately) is the preferred high-level design. For the hydrogen storage business model, the minded-to position is a model which includes a minimum revenue floor to provide investors certainty.
- We are developing our approach to **strategic planning for hydrogen T&S infrastructure** at pace to help identify and prioritise early strategically significant projects. Government's position is that some form of **strategic planning, potentially combined with elements of market-led development, is necessary** to enable the efficient, cost-effective and timely roll-out of transport and storage infrastructure.
- We will set out a '**hydrogen networks pathway**' of the next steps in our vision for the development of hydrogen T&S in the UK alongside the hydrogen production delivery roadmap by the end of 2023. This will set out in more detail the considerations necessary to identify priority projects. These considerations will form the basis of a **strategic framework for hydrogen T&S infrastructure planning** and will inform the design of the business model allocation process for both transport and storage infrastructure.
- We **intend for the FSO to take on a role in central strategic planning for hydrogen T&S**, and we intend to set out more detail on this in our hydrogen networks pathway. We expect the FSO to start building competence in hydrogen as part of its network planning roles in electricity and gas and its duty to consider whole system impacts. This will put it in a position to take on a central strategic planning role for hydrogen T&S infrastructure at an appropriate time following its establishment, within the statutory framework provided for by the Energy Bill.

In addition:

- We are now [consulting on a new Strategy and Policy Statement for Energy](#), proposing a **fundamental role for Ofgem, the FSO, government and industry partners in addressing barriers** which prevent the near-term development of hydrogen infrastructure and helping ensure a suitable framework for hydrogen T&S expansion.
- We published new drafts of the [energy National Policy Statements](#) in March 2023 for consultation. The consultation closed on 23 June 2023. References to hydrogen are now included in the relevant documents to provide additional guidance on hydrogen planning and development. We are reviewing the responses to this consultation and

next steps. This is likely to include a further assessment of the suitability of the new suite of National Policy Statements for supporting hydrogen projects.

Use of hydrogen

It is essential that offtakers have the confidence to invest in new, cost-effective technologies and processes that utilise low carbon hydrogen. Government continues to work at pace to provide conditions to incentivise hydrogen demand. Measures are in place across sectors and look to compliment funding provided through the hydrogen production and hydrogen T&S business models. We are providing further support for research, innovation and demonstration at scale, as well as looking to create a regulatory environment that supports fuel switching and decarbonisation.

The carbon price, established through the UK Emissions Trading Scheme (ETS), will incentivise low carbon hydrogen uptake in industry, power and aviation sectors, and the UK ETS Authority are consulting on expanding its scope to cover the domestic [maritime sector](#), another key potential sector for hydrogen demand. We view hydrogen as an important component of government's commitment to decarbonise the UK power system by 2035, subject to security of supply, including as part of the Review of Electricity Market Arrangements (REMA), and in wider Government subsidy schemes such as the Renewable Transport Fuel Obligation (RTFO).

Our progress in the development of the UK Low Carbon Hydrogen Standard and Low Carbon Hydrogen Certification Scheme will also enable growth in demand by providing confidence to offtakers that the hydrogen being purchased is a low carbon alternative to current fossil-based fuels. In addition, we are continuing our work to understand and realise potential new uses of hydrogen, including blending into the gas grid, use of heat in buildings and exporting hydrogen to international markets.

Use of hydrogen in industry

We continue to fund innovation and deployment of hydrogen across multiple industrial applications to support and accelerate industrial decarbonisation. This has included the recent funding extension to the [Industrial Energy Transformation Fund \(IETF\)](#) and developments in fuel switching innovation competitions. The UK ETS Authority is in the process of reviewing free allocation policy and consulted last year on elements of this. The Authority will also be consulting later this year on potential changes to the methodology for distributing free allocations and ways to better target those most at risk of carbon leakage.

- On 30 March an [extension to the IETF](#) was announced in the Powering Up Britain plan, **increasing total grant funding by £185 million**. Subject to business case approval, we intend to open Phase 3 of the IETF for new applications in early 2024, supporting industry to cut energy bills and carbon emissions through investing in energy efficiency

and low carbon technologies such as hydrogen fuel switches. [Winners from previous application rounds](#) were published in May 2023, including a number of projects switching to low carbon hydrogen as a fuel.

- In June 2023 the government launched a call for applications to the £5 million [Local Industrial Decarbonisation Plans Competition](#), which will help to facilitate the decarbonisation of dispersed sites through the development of area-based collaborative 'local clusters'. Successful local clusters will be expected to develop strategic industrial decarbonisation plans which will explore technological solutions, and could include the identification of hydrogen options in their area. The [competition window](#) remains open until 2 August 2023.
- The 21 Phase 1 feasibility projects funded by the £57.5 million [Industrial Fuel Switching 2 competition](#) are now completed, with [reports](#) published in June 2023. £49.7 million funding was awarded to [13 Phase 2 projects](#) which were announced in June 2023, these projects will support the physical demonstration of fuel switching or fuel switch enabling solutions. Phase 2 provides a total of £19.7 million funding across 6 hydrogen projects to demonstrate fuel switching solutions within industry.
- Nine feasibility reports have been published from Stream 2A of the [Industrial Hydrogen Accelerator competition](#) for feasibility studies showing the possibilities for using hydrogen to decarbonise industrial sites across the UK. Winners of the stream 2B competition, for projects to take forward demonstration and detailed design, will be announced in due course.
- [Phase 2 of the £40 million Red Diesel Replacement competition](#) closed in March 2023 and bids are now being assessed. In Phase 2 projects will demonstrate end-to-end solutions to replace red diesel with technologies such as hydrogen on construction, mining or quarrying sites, with up to £30 million in total grant funding available.
- In collaboration with the British Standards Institute, government is working to establish a **Publicly Available Specification (PAS) for hydrogen-ready industrial-sized boilers**, with the formal PAS development process due to be launched in the near future.
- We are currently assessing the merits of expanding the decarbonisation readiness proposals for power generation (see "Uses of hydrogen in power" section, below) to cover heat-only combustion plants in the future. This work may form the basis of a future consultation as we look to support the decarbonisation of industry.
- We have published the report "[Future of hydrogen in industry: initial industrial site surveys](#)" on 5 July 2023, examining the feasibility of switching to 100% hydrogen in 7 industrial sites.
- Government has also announced its **intention to launch a call for evidence on non-road mobile machinery (NRMM) decarbonisation later this year, and committed to a NRMM Decarbonisation Strategy**, with work starting in 2023. Evidence gained will be supported by a recently commissioned external research study on decarbonising industrial NRMM and will support further policymaking around hydrogen NRMM.

Use of hydrogen in power

Government views hydrogen to power as an important component of our future power system. It can provide reliable low-carbon flexible generation while creating a decarbonisation pathway for unabated generation; supporting our decarbonisation ambitions while maintaining security of supply. Excess low carbon electricity can be used to produce hydrogen, which could be stored over time in large quantities and used flexibly, enabling more efficient utilisation of our increasing renewable electricity production capacity. [Government analysis](#) shows that having hydrogen available in the power sector could achieve lower emissions at a lower cost than scenarios without hydrogen. Hydrogen to power provides an additional route for the decarbonisation of existing unabated combustion generation and can be a key early offtaker for significant volumes of low carbon hydrogen. Accelerating hydrogen to power is therefore a key aspect of our power sector decarbonisation work and our hydrogen ambitions. Since December 2022, we have:

- Announced in the [Powering Up Britain - Energy Security Plan](#) our **intention to consult on the need and potential design options for hydrogen to power market intervention in 2023**. We are exploring non-financial barriers to the use of hydrogen in the power sector. Government is engaging with industry to identify and understand how to address these barriers.
- Published a [response](#) to the **consultation on more closely aligning the Capacity Market (CM) with net zero** in July 2023. In line with broad support received, government remains committed to introducing an emissions limit reduction for new build and refurbishing capacity into the CM to help drive the transition to a net zero power system by 2035, subject to security of supply. Government intends to undertake further analysis and development prior to taking a final decision on implementation of emissions limits on new and refurbishing plants.
- The [consultation](#) on more closely aligning the CM with net zero also included a call for evidence on managed exits for carbon intensive plants with CM agreements to enable them to abate. Government intends to progress policy thinking to support decarbonisation pathways, which may include abatement via conversion to hydrogen to power.
- Consulted on proposals for updated [Decarbonisation Readiness requirements](#) in March 2023. We are proposing to require new build and substantially refurbishing combustion power plants be built such that they can easily decarbonise in the future, by switching to 100% hydrogen fuel or retrofitting carbon capture and storage technology. We intend to issue a government response in summer 2023.

Use of hydrogen in heat

Government believes that low carbon hydrogen has the potential to offer a strategic option for decarbonising heat in buildings alongside heat pumps and heat networks. The Government is supporting industry to deliver a range of research, development and testing projects, including

pioneering hydrogen heating consumer trials, designed to determine the feasibility, costs and convenience of using hydrogen as an alternative to natural gas for heating. Developments since December 2022 include:

- SGN has started building the new hydrogen network and demonstration facility for the H100 hydrogen heating trial in Fife. Due to start in the second half of 2024, this trial will supply green hydrogen to around 300 homes through new pipes laid parallel to the existing natural gas network. It will provide early evidence on domestic consumers' experience of using hydrogen in their homes and constructing and operating a hydrogen network.
- The government is continuing to develop the proposal for a hydrogen village trial in Redcar, Teesside with Northern Gas Networks. A decision on whether to proceed with the village trial in Redcar will be made by the government later this year. The village trial will provide essential evidence to inform government's strategic decisions in 2026 on the role of hydrogen in decarbonising heat.
- Our consultation on [improving boiler standards and efficiency](#) closed in March 2023. We are currently analysing responses and **intend to publish a government response in due course**. This consultation discusses several important issues both for improving current boiler standards, as well as setting out government's vision for the use of hydrogen-ready boilers and hybrid boilers in future.

Use of hydrogen in transport

Hydrogen could play a vital role in decarbonising heavier transport applications, where longer ranges are required (for example for long distance Heavy Goods Vehicles [HGVs]) or greater energy density is needed (such as for aviation and shipping). Current government funding is split into where i) the technology is proven but needs demonstrating at scale in the 'real world', and where ii) we are driving innovation. The Department for Transport (DfT) has made the following announcements to better determine, facilitate and expand hydrogen's potential role in decarbonising the transport sector:

Cross-modal

- [RTFO guidance](#) was updated in May 2023 to enable **renewable energy from renewable and non-renewable sources to be blended** to allow for reaching the same 65% GHG savings as biofuels. Previously the requirement to exclusively use additional energy meant that the carbon savings required for RTFO compliance would have been more than 90%.
- The [Energy Bill](#) contains provisions that, subject to the Bill completing its passage and reaching Royal Assent, will enable **hydrogen made from recycled carbon wastes to be supported by the RTFO and nuclear derived fuels by the Sustainable Aviation Fuel (SAF) mandate** once suitable secondary legislation is made. This is part of the Energy Bill following an amendment tabled by the Government in the House of Lords.

- **DfT will publish a Low Carbon Fuels Strategy later this year** to further support investment in the low carbon transport fuels sector by setting out a vision for the deployment of low carbon fuels across transport modes up to 2050.

Road

- **Government intends to publish a Zero Emission HGV Infrastructure Strategy in early 2024.** It will set the strategic direction and outline the roles and responsibilities of government and industry in the deployment of the refuelling and recharging infrastructure needed to support the end of sales of non-zero emission HGVs that begin in 2035.
- The winning projects from the [22nd funding round of the Advanced Propulsion Centre's collaborative research and development competition](#) were announced in May 2023, with the winners receiving **£77 million in joint government and industry funding to develop clean transport technologies**. Five of the seven projects funded will use hydrogen technologies, including to develop zero-emission emergency service vehicles.
- We are developing our response to our [consultation on setting a legal end date for the sale of new, non-zero emission buses and calls for evidence on coach and minibus decarbonisation](#), which will be issued shortly.

Maritime

- In February 2023 we launched the [Zero Emission Vessel and Infrastructure \(ZEVI\) competition](#) with £77 million available to accelerate the roll out of zero emission solutions for vessels and port-side infrastructure that are nearing commercialisation. Hydrogen and hydrogen-related fuels are in scope. The application window closed in April 2023 and winners will be notified later this year.
- We announced the winners of the third round of the [Clean Maritime Demonstration Competition \(CMDC3\)](#) in February. Over £60 million has been allocated to 19 projects to conduct technology and system demonstrations in clean maritime solutions between April 2023 and March 2025, with six projects exploring the use of hydrogen and/or hydrogen-derived fuels.
- We announced the fourth round of the [Clean Maritime Demonstration Competition \(CMDC4\)](#) on 7 July 2023. Up to £34 million is available to fund real world demonstrations, pre-deployment trials and feasibility studies into clean maritime technologies that reduce greenhouse gas emissions. Hydrogen technologies are in scope, with the competition opening on 2 August 2023.
- We launched the [Clean Maritime Research Hub competition](#) to support early research in clean maritime. The UK Shipping Office for Reducing Emissions and the Engineering and Physical Sciences Research Council will jointly allocate £7.4 million funding to establish the flagship hub, which will run from September 2023 to March 2027.

Aviation

- In March 2023 the Zero Emission Flight Infrastructure (ZEFI) programme published its findings on [handling hydrogen at airports](#).
- The government published the second [SAF mandate consultation](#) on 30 March 2023, setting out proposals for how the mandate will work to ensure we can meet our implementation date of 2025, and for hydrogen's use as a process input or as a feedstock.
- We launched the [second round of the £165 million Advanced Fuels Fund](#), making **£55.8 million available to support UK SAF projects through to construction**. This is further to five projects awarded a share of £82.5 million in December 2022 that will together produce 300,000 tonnes of SAF and save 200,000 tonnes of CO2 annually.
- We announced the [University of Sheffield as the delivery partner for the UK SAF Clearing House](#) in March 2023, acting as a central hub to co-ordinate testing and certification of SAF, helping to remove barriers to new fuels coming to market.
- We published the [Phillip New report 'Developing a UK SAF Industry' and the government's response](#) in April 2023, providing an independent evaluation of the necessary conditions to create a successful UK SAF industry. Revenue certainty was identified as a barrier to investment and the government response committed to working with industry to develop options to overcome this, recognising the leading role industry can play.

Creating a market

The development of a flourishing UK hydrogen market will inform and be affected by the objectives and plans for the decarbonisation of the wider UK energy system. New and updated arrangements will be required to enable growth of hydrogen production, as well as the efficient use of T&S infrastructure. In our hydrogen T&S infrastructure consultation we included a number of questions on the wider market and regulatory framework – our response to this consultation, published alongside this update, outlines the direction of travel in our policy development in these areas.

Developing the market framework for hydrogen

In the [response to our hydrogen T&S infrastructure consultation](#), published alongside this update, we acknowledged the diversity of stakeholder views on the existing gas market framework and industry commercial arrangements, and the extent to which stakeholders thought they were supportive of the development of hydrogen T&S infrastructure. We stated our intention to keep the market framework and industry commercial arrangements under review with a view to introducing timely amendments where they are warranted.

Ensuring a supportive regulatory framework

We published our [offshore hydrogen regulation consultation](#) in April 2023, setting out initial regulatory proposals for offshore hydrogen pipelines and storage. These would be operable for early offshore hydrogen projects and may be subject to further evolution. This consultation closed in May 2023 and we aim to publish our response in Q3 2023. We will continue to explore options to enable a suitable regulatory framework and work with stakeholders on the development of this.

The government response to our hydrogen T&S infrastructure consultation set out our evaluation of the existing frameworks on onshore and offshore regulations, the existing planning regimes, non-pipeline transportation, and environmental regulations, and outlined some high-level plans and work packages government is progressing with relevant regulators.

We will continue to work closely with industry and regulatory bodies to consider the issues raised and the suggestions put forward on the suitability of existing regulatory frameworks for hydrogen, with a view to introducing timely amendments where they are needed.

The UK Hydrogen Regulators Forum has established sub-groups on environment, offshore, and standards, with more focused work packages on these areas, and continues to support in coordinating non-economic regulatory work across the value chain. We intend to improve the Forum's functions in future meetings to improve knowledge-sharing, policy coordination and development amongst regulators to engage on ongoing and emerging regulatory challenges.

Gas blending

As set out in the [government response to our T&S consultation](#), **we intend to consult further on hydrogen blending in 2023 and we are continuing to target a policy decision in 2023 on whether to allow up to 20% hydrogen blending (by volume) into GB gas distribution networks**. This consultation will aim to outline the potential benefits, costs and means to implement blending into GB gas distribution networks. We invite stakeholders to provide views and evidence in response to this consultation.

Hydrogen sector development

We are working alongside industry to capitalise on the nature and scale of the economic opportunities across the developing UK hydrogen economy. The government's [hydrogen sector development action plan](#) focuses on four key areas: private investment across the value chain to unlock hydrogen projects; strong UK supply chains to support domestic hydrogen projects and those overseas; a skilled UK workforce to deliver our hydrogen projects at the right time, and enabling the UK hydrogen sector to participate in international trade of hydrogen related goods and services.

Investment

We published an updated [UK Hydrogen Investment Roadmap](#) in April 2023, **showcasing the UK's hydrogen offer and spotlighting investment opportunities across the hydrogen value chain** from production, through transmission and storage to the range of potential end uses, including industry, power, transport and heating. The document included a map of successful applicants for strands 1 and 2 of the NZHF and the shortlist of 20 electrolytic projects from HAR1, showing the breadth of opportunity and potential which may be realised across the UK. The measures in the Hydrogen Investment Roadmap will support the creation of a thriving new hydrogen industry, potentially supporting over 12,000 jobs and up to £11 billion private investment in the UK by 2030.

Working closely with the Department for Business and Trade and the Office for Investment, we have continued our engagement with industry and the investor community to get their views on the developing UK hydrogen policy framework, including understanding and addressing any potential barriers to unlock up to this estimated £11 billion of private investment by 2030. This has included a roundtable session in March 2023 with a number of key investors chaired by the UK Hydrogen Champion Jane Toogood to exchange views on the UK hydrogen investment landscape, including how government and industry can leverage more investment into the UK. A further roundtable was held in mid-July 2023 with supply chain companies from across the UK value chain to understand their investment opportunities and needs.

We are planning a second UK Hydrogen Investor Forum in the next 6-9 months, to be co-hosted with Hydrogen UK. This would bring together Ministers, officials, investors and senior figures from industry to:

- Provide an opportunity for Government to set out further detail on policy development to strengthen further the UK investment environment.
- Provide an opportunity for industry and investors to have deep dive sessions with officials on thematic areas to provide meaningful input on key policy areas.
- Create an environment for investors and industry to provide their perspectives on the investment opportunity in the UK.
- Facilitate networking between hydrogen investors, project developers and supply chain companies.

We have also been working closely with the UK Infrastructure Bank (UKIB), which is a government-owned policy bank focused on increasing infrastructure investment to help to tackle climate change and promote economic growth in the United Kingdom. UKIB published its first [Strategic Plan](#) in June 2022, in which the bank identified hydrogen as one subsector where there may be barriers to investment it can help address. The bank has £18bn of private financing capacity available and will focus where there's an undersupply of private finance and reducing barriers to investment – thereby crowding-in private capital, drawing on its unique position between the market and Government.

Supply chains

In the [Powering Up Britain - Net Zero Growth Plan](#) we committed to work with industry over the course of 2023 to **develop a supply chain strategy for hydrogen**, and evaluate what additional intervention, if any, might be required. The cross-industry work to develop the strategy is being convened by Hydrogen UK and overseen by the Jobs, Skills and Supply Chains Working Group which sits under the Hydrogen Delivery Council. The aim is to develop the strategy by the end of the year.

Jobs and skills

In the [Powering Up Britain - Net Zero Growth Plan](#) we committed to publishing a joint government-industry Net Zero and Nature Workforce Action Plan. This will represent the culmination of several sector assessments in the coming 12 months, including hydrogen.

Exports and imports

- There have been rapid developments in the creation of regional and global hydrogen markets to support greater trade in low carbon hydrogen, as well as associated hydrogen technologies and services across the value chain. These developments will help increase the financial liquidity of the hydrogen industry and accelerate the global transition to Net Zero.
- Participating in the trade of hydrogen, and related goods and services, will help UK industry play a key role in the future of the sector's international markets, allowing us to benefit from the economic opportunities that trade creates, while maintaining sufficient supply for domestic use. HMG has continued to support this trade. For example, Wrightbus received £50 million to boost exports of electric and hydrogen-powered buses supported by a [loan guarantee from UK Export Finance](#). Government backing will enable Wrightbus to sell its electric and hydrogen-powered, zero-emission buses to new markets in Europe and North America.
- **We want to play a key role in exporting hydrogen to others**, including to continental Europe where we see increased hydrogen demand, alongside established energy trading and interconnection with the UK. In the longer term, we also recognise the role that imports could play in building supply chain resilience and supporting energy security as part of a diverse supply mix.
- This is why we are taking steps to facilitate the trade of hydrogen, including **seeking to keep standards and certification for low carbon hydrogen aligned with international schemes where appropriate**; understanding options for international transportation, networks, and storage; reviewing offshore and international regulation; and continuing to increase international cooperation, following the recent developments with the [Ostend Declaration](#).

Research and innovation

- The [Clean Hydrogen Innovation Programme](#), which is supported by the Department for Energy Security and Net Zero, published a [hydrogen innovation needs assessment](#) aiming to identify and evaluate key innovation needs required to both unlock UK hydrogen deployment and drive cost reduction across the supply chain.
- Innovate UK launched the £4.35 million [Hydrogen storage and distribution supply chain collaborative R&D competition](#) in February 2023, which will fund collaborative research and development projects aimed at developing hydrogen supply chains. The fund aims to support projects of up to £1 million for up to 18 months.
- The Innovate UK Knowledge Transfer Network (KTN) [Hydrogen Supply Chain Directory](#) was launched in February 2023 and is being regularly updated. The Directory has been used by organisations to promote their projects, build collaborations and unlock business opportunities. KTN hosted a [Hydrogen Supply Chain Showcase](#) in June 2023 for organisations who are interested in networking and learning more about funding opportunities.
- The Department for Energy Security and Net Zero and the Natural Environment Research Council (NERC) are co-funding three projects under the £2.7 million [Environmental Response to Hydrogen Emissions programme](#), relating to soil sink response, climate atmospheres and air quality.
- Through National Capability funding, NERC is also providing £1.1 million research funding on the [security and viability of industrial scale subsurface hydrogen storage and storage efficiency](#) (and reservoir integrity of geological carbon dioxide storage).

Hydrogen Champion and the Hydrogen Delivery Council

- In March 2023, Jane Toogood, the UK Hydrogen Champion, published her [report on accelerating the growth of the UK hydrogen sector](#). The report made nine recommendations to government and industry, informed by extensive engagement with stakeholders across the hydrogen value chain. The Hydrogen Champion also hosted an investor roundtable to identify the challenges and opportunities for investors in the UK hydrogen economy.
- **In May 2023, we re-launched the Hydrogen Advisory Council as the 'Hydrogen Delivery Council'**, to reflect the shift in focus to delivering the UK's ambitions set out in the UK Hydrogen Strategy, and subsequent energy security and net zero plans. The Council and its working groups have developed a two-year work plan to drive the work of the Council in helping achieve the ambitions for 2025 set out in these publications.

Demonstrating international leadership

We continue to engage at both the bilateral and multilateral level to share our own expertise, learn from others and help to develop emerging regional and global hydrogen markets.

- Building on our [MoU with Belgium](#) we held the first annual UK-Belgium hydrogen working group in Brussels in March 2023.
- We also followed up on our [joint statement with Norway](#) to include **closer collaboration on hydrogen in our MoU on CCUS**.
- The UK also resumed participation with the [North Sea Energy Cooperation](#), which brings together countries in the North Sea region to collaborate on the development of the offshore grid and the large renewable energy potential in the region, including electrolytic hydrogen.
- We have signed the [Ostend Declaration of energy ministers on the North Seas](#) as a 'green power plant' of Europe with eight other North Sea neighbours. The declaration on delivering cross-border projects and anchoring the renewable offshore industry in Europe supports the development of a well-functioning market for hydrogen.
- As one of the five co-leads of the [Mission Innovation Clean Hydrogen Mission](#), the UK **convened a research and innovation (R&I) production working group to deliver against the Mission's Action Plan for 2022-2024**. The group facilitates knowledge exchange between countries and private sector stakeholders, focused on R&I that enables the production of cost competitive low carbon hydrogen and showcasing best practice to reduce costs.
- **We continue to take an active role in key multilateral hydrogen fora** including the International Partnership for Hydrogen and Fuel Cells in the Economy (IPHE) and Clean Energy Ministerial (CEM). The UK is participating in groups within these fora which cover hydrogen standards and certification, the Northwest Europe hydrogen market, and the ['Twin City Partnership' between Aberdeen and Kobe](#) in Japan. The UK has also joined the [CEM Hydrogen Trade Forum](#), which launched on 22 July 2023.

Upcoming opportunities

We value stakeholder input in developing hydrogen policy to ensure it delivers maximum value for money and drives us towards our objectives. Upcoming opportunities for stakeholders to provide feedback on our policy development and engage with our plans for funding include:

- The **launch of the second hydrogen allocation round expected** later this year, intended to award contracts in early 2025 to up to 750MW capacity, subject to affordability and value for money.

- A call for evidence on [future price-based competitive allocation for low carbon hydrogen](#), which closes on 11 August 2023.
- A **call for evidence on NRMM decarbonisation**, which we intend to launch later this year.
- A call for applications to the £5 million [Local Industrial Decarbonisation Plans Competition](#). The competition window remains open until 2 August 2023.
- A **consultation to finalise the design of Phase 3 of the IETF** later this year before launching the new phase in early 2024.
- A **consultation on the need and potential design options for hydrogen to power market intervention** later this year.
- The fourth round of the [Clean Maritime Demonstration Competition \(CMDC4\)](#), run by DfT and Innovate UK, opened for applications on 2 August 2023. The competition details were announced on 7 July 2023.
- A **consultation on hydrogen blending**, which we intend to publish later this year.
- A **second UK Hydrogen Investor Forum** is planned to be held in the next 6-9 months.

Conclusion

Our third Hydrogen Strategy Update to the Market sets out the government's continuing focus on delivery. It recaps the hydrogen announcements and forward look in the Powering Up Britain plan, the new Department for Energy Security and Net Zero's manifesto for the future. Of particular note are the first winning projects from the NZHF strands 1 and 2, and the shortlist of electrolytic projects taken to the due diligence stage under the first Hydrogen Allocation Round, which may offer NZHF and HPBM support.

We are continuing to develop policy at pace to deliver on government's ambitions on hydrogen, including taking forward recommendations from the Independent Review of Net Zero. This includes the development of a hydrogen production delivery roadmap later this year, and the high-level design of the T&S business models which we set out in the government response to the T&S consultation published with this Update to the Market. It also includes policy to bring forward demand for hydrogen such as the consultation on hydrogen blending and on the need and potential design options for market intervention to support hydrogen to power, which we intend to publish later this year.

The government will continue to leverage the UK's position as one of the world's most attractive business and investment environments, developing policy and a comprehensive market framework to enable rapid growth of the UK hydrogen economy. Alongside our work internationally, we will build confidence in the sector and cement our position as a world leader in delivering hydrogen as part of an energy secure and decarbonised economy.

This publication is available from: www.gov.uk/government/publications/uk-hydrogen-strategy

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