



A pragmatic approach to clean hydrogen

What public policy changes are needed to drive the scale up of private finance to support the delivery of a pragmatic approach to clean hydrogen as part of the decarbonisation of the UK economy?

November 2024



About this report

Barclays' Group Policy Development team creates public policy thought leadership content on behalf of Barclays. Our work draws on the bank's expertise, data and insights, and is intended to inform the design and application of public policy solutions in response to pressing economic and societal challenges.

The intended audience for this report is public policymakers and other actors engaged in shaping public policy. The report is general in nature and provided for information/educational purposes only. It does not take into account any specific investment objectives, the financial situation or particular needs of any particular person. It is not intended for distribution, publication, or use in any jurisdiction where such distribution, publication, or use would be unlawful, nor is it aimed at any person or entity to whom it would be unlawful for them to access.

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Executive summary

Hydrogen has the potential to play a cross-cutting role in the net zero transition, with an important role for public policy to support scale up and drive the development of the hydrogen market across the value chain. The new UK government has expressed support for hydrogen, both in setting overall production targets but also through its public financing ambitions.

The current gap between ambition and current delivery points to the opportunities for the new UK government to take a clear and pragmatic look at where and how hydrogen can play the most impactful role in the transition. This should balance the ambition and enthusiasm the government has expressed for clean hydrogen – broadly defined as hydrogen produced with lower emissions than incumbent fossil fuel-based methods – and its desire to support the industry to develop and thrive in the UK, with a pragmatic consideration of where scaling clean hydrogen can have the greatest value and impact.

Drawing on insights from Barclays support for hydrogen companies across the value chain, this report looks at what public policy changes are needed to drive the scale up of private finance to meet the UK's hydrogen ambitions, supporting the delivery of a pragmatic approach to clean hydrogen as part of the decarbonisation of the UK economy.

Our results highlight the role international competition is having in framing the policy landscape for hydrogen support. Market participants seek policy certainty to support investment in, production of, and use of hydrogen. Critically, there is a need to consider policy support across the entire hydrogen value chain. In doing so, public finance support mechanisms need to deliver a balanced risk allocation and incentive structure between actors, paired with appropriate demand signals.

To address these, this paper puts forward a series of recommendations for government to take action to drive the scale up of private finance to meet the UK's hydrogen ambitions. This includes: setting out a credible vision for the UK's role in a global hydrogen economy; providing policy certainty through developing a detailed government hydrogen roadmap; delivering demand-side policy intervention to secure a robust hydrogen ecosystem across the value chain; and retaining a credible and bankable revenue support mechanism, designing effective structures to support a mature steady-state and price-based competitive allocation process.



THIS PAPER PUTS FORWARD A SERIES OF RECOMMENDATIONS FOR GOVERNMENT TO TAKE ACTION TO DRIVE THE SCALE UP OF PRIVATE FINANCE TO MEET THE UK'S HYDROGEN AMBITIONS."

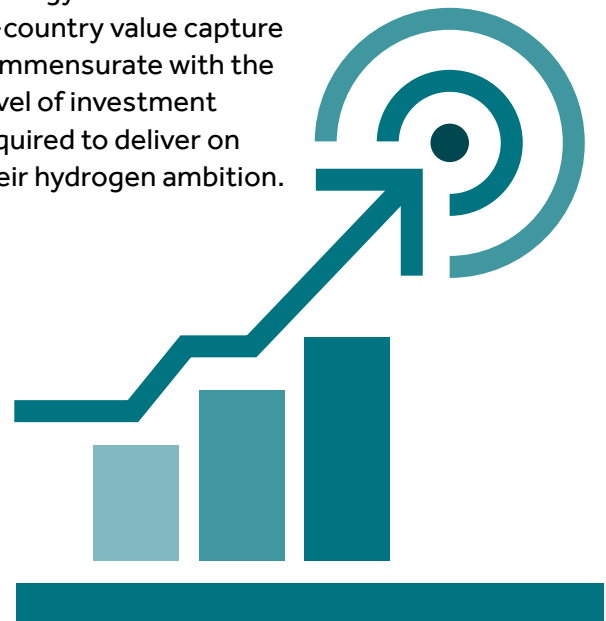
Gap analysis and research question

The Labour government sees hydrogen as part of its Clean Power by 2030 mission, as well as in the financing remits of the new National Wealth Fund and GB Energy, and has set an ambitious green hydrogen production target of 10GW.¹ This doubles the green hydrogen ambition of the previous government, which had anticipated half of their overall 10GW low carbon hydrogen production target² coming from green hydrogen,³ and had set interim targets of 1GW of green hydrogen and 1GW of blue hydrogen in construction or operational work by 2025.⁴ This is consistent with the view that hydrogen has the potential to play a cross-cutting role in the net zero transition.

However, the new government has not yet set out details of how it intends to reach its overall hydrogen ambition, including the role it anticipates green and blue hydrogen may play, nor a strategy for delivering a large step up in production, the associated demand to support offtake and infrastructure to support distribution.

For the government’s hydrogen ambition to be credible, government will need to carefully consider where clean hydrogen – broadly defined as hydrogen produced with lower emissions than incumbent fossil fuel-based methods – can play the most cost- and climate-effective role (in terms of CO₂ avoided in achieving net zero targets) and reflect this in a clear policy and strategy sitting underneath their headline targets and financial commitments. Moreover, it will be important for

the government to complement this with a well-justified value-for-money case, and a strategy to ensure substantial in-country value capture commensurate with the level of investment required to deliver on their hydrogen ambition.



HYDROGEN 'COLOUR'*	GREEN HYDROGEN	BLUE HYDROGEN	GREY HYDROGEN	PINK HYDROGEN
Production methods	Electrolysis of water using renewable energy	Natural gas and carbon capture	Natural gas	Nuclear

*Non-exhaustive

¹ Labour. [Make Britain a Clean Energy Superpower](#). 2024.

² Department for Energy Security & Net Zero. [Hydrogen Production Delivery Roadmap](#). December 2023.

³ Hydrogen UK. [Economic Impact Assessment for the Hydrogen Sector to 2030](#). April 2024.

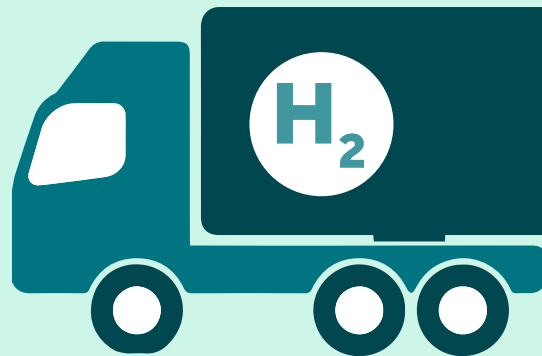
⁴ Department for Energy Security & Net Zero. [Hydrogen Production Delivery Roadmap](#). December 2023.



Decarbonisation use cases and opportunities for clean hydrogen

There are many potential use cases for hydrogen in the context of the net zero transition, with some potential opportunities set out below:

Harder-to-abate sectors. This includes energy intensive industries, heavy duty/long distance road transport, aviation, and shipping.⁵ Taken together, these currently contribute around 30% of total global CO₂ emissions.⁶ As other sectors of the economy progressively decarbonise, the proportion of CO₂ emissions from hard-to-abate sectors will increase, as these sectors are expected to decarbonise at a slower rate than the rest of the economy.⁷ Hydrogen used to support lowering emissions, including in fuel cells or as feedstock for fuels, may form one of a number of viable options for decarbonising these sectors.



Flexible power generation and energy storage. Hydrogen also has the potential to play a role in providing both flexible power generation and long duration energy storage.⁸ A zero carbon electricity system (as the UK will need to be by 2030 if it is to meet its clean power targets),^{8,9} will require significant flexibility to complement wind and solar power. Long duration energy storage and flexible power generation capacity, including hydrogen, will therefore need to scale. The Royal Society estimates that in 2050, up to 100TWh of storage will be needed to ensure a reliable and functioning renewables-powered energy system in the UK,¹⁰ significant amounts of which could come from hydrogen.¹¹

Low carbon hydrogen to decarbonise existing hydrogen uses. Most hydrogen today is used in industrial applications, such as in producing ammonia, fertiliser, or as a feedstock. Many of these applications will continue to be required throughout the transition, with additional possible industrial applications for hydrogen in steelmaking, as well as producing petrochemicals that currently use fossil fuel-based production methods. Scaling up lower carbon forms of hydrogen for use for these purposes will support industrial decarbonisation journeys.



⁵ Energy Transitions Commission. [Mission Possible: Reaching Net-Zero Carbon Emissions from Harder-to-Abate Sectors by Mid-Century](#). November 2018.

⁶ Energy Transitions Commission. [Mission Possible: Reaching Net-Zero Carbon Emissions from Harder-to-Abate Sectors by Mid-Century](#). November 2018.

⁷ Energy Transitions Commission. [Mission Possible: Reaching Net-Zero Carbon Emissions from Harder-to-Abate Sectors by Mid-Century](#). November 2018.

⁸ Department for Business, Energy & Industrial Strategy. [Modelling 2050: Electricity System Analysis](#). December 2020.

⁹ Labour. [Making Britain a Clean Energy Superpower](#). 2024.

¹⁰ Royal Society. [UK government must kick-start the construction of large-scale electricity storage or fail to meet legally binding net zero targets by 2050, warns Royal Society report](#). September 2023.

¹¹ Royal Society. [Large-scale electricity storage](#). September 2023.



Moreover, it is often proposed that hydrogen scale up brings a range of societal co-benefits, including:

Jobs. Estimates for the economic opportunity of the hydrogen sector in the UK include supporting “over 29,000 direct jobs and £7.0bn in annual direct and indirect GVA [gross value added]” in 2030.¹² This would represent a 15-fold increase from 2024, where annual direct employment in the UK hydrogen sector sat around 2,000.^{13, 14} The production of blue hydrogen specifically presents an opportunity for reskilling and redeployment of workers currently working in fossil fuel jobs, contributing to just transition goals.

“
Over **29,000** direct jobs and
£7.0bn
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gross value added in 2030.”¹²



Regional economic benefits. The logistics, transport costs, and reduction in energy through conversion, as well as the need for location alongside carbon capture, utilisation and storage (CCUS) when producing blue hydrogen, means that location of hydrogen production needs to be strategically considered based on proximity to end users and local context. The cluster approach to supporting and developing hydrogen capacity creates compelling opportunities for regional growth and centres of excellence, as well as economies of scale. Examples include the East Coast Cluster: while its focus is wider than hydrogen, it is expected to provide an average of 25,000+ jobs per annum up to 2050, with an expected £2bn+ average GVA up to 2050.¹⁵

Energy system resilience and security. Locally producing renewables, including hydrogen, will have the additional benefit of improving control over energy supply, reducing the UK’s reliance on imported energy and increasing export opportunities. It could also help mitigate price volatility and increase the overall resilience of the energy system through both diversification and, when used in storage, creating a more reliable renewables-powered grid. For example, it is estimated that long duration energy storage, supplied largely by hydrogen, could provide between £13bn and 24bn in savings across the systems costs of achieving net zero between 2030 and 2050, largely via reducing the variability in output across the power system and de-risking investments.¹⁶

“
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achieving net zero between 2030-2050.”¹⁶

¹² Hydrogen UK. [Economic Impact Assessment for the Hydrogen Sector to 2030](#). April 2024.

¹³ Hydrogen UK. [Economic Impact Assessment for the Hydrogen Sector to 2030](#). April 2024.

¹⁴ ‘Annual Direct Employment’ captures “the economic impacts of expenditure on developing a production site, energy inputs, and maintenance”, in contrast to indirect impacts that cover the broader supply chain effect. Hydrogen UK. [Economic Impact Assessment for the Hydrogen Sector to 2030](#). April 2024.

¹⁵ East Coast Cluster. [East Coast Cluster](#). Accessed October 2024.

¹⁶ Department for Business, Energy & Industrial Strategy. [Benefits of Long Duration Electricity Storage](#). July 2022



Limitations of hydrogen in decarbonisation applications

It is important, however, to also recognise the limitations of hydrogen in net zero pathways. Critically, it will not be the most effective option for all use cases; there are likely to be cheaper options when considering, for example, low temperature industrial and home heating. Important challenges remain in transporting hydrogen, and the energy cost of compression for transport. End-use demand and offtake uses are, in many cases, underdeveloped.

Financial cost is a key barrier. The low carbon hydrogen needed to support a future net zero economy is, right now, more expensive than conventional hydrogen and alternatives – in particular when factoring in hydrogen storage and distribution costs as well as production costs – and is not yet at the scale to support the investment or rollout needed to drive reduction of costs. Elements of cost reduction may come from scale, but a regulatory framework and directed policy support will likely be essential to support the business case for the development of the infrastructure necessary for widespread deployment.

As such, in developing its strategy and considering its ambitions for the role hydrogen could play in decarbonising the economy, the government needs to be clear eyed about where and how hydrogen can have the greatest impact and value. A hydrogen strategy that takes a pragmatic approach to where and how hydrogen is deployed can create the most value in achieving decarbonisation goals. This should utilise a variety of considerations in framing that strategy (see Box 1).

This will maximise impact and value for money of government investment, deliver success against production and offtake, and ultimately attract more private investment into the hydrogen sector – thereby helping to realise the government’s objectives.

Box 1: Considerations for assessing applications of and strategy for hydrogen utilisation for decarbonisation

Recognising that hydrogen will not be the most effective option for all decarbonisation use cases, the value and impact of its application could be maximised if considering use cases across a range of factors. These could include:

1 Climate return. Considered as cost per tonne of CO ₂ avoided by using low carbon hydrogen in contrast with other sources, as well as wider consideration of where renewable energy is most efficiently used.	2 Economic return. The return made from an investment in clean hydrogen, in contrast with other decarbonisation investment opportunities.	3 Supply chain considerations. These include availability, feasibility, and cost of infrastructure to support storage, transport, and distribution of hydrogen.	4 Jobs and economic growth. Direct and indirect jobs supported by the development and use of clean hydrogen, as well as gross value added (GVA).
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Scaling up hydrogen will require investment and focus across the value chain

With these considerations in mind, we can turn to what is required to enable deployment of hydrogen where it can be most effective. Scaling hydrogen will involve innovating and financing across the full value chain. To date, a large part of government focus has been on stimulating **production of clean hydrogen**. This is in line with government targets and existing support mechanisms, as well as the scale up of production of low carbon hydrogen and enabling technologies to support, notably carbon capture, utilisation and storage (CCUS).

But additionally, there will also need to be **stimulation of demand and end-use application for hydrogen, including creating a deep, liquid clean energy market**. Innovation is happening, in particular in hard-to-abate sectors where there has been focus on the potential role of hydrogen in areas such as aviation, shipping, and heavy duty vehicles and transportation. Policy targets and interventions, such as Sustainable Aviation Fuel mandates and bans on the sale of new fossil fuel heavy goods vehicles, can help stimulate demand. However, most of the technology to enable utilisation is currently not deployed at a commercial scale and could require significant funding and support to reach levels needed to achieve sectoral decarbonisation goals.

Lastly, **supporting infrastructure will need to be significantly scaled up** to enable delivery from production to point of use. Transportation and storage requires hydrogen to be either pressurised and delivered to point of use as a compressed gas, or liquefied. Pipelines for hydrogen delivery likely represent the fastest and most efficient form of transportation, though it can also be transported via trucks, haulage, and shipping, depending on production location and end use. It is currently relatively difficult and costly to transport hydrogen, and also results in losses in efficiency as the hydrogen is converted into the most appropriate transportable form.

Across all of this, government will **need to set out a clear vision for the role it wants hydrogen to play as part of a decarbonised economy, including in the international value chain**. This requires a realistic consideration of where the UK might be able to compete globally in the future hydrogen economy, as well as a clear understanding of where hydrogen can play the most impactful role in the UK's own decarbonisation efforts. This will involve both analysis of domestic production as well as requirements from import and international trade.

Whilst public finance and support mechanisms will be essential, **a significant volume of private finance will be needed to support this development and scale across the hydrogen supply chain**. The previous government's Hydrogen Investment Roadmap estimated up to £9bn would be needed by 2030 to deliver up to 10GW of hydrogen production capacity, with a further £2bn needed by 2030 in infrastructure to enable the growth of the UK hydrogen economy.¹⁷ This is on the low end of non-governmental estimates. For example, analysis conducted by the independent National Wealth Fund Taskforce estimates that the investment need to 2030 for green hydrogen alone is £14.1–22.3bn.¹⁸

What's needed to enable hydrogen development?

- 1 **Stimulation of demand and end-use application for hydrogen.**
- 2 **Government will need to set out a clear vision.**
- 3 **Significant volume of private finance is needed.**
- 4 **Supporting infrastructure will need to be scaled up.**



¹⁷ HM Government. [Hydrogen Net Zero Investment Roadmap](#). February 2024.

¹⁸ Green Finance Institute. [National Wealth Fund Taskforce](#). July 2024.

Existing government support to stimulate hydrogen production and use

There is an important role for public policy globally to support scale up and drive the development of the hydrogen market across the value chain. It is estimated that, with the right support from government and industry, hydrogen could support the global market in saving up to 15% of current energy-related CO₂ emissions by 2050.¹⁹ Bloomberg NEF estimates that, if there is strong and comprehensive policy in place, almost 700 metric tonnes (MMT) of hydrogen could be in use globally by 2050, a six-fold increase on current levels, but requiring US \$11tn of investment in production storage and transport infrastructure.²⁰

In the UK, the new government has expressed support for hydrogen, both in setting overall production targets but also through its public financing ambitions. The new National Wealth Fund has committed an additional £500m of support for green hydrogen, and GB Energy has a mandate to stimulate new technology in areas including hydrogen.²¹ This represents early recognition from the new government of the role blended finance will play in delivering the investment needed to support hydrogen ambitions.

This new funding will build on a wider breadth of existing financing for hydrogen, as well as revenue support tools to help de-risk and build confidence:

The Hydrogen Production Business Model, via the **Hydrogen Allocation Rounds (HARs)**, provide revenue support to companies over a 15-year period. There have to date been two hydrogen allocation rounds (HAR1 launched in 2022, and HAR2 launched in 2023), with the first projects supported through HAR1 expected to become operational in 2025.²² Two further rounds of HAR are anticipated between now and 2030 in order to meet the hydrogen production targets.²³ The government is still iterating the design of the mechanism for each round to optimise the offering.

Support via **locational-based financing and groupings**, notably the cluster approach. This aims to support the development of industrial clusters by delivering low carbon hydrogen alongside carbon capture, utilisation and storage facilities and renewable energy.³⁰ The cluster approach aims to accelerate decarbonisation in key areas that will overall account for approximately half of the UK's industrial emissions.³¹ The government recently pledged new funding to the HyNet project in the northwest and East Coast Cluster around Teeside in the northeast, confirming £21.7bn in funding over 25 years to support the UK's growth in CCUS and hydrogen.³²

Direct government financial support is also available through specific funds as well as the public finance institutions, including:

- £240m Net Zero Hydrogen Fund.²⁴
- £180m allocated or available via hydrogen-specific schemes under the Net Zero Innovation Portfolio (NZIP), including the NZIP Industrial Hydrogen Accelerator and the Hydrogen BECCS innovation programme.²⁵
- Local and regional support, such as up to £15m available from the Tees Valley Hydrogen Transport Hub Fund.
- Hydrogen was a focus area of the UK Infrastructure Bank, which had a stated priority for financing green hydrogen production over the next 12–18 months.²⁶ Deals to date have included £30m in GeoPura²⁷ and a £32m equity investment in ZeroAvia.²⁸
- Further opportunities for hydrogen companies to be supported via wider packages include the £960m Green Industries Growth Accelerator (GIGA) fund, £129m from the Clean Maritime Demonstrate Competition Rounds, and £140m for the Zero emissions heavy goods vehicle and infrastructure demonstrators.²⁹

¹⁹ Barclays. [Can global energy evolve to achieve net zero by 2050?](#) October 2023.

²⁰ Bloomberg NEF. [Hydrogen Economy Outlook](#). March 2020.

²¹ Department for Energy Security & Net Zero. [Policy Paper: Great British Energy founding statement](#). July 2024.

²² Department for Energy Security & Net Zero. [Hydrogen Production Delivery Roadmap](#). December 2023.

²³ Department for Energy Security & Net Zero. [Hydrogen Production Delivery Roadmap](#). December 2023.

²⁴ HM Government. [Hydrogen Net Zero Investment Roadmap](#). February 2024.

²⁵ HM Government. [Hydrogen Net Zero Investment Roadmap](#). February 2024.

²⁶ UK Infrastructure Bank. [Strategy Update: Green Hydrogen](#). September 2023.

²⁷ National Wealth Fund. [UK Infrastructure Bank backs UK's green hydrogen expansion with £30 million GeoPura investment](#). February 2024.

²⁸ National Wealth Fund. [Bank becomes cornerstone investor in latest ZeroAvia funding round](#). November 2023.

²⁹ HM Government. [Hydrogen Net Zero Investment Roadmap](#). February 2024.

³⁰ HM Government. [Net Zero Strategy: Build Back Greener](#). October 2021.

³¹ HM Government. [Net Zero Strategy: Build Back Greener](#). October 2021.

³² HM Government. [Government reignites industrial heartlands 10 days out from the International Investment Summit](#). October 2024.



But the UK is in danger of failing to meet its ambition

Despite this range of support, the UK is not on track to meet existing targets for hydrogen production, deliver the supporting infrastructure needed to enable its deployment, nor achieve the scale up of end-use technology or capacity to support hydrogen deployment:



³³ Climate Change Committee. [Delivering a reliable decarbonised power system](#). March 2023.

³⁴ Climate Change Committee. [Delivering a reliable decarbonised power system](#). March 2023.

³⁵ Hydrogen UK. [Hydrogen UK Manifesto: An agenda for the 2025-2030 term](#).

³⁶ Renewable UK. [Demystifying the Hydrogen Business Model for Electrolysis](#). November 2023.

³⁷ Hydrogen Insight. [Blue hydrogen projects make up 84% of UK’s clean H2 pipeline, but final investment decisions ‘must be taken in 2024’](#). March 2023.

³⁸ Climate Change Committee. [Delivering a reliable decarbonised power system](#). March 2023.

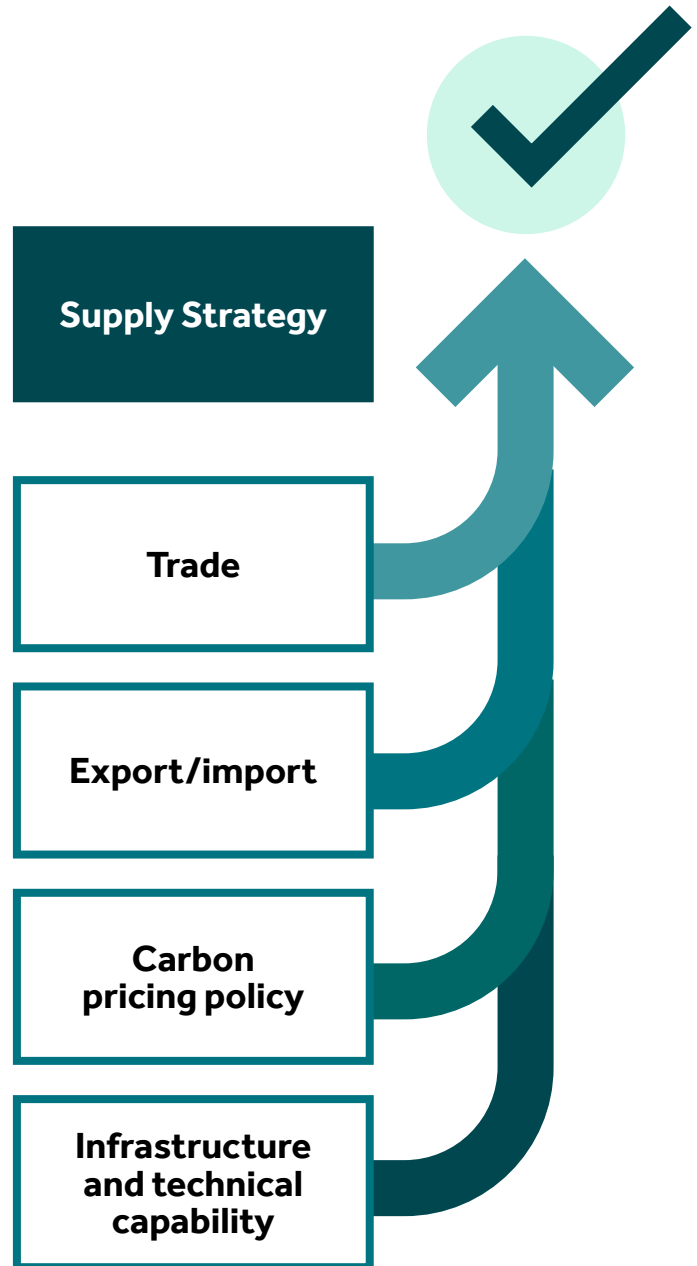
³⁹ Climate Change Committee. [Delivering a reliable decarbonised power system](#). March 2023.



A secondary challenge is that even reaching a 10GW target may not be enough for what is needed to meet decarbonisation goals – though these needs would require consideration through the lens of where and how hydrogen can represent the greatest value in its deployment (see Box 1).

Modelling done by the CCC indicates that previous government targets are on “the lower end of what could be needed to decarbonise the power sector by 2035,”⁴⁰ suggesting instead that 9–14GW of low carbon hydrogen production capacity would be needed by 2030, and 13–25GW by 2035. This itself is not a problem, as the UK can hypothetically import hydrogen, but a specific supply strategy would be needed to enable this, looking across trade, export/import, and carbon pricing policy, as well as the needed infrastructure and technical capability to import, deploy and use.

Operational green hydrogen	5MW ⁴¹
HAR1	125MW ⁴²
HAR2	875MW (anticipated) ⁴³
HAR3 and HAR4	1.5GW across the rounds (anticipated) ⁴⁴
Labour govt green hydrogen target	10GW by 2030 ⁴⁵



“ A secondary challenge is that even reaching a 10GW target may not be enough for what is needed to meet decarbonisation goals.”

⁴⁰ Climate Change Committee. [Delivering a reliable decarbonised power system](#). March 2023.

⁴¹ Renewable UK. [Demystifying the Hydrogen Business Model for Electrolysis](#). November 2023.

⁴² Department for Energy Security & Net Zero. [Hydrogen Production Business Model / Net Zero Hydrogen Fund: HAR1 successful projects](#). December 2023

⁴³ HM Government. [Hydrogen Allocation Round 2](#). December 2023.

⁴⁴ Department for Energy Security & Net Zero. [Hydrogen Strategy Delivery Update](#). December 2023.

⁴⁵ Labour. [Make Britain a Clean Energy Superpower](#). 2024.



Need for a targeted, pragmatic policy approach to drive finance scale up

The gap between ambition and current delivery points to the opportunities for the new UK government to take a clear and pragmatic look at where and how hydrogen can play the most impactful role in the transition. This should balance the ambition and enthusiasm the government has expressed for clean hydrogen, and its desire to support the industry to develop and thrive in the UK, with a pragmatic consideration of where scaling clean hydrogen can have the greatest value and impact. Utilising this framing, this report will therefore consider the following question:

What public policy changes are needed to drive the scale up of private finance to meet the UK's hydrogen ambitions, supporting the delivery of a pragmatic approach to clean hydrogen as part of the decarbonisation of the UK economy?

Barclays is supporting companies along the hydrogen value chain

As part of Barclays' ambition to support the energy transition, we recognise the role that hydrogen can play in supporting companies on their transition journeys. Our support for and engagement with the hydrogen economy is being driven forward in several ways:

Via our **Sustainable Impact Capital** portfolio, which has a mandate to invest £500m into climate tech companies. We have supported several successful hydrogen companies, including GeoPura, Protium, and ZeroAvia.

Barclays provides support for hydrogen companies along their growth journey, from supporting early-stage companies at our **Eagle Labs**, through to larger companies as they scale via our **Energy Transition Group**, which support clients on their path to net zero, providing expertise regarding the energy transition, including hydrogen.

Barclays has delivered co-investment opportunities with our hydrogen companies with public institutions, including leading a £56m follow-on investment round for GeoPura that secured a £30m investment from the UK Infrastructure Bank.⁴⁶

Through the **Unreasonable Impact** programme, Barclays has connected growth-stage ventures along the hydrogen value chain (production, end use, and delivery) with its network of mentors within Barclays and external industry leaders to help them scale.

Why now?

The new government has expressed strong support for clean hydrogen, with higher production targets and new public finance support. This presents an opportunity for a closer look at where and how hydrogen can offer the greater impact and value in the context of wider decarbonisation ambitions. Consideration should also be given to how the needed private sector investment can be catalysed to support the scale up of both production of and demand for clean hydrogen. Given multi-year timeframes between financing, production and rollout of hydrogen, the right operating environment and policy support needs to be in place now to support hydrogen investment and project

commencement as quickly as possible. An update to the government's Net Zero Strategy is expected in 2025; it will be important for the role of clean hydrogen as an enabler in key areas of the transition to be clearly set out in or alongside this strategy.

“The new government has expressed strong support for clean hydrogen, with higher production targets and new public finance support.”



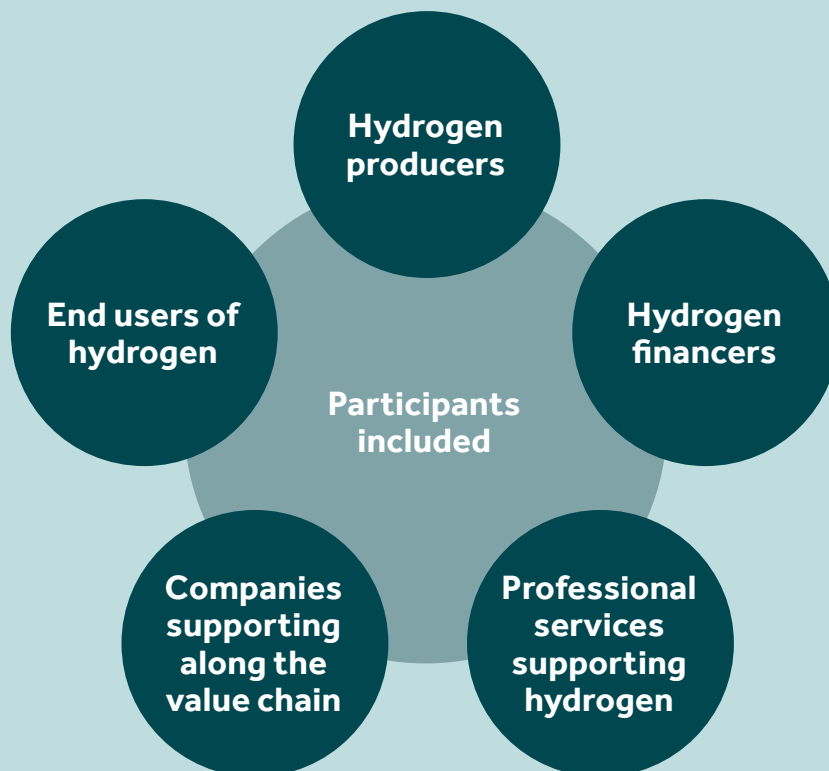
⁴⁶ National Wealth Fund. [UK Infrastructure Bank backs UK's green hydrogen expansion with £30 million GeoPura investment](#). 2024.

Methodology

Barclays hosted a roundtable with hydrogen companies and investors along the hydrogen value chain in June 2024. The discussion covered the challenges and opportunities of scaling hydrogen companies and investing in the sector, including the role of the market, UK government policy, as well as international opportunities and competition.

Participants included:

- **Hydrogen producers**, including a green hydrogen production company.
- **End users of hydrogen**, including a company building hydrogen-powered vehicles.
- **Hydrogen financiers**, including a clean hydrogen investment fund and a decarbonisation-focused venture capital firm.
- **Companies supporting along the value chain**, including in developing infrastructure to transport hydrogen, and producing the electrolyser cells to support green hydrogen production.
- **Professional services supporting hydrogen**, including insurance to support blue and green hydrogen projects.



Results

Four main themes emerged from our discussions:

- 1 The impact of **international competition** in framing the policy landscape.
- 2 The need for **policy certainty** to support the delivery of investable projects.
- 3 The need for public support to be considered across the entire **hydrogen value chain**.
- 4 The importance of **public finance support mechanisms** delivering an appropriate risk allocation and incentive structure between actors.

1 International competitiveness is framing the policy landscape

- The UK is competing in an international marketplace for hydrogen production. The UK faces challenges around **jurisdictional comparison**, with strong support and incentives from government policy in both the US and the EU. Investors and investees are looking to jurisdictions that can deliver certainty and simplicity – and the UK is not necessarily delivering on either of these metrics when it comes to support for hydrogen. While participants welcomed ambition from Labour, such as the potential future of GB Energy, there was a desire for a clearer sense of what this meant practically in terms of financing.
- Whilst the UK is seen to provide strong support at the startup stage, structural issues are observed in later growth rounds in the UK – especially in comparison to other markets. Participants thought there was a role for greater collaboration to address these issues, as well as use of financial tools such as insurance that might help bridge this gap and support banks and lenders to allocate capital at an earlier stage.



Investors from outside the UK [are] trying to get these [hydrogen] companies to come and scale in their countries."

Hydrogen user



Looking to Europe and the US with the [Inflation Reduction Act] – these are quite significant incentives... it was notable when Keir [Starmer] talked about the future of GB Energy – [but] what does that mean in [terms of] financing?"

Power company



The UK is commonly seen as a nation of startups not scaleups. At Series B and Series C there are structural issues."

Risk mitigation company supporting hydrogen



2 Policy certainty is needed to deliver investable projects

- **Policy certainty was consistently highlighted as critical for supporting the development and expansion of hydrogen production and use.** This is essential if the UK government wants to see hydrogen playing a role as early as 2030, given that quick and rapid investment and action will be needed if production is to be scaled up in time. The government has a key role in delivering clarity around the expected role and use of hydrogen in its net zero plans, as well as the accompanying frameworks for support. Investors highlighted that finance cannot be realised for the investment needed without a good deal of certainty and clarity in the forward policy pathway – not least given the long timeframes for many of these infrastructure-heavy investments. Frameworks and subsidies can be essential to underpin the business case to raise finance. For example, existing UK mechanisms such as the Hydrogen Production Model’s 15-year revenue certainty commitment helps to de-risk often capex-intensive investments with long pathways to profitability. However, this must also be matched by a deep and liquid green hydrogen offtake market, with a range of investment-grade offtakers, to deliver the revenue certainty for providers of finance.
- Some participants raised the need for a more **fundamental consideration of the role of government in how and where to best support the market.** Several participants agreed that government can play the most effective role in ‘banning’ actions or use cases, rather than picking winners, given that such an approach allows the market to innovate and scale to set timeframes. One example cited of where this had worked well was the previous government’s ban on the sale of new fossil fuel vehicles, which had a positive effect in stimulating investment in and production of electric vehicles. Additional benefits to this approach were also seen to include a more meaningful impact on the demand side of the scaleup equation, as well as providing industry with a simple and unified sense of direction.
- There were **contrasting views from participants about government taking a position on what role hydrogen should play.** Whilst wider clarity was seen as important when it came to hydrogen investment and roadmaps, some cautioned against government choosing or being too clear on a preferred solution, suggesting instead that the important thing would be for government to stimulate the hydrogen market as a whole and leave investors to determine the most viable and financeable path forward within that. One participant mentioned, in the context of the blue hydrogen debate, the importance of the government remaining clear about the overall aim of supporting competition and speedy rollout of hydrogen as a solution more generally (regardless of the colour), and its potential role in reducing greenhouse gas emissions.



Certainty and a framework is key – without that you can’t get investment... can’t realise finance for those investments without a good deal of certainty and clarity.”

Hydrogen transport and storage, infrastructure and end-use company



Our investors are looking at where [the policy environment] is certain... and not overcomplicated.”

Professional services firm supporting hydrogen



Uncertainty of the regulatory environment is the elephant in the room.”

Power company



Ban things that are bad, and then let the market take care of what the solution is, rather than mandating a specific solution.”

Hydrogen producer



Blue hydrogen is fine if it is economically competitive and speeds things up. But you need tight regulation of methane otherwise you could have more harm than good.”

Power company



We shouldn’t be too specific as a country around what the solution needs to look like. The most important thing is to stimulate the market.”

Hydrogen T&S, infrastructure and end-use company



3 Support must be considered across the entire hydrogen value chain

- Participants emphasised the **importance of considering the entire hydrogen value chain and ecosystem, and for government to consider different types of support needed along the hydrogen value chain**. There was a large focus to date on boosting supply, but policymakers also need to shore up demand. This was seen as important as, even if the UK had good stimuli for production investment, a lack of actual or anticipated demand can inhibit finance if investors are not certain that there will be a robust market for hydrogen offtake and use of the financed production.
- **To help drive up demand, use cases of hydrogen, and the technology to support its deployment in hard-to-abate sectors, were also considered essential**. Greater focus is needed on hydrogen application, and the potential for different types of tools to close the financing gap. This could include a range of levers to support use cases. For example, taking Sustainable Aviation Fuel (SAF, for which hydrogen is one possible input), the use of carbon pricing and mandates can make business as usual more expensive, driving SAF demand. Use of incentives can also make SAF production methods cheaper. To be effective in driving change and increasing investment, participants felt that policy focus on both sides of the equation was needed.
- **A wider ecosystem of changes and policy is needed** to support hydrogen development, such as reform of the planning system and the grid to support renewables scale up. Focus is also needed on the infrastructure supporting hydrogen delivery and use, notably transportation where there is currently no real pipe network or appropriate vehicular logistics capability. Participants called for a holistic approach to policy that supported longer-term thinking around clear goals and mandates.



Even if the UK has good stimuli for production investment, you don't have the demand. So when you are looking at financing, people are asking why they should buy green hydrogen rather than grey. Without that demand, [clean hydrogen projects] are lagging behind on financial attractiveness."

Professional services firm supporting hydrogen



Demand stimulation has been very useful in Europe, and we hope to see more of that in the UK."

Investment manager



We want to do investments in Sustainable Aviation Fuel, but we need to convince investors to take the additional risk... a large piece of [addressing] that is in the demand."

Hydrogen investment company



If you had the end use [supported], that could drive things like the infrastructure, storage and transportation needed – focusing on the ecosystem rather than just on the production side."

Venture capital firm



4 Public finance support mechanisms need to deliver an appropriate risk allocation and incentive structure between actors, paired with appropriate demand signals

- **Infrastructure-heavy hydrogen companies can face challenges securing finance as they scale.** Companies can require **large ticket sizes to build infrastructure, which can pose a challenge for investors focused on return.** There has been less interest in investment in hydrogen from mainstream financing institutions, as the technology is seen as early stage and risky. This leaves a gap in the market which may require a government-led approach to address.
- Participants flagged a wide range of **financial tools that might usefully help de-risk investment.** These included insurance, whether that be addressing technology performance risk or credit risk, which can help banks and lenders allocate capital at an earlier stage. Also discussed were technology performance guarantees, which have had success and traction in the US market to bring debt capital in at a much earlier point in time; and surety bonds to delay equity contributions to improve deal economics. More generally, there were opportunities seen for strong collaboration between lenders and project developers to come together at the point in time they are thinking about capital raising or lending, to discuss the full range of issues preventing bankability.
- **Hydrogen revenue certainty mechanisms need to sit within a wider framework of support to deliver the certainty required by investors.** Participants flagged that, while the hydrogen revenue certainty mechanism in the UK had been generous and arguably one of the best in the world, there is a challenge for government in getting the design right. The mechanism must ensure it can best incentivise producers of hydrogen, deliver affordability, and ensure early adopters are not penalised. It also cannot sit in isolation, and will need to be supported by a comprehensive policy framework across the value chain, in particular around financing challenges and associated risk allocation in the wider ecosystem, rather than just on the production side. The full benefits of the **Hydrogen Production Business Model** and the 15-year revenue support will only deliver real certainty and investment incentive if also supported by a deep and liquid green hydrogen offtake market to round out the business model.
- Participants also saw there being a role for **local authorities** in helping to drive hydrogen adoption, for example by committing to buy hydrogen fuel for transportation. One participant cited the Aberdeen Hydrogen Hub as a great example of local-led policy stimulating demand.



Investors are concerned about return and when they are going to get that."

Hydrogen user



What we're not seeing is interest from mainstream financial institutions. [Hydrogen] is seen as early stage and risky for them. That is a gap in the market and requires a government-led approach to address this."

Hydrogen investor



HAR is a great example of a good policy framework... [but] it is too slow."

Hydrogen T&S, infrastructure and end-use company



The Contracts for Difference is very generous and one of the best in the world... but the risk and the cost should be shared more across the value chain."

Hydrogen investor



Local authorities have been committing to buying hydrogen fuel to transport... a lot of cities have been at the forefront of hydrogen mandates."

Professional services firm supporting hydrogen scale



The insurance market has made leaps and bounds to take technology performance risk off the table, so that banks and lenders can allocate capital at an earlier stage."

A risk mitigation company supporting hydrogen

Summary of insights

1

International competition is framing the policy landscape.

The UK is competing in an international marketplace for hydrogen, with strong competition around support and incentives from government policy in particular in the US and the EU. This is affecting decisions around location for hydrogen companies and investors.

2

Policy certainty is needed to deliver investable projects.

Market participants seek policy certainty to support investment in, production of, and use of hydrogen.

3

Support must be considered across the entire hydrogen value chain.

Participants emphasised the importance of considering the entire hydrogen ecosystem, and for government to consider different types of support needed along the hydrogen value chain. Focus was needed not just on production but also to boost demand to ensure there is a compelling case to buy hydrogen.

4

Public finance support mechanisms need to deliver a balanced risk allocation and incentive structure between actors, paired with appropriate demand signals.

Investment will be required to be made over long timeframes, requiring certainty and stability to encourage capital to flow to projects critical to meet wider production and use targets. Financing and risk allocation will need to be considered across the whole value chain. Existing frameworks that provide clarity and revenue certainty over several years, such as the Hydrogen Production Model's 15-year timeframe, are welcome, but overall simplicity of the various schemes on offer should be considered in light of international competition, and frameworks should ensure they incentivise production to build a deep and liquid hydrogen offtake market.

Public policy recommendations

The insights gathered by Barclays shed light on the range of challenges faced by both hydrogen companies as well as hydrogen investors, and the role that government can play in better supporting and enabling hydrogen to scale. Taking these insights, we put forward four recommendations for government to take action to drive the scale up of private finance to meet the UK's hydrogen ambitions.

1

Set out a credible vision for the UK's role in a global hydrogen economy.

Page 20

2

Provide policy certainty through developing a detailed government hydrogen roadmap.

Page 21

3

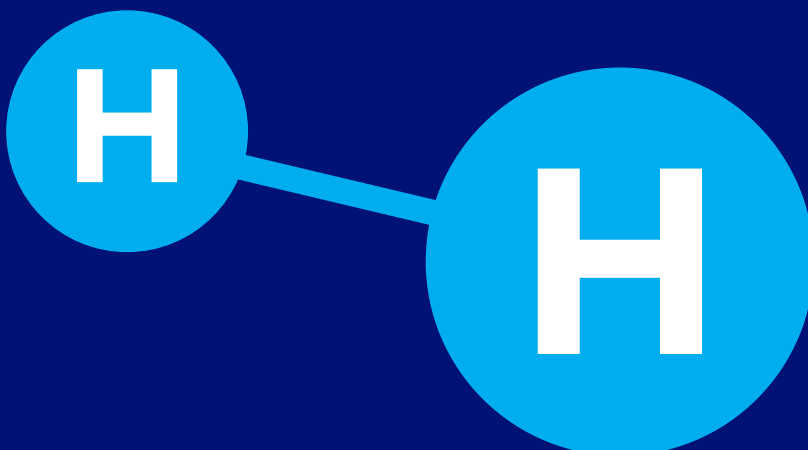
Deliver demand-side policy intervention to secure a robust hydrogen ecosystem across the value chain.

Page 23

4

Retain a credible and bankable revenue support mechanism, designing effective structures to support a mature steady-state and price-based competitive allocation process.

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Recommendation 1: Set out a credible vision for the UK's role in a global hydrogen economy.

Recommendation 1: In consultation with industry, the UK government should put forward a pragmatic, actionable view on the role it wants to play in the international hydrogen economy, leaning into areas where it could have a unique global competitive advantage.

There is international competition for hydrogen as countries globally look to lead the way in its scale up and use. This includes the US, where the Inflation Reduction Act has provided a hydrogen production tax credit expected to result in a 50–70% reduction in the cost of hydrogen production,⁴⁷ alongside other fiscal support such as the US \$8bn allocated through the Bipartisan Infrastructure Law to develop regional clean hydrogen hubs.⁴⁸ The UK therefore needs to consider where it seeks to compete in a future global hydrogen economy – carefully considering the framing principles of climate and economic return, supply chain considerations, and jobs and economic growth.

The detailed roadmap put forward in Recommendation 2 below provides the essential starting point for the UK to have a credible, actionable and – critically – investable plan to take hydrogen from being a nascent technology today to an essential part of the net zero economy over the next few decades. Once headline targets have been supported by specific deliverables with associated timelines, a clearer and realistic picture will emerge of the UK's ability and ambition to be a leader in the global hydrogen economy.

“Once headline targets have been supported by specific deliverables with associated timelines, a clearer and realistic picture will emerge of the UK's ability and ambition to be a leader in the global hydrogen economy.”

The UK government should therefore, in consultation with industry, consider the role it wants to play in the overall hydrogen global economy, and how it should therefore incentivise and invest in different parts of the value chain to support that ambition.

This will involve a realistic assessment of the different strengths that the UK might have, whether that is on the production of green or blue hydrogen, or in the development of end-use innovation such as Sustainable Aviation Fuel and supporting engines. The UK can then consider how that can be a unique global competitive advantage in considering both outward export potential as well as attracting international investment. This should recognise that it may not be possible for the UK to 'win' in everything, and that consideration may be needed as to where along the hydrogen value chain there is the opportunity to have greatest impact and leadership.

The UK should also consider overall targets of hydrogen end use and capacity, and therefore its expected requirements with regards to import of hydrogen to meet expected demand. Doing this work would better allow the government to begin to consider hydrogen use implications as part of wider trade strategy. This might include how it considers different sources of fuels (including hydrogen) in upcoming Carbon Border Adjustment Mechanism policy, as well as its efforts around low carbon hydrogen certification to support international trade.



⁴⁷ Fitch Ratings. [U.S. Green Hydrogen Tax Credit Rules Pose Hurdles for Market Growth](#). March 2024.

⁴⁸ The White House. [Biden-Harris Administration Announces Regional Clean Hydrogen Hubs to Drive Clean Manufacturing and Jobs](#). October 2023.

Recommendation 2: Provide policy certainty through developing a detailed government hydrogen roadmap.

Recommendation 2: The government should deliver a detailed hydrogen roadmap that sets out specific enabling policy actions and investment pathways to deliver headline production targets, against clear timelines. This should cover the full hydrogen value chain and be set within a broad National Transition Plan for the UK so that market participants can understand the role the government envisions hydrogen playing in the wider net zero transition.

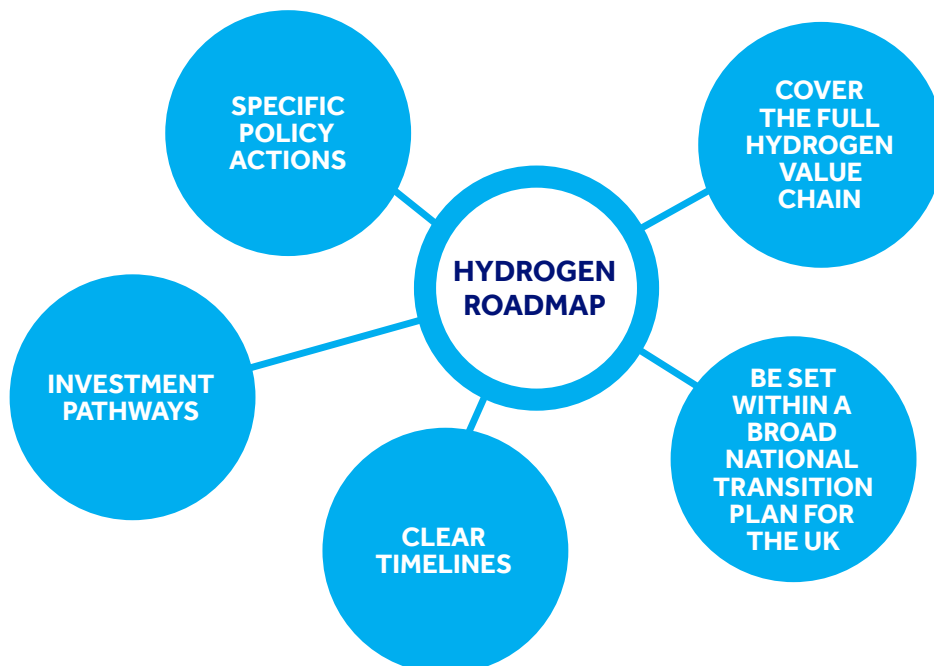
There is a need for a comprehensive roadmap that underpins the high-level strategy for the sector, supported by implemented policy and plans for support along the entire value chain. This should be set clearly in the context of an articulation of the role of the UK in an internationally competitive global hydrogen economy (Recommendation 1) as well as the UK's needs from hydrogen in the context of its own net zero goals. This is particularly relevant under the new government, where early statements indicate an increased ambition for hydrogen production, but without further detail or plans needed to deliver these higher targets.

Central government delivery of an actionable and specific roadmap would reconfirm the new government's commitment to hydrogen, provide pathways against which investment can be allocated, and boost wider confidence in hydrogen investment.

The previous government published a range of documents, including a Hydrogen Strategy and Investment Roadmap. Whilst welcome, the enabling policy sitting under these strategies was often slow, and there has been a wider disconnection between the production aims for hydrogen and the support for the end-use cases of this hydrogen. Interim targets for this production had been set, but there was limited visibility of tracking and delivery of these targets, as well as of detailed plans to scale up from the previous 2GW target for 2025 to the 10GW target for 2030.

In addition, although there is clarity on some of this information provided already by government, it was clear from feedback we received that this was not being transmitted as a coherent whole to market participants. In many cases, the information was spread over multiple strategies or documents (such as the Hydrogen Strategy, The Hydrogen Net Zero Investment Roadmap, and individual sector strategies such as the Jet Zero Strategy or Clean Maritime Plan). A comprehensive hydrogen roadmap could usefully bring these together in one place, providing a snapshot of targets and enabling policy across the value chain.

//
The government should deliver a detailed hydrogen roadmap that sets out specific enabling policy actions and investment pathways to deliver headline production targets."



To support this, a comprehensive hydrogen roadmap should:

STRATEGY

- Present a clear view on where and how clean hydrogen can have the greatest impact and value in achieving decarbonisation goals, considering factors such as climate and economic return, supply chain considerations, and jobs and economic growth.
- Develop policy to accelerate the nascent green hydrogen market into a mature, deep and liquid one, alongside clear policy interventions in the interim before that is achieved. This is particularly important given the scale up of the new government’s green hydrogen ambition, which creates an even more ambitious landing zone.
- Set out requirements for hydrogen via a wider trade and import policy, to ensure the UK is in a position to import the hydrogen required to meet the gap between 2030 hydrogen production targets and anticipated 2030 hydrogen demand (see Recommendation 1).
- Directly link to the wider cross-economy net zero strategy, and be situated within a broad National Transition Plan for the UK so that market participants can understand the role the government envisions hydrogen playing within the wider net zero transition. This is likely to include particular focus on speeding up planning and permit permissions, investing in the skills needed to support hydrogen deployment, and an ambitious vision on the transportation and storage network needed to support hydrogen delivery and use. A comprehensive roadmap and strategy should understand and quantify these barriers and dependencies, and set out specific policy actions with associated timelines to overcome these.

FINANCE

- Set out actionable timeframes for future Hydrogen Allocation Rounds that align with the overall targets, ensuring financing agreements and contracts are completed rapidly after award allocation to enable construction and build to begin in good time.
- Set out a roadmap, with timings for consultation, design, and launch, for the move towards price-based competitive allocation processes led by the market though supported by government (see Recommendation 4). This will be needed to support longer-term hydrogen production targets beyond 2030.

VALUE CHAIN

- Set out detail on ambitions for hydrogen end use, and supporting policy to enable scale up and delivery of those ambitions.
- Be clear on the supporting infrastructure needed to support hydrogen scale up and deployment (e.g. pipelines, wide transport and storage networks).
- Understanding the multitude of hydrogen uses, set achievable targets for use of hydrogen for storage, as well as the development, financing and approval of hydrogen transport and storage infrastructure needed. This should be clearly placed within the wider calculations for and investment in grid storage and strategy.
- Relatedly, ensure that the first Hydrogen Storage Allocation Round has an ambitious enough target to supercharge investor interest and really drive forward the development of hydrogen as part of the high levels of long duration energy storage needed for a clean power 2030 system.

Delivering this successfully will likely involve join up across multiple different areas of policy, including wider industrial strategy. This will help to ensure investors and hydrogen companies can understand the overall cross-economy vision for hydrogen, how different policy levers and approaches will support this, and be confident as to the timelines for the

support and expectations on industry and finance. Clear messaging directed at businesses, investors, consumers and other end users to encourage planning for take up of hydrogen, can support understanding of, engagement with, and confidence in, the roadmap once it has been finalised.



Recommendation 3: Deliver demand-side policy intervention to secure a robust hydrogen ecosystem across the value chain.

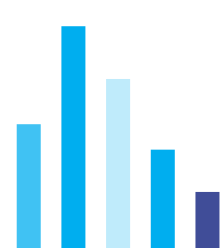
Recommendation 3: The government should work with industry to develop and implement clear demand-side interventions for key sectors where the government wants to prioritise hydrogen use as part of decarbonisation goals. This includes use of tools such as quotas or mandates, mandatory use directives, or bans on fossil fuel use by certain dates.

Much of the government support for hydrogen has, to date, been focused on boosting the supply side and scaling up production. Yet, whilst this has and continues to be important, a lack of actual or anticipated demand can potentially inhibit finance, as investors may not have a clear line of sight of potential demand for hydrogen to support the business case for investment in production. This is not a UK-only challenge – research by the International Energy Agency has found that, globally, targets for creating hydrogen demand are less than half of those for production.⁴⁹ Policy support for stimulating

demand, creating deep and liquid markets for offtake, will provide essential underpinnings of successful delivery of revenue support mechanisms aimed at stimulating hydrogen supply (see Recommendation 4).

As part of its development of a detailed and specific hydrogen roadmap (Recommendation 2), it is essential that the government comprehensively sets out its approach to demand-side interventions and support. In partnership with industry, government should consider in which sectors hydrogen has the potential to have the most impactful role, and put forward sector-specific approaches to scaling demand and hydrogen offtake. This could involve policy tools such as quotas or mandates, mandatory use directives, or bans on fossil fuel use by certain dates. The most appropriate intervention to stimulate demand will depend on the individual sector and use cases, as well as the current state of hydrogen use and development. As such, the government should consult closely with companies both producing and using hydrogen, as well as investors, to ensure it drives forward measures that will have the greatest impact.

“ The government should work with industry to develop and implement clear demand-side interventions for key sectors where the government wants to prioritise hydrogen use as part of decarbonisation goals.”



⁴⁹ International Energy Agency. [Global Hydrogen Review 2023](#). 2023.

Recommendation 4: Retain a credible and bankable revenue support mechanism, designing effective structures to support a mature steady-state and price-based competitive allocation process.

Recommendation 4: The government must ensure its clean hydrogen revenue certainty mechanism remains credible as it matures to a steady-state, price-based competitive allocation process, using the tool to incentivise and support the development of a robust green hydrogen market.

There is a range of existing financial support from government for hydrogen, including direct funds as well as revenue support mechanisms. Yet there is a need to ensure these are best aligned with the wider hydrogen roadmap, and are being deployed to the points on the value chain most in need of de-risking to support private sector investment. The new government is committed to increasing the amount of public finance support for hydrogen – including £500m committed via the new National Wealth Fund – and it should ensure it maximises the use of these public finance envelopes by aligning its allocation with the robust central hydrogen roadmap (Recommendation 2) and targeting areas most in need of de-risking to attract private capital. This is especially important in light of the generous approaches to public finance in competitor jurisdictions.

Just as important will be ensuring that the hydrogen revenue support mechanism matures to deliver the hydrogen production capacity needed to meet the UK’s ambitions for both supply and offtake.

The UK was a leader in setting up the world’s first national clean hydrogen scheme, launching the new Contracts for Difference (CfD) arrangement in 2021 via the Hydrogen Allocation Rounds (HAR). These models have had a positive impact in channelling finance to hydrogen production, with HAR1 supporting 125MW production capacity,⁵⁰ and HAR2 aiming to deliver up to 875MW production capacity.⁵¹

However, the HAR process remains government-led, with the rounds requiring bilateral negotiations with individual projects, limiting their scale. Consideration therefore needs

to be given on how to move to a more steady-state, price-based competitive allocation process that supports offtake. This could be a significant step forward for the burgeoning hydrogen sector in the UK. These agreements provide upfront certainty around production offtake, creating pricing confidence and stability. They would offer financial security to emerging companies, attract investment, lower production costs, and support the shift towards a sustainable energy future – creating a more steady-state step up from the HAR model to date. Such policy measures could support the development of the hydrogen sector and increase the chance that it reaches its full potential.

As government considers the optimal revenue certainty mechanism on a steady-state, price-based competitive allocation process, there are various models that could be considered. These include a ‘buyer of last resort’ mechanism, wherein a government scheme provides a guaranteed ‘backstop’ route to market at a specified discount to the market; or a make whole / ‘top up’ payment proposal, which in effect provides government support to compensate projects like-for-like should a producer fail to secure a buyer for the hydrogen. Both options could be designed to avoid the need for the UK government to build a separate organisation to physically buy, store, and trade hydrogen, whilst still providing producer certainty around payment for produced hydrogen. The buyer of last resort mechanism would operate more akin to the existing CfD mechanisms that have successfully provided revenue certainty and support for renewables over several rounds. An illustration of what this could look like can be found in **Box 2**.

“
The new government is committed to increasing the amount of public finance support for hydrogen – including £500m committed via the new National Wealth Fund.”



⁵⁰ Department for Energy Security & Net Zero. [Hydrogen Production Business Model / Net Zero Hydrogen Fund: HAR1 successful projects](#). December 2023

⁵¹ HM Government. [Hydrogen Allocation Round 2](#). December 2023.

Box 2: What might a buyer of last resort/government backstop mechanism look like?

SUMMARY	Government support ensures that there is a buyer of last resort for produced hydrogen.
DETAILS	<p>Under this design, a government scheme provides a guaranteed 'backstop' route-to-market at a specified discount to the 'market price', securing the offtake from the producer if a buyer cannot be found in the private market.</p> <p>The hydrogen producer enters into a contract/backstop agreement which guarantees that the government as the 'buyer of last resort' will step in and purchase the hydrogen at a pre-agreed price if a buyer for the hydrogen cannot be found. This price should be sufficiently discounted to ensure it is a genuine last resort option. Given there is not yet a functioning liquid market for green hydrogen against which to track prices, this could be linked to the initially agreed reference price, with the discount set as an equity pain mechanism rather than equity and senior debt. This would prevent bankability issues with senior lenders. It would have to be structured to ensure it maintains a discount in relation to the market as that evolves, to ensure it is a genuine last resort option. Mechanisms to deliver this could include a progressive increase to the discount over time to incentivise sponsors to find offtakers, but always floored at the point where equity takes the full pain.</p> <p>This obligation/right lasts for as long as the hydrogen support business model, rather than time limiting the contract, as is done in other CfD arrangements. This will be needed to address the stranded asset risk of there not being an offtaker for the hydrogen produced, and mitigate the risk of venting hydrogen that cannot be sold. However, government could consider whether it needs to structure the contract to give it a discontinuance right under this more long-term arrangement, such as requiring compensation on termination at least sufficient to cover senior debt and related hedging.</p>
BENEFITS	<ul style="list-style-type: none"> • This system incentivises hydrogen production by ensuring offtake, as well as ensuring the hydrogen is actually used (vs just vented because it was not sold). • This structure can alleviate some of the current financing concerns, including: i) the covenant strength of the offtaker; and ii) the lack of a deep and liquid offtake market. • The contract establishes the bottom price for the hydrogen, to ensure that minimum operating costs for the hydrogen producer are always covered.
PRECEDENTS	<ul style="list-style-type: none"> • Offtaker of last resort in the low carbon CfD.⁵² • Buyer of last resort in the Sustainable Aviation Fuel consultation⁵³ (or 'end of life' Renewables Obligation Certificates post-2027).

⁵² HM Government. [Power Purchase Agreement scheme: Offtaker of Last Resort](#). April 2020.

⁵³ Department for Transport. [Sustainable Aviation Fuels Revenue Certainty Mechanism](#). 2024.

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A pragmatic approach to clean hydrogen
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