

Hydrogen Net Zero Investment Roadmap

Leading the way to net zero

April 2023



The UK is leading the charge towards a net zero, nature-positive future



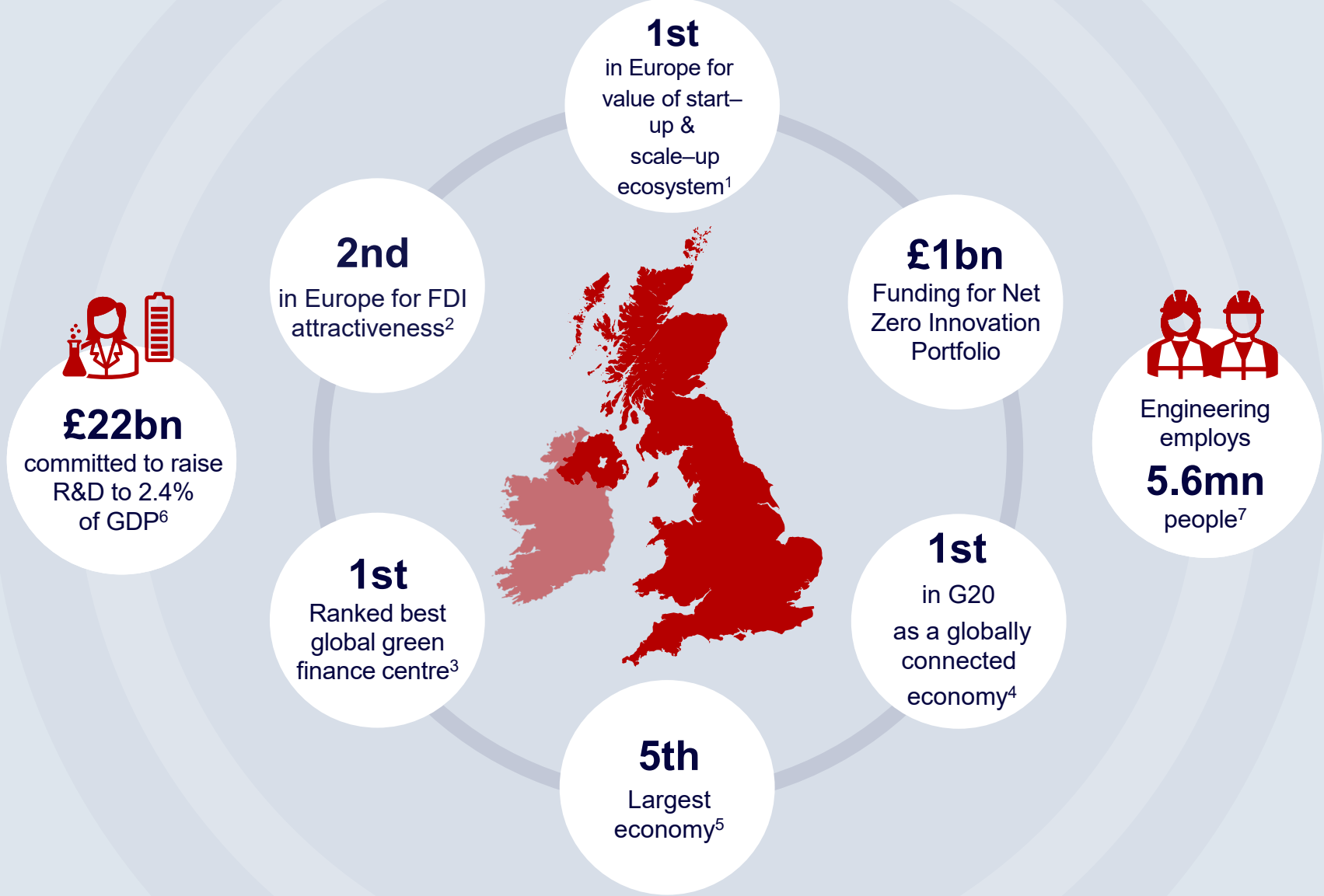
With a world leading policy environment a strong financial offer to investors, the UK already has an exciting pipeline of projects for hydrogen use in transport, industry and power, as we deliver on our ambitious plans for H2.



Rt Hon Grant Shapps MP – Secretary of State for Energy Security and Net Zero

- From tackling the energy needs of our most hard to abate industries, acting as a store to help balance our energy supply, and huge potential across transport, low carbon hydrogen is critical to UK energy security, presents a significant growth opportunity, and will help us reach net zero.
- Moreover, the UK's geography, geology, infrastructure, innovation and expertise make us well suited to develop rapidly a low carbon hydrogen economy, with the potential to become a global leader.
- We have doubled our ambition to up to 10GW of low carbon hydrogen production capacity by 2030, with at least half of this coming from electrolytic hydrogen, drawing on the scale up of UK offshore wind, other renewables and new nuclear.
- Last year we launched our first electrolytic hydrogen allocation round, offering capital support from our Net Zero Hydrogen Fund (NZHF) and revenue support from our Hydrogen Production Business Model (HPBM), and have published a shortlist of 20 projects that we intend to enter due diligence with.
- Through this first electrolytic hydrogen allocation round, we expect to award contracts of up to 250MW of new production capacity, which could unlock hundreds of millions of pounds of investment across the UK. We intend to launch a second allocation round in Q4 2023, aiming to award contracts of up to 750MW.
- A new hydrogen economy provides opportunities for UK companies and workers across our industrial heartlands. Government analysis suggests that by 2030 the sector could support over 12,000 jobs and unlock up to £11 billion in private investment.

The UK has one of the world's most attractive business and investment environments



- Open, liberal economy
- Stable regulatory regime with independent legal system
- Globally competitive and transparent tax regime
- Generous R&D and patent tax relief
- The UK-EU Trade and Cooperation Agreement allows zero tariff market access with the EU
- Flexible labour market
- World class professional services sector supporting businesses with insurance and finance

References: ¹Dealroom; ²EY Attractiveness Survey June 2022; ³Z/Yen Global Green Finance Index 2022 (GGFI 10); ⁴DHL Global Connectedness Index 2021; ⁵Official statistics converted at market exchange rates as a source; ⁶UK Innovation Strategy (2021); ⁷Workforce trends (2022)

Why invest in UK Hydrogen?

A sector with striving ambitions and major opportunities for growth

Up to
10GW
ambition by 2030,
at least half from
electrolytic
hydrogen

£240mn
Net Zero Hydrogen
Fund provides
CAPEX/DEVEX
support

Up to
35%
of UK's energy
consumption could
be hydrogen by
2050

20GW
of potential hydrogen
projects identified in
the UK pipeline
(through to 2037)

More than
£150mn
will be spent from the
Net Zero Innovation
Portfolio on hydrogen
innovation

Up to
£18bn
private financial capacity
available from UK
Infrastructure Bank for
sectors including H2

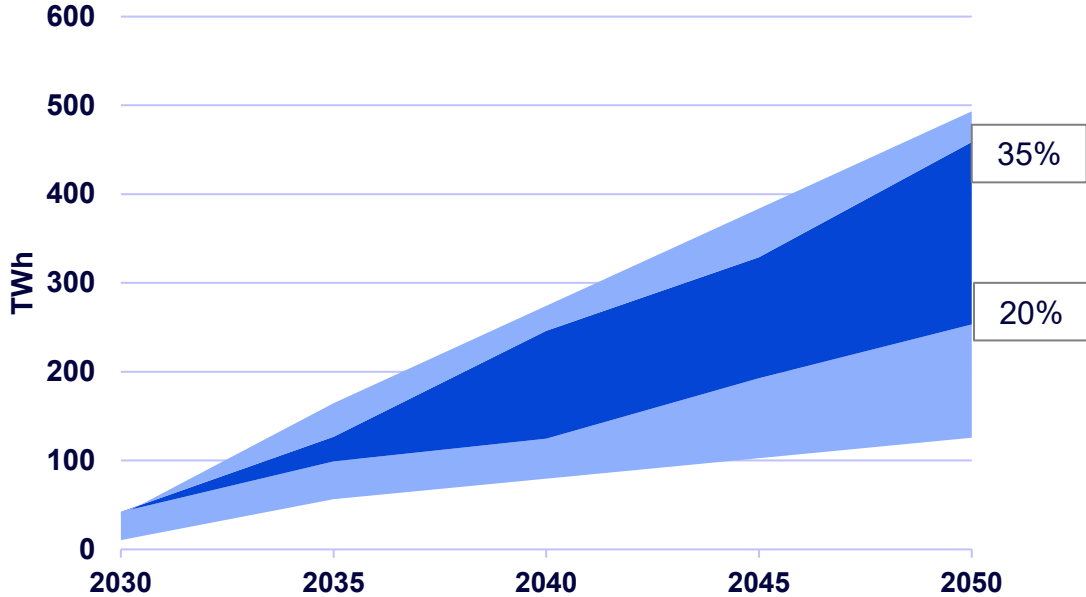
Opportunities in an advanced & growing sector:

- **Revenue support:** Hydrogen Production Business Model (HPBM) focusing initially on electrolytic & Carbon Capture Usage Storage (CCUS)-enabled hydrogen production.
- **CAPEX & DEVEX support:** Successful applicants announced for strands 1 and 2 of NZHF with a second window due to open in Spring 2023.
- **Joint HPBM & NZHF support:** Aim for contracts from the first electrolytic hydrogen allocation round, jointly offering NZHF capex and HPBM revenue support, to be awarded in Q4 2023. Government also intends to launch a second allocation round in Q4 2023.
- **Standards and Certification:** A clear standard for Low Carbon Hydrogen (published 2022) and a new certification scheme (due 2025).
- **Existing natural assets and expertise:** Salt caverns, depleted oil & gas fields and gas pipeline infrastructure can be redeployed.
- **Projects under development:** Nearly 20GW known projects in the pipeline, in all countries and regions of UK including CCUS enabled (blue) and electrolytic hydrogen.
- **Leading UK companies:** Over 200 companies working on hydrogen and fuel cell technologies in the UK.

Hydrogen will play a crucial role in future of the UK's energy system

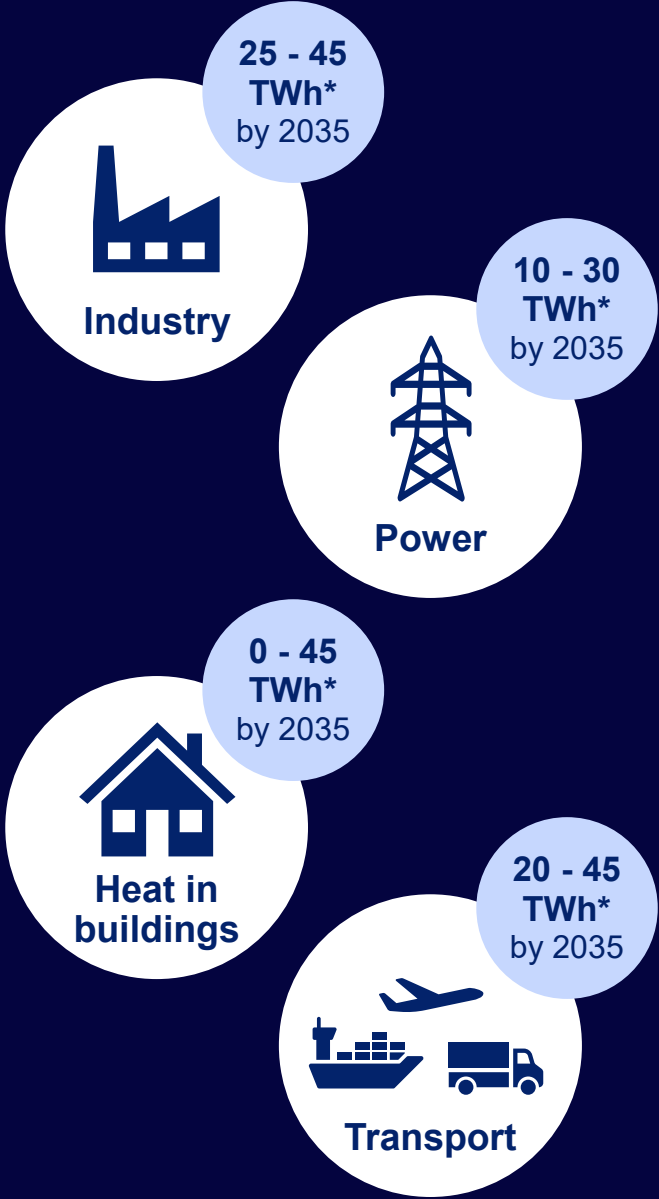
- Our ambition for up to 10GW of low carbon hydrogen production capacity by 2030 will help to create a thriving hydrogen economy in the UK, supporting the deep decarbonisation of key UK sectors, particularly in 'hard to electrify' industries, and can provide greener, flexible energy across power, heat, transport, and potentially heat in buildings.
- Our drive for renewables makes hydrogen especially valuable for energy security and independence by providing flexibility and energy storage: excess renewable electricity can be used to produce hydrogen, which can be stored over time and used to generate electricity when there is less sun or wind to power the grid.
- Analysis for the UK Hydrogen Strategy shows that low carbon hydrogen could play a key role in UK energy system potentially becoming comparable in scale to existing electricity use by 2050.

Hydrogen demand could be 20-35% of UK final energy consumption by 2050



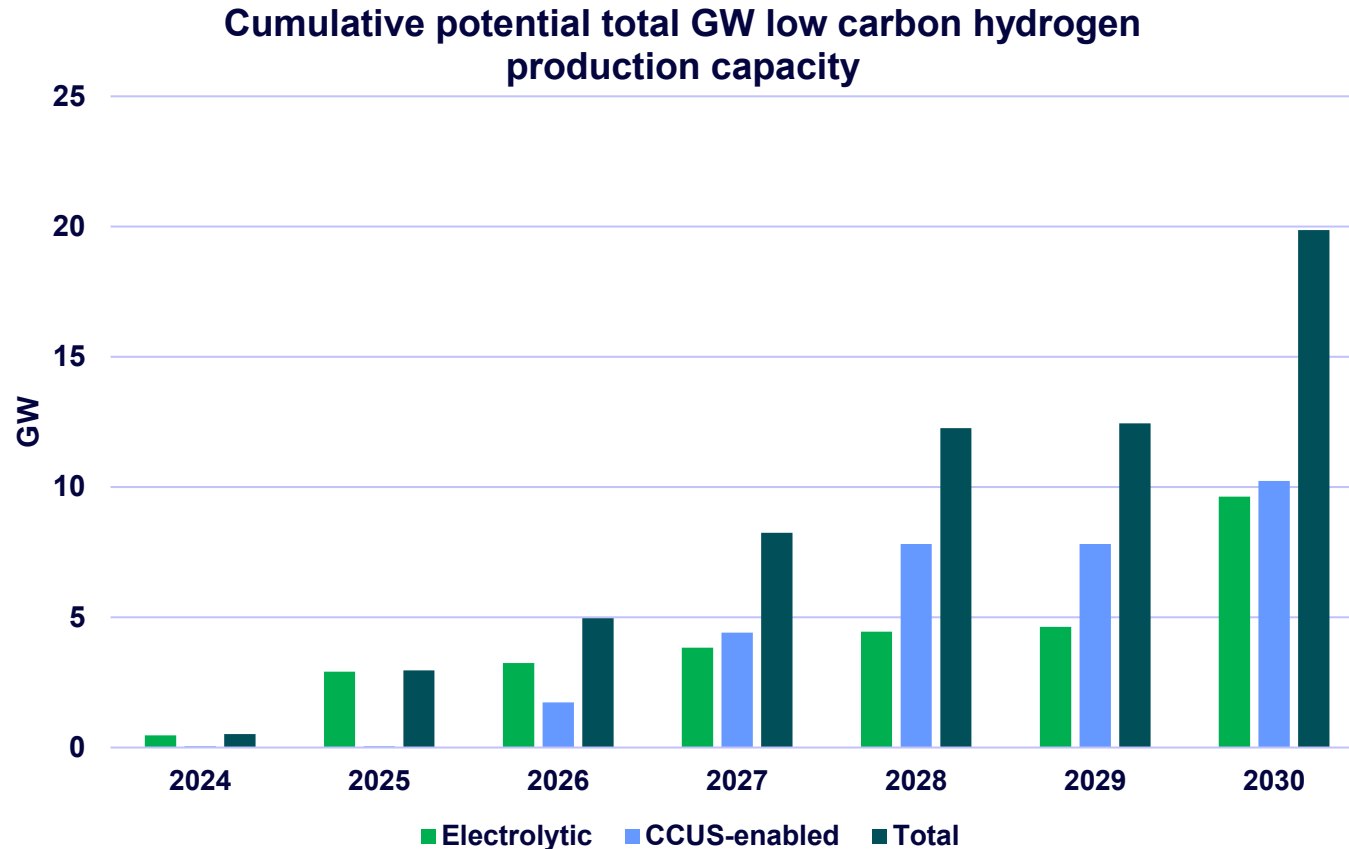
% = hydrogen as proportion of total energy consumption in 2050.

Source: Central range – illustrative net zero consistent scenarios in CB6 Impact Assessment. Full range – based on whole range from UK Hydrogen Strategy Analytical Annex. Final energy consumption from ECUK (2019).



*Illustrative demand based on analysis for the UK Hydrogen Strategy (2021)
<https://www.gov.uk/government/publications/uk-hydrogen-strategy>

The known pipeline of hydrogen projects shows potential for growth and investment



Source: DESNZ Low Carbon Hydrogen production pipeline. Note that all figures here are based on potential deployment and scale up according to the projects themselves, and does not relate to decisions on individual projects or volume support through specific funding allocation windows.

Hydrogen Production

- A growing pipeline of over 250 projects across a range of low carbon hydrogen production pathways provides confidence in the future development of the UK hydrogen economy.
- The first electrolytic allocation round is expected to award contracts totalling up to 250MW of capacity, with the first projects operational in 2025, kickstarting the UK low carbon hydrogen production sector.
- Intend to launch a second allocation round in Q4 2023 and aim to award up to 750MW of capacity in early 2025, to deliver up to 1GW of electrolytic hydrogen production capacity in construction or operation by 2025.
- Announced two CCUS-enabled hydrogen projects announced as part of the Track-1 Cluster Sequencing process, plans to establish two further CCUS clusters in Track-2, as well as enable further expansion of the Track-1 clusters.

Supportive policy and regulatory environment

World-leading policy framework

- The **UK Hydrogen Strategy (August 2021)** set out our approach to supporting multiple hydrogen production technologies, including electrolytic & CCUS-enabled hydrogen.
- The **British Energy Security Strategy (April 2022)** doubled our ambition to up to 10GW of low carbon hydrogen production capacity by 2030, subject to affordability and value for money, with at least half coming from electrolytic hydrogen.
- **£240 million Net Zero Hydrogen Fund (NZHF)** launched in April 2022 to support deployment of production projects through development and capital grants.
- The **Hydrogen Production Business Model (HPBM)** launched its first electrolytic allocation round in July 2022 to offer long-term revenue support, with a second round due to launch in 2023. Beyond the second round, we intend to move to price competitive allocation in 2025, subject to legislation and market conditions.
- **CCUS technology**, including CCUS-enabled hydrogen production, deployed across two industrial clusters by the mid-2020s, and across a further two clusters by 2030.
- **Powering up Britain (March 2023)**, we confirmed the first 15 winning projects from the £240 million Net Zero Hydrogen Fund, named the two CCUS-enabled hydrogen projects moving forward on the Track-1 clusters; published a shortlist of 20 projects we intend to enter due diligence with for the first electrolytic hydrogen allocation round, and announced our intention to open two further hydrogen funding rounds in 2023.

Building infrastructure and supply chains

- Commitment to design **new business models for hydrogen transport and storage infrastructure by 2025**. Consultation published in August 2022 seeking stakeholder views on high-level design options for these business models.
- The **North Sea Transition Deal (March 2021)** will support workers, businesses, and the supply chain through a transition to a net zero future by harnessing the industry's existing capabilities, infrastructure and private investment potential to exploit new and emerging technologies, including hydrogen production and CCUS.
- Work has begun as part of the **Supply Chain Roadmap** to increase pipeline visibility to support the supply chain to identify forthcoming opportunities and identify gaps, which includes work led by Offshore Energy UK on a **Supply Chain Visibility Tool**.
- Up to **£18 billion private financial capacity available from UK Infrastructure Bank (UKIB)** or sectors including hydrogen, which has been identified as an investment opportunity in its first strategic plan. Projects are encouraged to contact UKIB about their financing needs. Subject to proposals meeting its investment principles, the bank stands ready to invest.
- Government will 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.

Supportive policy and regulatory environment

Power

- In the **Energy Security Plan**, we announced our intention to consult in 2023 on the need and potential design options for market intervention to support hydrogen to power.
- Consultation on the **Capacity Market** (CM) published in January 2023 sought views on enabling unabated gas capacity to decarbonise, subject to security of supply, and strengthening emissions limits for new build and refurbishing plants from 2034.

Transport

- Spring 2023 guidance enhanced the flexibility of the **Renewable Transport Fuel Obligation** for electrolytic hydrogen allowing suppliers to blend additional and non-additional renewable energy in order to reach the GHG threshold and qualify for support.
- £20 million additional funding for **Tees Valley Hydrogen Hub** to support large scale trials and demonstration of hydrogen use across multiple transport modes and infrastructure.

Industry

- **£315 million Industrial Energy Transformation Fund** supports the deployment of fuel switching technologies, with various innovation programmes for hydrogen end-use funded through the **£1 billion Net Zero Innovation Portfolio**.
- Sponsoring British Standards Institute to develop a publicly available specification for **hydrogen-ready industrial boilers**, supporting faster and cheaper fuel switching to hydrogen.

Blending & Heating

- Government is aiming to make a policy decision on **blending into the gas distribution networks** by end of 2023 (subject to strategic and safety cases).
- Government is supporting industry to deliver a **100% hydrogen heating neighbourhood trial by 2024** and a village trial by 2025. The knowledge and experience gained in delivering trials in communities, together with the results of our wider R&D and testing programme, will enable the Government to take strategic decisions in 2026 on the role of hydrogen in decarbonising heat.
- The **Hydrogen Skills and Standards for Heat programme** is developing standards for hydrogen gas installations as well as training frameworks for installers. These will support future trials and conversion of the existing gas system for hydrogen heating.

Stimulating demand and making the case for use of hydrogen



Incentives to innovate and invest

Supportive standards and regulatory environment	<ul style="list-style-type: none">▪ Low Carbon Hydrogen Standard (published April 2022) and Hydrogen Certification Scheme (planned for 2025) to support policy ambitions.▪ Hydrogen Regulators' Forum to determine current and future non-economic regulatory responsibilities across the hydrogen value chain.
Skills & capability	<ul style="list-style-type: none">▪ Decarbonising our fuel supply and driving the new green industry of hydrogen has the potential to support 12,000 jobs in 2030 across production, transport, and storage alone.▪ We are supporting Institutes of Technology across England with £120 million for institutes specialising in delivering high technical education and developing green skills.▪ We are reforming the skills system through Local Skills Improvement Plans. We have instituted a Lifetime Skills Guarantee supporting workers gain the skills they need to transition to the green economy, including through targeted support for retraining.▪ In England, DfE is investing an additional £3.8 billion in skills by 2024-25. This includes funding for programmes to support green skills, including apprenticeships, T levels and Skills Bootcamps.▪ Free Courses for Jobs supports eligible adults to gain high value Level 3 (A level-equivalent) qualifications, many of which can help them to transition to or specialise in roles in the green economy.▪ The Green Jobs Delivery Group has been established as the central forum through which government and industry are working together to accelerate the supply of a skilled workforce for our low carbon sectors and hydrogen is included as part of the group's workplan.▪ The North Sea Transition Deal has developed an integrated People and Skills Plan to ensure the highly skilled oil and gas workforce with skills transferability to adjacent energy sectors can be deployed to develop our hydrogen industry.
Innovation support	<ul style="list-style-type: none">▪ Public funders like the Department for Energy Security and Net Zero, the Department for Business and Trade, and UK Research and Innovation continue to fund hydrogen innovation including through the flagship £1 billion Net Zero Innovation Portfolio (NZIP). In late 2022/early 2023;<ul style="list-style-type: none">• The £60 million NZIP Low Carbon Hydrogen Supply 2 competition invited tenders from 23 feasibility projects for follow-on support, and has awarded £19.4 million to 5 projects to build demonstrations of cutting-edge hydrogen technologies in the UK.• The NZIP Hydrogen from Bioenergy with Carbon Capture and Storage (BECCS) competition Phase 1 began with 22 scoping projects concluding in Jan 2023. Phase 2 has £25 million to support the best Phase 1 projects develop demonstration units.• Innovate UK awarded £6 million to Hydrogen Innovation Initiative's Seed programme, a collaborative initiative between the Catapult Network and other centres.

Addressing barriers to investment

Investments considered high risk or low certainty on returns

- The **Cluster Sequencing process** maps a logical sequence for CCUS deployment in the UK. CCUS-enabled clusters will be the starting point for a new carbon capture industry.
- CAPEX and OPEX supporting mechanisms such as the **NZHF, HPBM, future Transport & Storage Business Models** (expected 2025).

Need for clarity on future demand – both offtake ambition and arrangements/ model

- Policy decision **on blending hydrogen** into the existing gas distribution network due in 2023 which can act as ‘demand sink’.
- Enhanced flexibility of **Renewable Transport Fuels Obligation** (RTFO) guidance.
- The **£20 million Tees Valley Hydrogen Hub** Phase Two competition will deploy hydrogen refuelling infrastructure and vehicles in Tees Valley to explore how hydrogen works in a number of transport modes.
- Government intends to consult in 2023 on the need and potential design options for market intervention to support **hydrogen use in the power system**.
- We are exploring opportunities **to export hydrogen**, including from the UK to continental Europe, where we see increasing hydrogen demand alongside established energy trading and interconnection with the UK.

Addressing barriers to investment

Certainty/ visibility of pipeline - i.e. regularity of project awards

- We have now published the Track-1 Project Negotiation List which includes 8 projects which we have selected through the Cluster Sequencing Process to progress to negotiations to form the first two CCUS clusters, **based in HyNet and the East Coast Cluster**.
- We have **launched Track-2 of the CCUS cluster sequencing process** to establish two further CCUS clusters and we will launch a process within 2023 to enable further expansion of Track-1 clusters
- Regular updates on hydrogen production policy development, including the production pipeline, in **Hydrogen Strategy updates** to the market.
- **Successful applicants announced for strands 1 and 2 of NZHF** with a second application window due to open in spring 2023.
- Government expects to award contracts totalling up to **250MW of capacity from the first electrolytic hydrogen allocation** round in Q4 2023, subject to affordability and value for money. The Government intends to launch a second allocation round in Q4 2023 with an aim to award contracts up to 750MW of capacity and then to move to price competitive allocation in 2025, subject to legislation and market conditions.

Lack/low availability of skilled workforce

- Upskilling of existing workforce in neighbouring industries such as **oil and gas**.
- **Green Jobs Delivery Group** working with industry and others to ensure investment in skills needed across the value chain and drive local and regional opportunities, helping to level-up across our industrial heartlands.
- Continue to deliver relevant **green T-levels, apprenticeships and skills bootcamps**.

Cost of technology, materials or labour

- **Industrial Fuel Switching programmes** supporting innovation in the development of pre-commercial fuel switch and fuel switch enabling technologies for the industrial sector, to help industry switch from high to lower carbon fuels.
- **North Sea Transition Deal** supports the re-skilling of UK's world-leading oil and gas workforce.

Stimulating hydrogen production investment



Deployment investment needed by 2030 to deliver up to 10GW of hydrogen production capacity.

Potential investment opportunities:

- Debt and equity finance opportunities through life cycle for 'first of a kind' electrolytic and CCUS-enabled hydrogen production projects awarded NZHF and HPBM support.
- **From 2023 - 2025** investment is needed in R&D, feasibility, FEED and construction. Opportunities for equity as well as debt investors such as existing manufacturers, oil & gas majors, private equity firms, sovereign wealth funds, commercial banks and sector incumbents.
- **From 2025 - 2030** investment needed for full project development cycle from inception to operations (excluding R&D) from equity investors including electrolyser manufacturers, oil & gas majors, asset managers and private equity firms. Based on the existing pipeline of projects we see significant demand and potential investment opportunities for the following areas of the supply chain:
 - Services such as engineering, construction management and commissioning
 - Manufacturing materials such as reformers, compressors, piping, instrumentation & controls equipment, civil & structural materials, electrolyser packages, water treatment and cooling packages and electrical equipment and materials

Examples of planned projects:

Electrolytic

bp HyGreen: Up to 500MW of electrolytic hydrogen located in the Teesside industrial cluster. Read more [here](#).

RWE Pembroke Net Zero: Located in the South Wales Industrial Cluster, progressing plans to develop 100-300MW of electrolytic hydrogen production. Read more [here](#).

EDF and Hynamics Tees Green: Scaling up to a potential 500MW of electrolytic hydrogen to supply industry and decarbonise local port operations. Read more [here](#).

CCUS-enabled hydrogen

HyNet HPP1: Up to 350MW of low carbon CCUS-enabled hydrogen production within Hynet. Read more [here](#).

bp H2Teesside: Up to 708MW of low carbon CCUS-enabled hydrogen production within the East Coast Cluster. Read more [here](#).

PLEASE NOTE: Any hydrogen projects cited as examples in this Roadmap are indicative only. Any reference to such projects has no bearing on their likelihood of selection under current or future subsidy schemes

Stimulating transport & storage investment



Investment needed by 2030 in infrastructure to enable growth of the UK hydrogen economy.

Potential investment opportunities:

- **By 2025** Business models for Transport & Storage are being designed to unlock/de-risk investment. Although first hydrogen projects are expected to be developed close to end-users with specified off-takers, as demand grows, hydrogen transporting and storage will be vital to connecting and balancing supply and demand.
- **From 2023 - 2025** Investment required in feasibility studies, pre-FEED and FEED from equity investors such as manufacturers, energy companies and storage specialists. Plus opportunities for debt investors such as commercial banks and sector incumbents.
- **From 2025 - 2030** Storage developments: investment required in feasibility studies, pre-FEED and FEED, as well as construction from natural gas network operators, H2 producers/off-takers, H2 storage operators, private equity firms, infrastructure funds. Potential supply chain investment opportunities include:
 - Pressure vessels, control valves and instrumentation, leveraging existing UK capabilities servicing petrochemicals and oil & gas industries.
 - Short/medium/long range storage provision to balance across seasons and provide resilience to broader market.
 - Inter-cluster transmission pipelines to connect industrial centres and provide resilience as well as facilitate inland market.
 - Tube trailers as a form of both small-scale storage and non-pipeline distribution to support initial hydrogen economy.

Examples of projects:

Hydrogen Transport Projects

East Coast Hydrogen: Project led by NGN, Cadent, and NGG to build off Project Union to provide a hydrogen delivery network connecting producers to end-users in northeast England. Read more [here](#).

Cadent, HyNet: Project to construct and operate an onshore pipeline transporting hydrogen from CCUS-enabled production in northwest England to end users. Read more [here](#).

National Gas Transmission, Project Union: Proposed hydrogen national transmission system, or hydrogen “backbone”, repurposing around 25% of current gas transmission pipelines. Read more [here](#)

Hydrogen Storage Projects

Inovyn, Storengy: Proposed new and repurposing of salt caverns in Cheshire, currently used for natural gas storage, to store 1.3TWh of hydrogen. Read more [here](#).

SSE Thermal/Equinor: Proposed 0.32TWh salt cavern to store low-carbon hydrogen produced and used in the Humber region, potentially from 2028. Read more [here](#).

Centrica Rough: Following re-opening in 2022, Centrica aims to redevelop rough storage facility into a 10TWh hydrogen store. The hydrogen storage capacity is set to be developed in ~3TWh phases. Read more [here](#).

PLEASE NOTE: Any hydrogen projects cited as examples in this Roadmap are indicative only. Any reference to such projects has no bearing on their likelihood of selection under current or future subsidy schemes

NZHF, HAR1 & CCUS project updates March 2023

- There are 15 successful applicants from the Net Zero Hydrogen Fund (NZHF) strands 1 (DEVEX) and 2 (CAPEX) round 1 (April 2022) competition window.
- The first electrolytic hydrogen allocation round (HAR1) launched in July 2022. We have shortlisted 20 projects, totalling 408MW capacity, to proceed to the next stage. From this, we intend to award Hydrogen Production Business Model (HPBM) contracts to projects totalling up to 250MW capacity.*
- We have published the Track-1 Project Negotiation List which includes 2 CCUS-enabled hydrogen projects, 5 industrial carbon capture projects, and 1 power project which we have selected through the Cluster Sequencing Process to progress to negotiations to form the first two CCUS clusters, based in HyNet and the East Coast Cluster.

Shortlisted for HAR1

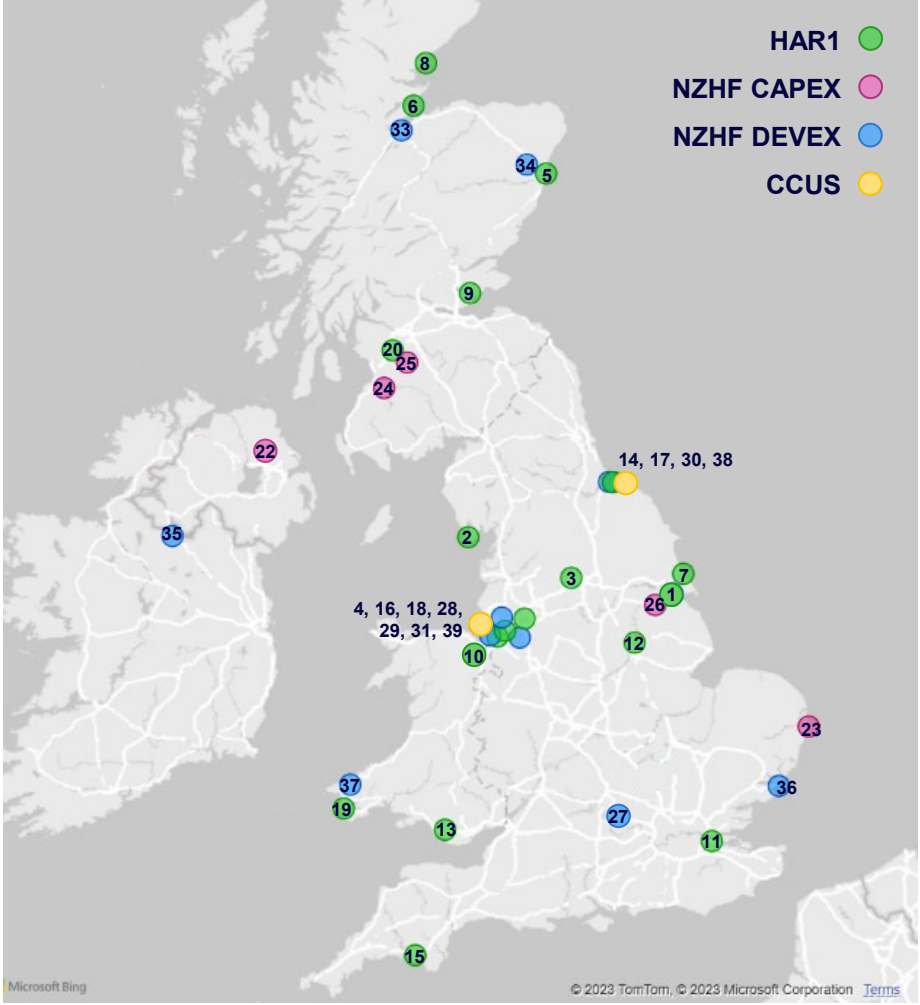
1	Aldbrough Hydrogen Pathfinder	SSE Thermal
2	Barrow Green Hydrogen	Carlton Power
3	Bradford Low Carbon Hydrogen	Hygen
4	Cheshire Green Hydrogen	Progressive Energy Net Zero
5	Commercial Scale Demonstrator	ERM Dolphyn
6	Cromarty Hydrogen Project	Pale Blue Dot Energy
7	Gigastack	Philips 66
8	Gordonbush Hydrogen Project (GBH2)	SSE Renewables
9	Green Hydrogen 1	RES and Octopus Green Hydrogen
10	Green Hydrogen 2	RES and Octopus Green Hydrogen
11	Green Hydrogen 3	RES and Octopus Green Hydrogen
12	H2 Production Plant at High Marnham	JG Pears
13	Hybont	Marubeni Europower
14	HyGreen Teesside	BP Alternative Energy Investments
15	Langage Green Hydrogen	Carlton Power
16	Quill 2	INOVYN ChlorVinyls
17	Tees Green Hydrogen	EDF Renewables Hydrogen
18	Trafford Green Hydrogen	Carlton Power
19	West Wales Hydrogen Project Phase 1	H2 Energy & Trafigura
20	Whitelee Green Hydrogen	Scottish Power

NZHF CAPEX

22	Ballymena Hydrogen Project	Ballymena Hydrogen
23	Hydrogen Lowestoft	Conrad Energy
24	Knockshinnoch Green Hydrogen Hub	Falck Renewables
25	Lanarkshire Green Hydrogen	Octopus Hydrogen
26	MCRU Integrated Hydrogen Delivery for a Fuel Cell Van Fleet Pilot	Centrica

NZHF DEVEX

27	Didcot Green Hydrogen	RWE Generation
28	Green Hydrogen St Helens	Progressive Energy
29	Green Hydrogen Winnington and Middlewich	Progressive Energy
30	H2NorthEast	Kellas Midstream
31	HyNet Hydrogen Production Plant 2 (HPP2)	Vertex Hydrogen
33	Inverness Green Hydrogen Hub	Getech Group
34	Kintore Hydrogen	Statera Energy
35	Mannok Green Hydrogen Valley	Mannok Build
36	Port of Felixstowe Green Hydrogen Project	Scottish Power
37	Trecwn Green Hydrogen Valley	Statkraft UK



CCUS

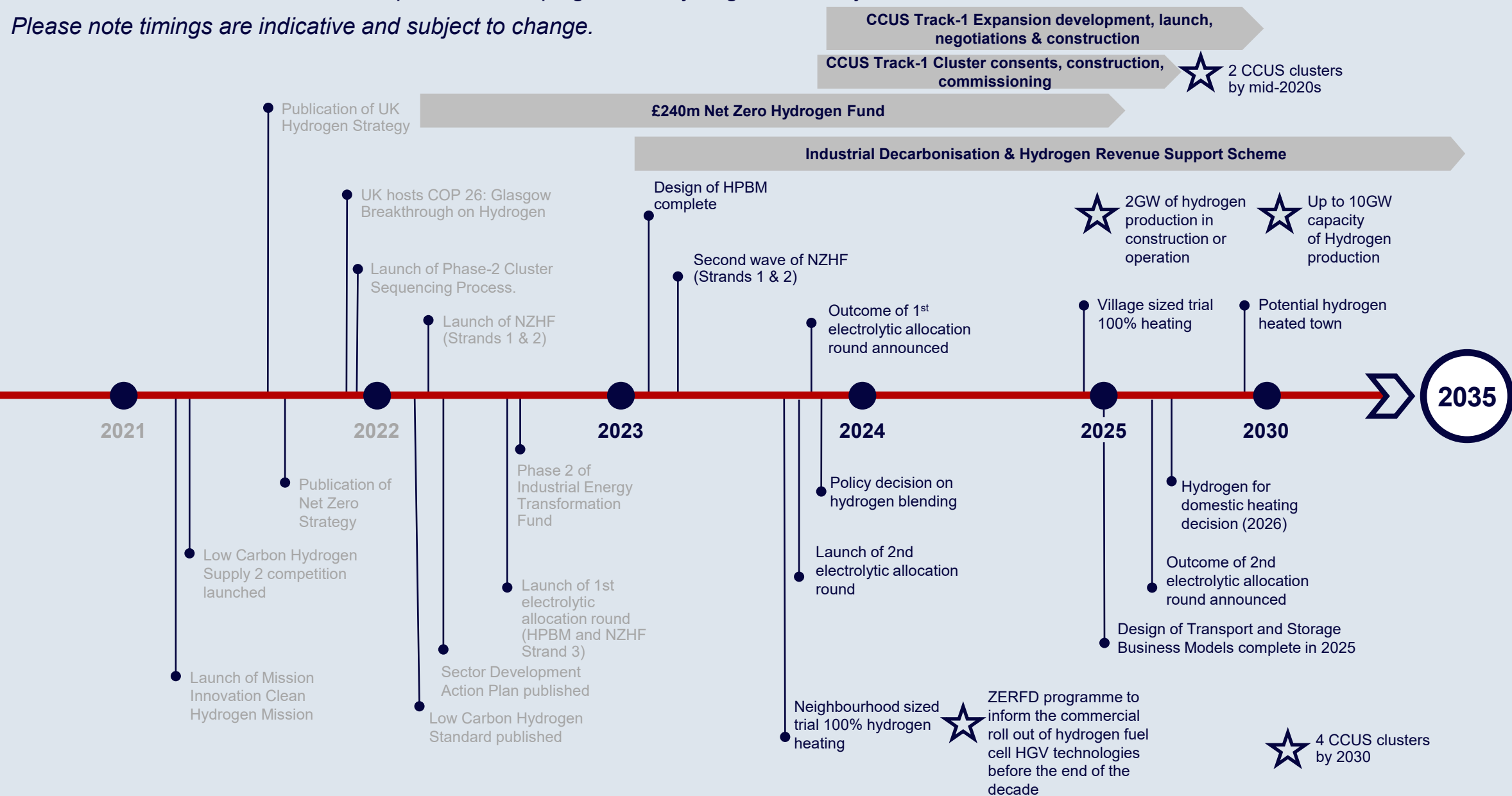
38	bpH2Teesside	BP Exploration Operating Company
39	HyNet Hydrogen Production Plant 1 (HPP1)	Vertex Hydrogen

* The Agreeing an Offer stage consists of due diligence and value for money assessment. Being shortlisted does not guarantee progress to negotiations or award of support.

Our 2035 Delivery Plan

Critical activities and milestones on a path to developing the UK hydrogen economy.

Please note timings are indicative and subject to change.



Further ways we help you invest and develop in the UK

The UK's commitment to support global investment is unparalleled

The Department for Business and Trade (DBT)

DBT supports businesses to invest, grow and export, creating jobs and opportunities across the country.

Office for Investment (OFI)

OFI is a joint DBT and No.10 team that provides a single front door to Government for high-value and high-impact investors, facilitating with access and insights through a concierge offer. The OFI works across departments to drive increased investment in line with the Government's Net Zero agenda.

UK Export Finance (UKEF)

The UK's export credit agency, has enhanced its support to attract investment into supply chains and building export capability.

UK infrastructure Bank (UKIB)

The UKIB can invest across the capital structure (senior debt, mezzanine, first loss, debt guarantees and equity) to help crowd private finance into net zero infrastructure. Projects are encouraged to contact UKIB about their financing needs.

Support moving a tech business

The Global Entrepreneur Programme (GEP) helps high-growth overseas companies relocate to the UK.

Economic development agencies

There are a number of organisations with significant experience in delivering public sector investment packages. For example, Scottish National Investment Bank is a mission-led development bank that provides patient capital to build a stronger, fairer, more sustainable Scotland.

Helpful guides

Guidance on expanding to the UK, including visas and migration; tax and incentives; regulatory and business planning; staff recruitment, retention and training; and immigration.

Links to key organisations

In addition to centres of excellence and industry clusters, we will facilitate introductions to universities, Local Enterprise Partnerships (LEPS) and Enterprise Zones.

Find a UK specialist

The UK Investment Support Directory allows you to find companies with skills and experience in helping overseas businesses set up or expand in the UK.

Visit [great.gov.uk](https://www.great.gov.uk)

Appendix A – Notes and Definitions

Investment needs are defined as the total sum of capital contributions required to deliver the necessary projects to achieve the current deployment pathway assumed in the Net Zero Growth Plan.

The investment needs data is calculated to 2030 to align with the Nationally Determined Contribution (NDC) agreement to revisit and strengthen Net Zero 2030 targets.

Methodology used to estimate the investment need:

Hydrogen production investment is based on the capital costs required to meet our ambition for up to 10 GW of hydrogen production capacity by 2030. Transport & Storage investment is an estimate of the capital costs needed to build the large-scale hydrogen transport and storage infrastructure projects identified as priority infrastructure projects in the growth plan in September 2022*.

Data Caveats:

- The profile of deployment, and therefore investment, in the 2020s is highly uncertain and dependent on the capacities allocated through funding rounds for the Hydrogen Production Business Model and the mix of hydrogen supply technologies deployed. The figures only cover the cost of projects deploying up to 2030, so in reality we would expect additional investment for projects commissioning after 2030.
- Capex costs are estimated based on published costs from the Hydrogen Production Costs Report 2021 and assume capex costs are spread over 3 years before the plant comes online. Capex costs are highly uncertain, and costs for actual projects may differ from the generic assumptions used.
- Like production, the T&S investment figures are highly uncertain, and we anticipate higher investment after 2030. Investment needs will be dependent on the types of production and demand deployed and their location.
- The T&S investment figures, as well as the production investment figures, do not include investment in small scale T&S infrastructure. This is because there is insufficient evidence currently to split out CAPEX costs from total levelized costs for small-scale T&S infrastructure.

*Inclusion in these figures does not guarantee, where applicable, funding, planning consent or approval for other regulatory or permitting processes.

Appendix B.1 – Summary of government funding schemes

Scheme	Aim of programme	Funding available	Technological maturity <i>(click for more information)</i>	Geographical scope	Status
Net Zero Hydrogen Fund	The Net Zero Hydrogen Fund will fund the development and deployment of new low carbon hydrogen production to de-risk investment and reduce lifetime costs. Both strands are designed to support multiple low carbon hydrogen production technologies that meet the eligibility criteria.	Total: £240 million Breakdown: Strand 1: DEVEX grant up to 50% co-funding for FEED and post-FEED studies, Grant awards of £80k–£15 million Strand 2: CAPEX grant up to 30% co-funding, Grant awards of £200k–£30 million	Technology Readiness Level (TRL) 7	UK wide	Award to be announced in 2023. Further rounds intended to open in the future
Hydrogen Production Business Model	Hydrogen Business Model (HBM) incentivises the production and use of low carbon hydrogen through the provision of ongoing revenue support.	Ongoing revenue support - will be funded by government until the hydrogen levy comes into effect	TRL 7	UK wide	Award expected to be announced in 2023. Further rounds intended to open in the future
NZIP Industrial Hydrogen Accelerator	Demonstrate end-to-end industrial fuel switching to hydrogen to provide evidence on feasibility, cost and performance.	Up to £26 million	TRL not specified, but must show there is innovation at system or component level and provide evidence of deliverability	UK wide	One demonstrator project running (stream 1). Awards for demo funding for best of the feasibility projects are pending.

Appendix B.2 – Summary of government funding schemes

Scheme	Aim of programme	Funding available	Technological maturity <i>(click for more information)</i>	Geographical scope	Status
NZIP H2BECCS innovation competition	Supports innovation in hydrogen BECCS (bioenergy with carbon capture and storage) technologies	£30 million	Innovations must have been between Technology Readiness Levels (TRLs) 4 to 6 at the start of the Phase 1 project	UK wide	Awards pending
UKRI Hydrogen storage and distribution supply chain innovation competition	Support development of hydrogen storage and distribution systems, reducing the associated cost of hydrogen supply chains and encouraging the commercialisation and adoption of hydrogen storage and distribution innovation in the UK	£4.5 million		UK wide	Open for bids until 26.4.23
NZIP Low Carbon Hydrogen Supply 2 innovation competition	To provide funding for projects that can help develop a wide range of innovative low-carbon hydrogen supply solutions	Up to £60 million	Innovations must have been between Technology Readiness Levels (TRLs) 4 to 6 at the start of the Phase 1 project	UK wide	5 'Stream 2' quick-start projects underway. Awards for demo funds for best feasibility projects to be announced soon.



Disclaimer

The Department for Energy Security and Net Zero is the department for delivering security of energy supply, ensuring properly functioning markets, greater energy efficiency and seizing the opportunities of net zero to lead the world in new green industries. **The Department for Business and Trade** is the department for economic growth. We support businesses to invest, grow and export, creating jobs and opportunities across the country.

Legal disclaimer

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