Shaping Hydrogen Policy

Dr Emma Guthrie, Hydrogen Energy Association
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Hydrogen Energy Association

Formerly the UK Hydrogen and Fuel Cell Association

Today's presentation

- The current hydrogen policy landscape in the UK
- The role of industry collaboration in shaping effective and realistic policy
- Opportunities for organisations to contribute to policy development
- The importance of strategic engagement through networks such as HORN

Why Hydrogen?

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Hydrogen is versatile and can be utilised in various ways.
These multiple uses can be grouped into two large categories:

1. Hydrogen as a feedstock / process gas.

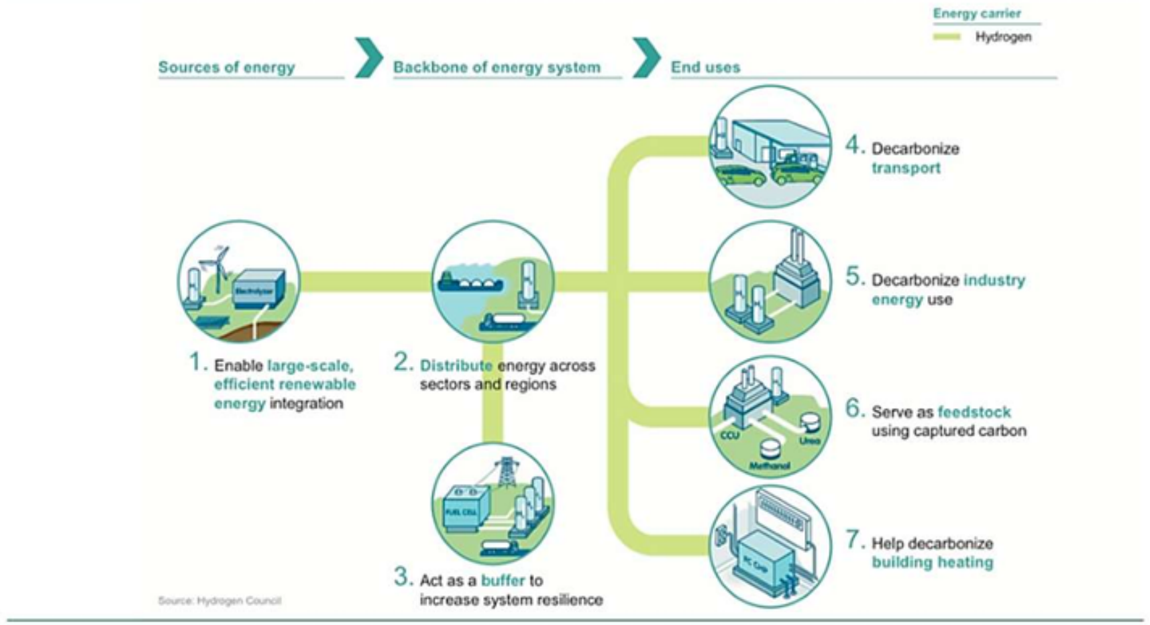
A role whose importance is being recognized for decades and will continue to grow and evolve.

2. Hydrogen as an energy vector enabling the energy transition.

The usage of hydrogen in this context has started already and is gradually increasing. In the coming years this part will grow dramatically.

The versatility of hydrogen and its flexibility is why hydrogen can contribute to decarbonise existing economies.

Figure 2: Hydrogen has seven roles in decarbonizing major sectors of the economy



[Hydrogen Europe Home]

Where does it come from?

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Hydrogen does not typically exist freely in the atmosphere and needs to be extracted from other feedstocks. The production methods and feedstocks vary and each has different impacts on the environment and associated costs.
Today – these various methods are often assigned different colours – here's a few examples:

Green Hydrogen

Green hydrogen is mainly produced by splitting water (i.e., water electrolysis) using electricity generated from renewable energy sources (RES). The reason it is called green is that there is no CO2 emission associated with the hydrogen production nor with its usage. When used in a fuel cell, the only by-product of its use is the pure water that was originally used in its production. Renewable hydrogen is generally more expensive than blue hydrogen, though prices are becoming more competitive. Although "green" hydrogen often refers to electrolytic hydrogen produced using electricity generated from renewable energy sources, it can also refer to hydrogen produced via different methods using other renewable sources such as biogas, biomethane, bio-waste and other renewable sources, these methods are less common than water electrolysis but also result in either very low or zero emissions.

Blue Hydrogen

Blue hydrogen refers to hydrogen derived from natural gas, which is a fossil fuel, however, most (albeit not all) the CO2 emitted during the process would be captured and stored underground (carbon sequestration) or bound in a solid product (such as bricks) and utilized. This is called carbon capture, storage and utilisation (CCSU).

Grey

Grey hydrogen is produced from fossil fuel and commonly uses steam methane reforming (SMR) method. During this process, CO2 is produced and eventually released to the atmosphere.

[In a nutshell | Hydrogen Europe]

Pink

Pink hydrogen is generated through electrolysis of water by using electricity from a nuclear power plant.

Purple

Purple hydrogen is made though using nuclear power and heat through combined chemo-thermal electrolysis splitting of water.

Red

Red hydrogen is produced through the high-temperature catalytic splitting of water using nuclear power thermal as an energy source.

Electrolysis of water

H_2O

$$2H_2O(l) \rightarrow 2H_2(g) + O_2(g)$$

Steam Methane Reforming (SMR)

CH_4

$$CH_4 + H_2O \rightarrow CO + 3H_2$$

Hydrogen's Heritage and Myth Busting

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Hydrogen has a rich heritage and has been used in industrial manufacturing for over **a century**. Large-scale industrial production and use of hydrogen began in the **early 20th century**, primarily for applications in **chemical processing and refining**.

- **1910s-1920s**: Hydrogen was used in the **Haber-Bosch process** to produce ammonia for fertilizers, revolutionizing agriculture.
- **1930s-1950s**: The petrochemical industry started using hydrogen for **hydrocracking** and **hydrotreating** in oil refining. Hydrogen has since played an important role in petroleum refining – producing the current range of low sulphur fuels to meet air quality standards
- **1960s-1980s**: Expansion into **methanol production** and **rocket fuel** for space exploration.
- **2000s-Present**: Growing use in **fuel cells**, **green hydrogen production**, and **decarbonization efforts**.

Other Industrial applications:

- Hydrogen is used in **float glass** manufacturing and as a reducing agent in certain ceramic processes.
- **Iron & Steel Production**: Used as a reducing agent in Direct Reduced Iron (DRI) processes, replacing coal-based methods to lower CO_2 emissions.
- **Welding & Heat Treatment**: Hydrogen is used as a shielding gas in welding and in heat treatment applications.

This wealth of experience means that the safe production, transport and use of hydrogen is well know and understood.

HEA Members

The voice of the UK hydrogen sector, driving its growth

Hydrogen Energy Association

Our >100 members represent over 200,000 employees globally, who cover the entire value chain from raw material sourcing, to supply chain and components, financing, professional services, B2B and consumer facing solutions.

The HEA advocates for the positive role that hydrogen can be play within our energy and transport system. We support the use of hydrogen across a range of production modes and end use applications.

HEA policy shaping

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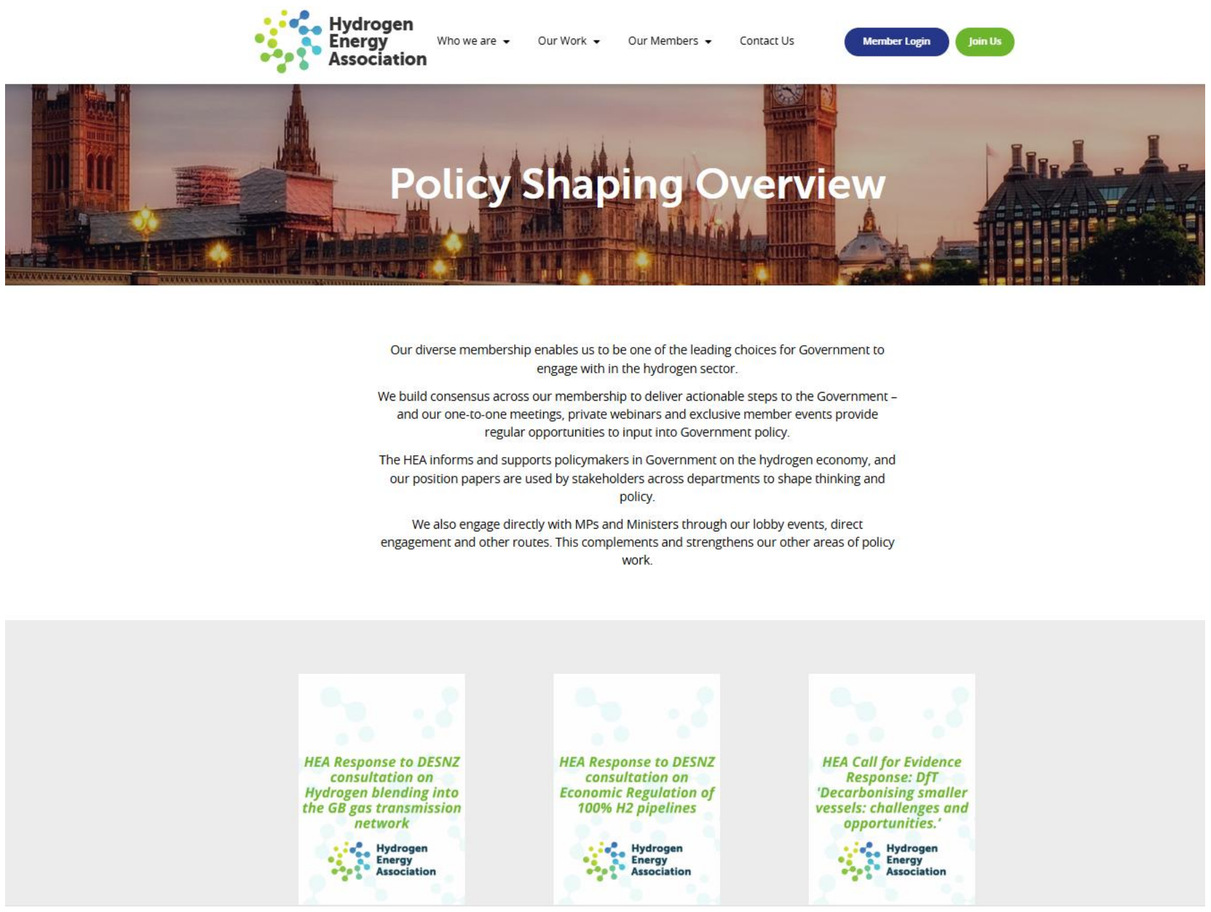


Our working groups see experts collaborating in an exciting forum, to deliver the knowledge needed to drive our policy shaping activities.

As the custodians of our policy development work, they bring together diverse industry perspectives to build consensus and drive our engagement with Government.

HEA members have the chance to participate in and contribute to these specialist groups, which cover everything from hydrogen for transport, through hydrogen storage to green and blue hydrogen production and planning for hydrogen projects.

They are a great way to network, and meet other members with shared interests.

Derivatives Working Group

Chair: Stephen Livermore, Development Manager, Green Cat Hydrogen

This group is interested in tackling key policy issues of hydrogen derivatives, where hydrogen is used as a feedstock for other fuels or chemicals (e.g. ammonia, e-methanol, SAF). The group will assess the policy landscape, market developments and scale, funding opportunities, technical and logistical challenges, and environmental challenges. This group also acts as a learning space for members that are not directly in the derivatives market with presentations and Q&A sessions on different derivatives.

Publications

Comms Working Group

The group's objective is to maximise the HEA's impact and reach, as the UK's leading national hydrogen trade group, including by capturing the expertise and insights of the HEA's technical working groups and refining the Association's strategic messaging. The scope of work also feeds into the execution of media and public affairs. The group's first priority areas are the promotion of industrial and Transport use opportunities for hydrogen and myth-bust acceptance barriers in these areas, including availability, cost and safety. The group aims to meet approximately quarterly on a project-by-project basis.

Publications

Low Carbon Hydrogen Production (LCHP) Working Group

Chair: Frédéric Séné, Commercial Director, Green H2 and NH3 Facility, Air Products

This group works to ensure all aspects of sustainable, low carbon hydrogen are accounted for in the UK's strategy for decarbonisation; this includes electrolytic, green ammonia, and future developing pathways. It establishes responses to Government consultations and provides recommendations regarding green hydrogen production and related supply chains. It also influences Government for legislative and policy changes that aid the development of low carbon hydrogen, and works with groups such as IPHA, IEA and RenewableUK.

Publications

Nuclear Enabled Hydrogen Working Group

Chair: Robert Alford, the Delivery and Engagement Lead for Nuclear Energy Application projects from the United Kingdom National Nuclear Laboratory.

This group identifies how nuclear enabled hydrogen (NEH) can support wider policy objectives and has previously developed a high-level position on how and where nuclear enabled hydrogen can contribute to the UK's move to Net Zero. It puts forward specific policy recommendations, setting out how these will accelerate deployment in the UK, and what needs to be done to enable this to happen at scale. This group will also build and provide educational support to inform policy recommendations and the wider HEA association. Members work with other relevant groups to ensure messaging alignment when engaging with Government.

Publications

Planning for Hydrogen Projects Working Group

Chair: Patrick Robinson, Consultant / Partner, Burges Salmon

This group shares know-how on successfully obtaining permission for new development involving hydrogen, where permission needs to be obtained from the local planning authority or Secretary of State under the Town and Country Planning Act 1990 or the Planning Act 2008 or their equivalents in Scotland, Wales or Northern Ireland. The emphasis is on practical support in the planning process.

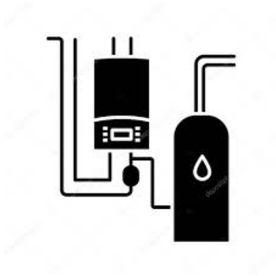
Publications

Policy Landscape for Hydrogen

- Hydrogen can play a supportive role in the decarbonisation of our energy and transport system – with associated benefits in energy security, resilience and opportunities technology developers.
- UK government recognises the role of hydrogen in supporting decarbonisation and meeting Net Zero commitments.
- The overall drive in our energy system is to move from a fossil based to a renewable based one with a focus on electrification where possible. This is considered within industrial power, home heating and transport.
- Government recognises that some areas cannot be decarbonised through electrification only
- In this case a molecule-based solution is needed. In these ‘hard to electrify’ areas – hydrogen is considered as an enabling tool – mainly around certain industrial applications and in heavy transport.
- Hydrogen’s role extends beyond fulfilling net zero commitments, with an understanding that hydrogen technologies can play a role in supporting energy resilience and security and job creation.

Hydrogen for Industry

- The UK's largest industrial clusters emit around 40 million tonnes of CO_2 per year.
- Just over half of UK industrial emissions arise from six coastal industrial clusters.
- Up to 50TWh of demand in industry could be met by low carbon fuels, primarily hydrogen, in 2035.
- Hydrogen is decarbonising industry via: Fuel switching for boilers, burners and other high temperature processes used in industrial and manufacturing operations; and process gas feedstock.



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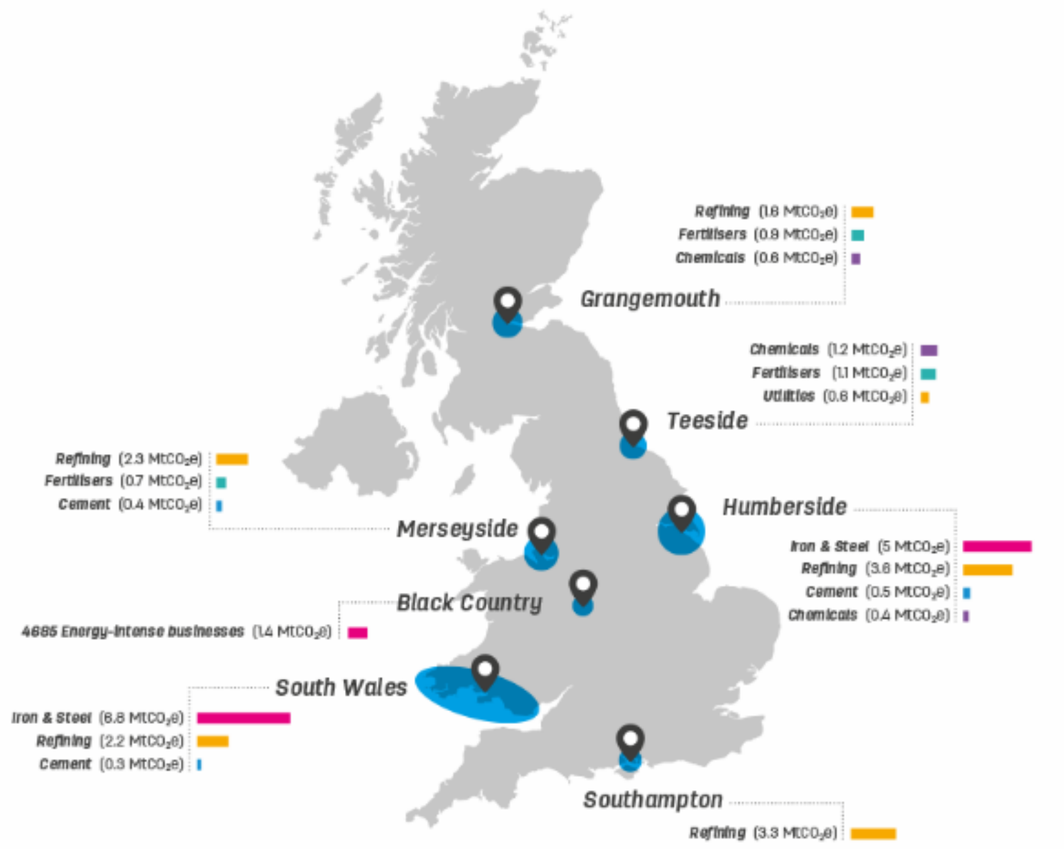
UK Hydrogen for Industry snapshot



- Industry is scaling up to delivery a minimum of two decarbonised industrial clusters by the 2025, and four by 2030.
- The East Coast (combining Humberside and Teesside) and HyNet (Merseyside) clusters are the first.
- Government is providing project specific support through various funding streams and across various sectors, including food processing, ceramics and steel.
- Parallel funding of £20 billion over 10 years for CCUS.

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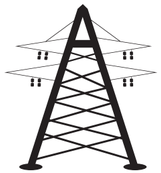
Hydrogen for Power

- Hydrogen available in the power system could achieve lower emissions at a lower cost than a system without hydrogen.

- Long duration energy storage, supplied primarily by hydrogen, could provide between £13 billion and £24 billion in savings to the electricity system between 2030 and 2050.

- Multiple roles – for example:
  - fuel for low carbon flexible generation technology ("hydrogen to power") to help balance electricity supply and demand
  - a decarbonisation pathway for existing unabated gas power plants



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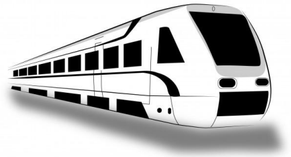
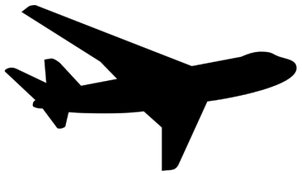
Hydrogen as a Transport Fuel

- The transport sector accounted for over a third of final energy consumption in 2019
- p to 45TWh of demand in transport could be met by hydrogen in 2035
- Favourable applications include road transport (HGV, Bus Fleets), off road machinery, rail, shipping and aviation
- Hydrogen offers benefits in range and weight
- Both fuel cells and combustion are options





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Hydrogen Production / Low Carbon hydrogen standard

- Hydrogen can be produced in a variety of routes, from different feedstocks
- Colours are often used as a shorthand to explain the various route
- While most of the hydrogen used today is ‘grey’ – produced from natural gas a feedstock with CO2 emissions, government support and policy is aligned to the low carbon hydrogen standard (LCHS)
- The LCHS is a government-standard in the UK that sets criteria and a methodology for hydrogen producers. It defines what counts as “low carbon hydrogen.
- There is also a Low Carbon Hydrogen Certification Scheme being planned, building on the LCHS (intended to help producers verify and consumers trust the emissions credentials of hydrogen)
- To count as “low carbon,” hydrogen production must result in GHG emissions below a set threshold.
- UK Low Carbon Hydrogen Standard - GOV.UK

HAR funding mechanism

- HAR (Hydrogen Allocation round) is the flagship mechanism by which government is supporting the growth of hydrogen in our energy systems
- The purpose is to provide revenue support over long-term contracts (15 years) to hydrogen production facilities, in order to close the cost gap between low carbon hydrogen and conventional higher-carbon fuels
- The HARs are aimed mainly at electrolytic hydrogen production (i.e. green hydrogen using renewable electricity), though other low carbon hydrogen pathways (e.g. CCUS-enabled blue hydrogen) are also part of the wider hydrogen production roadmap
- HAR1 has 11 projects announced – awaiting FID
- HAR2 has a shorted list projects announced
- HAR 3 and 4 have been committed by government

UK context for Hydrogen – Policy framework

Department for Energy Security & Net Zero

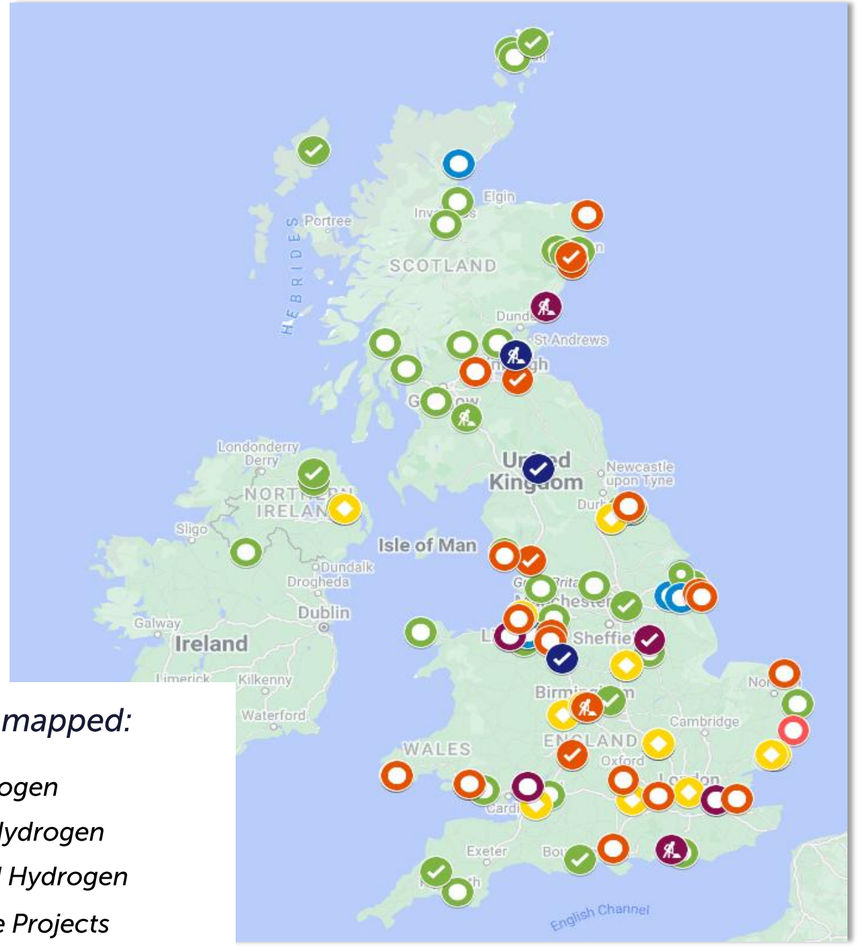
Hydrogen Update to the Market

July 2025

Hydrogen Update to the Market – July 2025 (DESNZ)

- **Government mission:** Low-carbon hydrogen central to UK's goals to **kickstart economic growth** and become a **clean energy superpower**.
- **Vision:** A thriving hydrogen economy to decarbonise hard-to-electrify sectors, boost energy security, and create quality jobs across the UK.
- **Autumn 2025 (expected):** Revamped UK Hydrogen Strategy — **evidence-led**, **impact-focused**, designed to fast-track delivery, sharpen priorities, deepen industry collaboration, and unlock hydrogen's potential over the next decade.
- Upcoming: HAR3 market engagement, hydrogen supply chain growth, hydrogen production cost updates, and hydrogen storage business model consultations, development of transport and storage commitment

UK Hydrogen projects map



What projects are mapped:

- *Electrolytic Hydrogen*
- *CCUS-enabled Hydrogen*
- *Nuclear-enabled Hydrogen*
- *H2 Infrastructure Projects*
- *Hydrogen-Powered Transport Use*
- *Commercial & Industrial Use Projects*
- *Hydrogen for Domestic Heating Projects*

- Over 70+ low-carbon hydrogen production projects, post FEED, mapped
- Aberdeen H2 Hub (400MW), Cromarty Hydrogen Hub (300MW), Lowestoft hydrogen production facility (200MW) and Hybont (250MW) are some of these pioneering projects will be the first at scale electrolytic projects online
- Many industrial use projects advancing rapidly with HEA members and their partners across the country - e.g. JC pears, Kimberly-Clark, Budweiser Brewery
- Key hydrogen mobility examples such as Fleetwide Conversion for Aberdeen City Council, and Teesside Transport Hub with various HEA members involved, including ULEMCo

https://ukhea.co.uk/uk-hydrogen-project-map/

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What is the UK Hydrogen Innovation Opportunity?

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Hydrogen Innovation Initiative

When both direct and indirect economic benefits are considered, the global hydrogen economy has the potential to be worth $8 trillion by 2050.

HII is working with >250 companies and 10 sector bodies in the UK, to coordinate innovation in 9 critical technology areas across:

10x10 - Secure 10% global market share in 10 years

Delivering benefits to the UK economy:

£70bn
Annual revenue by 2050

410,000
High value jobs created and transitioned by 2050

10x
Investment into UK hydrogen technology supply chains

Addressing four focus areas

Built on five critical technology supply chains

[Home - Hydrogen Innovation Initiative]

The Power of Speaking with a collective voice

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1. **Our sector can feel fragmented – causing confusion for external stakeholders.**
   - **Let's appreciate the role that all low carbon hydrogen production and distribution pathways play over time in delivering our net zero future**
   - **Let's appreciate the beneficial aspects of hydrogen in all its colours**
2. **Hydrogen can be seen to be at odds or not compatible with a decarbonised, electricity lead future.**
   - **Let's advocate for the role that hydrogen can play alongside electricity in delivering Net Zero targets**
   - **Let's demonstrate the role of hydrogen in hard to electrify areas for power, heat & transport**
3. **There is still work to do in developing policy and technology in what is still a nascent sector.**
   - **Let's continue to build on a collaborative approach – the output of today's research will form the input of tomorrow's industrial strategies.**

Hydrogen is an essential glue that holds together many aspects of our clean energy future.

Collaboration and positive messaging is needed to clearly articulate this value to external stakeholders

Thank you

ukhea.co.uk

e.guthrie@ukhea.co.uk

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