scottish renewables

GREEN HYDROGEN VISION

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SCOTTISH RENEWABLES

GREEN HYDROGEN VISION

The Scottish Renewables (SR) Green Hydrogen Vision 2025 outlines our policy position for the development of green hydrogen in Scotland and the next steps required to realise the vast potential of this technology's role in our future energy system.

As the Department for Energy Security and Net Zero (DESNZ) prepares to update the UK Hydrogen Strategy[1], SR has worked closely with its members and key stakeholders to identify the most significant challenges to the deployment of green hydrogen in Scotland. This follows regular engagement with DESNZ ahead of its Hydrogen Strategy update and takes into account the wider strategic energy plans and publications emerging from the UK Government, the Scottish Government and the National Energy System Operator (NESO).

THE OPPORTUNITY

Green hydrogen – hydrogen produced through electrolysis powered by renewable electricity – has been identified as a crucial technology for reaching the UK's net-zero targets due to the unique system benefits and energy resilience it provides.

With an abundance of renewable energy resources, a positive policy environment and support from the UK Government, Scotland has the potential to become a major producer of green hydrogen which can play a key role in the transition to a secure, clean energy system at home, while maximising exports overseas and enabling the transfer of essential skills and expertise from oil and gas.

Scottish Renewables has worked closely with its members on a Green Hydrogen Vision, setting out the key recommendations and policy actions Scotland will need to establish a thriving green hydrogen sector. The following list of recommendations and policy asks should inform a coordinated approach between NESO, Ofgem and DESNZ, to address policy barriers under the control of the UK and Scottish Governments.

1 Department for Energy Security and Net Zero (DESNZ), Hydrogen Strategy, August 17, 2021.

RECOMMENDATIONS & POLICY ASKS

RECOMMENDATIONS

Strategic Planning

The UK Government, the National Energy System Operator (NESO) and the Scottish Government must ensure their strategic plans and policies are coordinated and recognise the value of locating green hydrogen projects near renewable energy resources in Scotland. Developing the infrastructure needed to grow the green hydrogen sector should continue to be a priority for both the UK and Scottish Governments. Clarity and action on the following points will provide certainty for the developers and investors building green hydrogen projects in Scotland.

To ensure Scottish hydrogen plays a key role as part of the UK's future energy system, we call on NESO to:

- Work with the UK and Scottish Governments to ensure green hydrogen projects can be developed near the significant renewable energy resources that will be located in Scotland.
- Collaborate closely with industry as part of the Strategic Spatial Energy Plan (SSEP)[2] and Centralised Strategic Network Plan (CSNP)[3], as well as future Regional Energy Strategic Plans (RESP)[4], to assess and appropriately value the strategic and socioeconomic benefits of this technology, such as:
    - Locating grid-connected green hydrogen projects near significant amounts of renewable energy to maximise benefits to the energy system.
    - Creating green hydrogen storage capacity to increase flexibility and reliability in the energy system.
- Engage closely with industry when identifying where and when green hydrogen infrastructure will be built.
- Share with industry the modelling inputs for its current and future strategic plans to ensure green hydrogen projects can be delivered successfully.
- Ensure the design of the Constraints Collaboration Project (CCP)[5], which is intended to find solutions for thermal constraints and reduce costs to the consumer:
    - Is suitable for green hydrogen production
    - Does not restrict green hydrogen producers from producing outside of constraint periods.

We urge the UK Government to:

- Prioritise the build-out of 100% hydrogen pipeline networks in Scotland – infrastructure that is only used for hydrogen and connects production to where it is needed – to accelerate green hydrogen production in Scotland.

2 NESO, Strategic Spatial Energy Plan, expected late 2026.

3 NESO, Centralised Strategic Network Plan, expected 2027.

4 NESO, Regional Energy Strategic Plans, expected 2027.

5 NESO, Constraints Collaboration Project.

POLICY ASKS

Strengthen support for producers of green hydrogen

Further analysis and action from UK Government and Ofgem are needed to address the cost of producing green hydrogen, ensuring that projects currently in development can be delivered, as well as addressing obstacles to long-term growth. In addition, stronger communication and engagement with industry as part of the Hydrogen Allocation Rounds (HARs)[6], as well as changes to mechanisms under the Hydrogen Production Business Model (HPBM)[7], such as the Low Carbon Hydrogen Standard (LCHS)[8], will build investor confidence and create certainty for developers.

To address the high costs of producing green hydrogen, we urge the UK Government to:

- Develop clear incentives to build green hydrogen projects near to where renewable energy is being produced which will maximise network benefits under the HPBM.
- Recognise the importance of enabling green hydrogen offtake, which provides a guarantee to producers that there will be a commercial demand for their fuel.
- Build investor, developer and offtaker confidence by providing certainty on timelines for the HAR, as well as the preferred options for demand, under the HPBM.
- Engage with industry when developing the Hydrogen Storage Business Model (HSBM) and Hydrogen Transport Business Model (HTBM), expected in 2026.
- Accelerate the HAR processes for Hydrogen-to-Power (H2P), as well as the upcoming Storage and Transport Allocation Rounds by reducing the length of time between announcing submission periods, shortlisted projects and those that are successful.
- Increase communication with project developers and the wider industry as part of the HAR for H2P, as well as the upcoming Storage and Transport Allocation Rounds.
- Allow third parties to participate in the green hydrogen market as eligible offtakers with appropriate regulations.
- Amend the LCHS to recognise the additional benefits of using low-carbon electricity to power green hydrogen production in Scotland.
- Explore alternative methods of reducing the strike price for green hydrogen projects through indexation. Currently, the strike price is linked to the Consumer Price Index (CPI), which exposes green hydrogen projects to high, unpredictable electricity prices.
- Support both smaller-scale projects co-located with demand, such as green hydrogen generation for distilleries, as well as industrial-scale offtake projects that provide large-scale, flexible demand for green hydrogen.

6 DESNZ, Hydrogen Allocation Rounds, January 23, 2024.

7 DESNZ, Hydrogen Production Business Model, December 13, 2022.

8 DESNZ, Low Carbon Hydrogen Standard , April 8, 2022.

To realise the UK Government's ambitions to grow the green hydrogen sector, we urge Ofgem to:

- Reform network charges to incentivise green hydrogen projects with high electricity demand to build and operate in locations with abundant generation, such as Scotland, to limit constraints and optimise the use of available network capacity.

Increase demand for green hydrogen

Increasing demand for green hydrogen by strengthening support mechanisms under the HPBM is crucial for supporting the sector's growth in Scotland and the UK.

As such, the UK Government should:

- Work with industry to establish and grow the demand sectors for green hydrogen highlighted by DESNZ, which are: hard-to-decarbonise heavy industry, maritime, network, food service and storage.

- Produce a carbon utilisation strategy that supports a strategic approach to the production of synthetic hydrocarbons, such as Sustainable Aviation Fuel (SAF) and green diesel.

- Incentivise offtakers to join the green hydrogen network by supporting facility and technology upgrades.

- Reassess the length of contracts under the HARs.

- As a temporary measure, allow a blending of natural gas and green hydrogen through the UK's methane gas networks in advance of 100% hydrogen infrastructure, while recognising the limits and challenges blending may present.

THE SUPPORT

The UK and Scottish governments have outlined their aspirations to be world leaders in the development of green hydrogen and industry is committed to delivering that vision. The Scottish Government's Hydrogen Policy Statement[9], released in 2020, sets ambitious targets to produce 5GW of renewable and low-carbon hydrogen by 2030 and 25GW by 2045.

The following year, DESNZ published its UK Hydrogen Strategy, which set a 5GW target for renewable and low-carbon hydrogen. Since then, DESNZ has doubled its targets to 10GW by 2030 as part of its British Energy Security Strategy[10]. At least 5GW of this target must be green hydrogen, highlighting the commitment to move to a renewable energy-based system. The Scottish Government then released the Hydrogen Action Plan[11] to outline the steps necessary to meet its ambition for producing low-carbon hydrogen.

When the Electricity System Operator (ESO) became the National Energy System Operator (NESO) in 2024, it assumed responsibility for integrating all gas networks, including natural gas, low-carbon and green hydrogen, in its plans for the UK's future energy system. As indicated in its Beyond 2030 Blueprint[12], NESO assumes that Scotland will have an additional 5GW of electricity demand by the mid-2030s and highlights the benefits of locating a further 5GW of flexible electricity demand in Scotland – 10GW in total. Locating more green hydrogen production in Scotland could help deliver this future electricity demand and reduce bottlenecks in the electricity network.

With a nearer-term goal of transitioning the whole of the UK to a clean energy system by 2030, DESNZ published the Clean Power 2030 Action Plan (CP30)[13] which outlines that 2-7GW of dispatchable power is needed to satisfy projected demand. Dispatchable power sources, such as H2P can be turned on or off when the wind is not blowing and the sun is not shining, thereby strengthening the UK's energy resilience. This ambition is reinforced by HM Treasury's release of the Statement of Strategic Priorities to the National Wealth Fund[14], which secures the investment focus needed to establish a low-carbon hydrogen economy in the UK.

9 Scottish Government, Hydrogen Policy Statement, December 21, 2020.

10 DESNZ, British Energy Security Strategy, April 7, 2022.

11 Scottish Government, Hydrogen Action Plan, December 14, 2022.

12 NESO, Beyond 2030: A National Blueprint for a Decarbonised Electricity System in Great Britain, March 2024.

13 DESNZ, Clean Power 2030 Action Plan, December 13, 2024.

14 HM Treasury, Statement of Strategic Priorities to the National Wealth Fund, March 19, 2025.

Industry welcomed the DESNZ Hydrogen Update to the Market: July 2025[15], particularly the increased clarity it provided on the upcoming HSBM and HTBM. Storage and transport are critical for connecting green hydrogen produced in Scotland to centres of demand throughout the UK and abroad. As the majority of the UK's manufacturing industry is located in the North East of England, it is essential to link areas of efficient green hydrogen production with these demand centres, especially for industries that are difficult to decarbonise. The DESNZ Hydrogen Infrastructure Strategic Planning: Policy Statement[16] outlines how NESO and DESNZ will align the HPBM and strategic planning to facilitate the build-out of infrastructure and drive growth of the green hydrogen industry in Scotland.

The update to the Hydrogen Strategy must build on the UK Government's commitment to coordinate with NESO and the Scottish Government to recognise the role and value of Scottish green hydrogen in a strategically planned energy system. The UK Government must then structure its energy roadmap by coordinating plans, such as NESO's SSEP and the CSNP, to support the effective deployment of green hydrogen in Scotland.

To establish and capture the opportunities of a green hydrogen economy in Scotland, both governments must move swiftly and decisively to enable and accelerate the production of commercial-scale green hydrogen.

15 DESNZ, Hydrogen Update to the Market: July 2025, July 23, 2025.

16 DESNZ, Hydrogen Infrastructure Strategic Planning: Policy Statement, October 7, 2025.

DEMAND FOR GREEN HYDROGEN

For producers of green hydrogen, offtake agreements are a guarantee of demand for their fuel which is crucial for attracting investment and making projects financially viable.

The Climate Change Committee's 7th Carbon Budget[17] reaffirms that green hydrogen has a variety of uses in hard-to-electrify sectors such as heavy industry and dispatchable power production. It can be used to reach high temperatures in processes such as steel manufacturing, distillation and concrete production. In addition, green hydrogen can be converted into derivatives that provide a green alternative for the production of various chemical products, like green ammonia or e-methanol. Scotland is well-placed to capitalise on opportunities such as decarbonising the maritime and aviation industries using these derivatives.

It can also provide additional flexibility to the UK energy system by offering medium to long-duration storage solutions. While naturally existing storage solutions for green hydrogen are located in North East England, we encourage NESO and the UK Government to continue exploring options for green hydrogen storage in Scotland, particularly in areas with network constraints.

> CREATING ADDITIONAL AVENUES FOR GREEN HYDROGEN DEMAND IN SCOTLAND WILL ATTRACT INVESTMENT AND CREATE JOBS, PARTICULARLY IN REGIONS LIKE THE NORTH EAST, OFFERING A PATHWAY FOR WORKERS TO TRANSITION FROM OIL AND GAS TO RENEWABLE ENERGY ROLES.

Additionally, increasing green hydrogen demand would enhance energy security by boosting resilience in the UK's energy system.

With the knowledge that green hydrogen will play a critical role in areas that are difficult to decarbonise, it is crucial that government policy supports the growth of these offtake routes to enable the growth of the green hydrogen economy in Scotland.

The areas of opportunity are:

- **The reindustrialisation of Scotland** – The Scottish Government's Green Industrial Strategy[18] recognises the potential of the low-carbon and green hydrogen industry to provide opportunities domestically and abroad through export to centres of demand across Europe. Manufacturing products such as cement or steel requires high temperatures but achieving these temperatures through electrification is technically challenging and costly. Green hydrogen can provide an alternative to historically used, carbon-based fuels. Building manufacturing hubs in Scotland, supported by green hydrogen production, creates the opportunity to build industries such as manufacturing and bring jobs and investment to Scotland.

17 Climate Change Committee, The Seventh Carbon Budget, February 26, 2025.
18 Scottish Government, Green Industrial Strategy, September 11, 2024.

- **Decarbonising heavy transport** – Green hydrogen can also be combined with other elements to produce derivatives, such as green ammonia and methanol, for use domestically and for export. Green ammonia made by green hydrogen can be utilised as a feedstock for applications in areas such as agriculture or pharmaceuticals. Green hydrogen projects producing derivatives are already being developed in Scotland, fulfilling the demand for green hydrogen-based alternative fuels that will enable the decarbonisation of heavy transport, such as the maritime, aviation and rail sectors. The growth of offtake routes provides certainty that there will be a future need for green hydrogen both domestically and abroad.

- **Flex demand** – In addition to green hydrogen's flexibility through H2P, the DESNZ Clean Flexibility Roadmap[19] points to green hydrogen providing long-duration, high-volume storage to support the balancing of the UK's electricity network. Developing production and storage solutions in Scotland will allow green hydrogen to provide dispatchable power through H2P, which can be turned on or off during periods of low generation, thereby building resilience and enhancing energy security.

- **Export opportunity** – Establishing Scotland as a leader in producing green hydrogen will create significant export opportunities to supply green hydrogen and its derivatives to Europe and beyond. The Scottish Government's export plan, A Trading Nation – Realising Scotland's Hydrogen Potential[20] , positions Scotland as a key exporter of green hydrogen to centres of industrial demand, such as Germany and Denmark. In addition, due to the UK's rich history in oil and gas, Scotland is well-positioned to utilise previously developed knowledge and skills in building and managing gas assets.

While we have seen significant support to increase the generation of green hydrogen, further support is crucial for building hydrogen demand in Scotland and the rest of the UK.

> BY INCREASING THE DEMAND FOR GREEN HYDROGEN, SPECIFICALLY THROUGH INDUSTRIALISATION, WE CAN ESTABLISH SCOTLAND AS A GLOBAL LEADER IN THIS AREA. THIS WILL NOT ONLY STRENGTHEN THE UK'S ENERGY SECURITY BUT ALSO HELP SECTORS THAT ARE DIFFICULT TO DECARBONISE REDUCE THEIR RELIANCE ON FOSSIL FUELS.

19 DESNZ, Clean Flexibility Roadmap, July 23, 2025.

20 Scottish Government, A Trading Nation – Realising Scotland's Hydrogen Potential: Plan for Exports, November 29, 2024.

WHY SCOTTISH GREEN HYDROGEN?

Scotland has an abundant renewable energy resource, particularly onshore and offshore wind, that can be harnessed to produce green hydrogen that meets demand across the UK. Scotland also has a unique marine energy resource and is a world-leader in this sector. For example, the world's first tidal-powered hydrogen generation facility launched in Orkney in 2017.

> IF SCOTLAND ADOPTS THE MOST AMBITIOUS SCENARIO, BASED ON THE SCOTTISH GOVERNMENT'S HYDROGEN ACTION PLAN, GREEN HYDROGEN HAS THE POTENTIAL TO CONTRIBUTE £25 BILLION GROSS VALUE ADDED (GVA) TO THE ECONOMY EACH YEAR, SUPPORTING MORE THAN 300,000 JOBS BY 2045.

Benefits of producing green hydrogen in Scotland include:

- **Cost-effective, supply-driven production**
  Supply-driven production, green hydrogen produced near locations with abundant clean power, allows for the efficient use of Scotland's significant renewable energy resource. Increasing green hydrogen demand in Scotland and utilising clean electricity to enable significant supply-driven hydrogen production provides substantial benefits for the entire UK energy system. Potential offtake opportunities where green hydrogen can be utilised, such as industry and heavy transport, should be supported by government policy to increase the volume of hydrogen demand and usage.

- **Economic and supply chain benefits to Scotland**
  Scotland has a rich oil and gas history and green hydrogen offers a significant opportunity to transfer essential skills and expertise as part of the energy transition. It is therefore necessary to consider the socioeconomic benefits that a green hydrogen sector would bring to Scotland. By acting quickly and investing in our green hydrogen skills and the supply chain we can capture greater economic benefits and accelerate the move to a clean energy system.

- **Scalable demand**
  Scotland has the capacity to scale up quickly to meet hydrogen demand. Green hydrogen can be used in rural settings, utilising renewable energy within integrated systems that meet high-intensity, localised hydrogen demand and strengthen local energy resilience. Scotland's islands and rural areas are already playing a world-leading role in testing and deploying green hydrogen projects. For example, Shetland hosts two developers who are building green hydrogen projects that will produce e-fuels and derivatives, such as green ammonia.

Producing green hydrogen in Scotland has the potential to complement the growth of the wider renewable energy industry. Deploying renewable energy technologies, such as offshore wind, at scale will be crucial for the large-scale development of green hydrogen.

WHY SCOTLAND MUST ACT NOW

Both the UK and Scottish governments recognise the crucial role that green hydrogen will play in the future energy system but gaps remain in the regulatory support required to catalyse the development of a robust green hydrogen economy across the UK.

More clarity and certainty are needed as part of strategic planning. This can be achieved through closer and more transparent engagement with industry during the drafting process. Stronger support is also required to reduce the cost of producing green hydrogen, ensuring it is delivered on a commercial scale. In addition to this, the timely development and build-out of transport and storage infrastructure is crucial for enabling the production of supply-driven green hydrogen. Increasing the volume of demand is also essential for establishing Scotland as a world-leader in this technology. Our recommendations and policy asks work to address these challenges.

> THE UK GOVERNMENT NESO AND THE SCOTTISH GOVERNMENT MUST COORDINATE ON ALL STRATEGIC PLANS FOR HYDROGEN ACROSS THE UK TO PROVIDE A CLEAR VISION AND DELIVER A PATHWAY FOR GREEN HYDROGEN TO BE PRODUCED AT SCALE IN SCOTLAND.

Annex
For an in-depth explainer on green hydrogen technology and SR's position in 2022, please read SR's Policy Position Paper on Green Hydrogen.

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