

## Scottish Government Hydrogen Policy Statement

This Policy Briefing provides summary information on the Scottish Government report, **Scottish Government Hydrogen Policy Statement**<sup>1</sup>, which sets out the Scottish Government's current thinking on the development of a hydrogen economy in Scotland. This briefing focuses on the topics that are of interest for Scottish Renewables, including the key policy messages, the role of hydrogen for achieving net zero and the role of hydrogen on different sectors of the Scottish economy.

### KEY POLICY MESSAGES

For the development and deployment of hydrogen in Scotland the Scottish Government (SG):

- Confirm support for the strategic growth of a strong hydrogen economy in Scotland, supporting the development of Scotland's hydrogen production capability to meet an ambition of at least 5GW of renewable and low-carbon hydrogen by 2030 and at least 25GW by 2045.
- Commit £100 million funding towards the development of hydrogen economy over the next five years as implemented through the Hydrogen Action Plan, due for publication in 2021.
- Confirm that both renewable and low-carbon hydrogen will play an increasingly important role in the energy transition to net zero in 2045 and the importance of establishing low-carbon hydrogen production at scale by the mid-2020s, linked to Carbon Capture and Storage (CCS).
- Set out how Scotland's abundant natural resources, skills and supply chain offer the potential for large scale production of renewable hydrogen from offshore wind to be a key driver of the longer-term hydrogen economy in Scotland.
- Support the demonstration, development and deployment of hydrogen and its emergent role in the sustainable decarbonisation of critical industry functions and processes, transport and heat in buildings.
- Commit to drive technological progress and advance innovation by unlocking public and private funds for innovation development, and support demonstration for key hydrogen technologies, such as fuel cells and electrolyzers.
- Recognise the need for pace – the need to start now and grow quickly to capitalise on opportunities within the domestic and global hydrogen market.
- Commit to actively seek international collaboration in the development of our shared hydrogen economy and fully explore our hydrogen export potential.
- Support the transition and growth of Scotland's existing supply chain, including in the development of skills and manufacturing capacity, that can play a significant role in the hydrogen economy both domestically and internationally.
- Commit to exploring the opportunities for negative carbon hydrogen, combining the potential to use bioenergy resources to produce hydrogen with CCS.
- Commit to engage with the UK Government on the development of a UK policy and regulatory framework for hydrogen, business models, market mechanisms, carbon pricing, feed in tariffs, fuel economy standards, renewable fuel standards and zero emission vehicle mandates – all of which are important for raising market certainty and investor confidence.

## 1 The role of hydrogen for achieving Net Zero and generating economic opportunities

Hydrogen will play an important role globally in the transition to net zero and Scotland is not unfamiliar with this statement. In 2020 the SG carried out a hydrogen assessment to provide evidence that supports the hydrogen policies going forward. In the assessment, it was clear that hydrogen is not just an energy and emissions reduction opportunity; it could also have an important role in generating new economic opportunities in Scotland.

The Hydrogen Assessment sets out 3 scenarios, modelled to illustrate how Scotland could develop a future hydrogen economy. The scenarios help to frame and contextualise the uses of hydrogen in the energy system and the opportunities for Scotland as a key exporter of large-scale green hydrogen to the rest of the UK and Europe.

The gross impacts by 2045 across the three scenarios range from 70,000 to more than 300,000 jobs protected or created and GVA impacts of between £5 billion and £25 billion. The most ambitious scenario with the largest estimated gross impacts is in establishing Scotland as a major exporter of green hydrogen to Europe by 2045, with significant opportunities from unlocking Scotland's vast offshore wind potential. However, this would be dependent on Scotland producing green hydrogen that is competitively priced in a European market.

For the coming years, the SG is expecting to develop the hydrogen economy as follows:

**In the 2020s – Demonstration, accelerating market demand and getting the policy framework right:** supporting research, innovation development and demonstration, building capability, and building partnerships with organisations and governments in Europe and beyond. Providing support for low-carbon hydrogen production and supporting the transition of existing supply chain companies in Scotland to develop and manufacture new technology in the hydrogen value chain.

**In the 2030s – Production at Scale:** scaling up and bringing down costs, developing the value chain for renewable and low-carbon hydrogen; developing competitive, large scale, low-cost hydrogen for domestic use. Developing floating hydrogen production and an export industry for hydrogen and its derivatives.

**By 2045 – Scaling up and global expansion:** Enabling production of lowest cost green hydrogen for domestic use and for export, development of international hydrogen refuelling hubs, international transportation of hydrogen, including shipping and North Sea hydrogen pipeline infrastructure connecting Scotland to Europe.

## 2 Hydrogen within the energy system

The SG has the view that the most effective way to integrate hydrogen into the energy system, and the economy, is through the establishment of sector-coupling hydrogen productions hubs capable of simultaneously servicing transport, heat and industry needs. This is the approach the SG is starting to develop through this policy statement and in the action plan due for publication in 2021.

The report states that hydrogen can help address the renewable energy intermittency through its production by electrolysis at times of excess electricity supply. This can help developers with new routes to market and may change the investment proposition for new and existing renewable energy generation. On the other hand, electrolysis can also lead to greater integration of the gas and electricity grids.

Hydrogen can also be used for direct power production- potentially displacing natural gas as a provider of back-up, flexible power generation on the system and the vital technical qualities which generation of this kind provides for system stability. Additionally, hydrogen could also provide the option of energy storage over extended time periods and potentially deployable at scale.

### **3 Hydrogen supply chain in Scotland**

The current strengths of the Scottish hydrogen supply chain are in the areas of project development, installation, operation and maintenance and sector support where these capabilities can be transferred from Scottish companies with experience in similar industries. Scotland also possesses a wide range of engineering design and academic research capabilities that could be brought to bear. However, gaps in the Scottish supply chain are predominantly in supply areas bespoke to the design, manufacture and maintenance of hydrogen generation plants. These would be high value added activities as would be the specialist extended supply chains that go with them

To address these supply chain gaps the SG will support new and innovative Scottish companies as they develop next generation technologies as well as inward investment of manufacturing to Scotland. With this, it could be possible to not only generate direct jobs and value but may also lead to the establishment of a sustainable, long term local supply chain and stimulate wider supply chain opportunities.

There are companies in Scotland that are already building capabilities to support the development of electrolysis projects. European Marine Energy Centre (EMEC) first procured a hydrogen electrolyser in 2015 and have since gone on to expand their portfolio of hydrogen projects. A number of small to medium enterprises (SMEs) in Scotland specialise in areas of the electrolyser supply chain. Examples include: The Pure Energy Centre, an electrolyser integrator or assembler located on Orkney and; Logan Energy a system integrator and operator based in Edinburgh.

### **4 Scotland's Natural Resources, Infrastructure and Place**

While green hydrogen from renewable electricity appears an attractive opportunity for medium to longer-term, in the near to medium-term, low-carbon hydrogen demand and infrastructure could be developed in Scotland by aligning hydrogen production from fossil fuels with CCS.

The report states that significant investment in infrastructure will be needed to support new emissions reduction technologies such as CCS and hydrogen. This is recognised in the draft Infrastructure Investment Plan (IIP). The Plan includes details of around £24 billion of major projects and national programmes – with more to be confirmed in future years, including: more than £8 billion for environmental sustainability and the transition to net zero emissions.

Additionally, the SG recognises that CCS infrastructure; on and offshore renewable energy generation and networks; and clean hydrogen production and distribution are strategically important development opportunities in Scotland that should be reflected in the National Planning Framework 4 (NPF4). The draft NPF4 will be subject to Parliamentary scrutiny and public consultation from autumn 2021, and it is expected to be adopted by summer 2022.

### **5 Hydrogen for Heat in Buildings**

There is the potential for hydrogen in the gas networks to begin decarbonising heat from the early 2020s. Trials being carried out on the Keele University gas network are aiming to demonstrate that blending at up to 20% by volume in the gas distribution network can be accommodated within the network and used by existing gas boilers and other appliances. And one option for the Acorn Hydrogen

project at the St Fergus gas terminal, near Peterhead in Aberdeenshire, is to blend hydrogen at 1 – 2 % volume with the natural gas injected into the national transmission network from St. Fergus. Alongside other research support, the SG has already provided £6.9 million funding towards the delivery of H100 project in Fife: a first-of-a-kind hydrogen heating network proposed by SGN which SG believe will be a project of international significance.

The hydrogen policy positions will complement and support the wider Heat in Buildings Strategy to work with UK Government on product standards to require all new gas boilers to be hydrogen-ready and on their Hydrogen Energy and Utility Skills programme. This programme will develop a common competency framework for the training, accreditation, and registration of gas engineers working with hydrogen to ensure they are equipped to install hydrogen equipment into homes safely and efficiently.

## 6 Hydrogen in the industrial sector

The use of hydrogen to displace fossil-based fuels and the application of carbon capture technologies present a significant opportunity to decarbonise sections of the industrial sector for which energy efficiency measures and electrification alone will not provide the required emissions savings.

The development of a CCS network is a critical enabler for the production of low carbon hydrogen in industrial decarbonisation and negative emissions technologies such as Bioenergy with Carbon Capture and Storage (BECCS) and Direct Air Capture (DACCS). The most ambitious scenario in the Scottish Hydrogen Assessment assumes that low-carbon hydrogen production aligned with CCUS could credibly reach an installed capacity of 200 MW by 2025, 2 GW by 2032 and 5 GW by 2045.

The industrial decarbonisation pathways analysis concluded that with extensive uptake of fuel switching and CCUS deployment it should be possible to reduce emissions from the industries in scope by over 80% compared to 2018 levels by 2045.

The report states that the SG recognises the importance of fiscal support mechanisms and prompt deployment of enabling infrastructure and support for technology development needed by companies who are developing their decarbonisation plans. It also mentions that the SG has created the Advancing Manufacturing Challenge Fund, the Innovation Centres and the National Manufacturing Institute Scotland (NMIS), that are capable of changing how companies harness the power of technology and innovation to drive growth.

## 7 Hydrogen for transport

Although often viewed as competing technologies, battery electric and hydrogen systems are in fact complementary and could both become cornerstone technologies for the electrification of transport. The SG is supporting targeted investment in both technologies.

The Scottish Hydrogen Assessment indicates that the transport sector, alongside industry, will most likely form the initial areas of high demand for hydrogen in Scotland and could underpin a market of sufficient size to enable low-cost hydrogen production, with fuel cell markets developing or emerging in areas such as HGV's, buses, trains and shipping.

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<sup>1</sup> [Scottish Government Hydrogen Policy Statement - gov.scot \(www.gov.scot\)](https://www.gov.scot/publications/scottish-government-hydrogen-policy-statement/pages/1-introduction.aspx)