

**Scottish Renewables written evidence to the House of Commons
Scottish Affairs Committee inquiry into Hydrogen and Carbon Capture
in Scotland**

About Scottish Renewables

Scottish Renewables is the voice of Scotland's renewable energy industry, working to grow the sector and sustain its position at the forefront of the global clean energy transition. We represent around 280 organisations across the full range of renewable energy technologies in Scotland and around the world, ranging from energy suppliers, operators and manufacturers to small developers, installers, and community groups, as well as companies throughout the supply chain.

Executive Summary

Scottish Renewables welcomes the opportunity to provide written evidence to the House of Commons Scottish Affairs Committee inquiry into Hydrogen and Carbon Capture in Scotland. Our submission focuses on hydrogen, with particular reference to green hydrogen generated using renewable energy.

It is our position that with its abundant renewable energy resources, Scotland has the potential to generate a significant quantity of green hydrogen to both achieve its own net-zero target and for export to the UK and Europe. Scotland needs to act quickly and decisively to support green hydrogen production to secure the economic benefits that can underpin a green recovery from the pandemic.

Written Evidence

To what extent are the ambitions of the UK Hydrogen Strategy, published August 2021, adequate for Scotland?

1. The UK Hydrogen Strategy has ambitions for 5GW of low carbon hydrogen to be produced by 2030 and it is not clear how much of that 5GW will be produced in Scotland. A clear statement is needed from both the UK and Scottish Governments regarding this 5GW ambition, how much of this will be green hydrogen and how much of it to be generated in Scotland.
2. There should be a dedicated UK green hydrogen target of at least 3GW by 2030, with a potential 2025 interim green hydrogen target.
3. The Scottish Government's Hydrogen Assessment Project report states that jobs and GVA benefits are dependent on Scotland producing green hydrogen that is competitive in a European market. Not having a specific target for green hydrogen and a clearly articulated view on its role will hinder our competitiveness.
4. Scottish Renewables is concerned about the 'one size fits all' approach the UK Government is employing. Producing green and blue hydrogen are different processes and will require different approaches, separate allocation processes and separate quality standards. We have concerns that blue hydrogen will set aside green hydrogen – therefore a green hydrogen target is essential.

Additionally, we are concerned that 5GW by 2030 may not be sufficiently ambitious enough to meet domestic demand. A recent Scottish Enterprise report¹ projected the UK's hydrogen demand to be approximately 60TWh by 2030, and 220TWh by 2050. Demand is currently unclear due to the lack of a coherent strategy and target for green hydrogen. Demand must be unlocked through a clear set of policy tools that strategically target end-use sectors.

The business model support being developed by the UK needs to be cognisant of Scotland's export ambitions. The Scottish Hydrogen Assessment recognised green hydrogen production as

the largest contributor to jobs in all scenarios with between 70,000 to 310,000 jobs in its most ambitious scenarios relative to less than 20,000 for blue hydrogen.

The greatest economic potential comes from green hydrogen therefore it needs to be prioritised in the short term.

5. We are concerned that having one hydrogen business model that covers both blue and green hydrogen may not provide the specific support that green hydrogen needs, especially the smaller scale, 'stepping-stone' projects that are needed to grow the supply chain. We consider it extremely important to have a different subsidy "pot" for green hydrogen, so green projects are not directly competing against Carbon Capture Utilisation and Storage (CCUS) enabled projects.
6. Greater clarity is required on the capacity of green hydrogen that the UK Government will support on a year-by-year basis. This support should 'ramp up' over time and support GW-scale green hydrogen projects in the late 2020s.
7. The UK Hydrogen Strategy must have a clear focus on UK hydrogen production for UK hydrogen uses but must also have a clear goal of the quantity of hydrogen intended for export. If Scotland intends to export, rapid early action will be required to ensure our place in a competitive developing sector where we are seeing ambitions from other countries including Chile, Australia, and Saudi Arabia.

The technology-neutral approach may mean Scotland misses the opportunity to maximise the economic benefits from our abundant wind energy resources. We are also concerned that the timescale of Scotland's hydrogen ambitions could be too late to match the ambitions of potential export markets. Scotland's export ambition needs to be accelerated to meet off-takers demands in export markets. However, this raises questions regarding UK Government export funding support.

8. Additionally, assuming the UK Government persists with its twin-track approach, there is little recognition from the UK Government that hydrogen production ultimately needs to be consistent with net-zero and therefore the greenhouse gas intensity of the UK's hydrogen mix needs to decline over time consistent with the trajectory to net-zero and the corresponding carbon budgets.

What should be the focus of UK Government investment to ensure that Scottish industry, supported by Scottish research, is able to become a world leader in green hydrogen for domestic use and export?

9. As outlined in our answers, it is vital that green hydrogen is prioritised and accelerated given its economic contribution potential and cost reduction trajectories. Scottish Renewables' position paper on green hydrogenⁱⁱ recommended the following actions to ensure that Scotland can become a world leader in green hydrogen:
 - The opportunities to combine Scotland offshore wind including floating offshore wind, with green hydrogen production to supply UK and EU markets should be assessed and prioritised.
 - A clear vision of the scope and scale of the supply chain and export ambitions for the hydrogen economy is articulated to ensure this can be built into the development of the hydrogen economy from an early stage.
 - A commitment to collaborating with international stakeholders to help realise green hydrogen export potentials. A decision is rapidly made on the governance and regulation of the emerging hydrogen economy and that decision making allows consideration of the overall energy system and delivery of net-zero. This should include a decision on which existing

regulatory bodies will be responsible for the various aspects of the emerging hydrogen economy and if wider reform is necessary.

- All regulatory bodies in Scotland and the UK must incorporate the achievement of net-zero into their functions and we need rapid clarity of government regulations within the emerging hydrogen economy.
- The role of gas networks in the hydrogen economy is clearly articulated as is how this role contributes to the achievement of net-zero.
- The UK Government needs to take a sector coupling approach and work closely with industry.

Which market mechanism should be used to incentivise investment in producing low-cost green hydrogen?

10. The recent UK Government consultation on Designing a Hydrogen Business Model stated that the early stage will be a bilateral agreement progressing to an eventual aim of an auction, however, a great deal of work is needed to get to this stage as picking and choosing an offtaker will not work in the early days of the hydrogen economy.

11. We support the idea of bilateral negotiations for the near term. Longer-term, we support an auctions process.

12. While the level of subsidy should reduce over time as hydrogen production moves towards commercialisation, there is concern about this happening within a project lifetime. Such an approach could impact the commercial viability of the latter stages of the project lifetime and so the subsidy reduction mechanism would require careful design.

There is also the key issue of setting the strike price for an auction and it is recommended that this is agreed between industry and government so as not to discriminate against first of a kind (FOAK) demonstration projects who may not be able to compete under auction conditions alongside larger-scale facilities.

13. As green and blue hydrogen projects will have very different commercialisation pathways, they will require separate subsidy 'pots.' In the near-term larger blue hydrogen projects could outbid green hydrogen projects as blue hydrogen is expected to be cheaper in the early years of a hydrogen economy. Having separate pots will prevent this from undermining the emergence of a green hydrogen economy.

14. The Hydrogen Business Model consultation implied a one size fits all solution for all hydrogen production and ignores the disproportionate challenges faced by smaller green hydrogen projects. There needs to be a route to market for those smaller-scale, more demonstration-like projects. Smaller scale projects could benefit from a simple revenue support scheme.

15. The policy framework for a pipeline of blue hydrogen projects seems far more developed and robust than is the case for green hydrogen production. For example, the Department for Business, Energy and Industrial Strategy (BEIS) has set out cluster sequencing for Carbon Capture Utilisation and Storage (CCUS) deployment; Carbon Capture and Storage (CCS) Infrastructure Fund; Transport & Storage (T&S) Business Models; and Industrial; Power CCUS Business Models; and a roadmap for CCUS supply chains. £171 million was awarded under the Industrial Strategy Challenge Fund to nine CCS and CCUS hydrogen projects.

Against this backdrop, specific funding for green hydrogen production is largely absent. Nonetheless, we fully support the recent ring-fencing of funding for green production under the Industrial Decarbonisation and Hydrogen Revenue Support (IDHRS) scheme, set out in the Net Zero Strategy, and we would like to see more of this as well as greater clarity on the capacities to be supported beyond 2024.

16. We recommend that BEIS sets out a clear roadmap for green hydrogen production with particular emphasis on setting a target for its deployment. Failing to do this is a missed opportunity as the UK has an abundance of renewable energy and electrolysis can enhance our grid and further our net-zero ambitions.
17. The business model scheme proposed in the UK Government's Designing a Hydrogen Business Model consultation will be legally complex, with contracts running to many hundreds of pages, as well as the bilateral negotiations that may take place. It is difficult to envisage how smaller projects will navigate this process and complexity (e.g., through legal costs as development support) versus large hydrogen production plants that have more resources at their disposal. First-of-a-Kind (FOAK) green hydrogen projects are not yet at a stage where they can enter these lengthy negotiations but are in a process of upscaling to ensure electrolysis can be deployed at a large-scale by the end of the decade.

There also needs to be stronger alignment between the UK Government's Net Zero Hydrogen Fund (NZHF) and the business models as larger projects will need the revenue certainty provided by both these schemes.

18. Funding should not come from consumers' bills but from general taxation. Using levies to fund the CfD scheme in the power sector makes sense because the demand users are consumers. However, demand for hydrogen will be industrial and transport sectors in the short-term (subject to a UK Government decision on heat in 2026). We do not think it appropriate that domestic consumers subsidise these sectors directly, especially in light of the recent rising energy costs at a time of a cost-of-living crisis for many.
19. The UK Government stated in its Designing a Hydrogen Business Model consultation that it is not 'minded to' support production for export via the Business Models. The UK Government's business model consultation does not take account of hydrogen exports nor does the UK Government's new Export Strategy mention hydrogen, creating a potential source of conflict between UK and Scottish policy.

What infrastructure, and investment in infrastructure, is needed for green hydrogen to be easily available for heavy transport and buses across the whole of Scotland?

20. It is still unclear where the main priority for green hydrogen lies, as there is still ongoing debate and research into the sectors best suited for hydrogen use. Scotland has other net-zero options for transport, for example, electrification, while industrial processes have fewer options. Industry needs clarification on the prioritisation of sectors so that it can effectively plan where to focus production – in regional hubs or for transport use.
21. The Scottish Hydrogen Assessment Reportⁱⁱⁱ and the Scottish Offshore Wind to Green Hydrogen Opportunity Assessment^{iv} both provide the evidence base that demonstrates the huge opportunity for green hydrogen production via renewable energy in Scotland, citing Scottish Government support for energy projects, good planning processes, experienced workforce and good infrastructure as key reasons why green hydrogen should be developed in Scotland. This would meet both our net-zero targets and help in the transition to a low-carbon economy. This is a chance for Scotland to lead the way in green hydrogen production and capture the economic benefits this would create.

22. Hydrogen has significant potential in heavy fleet vehicles such as buses, HGVs and commercial fleet where range and refuelling durations may be more compatible with user requirements than electric vehicles. Trains, ferries and shipping/vessels are also high potential as appropriate hydrogen applications with opportunities to consider liquid fuels such as ammonia or methanol. These applications could be important in securing early and predictable demand in the short term. The Hydrogen Assessment predicted between 7-11TWh of Scottish transport demand could be supplied by hydrogen.

Consideration must be also given to investing in infrastructure for export. In the short-term hydrogen in the form of ammonia could be developed for export until the shipping options can be expanded.

23. The Scottish Government needs to increase the amount of hydrogen refuelling infrastructure in Scotland, with the establishment of a national refuelling network and plan.

24. Consideration needs to be given to storage. The amount of storage required will depend on the operating regime which will, in turn, depend on the approach to additionality and temporal reconciliation set out in the UK Government's Low Carbon Hydrogen Quality Standard. A more flexible approach to these reduces the relative need for smaller-scale storage therefore, reducing the cost of support in many cases.

25. The UK Offshore Energy Strategic Environmental Assessment states that "unlike natural gas and carbon dioxide, there is no consenting route for projects transporting hydrogen by offshore pipeline, either under the Energy Act 2008 (as amended), or related Regulations such as the Offshore Oil and Gas Exploration, Production, Unloading and Storage (Environmental Impact Assessment) Regulations 2020). Similarly, the consenting route for hydrogen generation offshore requires definition." We would welcome clarity on pathways to consent for hydrogen production and transportation both on and offshore.

26. We would recommend the Committee recognises that hydrogen infrastructure should receive rates relief on business rates, which would help to encourage deployment.

What role should the oil and gas industry play in achieving a "just transition" to blue and green hydrogen in Scotland?

27. A Scottish example of this in action is the ORION Clean Energy Project^v in Shetland which is ensuring a 'just transition' by moving straight to producing green hydrogen. There is no need for a stepping stone approach for developing green hydrogen by first producing blue. The goal of developing a hydrogen economy should be to produce green hydrogen, as it is green hydrogen that shows the most economic benefits (as demonstrated by the Hydrogen Assessment Project).

We note there is a commitment in The Scottish Government's Draft Hydrogen Action Plan to develop sustainable blue hydrogen, however, that plan only references carbon emissions, and not fugitive emissions, methane, or wider greenhouse gasses. The greenhouse gas intensity of the Scottish hydrogen mix over time needs to be consistent with the trajectory to net-zero and carbon budget milestones.

What training is required to build a hydrogen-ready workforce in Scotland? What is the long-term sustainability of the Scottish workforce for hydrogen power?

28. We welcome projections that a strong hydrogen sector in Scotland could support up to 300,000 jobs across all skill levels by 2045.

There will be a need for more skills in the existing workforce, such as welders, pipefitters, engineering design, civil engineers and construction personnel. There is a need for an increase in the number of workers who can be trained to handle hydrogen, such as the existing natural gas workforce. Additionally, electricians and workers trained in quality/testing and inspection and safety are required, particularly as hydrogen standards are so complex.

29. There are also gaps in the hydrogen supply chain. We are encouraged to see that The Scottish Government is considering the hydrogen supply chain but there is a lack of electrolyser producers in Scotland, and this may be the case for other necessary components, such as switchgear, purification, filtration (if using salt water). We recommend a focus on attracting one or more electrolyser manufacturing plants to base themselves in Scotland.

The Scottish Hydrogen Assessment report articulates that “capturing more of the green hydrogen production value chain, including electrolyser integration or even manufacturing upstream would result in greater economic benefits.” If Scotland is to realise the jobs and growth potential of hydrogen, it needs to support local original equipment manufacturers (OEMs), for example. There is great opportunity across the length and breadth of Scotland to maximise the economic benefits in all areas of hydrogen production.

30. There are opportunities for innovation in compression technologies. In the transmission and distribution of hydrogen, the necessary pipework is similar to existing oil and gas pipework therefore improvement in this area is a good opportunity to demonstrate just transition principles.
31. There is a small number of hydrogen storage suppliers in Scotland, particularly for cylinders that are then used in transport and other sectors. As the testing and inspection equipment is a large investment, this is a barrier to hydrogen production.
32. In terms of the end use sector, there is an increased opportunity for downstream applications. For example, there is lots of opportunity for retrofit and new build of heavy goods vehicles such as HGVs and buses. There is a requirement for large-scale hydrogen refuelling across Scotland and the UK. There is only one UK supplier of fuel cells so again, a focus on attracting these types of plant to Scotland would help to realise the jobs and growth potential of hydrogen in Scotland.
33. Positive examples of the Scottish supply chain in relation to hydrogen can be seen in our Supply Chain Impact Statement^{vi} which showcases some of the renewable energy companies operating in Scotland and supply chain opportunities in the sector.
34. With recent announcements of collaborations such as Scot2Ger^{vii} and UK and Scotland working with other countries, there needs to be an emphasis on the protection of local Scottish supply chains. However, this needs to be balanced with the need for more choices in the supply chain.

ⁱ Scottish Enterprise. Development of early, clean hydrogen production in Scotland. August 2021

ⁱⁱ Scottish Renewables. [Policy Position Paper on Green Hydrogen](#). January 2022

ⁱⁱⁱ Arup. Hydrogen Assessment Report. December 2020

^{iv} Scottish Government. Offshore wind to green hydrogen: opportunity assessment. December 2020

^v <https://www.orioncleanenergy.com/>

^{vi} Scottish Renewables. Scotland’s Renewable Energy Industry: Supply Chain Impact Statement 2021. February 2022

^{vii} <https://www.scottish-enterprise-mediacentre.com/news/scottish-german-collaboration-to-unlock-20-billion-green-hydrogen-market-in-the-eu>