HYDROGEN ENERGY ASSOCIATION
GB ENERGY SUBMISSION

Introduction

Hydrogen is a key component of the Government's Clean Energy Superpower Mission, and vital in meeting our aspirations around growth, decarbonisation and energy resilience across the UK. And with Great British Energy positioned to help deliver this Mission, it can play a valuable role in clearing the path so that hydrogen can help revolutionise the energy sector.

The Hydrogen Energy Association (HEA) is the leading pan-UK hydrogen focused association, dedicated to supporting stakeholders across the entire value chain. Our members represent over 200,000 employees globally, with combined revenues over £400 billion, and cover the entire value chain from raw material sourcing, to supply chain and components, financing, professional services, B2B and consumer facing solutions. We promote and represent our members' interests across the hydrogen space, and campaign for the best policy outcomes for the industry across the full range of applications and opportunities. With over 15 years of experience, the HEA is a leader in advocating for hydrogen.

This Paper, prepared by HEA, describes the ways in which GB Energy can deliver its Mission through hydrogen. It considers the mechanisms that can be deployed via the five functions laid out in the Founding Statement.

Why hydrogen?

<u>Hydrogen for jobs and growth</u>

- The global demand for hydrogen technology is expected to increase to £700 billion annually by 2050, and there is an opportunity for the UK to be at the forefront of this new global industry, generating jobs and exports across the UK [1].
- The UK economic opportunity out to 2030 is £11bn, with 12,000 high quality jobs focused in Teesside, across North-West & North Wales, Humber, Scotland and South-West, and many more in the supply chain. These jobs will encompass engineering, construction, manufacturing and service sectors among others.
- A 10% share of the hydrogen technology market alone could deliver £70bn revenue and £46bn GVA per annum to the UK economy by 2050 as well as 410,000 jobs.
- Existing skills in oil and gas can help us provide global leadership in hydrogen.

[1] https://hydrogeninnovation.co.uk/wp-content/uploads/2024/04/UK-Hydrogen-Innovation-Opportunity.pdf

Hydrogen for energy resilience

- Hydrogen is pivotal for achieving a decarbonised power system by 2030, ensuring flexibility and complementing high levels of intermittent renewable generation.
- Hydrogen allows us to balance supply and demand as we work towards our 50GW of offshore wind by 2030, with hydrogen storage as a vital buffer.
- In 2022 alone, there were 200 occasions when National Grid ESO had to pay Scottish wind farms to shut off their turbines, adding £800 million to consumer electricity bills and increasing greenhouse gas emissions by 1.3 million tonnes.
- Savings of £38bn have been identified if hydrogen is used to store energy to balance offshore wind and solar when the wind isn't blowing and the sun isn't shining [2].

Hydrogen for net zero

- The UK will not achieve its decarbonisation ambitions without hydrogen[3].
- Hydrogen's key role is in hard to abate sectors, where electrification is not possible – heavy industry, heavy duty transport (road, shipping, aviation) and power.
- By 2050, hydrogen could account for 35% of final energy demand.

The time for action is now

Nations across the world are pressing forward with the roll-out of hydrogen. At this stage, the race is not yet won, and there is a ten-year window of opportunity to convert investment in innovation into globally competitive supply chains and thus take a leadership position[4] – ensuring that the UK not only has access to growth driving solutions to meet its needs, but also to open up a multi-billion-pound global market.

The role for GB Energy

Recognising the immediate need for clean, flexible low carbon technology, the Government has positioned low carbon hydrogen as critical in accelerating the transition to Net Zero and greater energy security and delivering clean growth. Frameworks and foundations are now in place, particularly to support low carbon hydrogen production, and industry is working at pace to deliver our 2030 10GW target. However, challenges remain, particularly around securing investor confidence, working through regulatory frameworks that are struggling to evolve at the rate needed and scaling up demand. GB Energy is well placed to help overcome these challenges and deliver accelerated progress in line with our Clean Energy Superpower Mission objectives.

Overall principles

The HEA is fully supportive of the founding principles and objectives of Great British Energy. It has the potential to play an important role in delivering a future energy system that meets the UK's needs, including hydrogen. It will be important that the following principles drive the work going forward:

- Based in Scotland, delivering for the whole of the UK – spreading investments, projects and supply chains across all four nations
- Balanced coverage of clean energy technology solutions, including all low carbon hydrogen production options, across Great British Energy's five pillars – ensuring that the economic /

[2] Benefits of long-duration electricity storage (publishing.service.gov.uk)

[3] For example, although renewable electricity has grown significantly, electricity continues to make up only 20% of UK's energy mix. Among other things, hydrogen can help to decarbonise sectors currently reliant on natural gas, which accounts for over 40% of UK energy: usage. https://assets.publishing.service.gov.uk/media/664c827ff34f9b5a56adcb5d/UK_Energy_in_Brief_2023.pdf

[4] https://hydrogeninnovation.co.uk/wp-content/uploads/2024/04/UK-Hydrogen-Innovation-Opportunity.pdf

clean growth, decarbonisation and resilience benefits of each clean technology, for the wider energy system, are maximised.

- Playing a strategic risk-bridging role, both in terms of demand assurance (e.g. by fostering inland hydrogen hubs and acting as a risk-taking intermediary) and underwriting investment (e.g. on FOAK projects).
- A long-term view – ensuring sufficient periods for a return on investment to realise Great British Energy ambitions.
- Aligning with and supporting plans around the Infrastructure Strategy – including grid reinforcement and hydrogen refuelling infrastructure.

Project investment and ownership

As noted above, one of main challenges facing the roll-out of hydrogen is building up demand. Whilst Government support is helping to make hydrogen price competitive with natural gas, users are often faced with the need to change processes and technologies to adapt them for hydrogen use. They are also required to sign-up to multi-decade contracts when the market pathway for hydrogen is still evolving. Furthermore, pipeline networks to bring together producers and users will not be available for a number of years.

Together, these considerations are making it difficult to build demand. One solution to this would be for GB Energy to invest in inland hydrogen hubs as well as core industrial clusters and ports to allow hydrogen trade. A sizeable proportion of industrial activity occurs outside of the main industrial clusters and should not be overlooked. These hubs, which can combine different user types and sizes, would bring together demand with local production, mitigating the reliance on long-distance transportation and national pipelines. By aggregating users, it is possible to decouple production from demand and deliver a smoother overall demand profile, thus reducing risk and allowing producers to operate more economically. Hub elements to be invested in include low carbon hydrogen production, local pipeline[5]s, users and hydrogen refuelling infrastructure.

Inland hydrogen hubs could be connected to national hydrogen infrastructure in the future to become prosumers, supplying demand further afield. This approach would also help to accelerate hydrogen roll-out across the UK, thus aligning with the Modern Industrial Strategy's objective to maximise regional growth outside of London and the South East.

In addition to supporting inland hubs, we would also like to see GB Energy acting as a risk-taking intermediary between low carbon hydrogen producers and users while the market is established. Current requirements under the hydrogen production business model (HPBM) are for hydrogen producers to have bilateral agreements with users for the full contract period of 15 years. For the reasons outlined above, this is challenging.

Whilst electrolytic production remains in its infancy, allowing sufficient flexibility for the initial wave of projects will be crucial in accelerating progress. Hydrogen producers need as much demand as possible to make their projects viable. If primary users cannot take all the volume produced, then the project will under-produce and will either fail to deliver its expected returns (which will prevent further investment), or will have to increase its prices to users.

Introducing a third party, a risk-taking intermediary, who could link together a number of producers and users would allow producers to mitigate volume risk, which is crucial given that the LCHA requires producers to use almost exclusively renewable electricity of which production volumes are, to some

[5] Note that with hydrogen scheduled to be out of scope for RIIO-3, there is no clear funding mechanism for local pipeline connections - https://www.ofgem.gov.uk/sites/default/files/2024-07/RIIO_3_SSMD_Overview.pdf

extent, unpredictable. It would also spread and reduce overall risk, thus improving investment appeal. Government has, to date, been reluctant to accept risk-taking intermediaries, due to concerns over the traceability of hydrogen and ensuring the best value for money for the taxpayer.[6]

In taking on the role of risk-taking intermediary, Great British Energy can help overcome these challenges. By linking users of various sizes with producers, it would widen the choice of bankable users willing to engage relatively early in a project lifecycle and, thus, improve the security of the whole value chain. This approach would also encourage the formation of joint ventures between different areas of the supply chain, improving connectivity and collaboration, which will be key in determining the speed at which hydrogen ecosystems develop. More specifically, it would allow concerns about both traceability and tax payer value to be addressed.

Recent research has revealed that, while the UK has made strides in early-stage cleantech funding, a significant funding gap emerges when projects need to scale, leaving many promising First of a kind (FOAK) initiatives stranded in the "valley of death" between initial venture capital investment and later-stage infrastructure funding.

We believe that innovation and FOAK projects will be needed to bring down the levelized cost of hydrogen (LCOH); with the bulk of the existing cost base being driven by utility costs, it is likely that new technologies will be needed to address this issue and make significant inroads in the LCOH.

Addressing this funding gap should be a priority for Great British Energy, encouraging a broader range of participants – from pension funds and global asset managers to industrial conglomerates and energy majors – to engage more actively in hydrogen project financing.

Key measures to bolster investor confidence, reduce risk and address this funding gap for FOAK projects in the hydrogen sector would include:

- Establishing a dedicated FOAK workstream co-ordinating funding across entities including Great British Energy and the National Wealth Fund
- Tracking the progress of FOAK projects to provide holistic government and industry support
- Exploring new public-private partnership models

A full set of recommendations to tackle the funding gap for FOAK projects has been set out in the recent report published by Cleantech for UK, Powering Up the UK's Cleantech Advantage: Unlocking Investment for First-of-a-Kind Projects[7].

FOAK projects could also benefit from targeted DEVEX support. This will contribute significantly to helping more projects reach final investment decision (FID) as developers are able to derisk projects by getting them to a mature level of design, thereby mitigating downstream risks for supply chain. Whilst strand 1 of the Net Zero Hydrogen Fund provided some DEVEX support to electrolytic hydrogen projects, this was limited and Hydrogen Allocation Round 1 (HAR1) is expected to only see a handful of projects take FID. A potential reason for this has been the design uncertainties and technology risk associated with FOAK projects. To mitigate the same happening for future hydrogen projects, GB Energy could provide DEVEX support through investment in projects to enable projects that are sufficiently designed to increase their chances of taking FID. Co-investment from developers will help to ensure their commitment to subsidised opportunities.

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[6] https://assets.publishing.service.gov.uk/media/657b0bcb0467eb001355f85a/hydrogen-application-round-2-market-engagement-govt-response.pdf

[7] https://cdn.prod.website-files.com/63e633a0ccb11011f378c626/671213744fff90b36497f146_1810_Powering%20Up%20the%20UK%27s%20Cleantech%20Advantage.pdf

Another area where Great British Energy could play a role is in funding for offshore hydrogen pipelines. As these move further away from land, the economics of converting to hydrogen in situ and transferring onshore via pipeline, becomes increasingly compelling. Research suggests that a mixed solution, with both cable and pipeline, maximises socio-economic benefits and socially shared costs.

Project development

The partnership between Great British Energy and the Crown Estate builds on the latter's long-standing role in wind and other renewables. Whilst the HEA very much welcomes the proposed elements of the project development function to be delivered by this partnership, it is critical that this extends into hydrogen. Low carbon hydrogen production faces parallel challenges to those in renewables across issues such as land assessments, environmental surveys, securing planning consent and grid connection. The latter two of these, in particular, are causing considerable delays to hydrogen projects, and any activity to speed up and simplify these steps will help to significantly accelerate the roll-out of hydrogen.

Whilst potentially beyond the remit of GB Energy, the planning process for hydrogen will also benefit from clearer guidance for all parties, standardisation and training for officers. The development of wider frameworks, together with capability and capacity building in planning departments, will reinforce Great British Energy's work in this area. We recommend that Great British Energy liaises with other relevant stakeholders to streamline the overall process for the benefit of all.

Local Power Plants

As noted in the Foundation Statement, partnering between local authorities / combined authorities / community energy groups and private developers to deploy established technologies across local clean energy projects will deliver a range of benefits. Beyond renewables, there are specific opportunities for hydrogen to support the delivery of these benefits, and where operators are rolling out solutions in niche applications. One example is hydrogen powered EV charging facilities. These are already being deployed in service stations[8] and would be a great fit in a local authority's portfolio.

Supply Chain

The UK hydrogen industry has been working hard to define ways to build sustainable supply chains across the UK, and there is a strong body of evidence on which Great British Energy can build to achieve the clean growth benefits that hydrogen offers. Of particular relevance are the development of:

- the Green Industries Growth Accelerator (GIGA) (introduced by the former Government): positioned to support the expansion of strong and sustainable clean energy supply chains, and with a call for evidence[9] prior to the summer, feedback from industry[10] and work by the Department for Energy Security and Net Zero; and

- the Hydrogen Innovation Initiative (HII): where industry, government and academia are collaborating to create an investible, globally competitive hydrogen technology and services sector, here in the UK, with the Hydrogen Innovation Opportunity[11] already defined and a case for action under development.

[8] https://www.geopura.com/in-action/cairn-lodge-services-leads-the-charge/

[9] https://assets.publishing.service.gov.uk/media/65dda6d7cf7eb10015f57f6a/green-industries-growth-accelerator-hydrogen-ccus-cfe.pdf

[10] https://ukhea.co.uk/policy-shaping/

[11] https://hydrogeninnovation.co.uk/reports/uk-hydrogen-innovation-opportunity/

Both of these initiatives to date provide a great foundation from which Great British Energy can build. They provide already developed models of how Great British Energy can '*work with industry to accelerate the deployment of key energy projects and support the transition to an affordable, decarbonised power system by 2030 built using domestic manufacturing and supply chains'*.

Great British Nuclear

Great British Nuclear has been a welcome vehicle for delivering our nuclear ambitions. Nuclear enabled hydrogen is an important part of this:

- offering the potential for substantial zero carbon hydrogen production expanding the role of hydrogen in the energy system;
- with co-location synergies between industrial clusters, nuclear electricity and heat generation;
- affording the opportunity to open up future hydrogen and hydrogen derivative export markets.

Nuclear enabled hydrogen aligns fully with Great British Energy's mission, and we look forward to seeing if form a core component of Great British Nuclear going forward.