

Hydrogen Energy Association

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Dear Colleague,

The Hydrogen Energy Association's response to the DESNZ call for evidence on the 'Green Industries Growth Accelerator: hydrogen and carbon capture, usage and storage supply chains.'

I am writing on behalf of the Hydrogen Energy Association (Formerly the UK Hydrogen and Fuel Cell Association) and in response to your current call for evidence on the Green Industries Growth Accelerator (GIGA) funding allocated for hydrogen and carbon capture, usage and storage supply chains. The Hydrogen Energy Association (HEA) is the leading pan-UK trade body in the hydrogen energy sector, with a Mission to support the growth of our members and the sector, and to ensure that the right policy framework is in place. Our 110 plus member companies 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.

With over 15 years of experience, the HEA is a leader in advocating for and accelerating the transition to Net Zero in the UK through the deployment of hydrogen & fuel cell 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.

As establishing robust supply chains will be pivotal in determining the success of accelerating the UK Hydrogen economy, the HEA welcomes the dedicated Green Industries Growth Accelerator (GIGA) funding aimed at supporting the manufacturing capabilities that can facilitate this. We support the Government's decision to provide CAPEX support for supply chain and manufacturing, which, historically has not been commonplace in the UK. Other countries have adopted similar CAPEX support mechanisms and these have proved an effective strategy for strengthening hydrogen supply chain. With respect to the funding mechanisms that are currently in place, care should be taken to ensure that GIGA funding aligns with and builds on the existing frameworks.

With many questions in this Consultation directed at businesses in the space, our response focuses on those where the collective input that the HEA brings can contribute. Accordingly, please see our responses below to questions **3, 4, 19 and 20**.

Q.3 How important are the following components in overcoming supply chain restraints, delivering our deployment ambitions and maximising economic opportunities in the Hydrogen sector?

- Electrolyser packages
- Reformer packages
- Compressor packages

Please rate them one of the following options and explain your rationale: Very important, somewhat important, not important, don't know.

All of the three packages specified in Q.3 are very important areas of focus if the UK is to overcome supply chain constraints, deliver deployment ambitions, and maximise the economic opportunities for the hydrogen sector. They work together both upstream and downstream, and the interaction with power electronics is critical when knitting the whole system together. Thus, in order for full UK supply chain benefits to be realised, these packages above must be defined in the broadest sense to include all of the other significant Balance of Plant (BoP) components and supporting infrastructure. This includes equipment such as transformers, rectifiers, and power electronics, which are seeing increasing long manufacturing lead times. When allocating support to these packages, it is crucial that it is done so at all scales in order to ensure that hydrogen projects of all sizes can benefit from supply chain support.

In terms of how these packages work together, compression is required for boosting gas generated by electrolysis to usable pressures for onward storage and end use applications. Compressed buffer stock allows for outages of key plant, such as electrolyzers (where stored gas is kept on site as redundancy). Electrolyzers typically create gas at 20-30bar (not limited to) which means that the output is at too low a pressure for markets such as mobility. Hydrogen refuelling projects need to store the gas at 500 or 1000bar, which means that a dual stage compressor is required to take gas from 30BarG to 180BarG, then from 180BarG to 1000+Bar stored (This is to aid in the cascade dispensing needed).

Pressure differences between the hydrogen produced by reformers and that in the gas grid mean that compression will play an important role at various stages.

Q.4 Do you think any additional components should be targeted by this fund? If yes, please suggest which and provide justification.

While the packages outlined above are important aspects of the supply chain, they are production centric and offer a limited coverage of the wider supply chain. In this respect, the HEA recommends that the packages targeted by GIGA funding should be broadened to include a wider range of equipment / systems, in particular pressure vessel, refuelling, hydrogen ICE and fuel cell packages.

The UK, like other nations, has focused strongly on low carbon hydrogen production, with much less attention given to demand and other parts of the value chain. This is leading to a slower and more challenging roll-out than might otherwise have been possible. Alongside other mechanisms to achieve greater synchronisation across the value chain, GIGA can play a valuable role here.

In a 2023 report, the Committee on Climate Change stated that the UK's hydrogen pipeline network would not be able to fully serve industrial clusters until after 2030,¹ and potentially considerably longer for more remote areas. In light of this, it is fundamentally important that the Government also

¹<https://www.theccc.org.uk/publication/net-zero-power-and-hydrogen-capacity-requirements-for-flexibility-afry/>

supports supply chain packages that will facilitate the development of non-pipeline hydrogen transportation, such as the pressure vessels. The UK has strong capability in this area, and there are significant growth opportunities.

Hydrogen refuelling infrastructure is key to hydrogen mobility and the UK has a number of companies active in this area, such as Haskel and BOC. The demand for refuelling is set to grow substantially both at home and abroad.

Supporting fuel cell and hydrogen ICE packages will both build on the UK's longstanding credentials in this area and help to pull through the demand side, which will deliver benefits across the hydrogen value chain. This more holistic approach will lead to better alignment between production and use, filling order books and further stimulating manufacturing scale-up.

Within the funding specification of GIGA, there is an absence of definitions beyond 'equipment', which is causing uncertainty as to what exactly will be eligible for funding within an 'electrolyser package', for example. For the purposes of GIGA, the Consultation refers to CAPEX as the "investment in physical assets e.g. infrastructure, machinery, equipment." This definition needs to be significantly developed to provide more clarity for stakeholders, and to include the opportunity to pull through lower elements of the supply chain. To achieve this, we recommend that the funding scope includes supply chain based consortia, which will ensure that the UK has full supply chain coverage in key areas. In these consortia, funding should be targeted on those areas which are or are expected to cause delays on project roll-out and / or those where there is significant export potential. See also our answer to Q.19

Q.19 GIGA supply chain prioritisation

a) Please provide details of your view of where GIGA funding would be best targeted within the hydrogen and/or CCUS supply chain (max 250 words).

Examples of information we would like to see, if possible, include:

- What components do you believe GIGA funding should support scaling up manufacturing.

Please see also our answer to Q.3.

The HEA believes that GIGA should be developed to pull through full supply chains, with funding targeted towards elements of packages where gaps are evident or expected and / or where there are significant growth opportunities.

Whilst there may be broader capability in areas such as power electronics and transformers, the combination of demand from several sectors and existing solutions not being tailored for hydrogen means that incorporating these elements into the GIGA programme could be significantly beneficial. There has been some discussion around focusing in the first instance solely on short term (production) opportunities in the supply chain. We strongly recommend that GIGA looks both to the short and medium term if it is to achieve its objectives in anchoring globally leading solutions in the UK. Other countries are supporting a range of supply chain / manufacturing opportunities, with a view to growing the indigenous industries. If the UK delays, such opportunities will be gone.

20 Supply chain bottlenecks and barriers

a) Please provide details on your view of the key bottlenecks currently in the hydrogen and/or CCUS supply chains (max 250 words). Examples of information we would like to see, if possible, include:

- Any particular components you are currently struggling to procure.
- An assessment of procurement timelines across the sectors for key components.
- How far do you think these bottlenecks will harm your deployment ambitions?

b) To what extent could the costs of components across the hydrogen and/or CCUS value chains could be a barrier to deployment across the sector? (max 100 words)

The engineering required to produce, transport, store, and use hydrogen at commercially viable pressures means that the manufacturing and engineering in the hydrogen supply chain is far more complex and expensive than in other sectors. Without Government support, this extra expenditure will be a significant barrier to the deployment across the hydrogen sector until costs begin to fall. That said, due to high technical standards required to contain hydrogen, the resulting technology can have a much longer lifetime than other sectors, meaning that Government would be gaining a high value-for-money investment by supporting the CAPEX elements of hydrogen supply chains.

Hydrogen test facilities are much in demand, and their lack (including the hydrogen needed for the testing) could delay the development of UK based supply chains. Consideration should be given as to how to increase the availability of testing facilities to expedite progress.

c) Are there any other key supply chain barriers that will harm deployment across the hydrogen and/or CCUS sectors? (max 200 words)

The Consultation specifies that a benefit of the GIGA funding for CCUS and hydrogen supply chains, will be an “increase[e] in UK Gross Value Added (GVA) from sales to both domestic and export markets.” Yet, the post-Brexit trading conditions between the UK and neighbouring European markets risks undermining the export potential of supply chain stakeholders supported by GIGA. Taxation and other trade barriers mean that it can be difficult for UK produced packages to compete in mainland Europe, thus undermining one of stated objectives of GIGA. Given that Europe is a primary market for many hydrogen equipment manufacturers, the UK must do more to allow potential UK manufacturers to compete internationally and prevent the loss of investment to European counterparts.

More broadly, it will be vital to consider supply chain interventions as part of the wider policy approach to hydrogen. Synchronisation across the support framework will help to ensure that the UK gets the best outcomes across value for money and contribution to energy resilience / clean growth / net zero.

We would welcome the opportunity to discuss our recommendations further.

Kind Regards,



Celia Greaves
CEO