Hydrogen Energy Association
108 Lexden Road
West Bergholt
Colchester
Essex
CO6 3BW
Tel: 0044 (0) 1206 241360
Mob: 0044 (0) 7788 780317
Date: Tuesday, 22nd March 2024
Email: c.greaves@ukhea.co.uk

Dear Colleague,

The Hydrogen Energy Association's response to the DESNZ consultation on 'Alternative Routes to Market for New Nuclear Projects.'

I am writing on behalf of the Hydrogen Energy Association (Formerly the UK Hydrogen and Fuel Cell Association) and in response to your current consultation on 'Alternative Routes to Market for New Nuclear Projects'. 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.

The UK recently announced a major shift in its nuclear objectives, aiming to deploy more nuclear power in the next three decades than was built over the previous seven. This presents a significant opportunity for Nuclear-Enabled Hydrogen (NEH), the term for hydrogen that is produced using heat and electricity derived from nuclear power. The combination of nuclear power and hydrogen through NEH offers the potential of mass-scale hydrogen production, which can be used to help decarbonise some of the UK's hard-to-abate sectors. This Consultation provides a valuable opportunity to progress policy and support frameworks for NEH.

In this Consultation, the questions that are of direct relevance to our members and their objectives are as follows: **Q.5, 9, 10, 15, 16, 25.**

Q.5 To what extent do you agree that advanced nuclear could be a valuable energy source for hydrogen and synthetic fuel production? Please explain your answer.

The HEA believes that advanced nuclear would be a valuable energy source for hydrogen production; it has a range of different applications and the LCHS includes NEH as part of its alternative production pathways. On an energy system scale, using nuclear as an energy source for hydrogen could offer several levels of energy security through strong supplier relations, domestic processing capability, and the long-term storage of fuel. As detailed below, the more specific aspects of advanced nuclear technology, in terms of operating cost, scale, location, and technology compatibility would be beneficial for hydrogen production.

Once operational, nuclear plants have the ability to provide a stable, low-cost supply of electricity to hydrogen production facilities throughout the lifetime of the asset. This is particularly valuable for hydrogen electrolysis where a significant proportion of OPEX result from continuous electricity inputs. As a thermal technology, nuclear power stations can also provide heat at a variety of temperatures to enable a large efficiency factor increase for hydrogen production and subsequent products, including Ammonia and Synthetic Aviation Fuel (SAF). There are several variations of nuclear technology that could provide a valuable energy source for hydrogen production, all of which have their own assets for specific use cases. It is thus important that policy decisions are technology neutral and remain supportive of all NEH solutions.

Locating the production of NEH within industrial clusters has the potential to forge strong synergies between the nuclear electricity, heat generation, and industrial end use. Small Modular Reactor (SMR) technology would allow the input energy for hydrogen to be located near demand hubs, thus reducing infrastructure costs and transmission / efficiency losses.

The scale at which advanced nuclear operates would have the potential for large-scale hydrogen production that could make a nationally significant contribution to future hydrogen demands. The land requirements for NEH capable of supporting GW+ projects are relatively small and so would represent a highly productive allocation of land resources.

Q.9 What, if any, are the main opportunities and challenges for streamlining regulation while maintaining high standards of safety, security and environmental protection? Please explain your answer.

It is important to stress the need for swift and proactive action in regards to regulation, permitting, and licensing. A Royal Society Report from 2020[1] highlighted the importance of changes to regulatory structures to enable co-generation. Whilst parts of the Office for Nuclear Regulation now understand and are developing on the journey with the sector, a significant number are still not onboard; this will be a massive barrier to progress. A more collaborative approach is needed to make this work and it is likely this will require regulation to get over resistance.

A significant challenge for any NEH project looking to become operational now would be the lack of capacity in the permitting system. Based on current legislation, the UK permitting framework has the potential to accommodate NEH; yet the limited capacity could cause significant delays. The nuclear sector is at point now where all of the existing plants are legacy sites and if any new NEH plants are to be deployed, there has to be sufficient consideration for how the different regulatory and permitting requirements for advanced nuclear technology and hydrogen production facilities will overlap.

[1] https://royalsociety.org/-/media/policy/projects/nuclear-cogeneration/2020-10-7-nuclear-cogeneration-policy-briefing.pdf

While the co-location of nuclear facilities with other industrial uses is not a new occurrence, from a technical perspective, SMRs are likely to be considered a new technology, thus requiring new standards. To date, there has been no demonstration of transferring heat from a UK nuclear site to an adjacent process outwith the licensed site. That said, we stress the need to avoid reinventing the regulatory wheel and, instead, recommend amending the existing legislative pathways for NEH projects. In this respect, the HEA highlights the importance of learning from international regulation of similar applications in order to guide our domestic permitting process.

While SMR technology poses new considerations for regulators, there is no current legislation that would suggest that NEH could not be included into existing regulatory frameworks. We stress the need for increased capacity and experience in the permitting and consenting space, as given the challenges we have seen in the rollout of hydrogen thus far, there is little evidence to suggest that the UK has the resources to make swift and informed decisions.

Q.10 Following government's streamlining work to date, do you agree the next phase should focus on improving the efficiency of existing processes? Please explain your answer.

The HEA agrees that the focus should be on improving the efficiency of the existing processes, as reinventing the wheel would cause delays and added complexity. As with the consenting and permitting process, the primary consideration with the existing planning process is ensuring that there are sufficient resources and informed personnel within the framework to deliver this proposed streamlined process nuclear projects. Advanced nuclear technology, such as Small Modular Reactor solutions, may have smaller infrastructural footprints relative to applications that the 2008 Planning Act has previously covered, meaning that they would be well suited to a streamlined approach.

That said, it is important to note that the use of advanced nuclear technology to support adjacent processes, such as for NEH projects, is a new concept and requires more consideration before any further phases of planning improvements are undertaken. While the consultation states that the Government is looking to expand the threshold for Nationally Significant Infrastructure Projects (NSIPs) in England to include all nuclear reactors, is not clear if all elements of a NEH project would then receive a Development Consent Order (DCO) and benefit from a streamlined planning application or if the adjoining hydrogen infrastructure would be assessed by local planning authorities. Coordinating the applications of the constituent elements of NEH projects must be given sufficient forethought before attempting to improve the efficiency of the existing process. Clarifying the planning route for these solutions, including the peripheral and downstream infrastructural components, will be crucial for reducing the risk of inconsistencies, added complexity, and delays in the planning process.

Ultimately, the HEA stresses the need for Government to consider how nuclear projects that are linked to downstream processes for hydrogen production would attain planning permission at a project level. There is currently no clear regulatory pathway for developers to follow.

Q.15 What, if any, structures do you think are appropriate for advanced nuclear technologies? Please explain your answer.

It is important to stress that there is a role for both Regulated Asset Base (RAB) and Contracts for Difference (CfD) models to support nuclear applications coming through to market. Associated

revenue support mechanisms, similar to the HPBM, would also be a suitable structure to enable advanced nuclear technologies to play their role in delivering net zero and energy resilience, provided the Government adopts a proportional, long-term approach and recognises the long lead times associated with NEH.

Q.16 What are some key areas government should consider in a potential business model to bring a first-of-a-kind project to market? Please explain your answer.

The HEA reiterates the point made in Q.15 above. The construction and operation timelines of NEH projects must be appropriately considered within the development of a nuclear business model. The appropriate derisking financing needs to be supported in the early stages, particularly in a way that is conscious of the fact that these projects will be 'first of a kind.'

Q.25 To what extent do you agree that there are current or future gaps or constraints in the UK R&D landscape for Advanced Nuclear Technologies, either for that high TRL R&D and demonstration or earlier stage R&D? Please explain your answer.

The HEA agrees that there are current gaps in the UK Research and Development (R&D) landscape. Beyond developing the technology itself, insufficient resources are allocated to building the evidence base that will validate the application of nuclear technology for adjacent processes such as hydrogen production. The Consultation suggests that R&D will be primarily focused on how to build new nuclear reactors, yet the UK currently has limited funding for demonstrating the ability to utilise advanced nuclear technologies for other purposes. By way of example, a stronger evidence base is needed for defining best separation distances between SMRs and hydrogen production facilities. R&D must allow for more resources to focus on the application of the technology and consider the whole system implications for the use of advanced nuclear technologies for hydrogen and synthetic fuel production.

R&D in the UK must also support the capacity for independent technology verification and testing. The lack of high-quality, independent and warranted data on the new equipment being deployed could hinder projects in the early stages of consenting processes. R&D must not only be targeted at answering technical questions, but should equally allow scope for the appropriately recognised research institutions to validate operational data for equipment, which may be the first of its kind.

We would welcome the opportunity to discuss our recommendations further.

Kind Regards,

Celia Greaves
CEO