Designing the Net Zero Hydrogen Fund – Consultation:
Submission to BEIS, October 2021

1. What wider benefits could the NZHF deliver, such as local growth and low carbon leadership opportunities?

The NZHF has the potential to catalyse a range of benefits through incentivising the large-scale production and use of hydrogen in a low-carbon economy, including:

Job creation and investment

The development of decarbonised gas and associated infrastructure can be a significant job creator in its own right:

- A recent report by the Offshore Wind Innovation Hub found that the transition to **green hydrogen** (100% H2 gas network) will result in an estimated investment level of between £4 billion and £12 billion per year over an extended period (up to 50 years) between 2040 and 2090.[1]
- **CCS and hydrogen:** Hydrogen and CCS development for broad-based decarbonisation could be a significant job creator, leading to 43,000 jobs for industrial decarbonisation alone, 195,000 jobs if hydrogen plays a full role in economy-wide decarbonisation, and 221,000 jobs if the UK also becomes a major hydrogen exporter.[2]
- A recent report by the Hydrogen Taskforce found that, by 2035, **upstream hydrogen production** could deliver 28,500 jobs and £4.2bn of GVA, **midstream hydrogen transport** could deliver 15,500 jobs and £5.3bn of GVA, and **downstream hydrogen use** could deliver 30,500 jobs and £8.7bn of GVA.[3]

Levelling up and exporting

In many less affluent parts of the country, energy intensive industries – iron and steel, cement, chemicals, oil refining, food and drink, pulp and paper and ceramics – are the largest employers in the area and offer high quality jobs that pay above the median wage. Overall, energy intensive industry accounts for £140 billion in economic value added and employs over 1.1 million people.[4]

But the UK has seen too much emissions reduction through offshoring of heavy industry and is now the largest per-capita importer of CO2 emissions in the world.[5] To give one example, the closure of Redcar steelworks in late 2015 led to 2,000 job losses but caused nearly half the fall in industrial emissions in 2016.[6]

Decarbonised gas, and hydrogen in particular, provides an opportunity to turn this around, and develop UK exports of decarbonised industrial products, together with exports of hydrogen and CCS technology and services:

- Overall, the global hydrogen market could reach £1.9 trillion a year by 2050,[7] with the global fuel cell market reaching over £140 billion.
- The European electrolyser market (dependent on the Brexit trade outcome) could be £3.7 billion in 2017-2025, which could represent around £0.8 billion to the UK by 2025.[8]

International cooperation to ensure consistency on, for example, low carbon hydrogen standards, will be essential if the UK is to capture the full export potential.

Scientific superpower

In our minds, being a scientific superpower doesn't just mean leading the development of technologies to meet net zero, but also benefitting economically from them.

The UK has a leading position in a) many of the key decarbonised gas technologies, including fuel cells, electrolysers and advanced methane reforming, and b) the projects that could fit them all together at scale,

including the various cluster decarbonisation plans, and the considerable offshore CO2 storage capacity. So we are well placed to take advantage of the global growth in decarbonised gas – revitalising energy intensive industry and developing new manufacturing and service industries.

But these opportunities will only be realised if the UK produces hydrogen at home. If we wait for other countries to take the lead – and there are plenty of countries that are keen to take the lead – the opportunity will be diminished.

2. Do you agree with the proposed scope for the NZHF?
The NZHF is designed to encourage realisation of hydrogen production projects, and we would agree that the scope is suitable to assist with the de-risking of projects going through these stages, and complements other funds aimed at wider decarbonisation goals.

While this is the case, it should be noted that the administrative burden of applying for multiple funds and receiving smaller pots of money can prove to be large, and the various funding mechanisms for different elements of cluster projects and plans should work together, or, ideally, be brought together.

3. Are there any technologies for low carbon hydrogen production, other than CCUS enabled and electrolytic hydrogen, that you think could begin production of low carbon hydrogen during the early 2020s? Please give details.
The consultation highlights multiple hydrogen production technologies that are available for implementation and can begin production of hydrogen at scale in the 2020s. We do not believe that there are any additional technologies that are likely to produce hydrogen at scale during this timeframe, but note that due consideration should be made of the different types of electrolytic hydrogen production, for example, hydrogen production from nuclear and waste energy sources

4. What boundary should the NZHF set around production projects? Please explain your rationale, including any considerations that may change over time and / or vary according to the types of projects.
We believe that the boundary set by NZHF should cover all aspects of technologies that will need to be assembled to encourage the provision and of hydrogen – this will vary between projects and use cases, but each project will have some requirements for storage and transmission. The aspects required in each production/use-case will be different for each project, but the application process should acknowledge the inherent importance of small-scale distribution and storage linked directly to the production plant.

Given the amount available from this fund (£240 million) and the overall cost of large-scale production projects, we would support the view that the Fund is calibrated carefully to achieve a balance between large-scale production projects, smaller production projects and other projects that would support the 2030 ambition so they can all reach FID decisions in the early- to mid-2020s. If hydrogen networks are to be funded through other instruments and means (e.g. via OFGEM or RAB funding) within similar timeframes then they should not need to be included in the NZHF boundary. **In any case it is critical that support must be provided in a timeline fashion, particularly for large-scale storage, for which FID would need to be taken within the next 2 years to meet the hydrogen strategy roadmap of deployment in the late 2020s.**

The funding of established and demonstrated hydrogen production technologies is welcomed especially where those technologies are not covered by other funds, but we would note that suitably established distribution and storage infrastructure are required to support production even at a local project level. While the requirements to support 5GW generation capacity will require significant investment, and largescale infrastructure will need to be separately developed, early-stage projects will still need suitable storage and networks to realise the benefits of those projects.

Production, distribution, storage and end-use demand are intrinsically linked, and must be funded coincidently to result in meaningful developments in the production capacity. Funding, either under the NZHF or a separate scheme, must be made available to ensure that production of hydrogen is sufficiently supported by appropriate storage and distribution networks. Coordination between production and storage/distribution infrastructure is key to ensure that funded projects are set up in the best possible way to continue operating beyond the timeframes of NZHF support. If cross-chain integration is not suitably considered, there is a risk that production projects will become stranded assets.

Noting the proposed lifetime of the fund (2022-2025) the cluster sequencing process requires that if projects are being supported by cluster sequencing, they will have to finalise pre-FEED activity by the end of 2022. Assuming CCUS enabled projects wish to participate in the CCUS cluster sequencing process, this suggests that most FID decisions will take place between 2022 and 2025, in which time, in the context of this fund, consideration should be given to whether CAPEX or DEVEX would best suit the achieving of hydrogen production goals.

We would support provision of both DEVEX and CAPEX to suitable projects, and also would support expansion of the fund. Each category of project/application for must be investigated to determine suitable CAPEX values (including consideration of ongoing subsidy support provided through Hydrogen Business Models), given the variable conditions of each application.

There should also be some consideration made for the viability of current end-use technologies, including industrial and domestic use, and whether these end-uses will need CAPEX or DEVEX support for early-stage deployment. This is especially true for end-uses that do not currently have policy or regulatory incentives for uptake.
Similarly, to support the viability of both production and end-use, suitable consideration must be made of facilitating progress through distribution, storage and transmission, and what policy and funding levers may be required to encourage rapid development of these aspects.

5. Noting the importance of revenue support which could be covered by the Hydrogen Business Model, do you agree that capital grant funding is the most effective option for low carbon hydrogen projects to come forward? Please explain your answer.
We believe that capital grant funding is the most appropriate finding vehicle for this scheme. Our opinions echo the arguments summarised in the consultation, namely that:

• Loans do not remove risks and barriers sufficiently to effectively support the development of production in early-stage projects
• Equity funding tends to best lend itself to longer-term engagement, and the focus of this scheme is to facilitate the rapid uptake of hydrogen production throughout the 2020s. While a useful longer-term prospect, we feel that capital grant funding is more suited to encourage stimulate rapid increases in hydrogen production
• Equity and loans combined may give a suitable platform for future projects based on well-established production technologies and business models, but for initial development of production projects, capital grant funding is preferred.
• Capital guarantees are complex schemes, and we consider capital grant funding preferable.

Given that Hydrogen Business Models will provide ongoing revenue support for large scale production of hydrogen, capital grant funding could provide impetus for storage/transmission/end-use development as well as production projects, should the scope/boundary be expanded to include them. Capital Grant funding is the most appropriate funding methodology to assist with de-risking projects across all these areas and assisting with FID.

6. If capital grants were not available, would you consider applying for government loan funding?
Not applicable for the DGA

7. Do you agree that CAPEX support through the NZHF will help projects to reach Final Investment Decision? Please explain your answer.
We agree that CAPEX support will assist projects in reaching Final Investment Decisions. Contingency set through CAPEX funding is a strong positive for initial projects, however it should be noted that there is risk involved with first movers where projects involving new technologies are involved. CAPEX funding does assist with bearing this risk, and encouraging first movers to reach FIDs, especially where projects (even with support from Hydrogen Business Models) may require further incentive to commit.

This may be most applicable to smaller-scale production projects rather than larger scale production plants, who will see the proposals under the Hydrogen Business model as the main support for these projects.

In assisting with FID, the NZHF will best assist cluster projects that are well developed, and have completed FEED stages, and will provide support in collaboration with Hydrogen Business Models.

It is important to note that grant funding must be available on a timeline that doesn't constrain project development – we note the intent to run multiple competition windows. Applications must be as simple and as straightforward as possible.

8. Do you know of any projects that may only want CAPEX support, without a requirement for a hydrogen specific business model, in order to take FID? If so, please give details of the project(s).
There may be cases where CAPEX funding for transport projects, combined with funding from the RTFO will be sufficient to provide adequate subsidy for green hydrogen/transport projects. Each instance will require careful consideration in order to grow suitable hydrogen markets. It is likely that projects injecting hydrogen into industrial clusters will predominantly require support from hydrogen business models.

9. What reflections do you have on the approach we have identified to address the main challenges in building new hydrogen production facilities?
The solutions noted include provision of CAPEX to de-risk production projects: however, we would argue again that pure production elements cannot be taken out of the scope of the wider working projects that they feed into, incorporating the elements discussed in previous questions. While CAPEX funding will be useful, especially to FOAK projects, it must be noted that ongoing operational support provided by the Hydrogen Business Models, and demonstrable demand for hydrogen in the form of a developed domestic hydrogen market are also key.

10. Do you agree that there is a need/demand for government intervention to support hydrogen production projects with their development costs?
We agree that there is a need for government intervention. Development stages of a project are by nature higher risk than investing in a tangible project with known revenues. For this reason, it is more difficult to secure funding from private investors at this stage making grant fund critical to this stage of project development. Allowing DEVEX support is likely to significantly increase the number of potential hydrogen projects in the UK, particularly from smaller businesses. Provision of CAPEX may be more significant to projects that have completed these phases, and potentially focusing on these projects may improve production in the short term, but this must be balanced with ensuring that a suitable pipeline of projects remains, in order to achieve more distant generation targets, and build suitable development of hydrogen networks.

We would also note that uncertainties regarding further support for storage, transmission and distribution projects may provide barriers for projects coming online and would recommend that the government investigate the developing requirements for these aspects.

11. In light of available funding sources for project development, at what stage of the project life cycle would government support ensure the most effective use of the NZHF's resources and why?
We would recommend that funding during the higher risk, early stages of projects will have the most effect on their success and future implementation. While the funds available are a welcome boost for projects on the verge of deployment, we would note that further efforts must be made to develop suitable support for end-use technologies, storage, transmission and distribution to ensure that viable markets are built to support the increased generation of Hydrogen.

12. Do you agree with the proposed high-level eligibility criteria for NZHF applications? Please expand your answer.
We agree with the criteria proposed for eligibility assessment but it is currently unclear as to the consequences if FID were not taken within the specified window, and this should be clarified.

13. Do you agree with the proposed high-level assessment criteria for NZHF applications, and in particular? Please expand your answer.
We agree with the proposed high-level assessment criteria but note that the criteria remain very broad. It may be more suitable to narrow the scope of the criteria, given the number of schemes and funds available to applicants, to focus on those projects that can have higher impact on production and use of hydrogen.

14. Do you have any comments on the application process for the NZHF? Please explain any practical considerations the government should take into account when designing the final bidding system.
We agree with the proposal for holding multiple rounds of applications and feel that this will allow more projects to benefit from the NZHF. The eligibility assessment before full application is well-established system and has proven value in confirming relevance and eligibility.

However we would re-iterate the need to keep the application as simple as possible, and to consider how information from other applications (e.g. cluster plans) can be re-used for efficiency.

15. If your organisation is likely to apply to the NZHF, could you please state whether you would be seeking capital or development support and the estimated size of the bid? If your projects require capital support, please also express this as percentage of the overall costs.
Not applicable for the DGA

16. If you are seeking capital support, what stage of your construction are you looking to get funding for?
Not applicable for the DGA

About the DGA

The Decarbonised Gas Alliance (DGA) represents nearly 30 expert organisations who have come together to promote decarbonised gas as a stable pathway to help meet the UK's target of net zero climate emissions.

Our aim is to articulate a shared view on how decarbonised gas of all types can help the UK reach net zero effectively by both retaining funding for existing projects whilst shaping the future of the decarbonised gas industry.

The DGA offers a unique perspective to decarbonised gas markets including green, blue and other 'colours' of hydrogen, gaseous fuels from biomass and plastics as well as biogases and synthetic gas.

The development of attractive market structures and business models will be critically important in stimulating and underpinning decarbonised gas demand and supply side investment opportunity. The DGA is ready to help shape that process.

Since inception in 2017, the Secretariat and Alliance members have:

- Completed 18 responses to date on strategic government consultations
- Commissioned detailed public opinion research 'Getting net zero done' to understand consumer attitudes in detail to understand how domestic heating, transport and industry could be decarbonised (using gas), and worked with an external agency to produce a detailed report for government on how the sector could be supported https://www.dgalliance.org/wp-content/uploads/2020/05/DGA-Getting-Net-Zero-Done-final-May-2020.pdf
- Provided advice to BEIS through their Hydrogen Advisory Council Working Groups, and Business Model Expert Groups on Hydrogen and CCUS as well as cooperating with the Hydrogen Task Force
- Ensured representative responses to key BEIS, Treasury, All Party Parliamentary Groups, Climate Change Committee and Select Committee consultations
- Played a leading role in the design of the Industrial Decarbonisation Challenge, which secured £170 million of funding from the Industrial Strategy Challenge Fund.

The DGAs Primary Goal

Today, we remain focused on being a unified voice to support the deployment of low carbon gas solutions that make best use of our existing infrastructure and enable quicker and cheaper decarbonisation. We are committed to working with government and expert organisations of all levels to create a deliverable pathway net zero emissions.

[1] Offshore Wind Innovation Hub, Future Offshore Wind Energy Integration: Outlook & Analysis https://offshorewindinnovationhub.com/industry_insight/future-offshore-wind-energy-integration-outlook-analysis/

[2] Element Energy and Equinor, Hy-impact Study 1: Hydrogen for economic growth, November 2019 http://www.element-energy.co.uk/wordpress/wp-content/uploads/2019/11/Element-Energy-Hy-Impact-Series-Study-1-Hydrogen-for-Economic-Growth.pdf

[3] Hydrogen Taskforce, Economic Impact Assessment: Hydrogen is ready to power the UK's Green Recovery, August 2020 https://www.hydrogentaskforce.co.uk/resources/#:~:text=The%20Taskforce%20has%20produced%20an,drive%20towards%20NetZero%20by%202050.

[4] BEIS analysis using the ONS Annual Business Survey

[5] Office for National Statistics, The decoupling of economic growth from carbon emissions: UK evidence, October 2019, Figure 11 https://www.ons.gov.uk/economy/nationalaccounts/uksectoraccounts/compendium/economicreview/october2019/thedecouplingofeconomicgrowthfromcarbonemissionsukevidence

[6] Cooper SJG and Hammond GP, Decarbonising UK industry: towards a cleaner economy, Institution of Civil Engineers paper 1800007, May 2018, p.3; See https://www.gazettelive.co.uk/news/teesside-news/redcar-steelworks-closure-contributes-sharp-12696855

[7] Hydrogen Council, Hydrogen scaling up, November 2017, p.8 http://hydrogencouncil.com/wp-content/uploads/2017/11/Hydrogen-Scaling-up_Hydrogen-Council_2017.compressed.pdf

[8] Tractebel and Hinicio, Study on early business cases for h2 in energy storage and more broadly power to h2 applications, June 2017, p.2 https://www.fch.europa.eu/sites/default/files/P2H_Full_Study_FCHJU.pdf