REA Response to BEIS Consultation on Designing the Net Zero Hydrogen Fund

The Association for Renewable Energy & Clean Technologies (REA) is pleased to submit this response to the above call for evidence. The REA represents industry stakeholders from across the whole bioenergy sector and includes dedicated member forums focused on green gas, biomass heat, biomass power, renewable transport fuels and energy from waste (including advanced conversion technologies). Our members include generators, project developers, fuel and power suppliers, investors, equipment producers and service providers. Members range in size from major multinationals to sole traders. There are over 500 corporate members of the REA, making it the largest renewable energy trade association in the UK.

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

The NZHF will accelerate the deployment of hydrogen by overcoming barriers to entry that a subsidy mechanism alone would not be able to do. It would also allow a period of 'level playing field' for all routes of hydrogen production and use, to ensure they are all given the same chance. This will then allow the market to drive efficiency and best solution adoption, through the subsidy mechanism.

The fund will help deliver jobs and investment locally around the country and outside London. Our publication REview 2021 states that 330,000 jobs will be delivered in all renewable and clean technologies, including hydrogen, by 2035, provided that the right overall support for all technologies is provided.

Excerpt from the publication:

'We estimate that there could be nearly 200,000 additional jobs in renewable energy and clean technology by 2035, bringing the total up to 333,000 across the UK. This figure could increase if the Government properly backs the sector and puts the industry at the heart of the UK's economic recovery. By the same token, neither are these job projections guaranteed. If the sector continues to receive patchy and short-term support from the Government then we could fall well short of our sector's, and indeed our country's economic potential.'

2. Do you agree with the proposed scope for the NZHF?

Yes, we broadly agree with the proposed scope of the fund. We agree that it should cover multiple technologies, if these meet the low carbon hydrogen standard.

We believe a wide range of technologies and scales is required in the UK to build a functioning hydrogen economy and reach our Net Zero target.

However, we recommend the fund is targeted towards tackling barriers to entry for hydrogen. **The fund should not be a substitute to ongoing support mechanisms.** It

has been proven that ongoing support of projects from Government (such as Feed-In-Tariffs, Renewable Obligation and Renewable Heat Incentive) have been effective in stimulating the markets and allowing them to grow.

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.

Yes, other technologies or pathways in addition to those identified above could be deployed during the early 2020s. These include (but are not limited to):

Biohydrogen from thermal gasification of biomass with and without CCS

A demonstration project is currently being commissioned by Advanced Biofuel Solutions (ABSL) in Swindon using the RadGas technology.

Another much larger commercial plant is being developed by the same company with Progressive Energy at the Protos Energy Park in Cheshire, aiming at producing 350 GWh/year of BioSNG and hydrogen from 133,000 tonnes per annum of refused derived fuel (RDF), using the same technology as the Swindon plant.

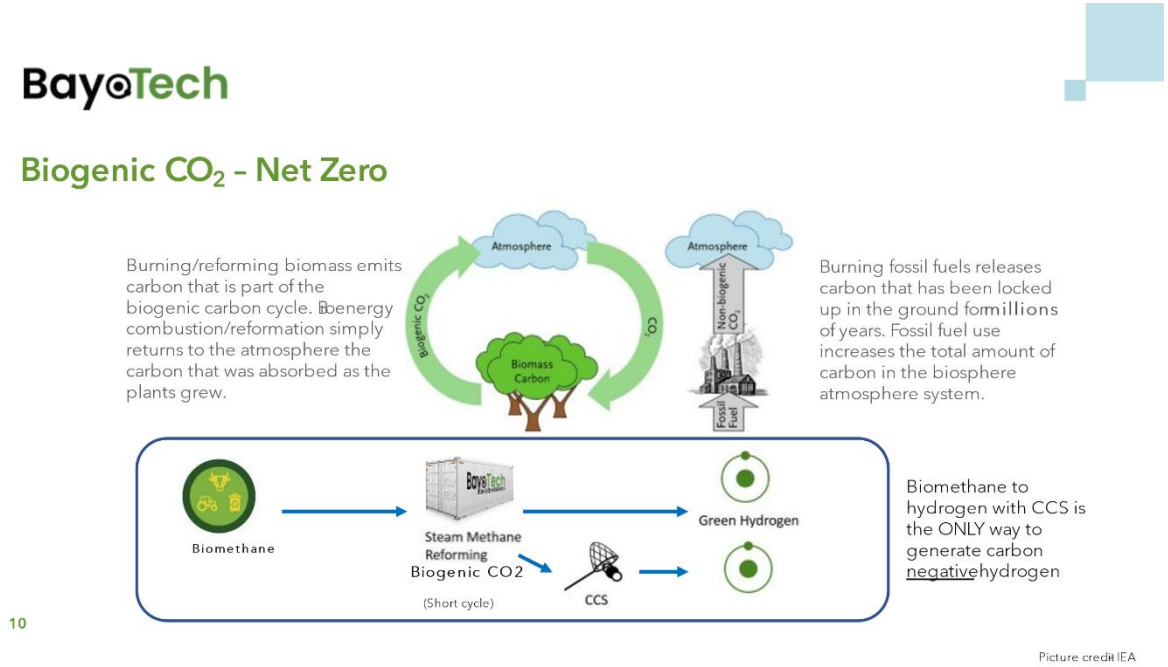
These types of projects can accept a wide range of biomass including black bag wastes, refused derived fuel, solid recovered fuel, tyre crumb, and any other dry waste feedstocks. It has been estimated that the UK has bioresource available to produce roughly 100 TWh of biohydrogen and we are aware of around six/seven companies looking into developing these types of projects in the UK. More than 2 million tonnes of RDF are exported into Europe from the UK which could instead be diverted into domestic low carbon hydrogen production.

It is important that this technology is included even without CCS, as this pathway can deliver significant GHG emission savings even when it is not combined with carbon capture, and it should be included as long as it meets the low carbon hydrogen standard. When combined with CCS it can deliver significant negative GHG emissions.

Biohydrogen produced from distributed steam methane reformation of biogas/biomethane from AD plants, with and without CCS

Small scale, modular units (e.g. those developed and supplied by BayoTech) can be used to convert biogas or biomethane to biohydrogen at an AD plant, or can tap into existing gas pipelines and generate biohydrogen from gas matched to green gas certificates at the point of demand. This enables decentralised production of hydrogen locally and distribution to nearby consumers in efficient high-pressure transport trailers. In the future, when parts of the gas network are replaced with 100% hydrogen pipelines, this solution may be key to minimise the risk of some AD assets becoming stranded. As a nation we are becoming more conscious of waste re-use and avoiding methane produced by biogenic breakdown therefore feedstocks are set to become more distributed and available. These systems can be deployed today delivering low carbon hydrogen to the market at speed. Once CCUS becomes more mature and cost

competitive, it can be added to these systems producing a carbon negative hydrogen stream without impacting the supply or availability of the existing hydrogen production.



Hydrogen from the non-renewable (fossil) fraction of waste streams

The REDII defines 'recycled carbon fuels' (RCFs) as liquid and gaseous fuels (such as hydrogen) that are either produced from liquid or solid waste streams of non-renewable origin or from waste processing gas and exhaust gas of non-renewable origin. This includes fuels derived from non-renewable waste streams e.g. fossil waste (plastic, rubber, gaseous wastes etc.) by means of thermochemical conversion technologies such as e.g., gasification, pyrolysis and liquefaction. Such fuels, although derived from waste fossil carbon, are included in RED II because of their potential contribution to the reduction of greenhouse gases (GHG) and they should be considered by BEIS for the same reason. However, the Commission has not finalised yet the methodology to calculate the associated GHG emissions. Similarly, the Dft included proposals related to supporting RCFs in their consultation on the RTFO earlier this year but they haven't finalised the details as yet and are likely to consult on it again soon.

It should be noted that in some cases inputs to these plants will include both, a biogenic, renewable fraction and a non-renewable fraction.

The pathway described below as 'Hydrogen from the non-recyclable fraction of plastic wastes' is an example of 'RCFs.

Hydrogen from the non-recyclable fraction of plastic wastes

An example of this pathway is the waste plastic to hydrogen facility already being developed at the 'Plastic Park' at Protos Cheshire. This is being developed by Peel NRE using technology from Powerhouse Energy Group. A second plant is being planned in Glasgow. Peel NRE has a collaboration agreement with Powerhouse Energy Group to develop 11 waste plastic to hydrogen facilities across the UK over the next few years,

with the option of exclusive rights to develop a portfolio of more than 70 facilities. The potential is therefore significant through a replicable distributed model and can be delivered in the near term.

Other innovative pathways

Some members of the REA are also looking at is gasification of heavy refinery products (fuel oil) which would produce ash as a by-product. The ash would contain carbon, and that carbon should be included in the carbon captured for the purposes of GHG calculations, i.e. [CO_2 captured] = [CO_2 to storage] + [C in Ash]).

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.

It would be helpful if the cost of storage could be factored in when it is essential to the type of project (for example where buffer storage is required to provide system flexibility e.g., hydrogen produced with excess solar PV and wind power that is stored for later use – as a fuel for transport, industry, or as a 'smart' load to increase power system flexibility).

Hydrogen is a complex energy carrier and there are barriers to entry at different parts of the production and supply chain.

The NHZF boundaries should include the storage, transportation, and the use of hydrogen. Without these considerations there will be a risk that production technology is advanced, but the success of hydrogen is limited by the inability to transport, store, and use the fuel.

A member suggested that the fund should also support the development of high-volume electrolysis, which does not involve the use of electrolytes or catalysts, and innovations in methane to hydrogen conversions, reducing their costs and disruptions. This should include gas networks, storage, industrial equipment, and domestic appliances. It could (for example) involve some way of coating or treating components to make them resistant to leakage and/or embrittlement.

Members also suggested that other portions of the fund should be allocated to the following:

Decarbonising industrial processes, such as:

- Reduction processes in iron and steel making;
- Alternative processes and chemical pathways in any other carbon intensive process, prioritising lime/cement/concrete;
- Scale-up of processes.

Synthetic fuels

- Eliminating their carbon footprint, including in their formation from hydrogen;
- Reducing their cost;

- High-volume manufacturing processes.

Any other related innovations that fit the funds Net Zero Hydrogen intent but don't fit either of the above criteria. Examples may include:

- Methods for roll-out;
- Detection of and response to leaks;
- Safety measures in operation;
- Safer and easier transportation (including in the fuelling of fuel cell vehicles).

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

The REA really welcomes the grant funding in the short term. We agree that it is an effective option in the short term to help with upfront capital costs.

Members of the REA have highlighted that these types of grants should be pinpointed towards the areas of hydrogen that cannot benefit from a subsidy, which include hydrogen storage, transportation, CO_2 capture and end use.

In the long term the more important factor will be a long-term revenue support mechanism, as with renewables projects, alongside demand side measures.

We agree that capital cost is a key barrier to the deployment of low-carbon hydrogen. Regarding electrolytic hydrogen, according to the IRENA's report, despite their market availability, PEM and alkaline water electrolysers are still considered highly expensive from both CAPEX and OPEX perspectives, compared to fossil fuel-based hydrogen production.

As mentioned by the IRENA's report, another great barrier to deployment is operational cost and this needs to be addressed by an appropriate producer-led subsidy and/or other Government measures.

For example, operational costs are significant for electrolysers that use electricity from the grid, which, in addition to the cost of electricity itself, pay significant further costs due to green levies and system fees applying to electricity bills.

We therefore strongly support BEIS proposal that projects benefitting from the fund will not be preclude from support under the business model, as in some cases both types of financial support will be required to move to FID.

It is also paramount that the business model designed by BEIS is appropriate to accommodate a wide range of projects and different scales and does not introduce a barrier to entry for smaller players and new market entrants. See our response to the business model consultation for further detail.

The REA believe that smaller scale projects are key to kick start the hydrogen market in the UK. Small and medium scale electrolytic projects can be developed much faster and will be crucial to accommodate more renewables in the system and balance the power grid. Not only can they play an important part in building the UK low carbon hydrogen

economy, but they also have an instrumental role in helping the UK reach its Net Zero target at a faster pace. We agree with BEIS that smaller scale electrolytic projects will play an important role in the UK hydrogen economy in the early 2020s.

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

We haven't received any feedback from members on this question.

7. Do you agree that CAPEX support through the NZHF will help projects to reach Final Investment Decision? Please explain your answer.

Yes. However, provided it doesn't impact the project from not receiving a subsidy. This is what happened with Biomass Capital Grant schemes and developers realised it would be punitive to use a grant if they forfeit the subsidy.

The use of the grant should be thought carefully – what is it trying to achieve? Grants should be there for non-energy production related activities linked to hydrogen such as storage, transportation and CO_2 capture.

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).

We are not aware of projects that may only need capital grant funding. We think most projects will require some form of producer-led subsidy that protect them from being exposed to energy market pricing and de-risk investments.

9. What reflections do you have on the approach we have identified to address the main challenges in building new hydrogen production facilities?

The main reflection is that it should not be solely the 'hydrogen production facility'. There are many other parts of the hydrogen chain that need barriers addressing and this is where a grant will be effective.

10. Do you agree that there is a need/demand for government intervention to support hydrogen production projects with their development costs?

Yes. However, the producer-led subsidy will ensure the development costs are covered. The grant/Government intervention should be there to ensure supply chain barriers are removed.

11. Do you agree that there is a need/demand for government intervention to support hydrogen production projects with their development costs?

Yes.

12. +/Do you agree with the proposed high-level eligibility criteria for NZHF applications? Please expand your answer.

Offtaker

Some members have raised concerns about the requirement to have an agreement in principle with an offtaker. A member commented that they are working very hard to get offtakers, but it is really challenging to have an agreed offtake for the project to qualify because of the 'chicken and egg' challenge.

For the larger scale projects, these may take around 1-2 years for planning permission and another 2-3 years to be built and become commercially operating. It is very challenging to secure any offtaker when we look at a 4–5-year timeline ie it is unlikely that an offtaker signs a contract or letter of intent before financial close, so 4 years before operation.

It would be useful to understand the reason why it is important to require an agreed offtaker. It is unlikely that a project will reach financial close if they cannot convince the funder that there is someone to buy the hydrogen, so we question what value there is in the fund criteria also requiring offtakers up front. Finally, a letter of intent may not guarantee that there is a buyer taking the product for a given period.

13. Do you agree with the proposed high-level assessment criteria for NZHF applications? Please expand your answer.

Yes, we broadly agree with the proposed criteria.

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 have received no comments from members on this question.

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.?

NA

16. If you are seeking capital support, what stage of your construction are you looking to get funding for?

NA