REA's position on additionality and low-carbon electricity inputs to electrolysers

At a recent meeting of BEIS focused on Electrolytic Hydrogen (10/02/2022) BEIS sought further views from stakeholders on additionality and low-carbon electricity inputs.

The purpose of this short paper is to re-iterate the position of the REA on this issue and provide additional detailed comments. We would be happy to discuss this in a call with BEIS if needed.

There are a number of actions Government can take quickly to unlock barriers to deployment of clean hydrogen. This paper covers those related to additionality and low-carbon electricity inputs, but there are other quick wins that could greatly assist the sector - for example members believe that a low-level blending of hydrogen into the NTS (e.g. 5%) could and should be greatly speeded up in the current circumstances. We will provide further thoughts on these to BEIS shortly.

1. Additionality requirements

We consider that BEIS should not place any additionality requirements specifically for hydrogen at this time, as this will significantly constrain the market at a time where it is critical to get the market off the ground, to scale it up and deliver the necessary cost reductions.

This is even more important now, in the context of energy security and reducing our dependence on fossil gas. Electrolytic hydrogen can play a crucial role to help balance the increasing shares of renewables in the system, reducing curtailment of renewable electricity and providing seasonal storage, which will be key to enabling large scale balancing of the networks between the peaks of energy generation and demand.

Alongside this general point, we have specific concerns about the impact of the proposals put forward by BEIS in their consultation on the Low Carbon Hydrogen Standard (as set out below). Introduction of additionality requirements at this stage will not do anything to drive investments in renewable electricity generation, but it would make it much harder to get the hydrogen market off the ground – and deployment of electrolytic hydrogen at scale is critical to deliver the required cost reductions.

'New Build requirement'

In particular, the 'new build' requirement would place substantial constraints. Lead-in times for RES generators and electrolysers are different. There are different permitting / planning issues. If new wind turbines need to be planned and developed before the electrolyser is operated, we won't see the hydrogen volumes in the system that we need. Renewable production facilities will still require a grid connection, either as a fall-back option or to connect to in order to virtually sleeve the power to an electrolyser. BEIS will be aware there are serious constraints challenges on the network with limited capacity and this is stalling projects: we are now seeing a huge backlog of new RES build that has been locked up in the process due to grid shortages.

On the generation side, there are tens of GWs of renewable energy projects in development which can progress if there is demand for the renewable power they produce when the grid is constrained e.g. Scotland has 30GW of offshore wind in development with another 4 to 5GW to be awarded lease options later this year/next year. Electrolysers will create demand for this power and support wholesale and perhaps even nodal power prices. In summary, we believe renewable energy generation and electrolytic hydrogen production will go hand in hand - one will follow the other as any market will find equilibrium in the long run, so there is no need to tie the development of that capacity to the build out of electrolysis.

The above requirement would also mean only companies with renewable projects in development could bid for support, which is anti-competitive, and it also risks gaming – how would a company prove they weren't going to build the project anyway but with a different route to market/business model.

Pay existing levies: This would simply increase costs and mean that the business model to support electrolysis would have to be higher than it would otherwise have had to be, and the subsidy for hydrogen production would be paying for subsidies for renewable generation. In addition, these levies pay for existing projects, which mean there would be no additionality.

Fund contribution: there are difficult questions about who would hold this fund and how it would be used. It is unclear whether LCCC or BEIS will start investing in or lending to projects, and even if they did how industry would know that the projects they supported wouldn't have happened anyway. This cost would simply be added to the project overhead, meaning again it would just be diverted subsidy rather than driving additional generation of renewable electricity.

<u>Managing increasing demand for renewable electricity</u>

The REA agree that there will be substantial increases in electricity demand that are a direct consequence of decarbonisation pathways for power, heat, transport and industry but **these risks would be best managed** at the macroeconomic policy level rather than by individual hydrogen producers**,** and **by driving additional renewable generation through other policy instruments, such as renewable electricity or carbon intensity targets for the power sector.**

While the hydrogen market is relatively small the impact of additional loads from hydrogen production on the electricity system will be negligible. For example, if electrolysis amounts to 1GW in the GB grid with its average load of 33GW, then there would be little overall impact or need for additionality. This is an additional reason why we don't see the need to introduce additionality rules for hydrogen production from the outset.

Government could revisit the need for those requirements in 2030, or until a certain level of hydrogen production has been reached, however it is paramount that any existing project with Government support should have its eligibility grandfathered. This is important for investor confidence because a single electrolyser

project will not be able to influence which new forms of generation are added to the local network in future.

2. Low-carbon electricity inputs

We remain convinced that it is essential to enable electrolysers to be plugged into the power grid so that they can be built where the hydrogen is needed or at key locations within the grid (e.g. purposely upstream of grid bottlenecks; or in those places where new load would not exacerbate grid constraints and would help manage local power flows from distributed generation). This means that Option 2 of BEIS consultation on the LCHS (physical links) would be far too restrictive. Rules to account for electricity inputs to low carbon hydrogen production need to be workable and pragmatic - they should not place significant additional costs that make hydrogen production uncompetitive and constrain sector growth, especially in the initial years of sector development.

This could be done in different ways, which we recommend are used as alternative options:

1. Actual carbon intensity at the time of use

A carbon intensity threshold is set and only electricity that meets that carbon intensity threshold can be used by electrolysers. The approach used in the RTFO has simply not worked, as it required using the average of the grid of two years previously (ie it has not allowed using the actual electricity grid intensity from the time of electrolytic hydrogen production). Nowadays it is possible to calculate the actual carbon intensity at the time of use accurately: all electrolysers have half-hourly electricity meters, and the electricity sector publishes carbon intensity of generation on a similar short time basis. So, electrolysers should be able to compute running average, or monthly/annual average GHG emission values for the hydrogen produced in a precise manner. Hydrogen below the threshold would be eligible. Flexible electrolysers can turn off during times grid electricity is high carbon ie during peak times (e.g. 4 to 6 pm) or as instructed on a day ahead or week ahead basis as a function of the expected grid GHG intensity.

2. Regional carbon intensity

In addition to option 1 and 3, BEIS could allow electrolysers to be plugged into the grid in regions where the average regional carbon intensity of the grid is below a certain carbon intensity threshold. A geographical approach to low carbon electricity in addition to the other options set out in this paper (1 and 3) could be adopted as the data is robust enough to allow for this to be done (Elexon, NG ESO and potentially Enappsys datasets). Data tracking could either be done on an annualised/monthly regional average basis or it could be tracked in real time on a half-hourly basis to provide both the temporal and geographical confidence desired. We are aware of ongoing conversations between BEIS and some of our members who have provided a greater level of detail on this approach, and we are supportive. We would not support

this option to be adopted in isolation as this may restrict deployment significantly (e.g. to rural regions or some regions in Northern Britain away from where industry is located and from where most petrol stations are. That could restrict early deployments until the regional carbon intensities fall later this decade.

Electrolysers that are operated flexibly have a system value. They are a great fit for increasing renewable generation and providing an immediate and cost-effective means of managing system constraints in areas where renewable generation is highest (Scotland, East Anglia). An electrolyser which operate in the Balancing Mechanism and is bid on to avoid wind curtailment is additional by definition because it is using electricity that would not have otherwise made it on to the system. Electrolysers that operate flexibly in areas of high renewable generation will inevitably lead to additionality.

3. Traded activities

We would support the use of virtual PPAs bundled with GoOs to show that green electricity has been procured by the electrolyser. We have highlighted in our consultation response some practical challenges with this approach, but our members working in the energy trading sector believe these challenges can be overcome.

4. Temporal correlation / temporality

We consider that the introduction of a granular temporal correlation (e.g. 30 min electricity settlement period) requirement in addition to a virtual PPA would place significant burden on the sector. Having to match the electricity generated with that used by electrolysers by the hour of half an hour would be extremely burdensome and it is currently very unclear how this can be done in practice[1]. Time stamp certificates / guarantees of origin may be available in the future to support this requirement, but currently this level of granularity appears difficult both in terms of measuring the electricity inputs and the hydrogen outputs. Generation, consumption and hydrogen volumes would need to be measured precisely and correlated on a 30 min time base. Instrumenting things sufficiently to do that is not impossible, but has not been done before and it is challenging. Matching generation with demand across a month, a quarter or a longer period would be more pragmatic. Also with temporally precise datasets, it is important for government to define an appropriate method of averaging the data for operators to verify that the electrolyser operation has conformed with the LCHS threshold across the month/quarter/year or relevant time period[2].

[1] For example, if in one 30 min period the generator produces more electricity than the electrolyser consumes, should all of its consumption be counted as zero carbon intensity? In another 30 min period if it produces less, should all of the generation be assumed to go to the electrolyser and none to other loads on the grid?

[2] There needs to be a clear methodology on calculation method, if BEIS insists on 30 min data. For example, does any H_2 produced above the LCHS threshold automatically get excluded in the averaging calculation (truncation), which then means the electrolyser would get the subsidy for only a proportion of its monthly/quarterly output (given the usual variability of grid carbon intensity)? Or do all half hour periods get included in the calculation (presumably with zero generation periods excluded) and the average

In summary, BEIS needs to seriously think through the practical measurement implications and the methodology if it is decided that a 30 minutes temporary correlation is to be used.

In any case, Government should consider the extent to which this degree of temporal correlation is actually needed in order to align electrolytic hydrogen production with periods of 'excess' renewables. We would note that electrolysers are already exposed to price signals on low or negative pricing, which already gives them some incentive to respond accordingly. We would expect the strength of those signals to increase over time, while the average GHG emissions of the electricity grid will reduce.

In conclusion Government need to think further about temporal correlation, make sure the measurement and CI averaging arrangements are presented to industry in more detail, and then allow industry to comment back before they go ahead and require temporal correlation.

We would also propose that the RTFO/RFNBO regulations are amended to align with the above to ensure that there is alignment between the two main schemes designed to support the production and use of hydrogen to displace fossil fuels as inconsistences across the two policies on electrolytic hydrogen could introduce market barriers and create unintended consequences / distortions in the market.

calculated at the end of the month, in which case if it's above the LCHS threshold the operator will get no subsidy for any of that months H2 production? The latter would mean the electrolyser operator needs some form of predictive control arrangement, to ensure the LCHS threshold is met by reducing operation prior to the end of the month as necessary (which could get a bit complex and upset the offtaker). So BEIS need to define a formula for calculating the H_2 CI in relation to the LCHS, if we are to comment fully on this approach.