Initial policy recommendations to kick start the development of clean hydrogen in the UK

Setting targets for green and bio-hydrogen

In addition to the current target of an overall 5 GW production capacity by 2030 (42 TWh/annum) set out in the **Energy White Paper**, the upcoming UK Hydrogen Strategy should set clear and ambitious targets to signal its long-term commitment to green and bio-hydrogen deployment and attract investment in these sectors.

Indicatively, the UK should set an overall target of 5 GW of green hydrogen capacity deployed by 2030. Based on industry's feedback, this could be made by the following sub-targets:

- 1 GW of green hydrogen deployed in refineries
- 1 GW of green hydrogen deployed in other industrial applications / processes
- 1 GW of green hydrogen in transport, and
- 2 GW of green hydrogen injected in the gas grid

Further work needs to be done to understand what specific targets should apply to biohydrogen and we are closely working with our relevant members to better understand this sector's potential.

Reducing the cost of renewable electricity

The greatest barrier to the deployment of green hydrogen is cost, largely due to the cost of renewable electricity via the grid. In addition to the cost of electricity itself, significant further costs are added by green levies and system fees applying to electricity bills.

The cost of green hydrogen production can therefore only be lowered if electrolysers can access cheaper renewable electricity. This can be done by:

- Exempting electrolysers from 'green levies' on electricity bills – i.e. electrolysis could be on the list as energy intensive users (see EII Scheme), thereby qualifying such sites for exemption from the indirect costs of funding Contracts for Difference (CFDs), the Renewables Obligation (RO) and the small scale Feed in Tariff (FIT).
- Exempting electrolysers that provide grid services from use of system fees (on a time limited basis), or adopting a system akin to the new rules for grid balancing charges borne by energy storage assets – i.e. on a net usage basis (exemption from final consumption levy double charging like storage devices).[1]

[1] When charging and discharging from the grid, storage devices in the past were paying fees for both these activities on a gross basis. However, there have been grid modifications made that allow them to be charged only on a net usage basis. This recognises the fact these devices are aiding the electricity system flexibility. A similar approach needs to be applied to hydrogen electrolysers that are grid connected.

- Ensuring PPAs are developed to enable electrolysers to take advantage of times when wholesale electricity prices are low in order to help firm up the market for new renewables.
- Ensuring an economic incentive exists to encourage the deployment and use of electrolysers to help reduce curtailment, because this provides an avoided-cost benefit for the system operator rebalancing the high-RES grid and reduces the wastage of renewable energy.

This would enable electrolysers to take advantage of times where wholesale electricity prices are low, for example when demand for electricity is at its lowest and there is surplus renewable power and help the continued integration with renewables.

Support scheme for hydrogen injection into the gas grid

Injecting hydrogen in the grid and selling it at the wholesale price of natural gas is unlikely to result in a viable business case. Power to gas and hydrogen injection into the gas grid will require a feed-in tariff style mechanism along the lines of that has been required for biomethane injection under the Renewable Heat Incentive to kick start the market. For example, the Green Gas Support scheme could be adapted to include support for injection of clean hydrogen, although this is a relatively short scheme (four years) and it is expected to be introduced as early as in the Autumn 2021, so BEIS would need to act on this very quickly.

BEIS revenue scheme for clean hydrogen (business models work)

Green hydrogen

BEIS are in the process of developing a revenue scheme to support clean hydrogen production (CCUS and non CCUS-enabled).

If BEIS intends to develop a CfD style mechanism to support green hydrogen, the view of our members is that this should be linked to offshore wind, given that by 2030 most of the renewable electricity production will be from this technology. There are many synergies between offshore wind and hydrogen.

It should be noted that a CfD type revenue scheme will be less useful if electrolysers are still unable to access low electricity prices (see first two policy recommendations above), so this issue needs to be addressed in parallel.

Different hydrogen end uses / applications should be considered separately as the economics look very different depending on where/how the hydrogen is used. For example, in the transport sector the value of hydrogen is already attractive as diesel is taxed heavily; and in the existing merchant hydrogen market grey hydrogen already has a relatively high value per kg, especially high purity hydrogen. For industry and the gas grid, green hydrogen is currently much more expensive than the alternative fossil fuel (grey hydrogen or natural gas). So, we may need a separate mechanism for different sectors: one size fits all CfD scheme may not be sufficient to get the market going for certain sectors.

For industry it may be necessary to mandate the adoption of green hydrogen to drive investment over the long term. E.g. setting a target of 25% decarbonisation of refineries by 2030 could kick start the market straight away. In Germany a 2GW target has been set for green hydrogen production at refineries (see German Strategy **here**).

So, in summary, a CfD style mechanism would certainly help, but there will also need to be a 'pot' of policy measures to support different sectors.

It is also important to distinguish measures necessary to support renewable hydrogen from those introduced by government for non-renewable hydrogen production and CCS, because of their different energy sources and scales. Achieving a clear identity for renewable hydrogen, both its production and use, is important.

Biohydrogen

The production of biohydrogen – either from steam methane reforming of biomethane or from thermal gasification of biomass – should also be supported through a revenue scheme.

It is crucial that BEIS doesn't focus only on blue and green (electrolytic) hydrogen (which of course we support) but that a technology neutral approach is taken.

If a revenue scheme is developed for blue and green, then we think biohydrogen should also be eligible, or if appropriate, should have their own revenue support scheme.

The REA has already approached BEIS officials to organise a roundtable with members to discuss future support for biohydrogen.

Blue hydrogen

We haven't included here recommendations for blue hydrogen as we know work to develop business models for these types of projects is well underway.

Additionality

We understand and support the principle of additionality for green hydrogen, but it is crucial to have greater flexibility not to deter companies to develop in the early years.

The low wholesale prices are already happening on the grid when renewables are high and demand is low, and this is a disincentive for more renewable electricity deployment. So green hydrogen production at those times on the grid is helpful to integrate more renewables. It is a potential asset to the continued integration of renewables into the power grid.

If green hydrogen can only be produced after a new solar or wind farm has been commissioned, this will represent a significant impediment to development of electrolysers in the earliest years.

Given that the additionality requirements set out under the RTFO are currently being revisited, it will be important that the rules chosen by BEIS are as aligned as possible

with those in the RTFO, as long as these are sufficiently pragmatic. You can see our detailed feedback on additionality in **our response** to the RTFO consultation. In particular, please read our answers to Questions 11 to 18 (pages 14 to 19).

PPA approach

In the RTFO **consultation** the DfT has suggested an approach based on the use of power purchase agreements (PPA), which could be used as evidence that suppliers have purchased renewable energy. This would enable the electrolysers and the plant generating renewable electricity to be at different locations. We certainly support the principle that the location of an electrolysers should not be constrained ie there shouldn't be a requirement for the electrolysers to be co-located with the renewable electricity generator. However, there needs to be further consideration given to how this approach will work. Further detail on some issues arising from this approach is contained in **our response** to the RTFO consultation.

It is also worth re-iterating that even if the current rules about additionality are addressed in the RTFO, this would be considerably less attractive if there are still significant use of system fees and green levies on electricity. If electrolysers are operated at a period of low demand when wholesale prices are low, then curtailment can be minimised but because of green levies and use of system fees there is still a danger that the electricity tariff paid by electrolysers will be too expensive. So, in summary, the PPA will need further consideration and in parallel we need to look at the interface with the power side and address this in parallel.

Calculation of carbon intensity

Another possibility to address concerns around additionality is to accurately calculate the carbon intensity of the electricity sourced from the grid and if this meets a certain carbon intensity threshold, it should be regarded as eligible (eg. the CertifHy threshold of 36.4gCO_2/MJ of hydrogen, below which hydrogen is classified as green). It would be possible to calculate this figure quite precisely, because all electrolysers have half-hourly electricity meters. An annual audit of all half-hourly readings could be carried out and the annual average carbon intensity could be worked out from the National Grid data (National Grid publishes carbon intensity of electricity). This carbon intensity value could be checked against a threshold. Hydrogen below the carbon intensity threshold would be considered 'green hydrogen' and should be eligible. A similar approach has been set out under the European CertifHy project[2].

[2] For information, the CertifHy 2019 project[1] suggests that the threshold for which hydrogen could be regarded as low carbon is 36.4 g CO_2e/MJ. CertiHy 2019 Project.

Reducing costs of certain applications

VAT should be waived on renewable hydrogen for transport applications until 2030, or charged at the lower rate of 5% (as applied to Energy Saving Materials), to encourage take up of hydrogen in the transport sector.

[some members have said they could sell H_2 to transport for £10/Kg, but they are forced to sell it at £12.Kg because of the VAT. Waiving this charge would encourage uptake of hydrogen in transport applications].

Other financial measures

Business Rates should also be reduced or removed for early adopters, to speed adoption.

Finally, the rules for EIS and VCT schemes should be changed so that hydrogen production from renewables is eligible.

Transport sector

A number of measures are likely to be needed to encourage deployment and unlock potential in different segments of the transport sector e.g. trucks, buses, railway and aviation. Certain segments may require capital support, others may require an early market based mechanism.

The RTFO will also need revising, as so far the market for development fuels has been very slow (DfT has now launched the RTFO consultation to address this). The DfT should allow more flexible rules for the qualification of renewable electricity for making renewable hydrogen. Further detail on this is in our response to the RTFO consultation.