Update on hydrogen for circulation to RTFG. Produced by G. Hartnell. 11th Nov.

I sent in the paper below "Hydrogen for transport and the RTFO " which very briefly summarises a number of potential approaches to determining eligible renewable electricity for producing hydrogen. I asked DfT which of them might possibly be acceptable, in order that we could focus on developing those that might possibly win favour.

I had a response from Gareth Mottram, and had an informal meeting on 31st October to chat it through with him. Key points to emerge from our conversation

- DfT doesn't want to have a policy which requires a hydrogen supplier to build both a renewable generating station and an electrolyser.
- They do not like suggestions 1 & 2.
- They don't object to No. 5, but note it's a very long way off before grid electricity could meet the GHG thresholds of the RTFO, even at times of high renewables penetration.
- "The third and fourth, using REGOs and PPAs are closer to what we think might be plausible and robust. Though there is still quite a bit of work needed to deliver a robust and defensible methodology based on these principles, would this potentially be very similar to the suppliers' FMD? We would certainly appreciate extra insight on the track that these options are pursuing."

We therefore need to develop these proposals further, and we need to bring in an electricity supplier to help us with this.

What I think DfT may be looking for is for a proposal which enables suppliers to provide a FMD for electrolysis customers on a monthly basis. The timetable is now that DfT is planning to introduce amendments to the RTFO for January 2021 and then again in 2023, and to run a workshop on hydrogen and the RTFO in January 2020.

The REA needs to produce the following;

- A detailed paper setting out both the REGO and the PPA proposal.
- A paper arguing that hydrogen producers should be added to the list of Energy Intensive Industries that benefit from relief from the indirect costs of renewable energy schemes

Hydrogen for transport and the RTFO

It is clear that the current rules surrounding what electricity is eligible for RFNBO production are extremely restrictive; consequently it is unlikely that much hydrogen will come forward. When coupled with the relatively small demand for hydrogen for transport, it seems inevitable that little progress will be made. This may well suit those who fear that RFNBO hydrogen could suddenly get significant and "flood" the development fuels sub target, but it does not fit in with the wider aspirations for hydrogen mobility or achieving net zero carbon emissions by 2050. Pragmatic eligibility rules are needed for grid-connected electrolysers, coupled perhaps with moving hydrogen out of the development fuels basket and boosting its incentive level under the RTFO by some other means.

Below are a few options for changing the eligibility rules, along with some pros and cons. What we'd like from the DfT is some sort of steer on the art of the possible, i.e. which of the options below might possibly be viewed favourably and worth us developing further? We can then work them up in more detail.

1. Evidence of a grid services contract

Grid-connected electrolysers can play a major role in helping the electricity system absorb and manage increasing amounts of variable renewable generation, while minimising negative pricing and curtailment of renewables output. Therefore electrolysers which can demonstrate they assist in this manner, through having a contract with the Transmission Services Operator or Distribution Network Operator to provide 'grid services', should be regarded as using electricity which qualifies for RFNBO production. These contracts encourage the electrolyser to operate when the frequency is high and renewables are at more risk of being curtailed, and to turndown / switch off when renewables are low. The operation of electrolysers in this way has the additional benefit of reducing National Grid's dependency on the CO2-emitting generation that is currently employed to provide balancing services. This approach will therefore result in synergistic decarbonisation benefits for the electricity and transport sectors.

Pros	Cons
It is pragmatic and would allow electrolysers to play a valuable role (and earn money from) the services they provide to the grid in the long-established balancing markets. It does not place a geographical restriction on where electrolysers and hydrogen stations are located and thus doesn't inhibit their deployment.	It would be a big change from the current guidance in the RTFO, in that it is not related to any of the current derogations. It requires a cross-sector perspective and constitutes a 'sector coupling' approach to decarbonisation.

2. Being connected to a new renewable generator and the grid, where all electricity consumption is regarded as eligible, even that which is taken from the grid

An electrolyser could be co-located with a new renewable generator, and be sized in order that the majority of its consumption would be accounted for by the renewable generation. Clearly the smaller the electrolser in relation to the size of the renewable generator, the more 100%-renewable-operating-hours would be achieved. What we are looking for in this proposal is having DfT accept a de-minimis amount grid electricity to be consumed (and deemed as meeting the GHG requirement) in order to enable the electrolyser to be economic. If accepted in principle, we can then consider what might be acceptable as deminimis grid consumption.

This option could be combined with the requirement to hold a grid services contract.

Pros	Cons
It would enable electrolysers to operate for enough hours to make them economic. The combination would encourage the commissioning of specific new renewable generation projects and demonstrate temporal and geographic correlation.	It is a fairly substantial change to the derogation c in Article 5 (4B)(e)(ii).

3. The REGO proposal

A very high level explanation of this proposal is that it makes use of an existing certificate system to demonstrate that the growth in electricity consumption for RFNBO hydrogen production does not exceed the growth of new, non-biomass renewable electricity generation. At a time when there are no other financial incentives for commissioning new renewable power generation, there is no justification to say that the output from these generators should be decarbonising the grid in preference to decarbonising transport.

Pros	Cons
It achieves DfT's high level desire for hydrogen to drive additional renewable generation, rather than divert it from decarbonising the grid, whilst allowing electrolysers maximum geographical and operational flexibility.	Provides average rather than instantaneous proof that hydrogen is not diverting renewable electricity from decarbonising the grid.

4. Electrolyser and new renewable plant not co-located, but have a PPA (which is exempt from environmental charges)

A PPA would enable the exact volume of renewable electricity produced from the new generator to be matched to the consumption by the electrolyser, minus losses. A licenced electricity supplier is involved in order to supply the electrolyser when the renewable project is not producing sufficient power, and to take the renewable output when it is not being consumed by the electrolyser.

However, under a PPA the electricity would be expensive, with much of the cost comprising network charges and costs imposed by environmental policies.

Pros	Cons
It achieves DfT's high level desire for hydrogen to drive additional renewable generation, rather than divert it from decarbonising the grid, whilst allowing electrolysers maximum geographical and operational flexibility.	Provides average rather than instantaneous proof that hydrogen is not diverting renewable electricity from decarbonising the grid. Would require some additional legislation to exempt the electrolyser from environmental charges, eg as is achieved by energy intensive industries exemption[1]

5. Real time carbon intensity, rather than that of 2 years' previous

The data exists to enable the real-time calculation of the carbon intensity of the grid and the proportion of power on the system coming from non-biomass renewables. This provides a more accurate measure of carbon intensity than one based on a grid-average value from 2 years previously. It brings forward the time when grid electricity will be green enough to meet the 60% GHG reduction requirement.

Pros	Cons
It ensures renewable hydrogen is only made at times when the GHG saving threshold is achieved	It would not make a material difference for several years to come because the carbon intensity of the U.K. grid is for the time being too high.

A note on electricity which would otherwise be constrained off

Constraining off renewable power generation is an absolute last option for grid operators and is extremely wasteful and bad environmentally. Enabling electrolysers to participate in grid services (along with various other demand side measures) assists in reducing the risk of curtailment. Restricting the eligibility of qualifying electricity to that which would otherwise be curtailed off, is extremely limiting and will hopefully become a diminishing option as the grid becomes smarter.

[1] Energy Intensive Industries: relief from the indirect costs of renewable energy schemes - widening eligibility,. https://www.gov.uk/government/consultations/widening-eligibility-for-renewable-electricity-cost-relief-schemes