Electrolysers that make H_2 from renewable electricity should be exempt from environmental levies

To meet the Net Zero emissions target, the Committee on Climate Change (CCC) has advised that we must use hydrogen (H_2). This applies to industry, HGV fuel and other difficult to decarbonise sectors, as explained in the CCC Technical Report:

https://www.theccc.org.uk/publication/net-zero-technical-report/

There are two main ways to produce low carbon H_2:

- Reforming methane and capturing the CO_2 formed in this process with a number of H_2/Carbon Capture and Storage (CCS) projects being proposed by industry

- Electrolysis of water using renewable electricity. The UK has a world leading position in this area of technology with ITM Power building a large electrolyser manufacturing plant in Sheffield

With the success of solar and offshore wind it is highly likely that by the mid-2020s there will be frequent periods where the supply of renewable electricity to the grid will exceed demand, resulting in very low cost or even negatively priced electricity. The Government's Contracts for Difference scheme may avoid offshore wind developers being paid nothing for their electricity, but the question remains - what to do with the electricity?

Installing electrolysers to manufacture H_2 using this surplus renewable electricity makes sense. Whilst electrolysis plants may initially have a low load factor, renewable electricity forecasts suggest that they may operate for around 50% of the year from 2030.

At present, consumers buying electricity from the grid are charged a levy that funds the additional costs of renewable power (incurred prior to the latest auctions). In 2019/20 this levy is estimated to total £11.2 billion and results in a charge of approximately 5p/kWh added to consumer's electricity bills (see below).

October 2018 Economic and Fiscal outlook: Fiscal supplementary tables: receipts and other

2.7 Environmental levies

	£ billion						
	Outturn	Forecast					
	2017-18	2018-19	2019-20	2020-21	2021-22	2022-23	2023-24
CRC Energy Efficiency scheme	0.5	0.5	0.5	0.0	0.0	0.0	0.0
Warm home discount[1]	0.0	0.3	0.3	0.4	0.4	0.4	0.4
Feed-in tariffs[1]	0.0	1.5	1.5	1.6	1.6	1.6	1.7
Renewables obligation	5.4	6.1	6.1	6.4	6.5	6.7	6.9
Contracts for difference	0.6	1.0	1.7	2.3	2.7	2.9	3.0
Capacity market[1]	0.0	0.7	1.0	1.3	1.0	0.9	1.2
Environmental levies	**6.5**	**10.2**	**11.2**	**11.8**	**12.2**	**12.4**	**13.1**
Memo: Expenditure on renewable heat incentive (RHI)	*0.7*	*0.9*	*1.0*	*1.1*	*1.1*	*1.1*	*1.1*

Note: The 'Environmental levies' line above is consistent with the 'Environmental levies' line in Table 4.6 of the October 2018 *Economic and fiscal outlook*.

[1] The ONS have yet to include Warm Home Discount, Feed-in Tariffs and Capacity market auctions in their outturn numbers. If they were included, they would have been £0.3bn, £1.4bn and £0.2bn respectively.

SOURCE: https://obr.uk/efo/economic-fiscal-outlook-march-2019/

The levy is only charged on electricity consumed through the grid. Local electricity production (whether from gas, diesel, wind or solar etc.) is exempt if consumed on site. Hence, renewable hydrogen production from electrolysers is uneconomic, even when electricity is negatively priced.

If the wholesale electricity cost was zero, then it would still cost approximately 7p/kWh to buy electricity to make H_2 (assuming transmission and distribution costs of 2p/kWh and environmental levies of 5 p/kWh). This would yield hydrogen at a cost of approx 8.4 p/kWh (assuming an 80% efficient electrolyser). With natural gas costing 1.5 p/kWh, this represents a huge cost premium, even if the cost of carbon is added to the cost of natural gas.

By waiving the levy for electrolysers, hydrogen could be produced at a much lower price - closer to that of natural gas today. By injecting it into the gas network, end use applications for gaseous fuel could be de-carbonised. This is a renewable electricity storage solution - the hydrogen displaces methane which can then be stored in the existing gas network and used to make electricity on windless days, with the end user then paying the (previously avoided) environmental levy. In effect, we would be treating hydrogen like we do standalone battery storage facilities which do not pay the charges.

CNG Services Ltd have reviewed 120 biomethane injection projects and identified around 30 sites as suitable for H_2 injection at a 20% blend. There is a good synergy between such biomethane injection and hydrolysis sites. They have gas grid capacity, grid injection facilities and the ability to take electricity from the grid to supply an electrolyser.

It is widely recognized that the current approach to renewable charges is not ideal. We charge the cost of de-carbonising onto the fuel that is de-carbonising most effectively, electricity – rather than onto the price of carbon based alternatives. Although it is hard to substantially increase the cost of natural gas, the initiative outlined here would at least help instigate a market in converting surplus electricity to hydrogen with the potential to reduce the cost of electrolysis and increase efficiencies. Its time to start the electrolysis market and to do this alongside biomethane is an efficient option.

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