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Dear BEIS Electricity Systems Team,

In response to your consultation on “a smart, flexible energy system”, specifically:

Question 35. What barriers (regulatory or otherwise) are there to the use of hydrogen water electrolysis as a renewable energy storage medium?

1. Geographically, the congestion of excess renewables (i.e. hydrogen production site via electrolysis) will coincide only in very few occasions with the point of use for the hydrogen generated.
2. Therefore, either
 - a. The transmission and/or distribution power grid will have to be expanded to accommodate distributed electrolysis
 - i. Will this be accepted by communities/cities (e.g. see Germany, where there is a lot of societal resistance to expand the overland transmission grid from north to south)?
 - ii. What is the scale of the required distributed hydrogen storage and will this be socially accepted?
 - iii. What will be the usage for the vast amounts of hydrogen projected to be produced – heating? If so, how is this hydrogen being transported to the end-user and what happens on cloudy, low wind winter days?
 - b. Hydrogen will have to be stored centrally on large scale/transported via pipeline
- iv. Is there enough underground storage capacity in UK and is this on/off-shore? In case of on-shore, will this be accepted by society seeing the difficulties with CCS? Also, who takes on legal responsibility for the hydrogen stored long term (see CCS and nuclear waste debate).
- c. Hydrogen will have to be injected into the NG grid straight away
- v. On large scale, this might lead to significantly varying NG composition locally, influencing Wobbe index and therefore could severely hamper the performance of industrial and/or domestic burners.
- vi. Or a separate 100% hydrogen pipeline grid will have to put in place, instead of or next to the NG grid. Who will make such investment and who will use these amounts of hydrogen as there will be a supply/demand imbalance if electrolyzers only produce when there is excess renewables?

Kind Regards,

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