Consultation on a UK low carbon hydrogen standard

25 October 2021

About Energy UK

Energy UK is the trade association for the energy industry with over 100 members spanning every aspect of the energy sector – from established FTSE 100 companies right through to new, growing suppliers and generators, which now make up over half of our membership.
We represent the diverse nature of the UK's energy industry with our members delivering over 80% of both the UK's power generation and energy supply for the 28 million UK homes as well as businesses.
The energy industry invests £13bn annually, delivers £31bn in gross value added on top of the £95bn in economic activity through its supply chain and interaction with other sectors, and supports 738,000 jobs in every corner of the country.

Energy UK welcomes the opportunity to respond to this consultation, we provide comments to the questions below:

Q1. Do you agree that the standard should focus on UK production pathways and end uses whilst supporting future export/imports opportunities?

YES

Energy UK recognises the importance of the standard and its central role in determining whether projects may be eligible for support via the business model or net zero hydrogen fund (NZHF). It is the key element that links together these strands of the hydrogen strategy and its delivery. We encourage BEIS to set out a minded to position or working definition as soon as is practicable as this will aid project development.

It is important that the UK makes early progress on a range of hydrogen production technology options to promote the development of the hydrogen economy in support of decarbonisation. It is also necessary to be mindful of consistency with other schemes to ensure import / export can happened in due course.

Q2. Would there be benefits in developing the standard into a certification scheme?

YES

Whilst the standard defines the parameters for support, a certification scheme can support trade and contain more information to enable producers to identify the carbon intensity of their production, enabling differentiation in marketing. Whilst consumers can, via the certificates, express a preference for a particular 'type' of hydrogen in relation to the carbon intensity of its production.

A certification scheme could also help consumers demonstrate compliance with emissions targets and provide evidence to back up the carbon intensity of their energy use / products.

Once the standard is defined, attention should be given to establishing the certification scheme for early production.

Q3. a. Is international consistency important, or should the UK seek to develop a low carbon hydrogen standard primarily based on the UK context and criteria set out above? Please provide detail.

At the outset the standard needs to be set in a way that works to promote GB production, whilst being mindful of developments elsewhere to enable cross-border exports and imports in due course, if hydrogen is to become a significant energy vector. Consistency in methodologies may be important.

For instance; GB is pursuing a twin track approach whilst most EU Member States are focussing on electrolytic hydrogen, but many expect to be importing hydrogen to meet demand in the future. It is not clear what rules or standards will apply to imports to the EU, robust certification would put the UK in a leading position and help facilitate exports

b. If elements of a UK standard differ to comparable international standards or definitions, would this impact the ability to facilitate investment in the UK or cause issues for business operations across borders?

A UK standard that was particularly stringent would likely increase costs in the UK relative to other regions and incentivise investment outside the UK.

Certification may be more relevant for trade than the standard itself. Uncertainty does not favour investment; it adds risk and can lead to higher costs at the outset and overall. This could arise if GB hydrogen may not be fully tradable, so clarity is needed.

c. If answering yes to 3b, what elements of existing low carbon hydrogen standards or definitions are most important to ensure international consistency

Consistency on thresholds, purity and additionality would be particularly important

Q4. a. Should the standard specify a list of hydrogen production pathways, which would be updated periodically or on request?

YES

This could be useful as an early check on likelihood of projects to meet the standard, based on BEIS' analysis on typical projects and emissions

The list should be capable of being updated to include new production processes, with a defined process for inclusion on the list.

b. If yes, we would welcome respondents' views on what production methods could have significant potential in the UK in the near term.

Early volumes are likely to be from methane reforming with CCS and electrolysis using low carbon electricity.

c. If no, we would welcome respondents' views on alternative options.

Q5. a. Do you agree that the standard should adopt one label of 'low carbon' hydrogen, or would it be valuable to have multiple categories?

Energy UK agrees one label of 'low carbon hydrogen is appropriate for the standard for all production technologies, as the threshold for support, with further differentiation for customers via the certification arrangements which can provide additional information on the carbon intensity of the production process.

b. If multiple categories, what benefits would we get from adopting this approach in terms of emissions reduction and consumer confidence?

No comment

Q6. a. Do you agree that a UK low carbon hydrogen standard should be set at the 'point of production'?

YES,

This is likely to be simpler to administer, any downstream consideration would need to look at diverse end use and network utilisation.

b. If no, what would the advantages be of the standard making assessments at 'point of use' or 'point of use + in use emissions'?

No comment

Q7. Which chain of custody system would be most appropriate for a UK low carbon hydrogen standard: a mass balance or a book and claim system? Please explain the benefits of your chosen option.

Most members within Energy UK favour a book and claim system, as this is simpler, faster to implement and more likely to facilitate a traded market in the medium term.

However, some members support a mass balance approach as this provides greater physical traceability, and is therefore a more robust mechanism to demonstrate the origin of hydrogen. It may be more suited to isolated production and demand and may be less workable in a meshed network.

Q8. Should other CoC options be considered instead?
NO

Q9. a. If the system boundary was set at the point of production, should there be defined reference purity and pressure levels for a UK low carbon hydrogen standard?

YES,

Reference conditions are needed to enable production techniques to be compared fairly and consistently, there will need to be a methodology or calculation defined for comparison at the reference pressure.

There should be no requirement to meet these physical parameters, eg delivering hydrogen a certain pressure, the delivery pressure will be defined by the directly connected consumer or network entry agreement.

b. If yes, what should they be?

The levels need to be chosen being mindful of the impact on different production technologies by deemed conversion

c. If no, what are the benefits to not defining reference purity and pressure levels?

No comment

Q10. a. Should there be minimum pressure and purity requirements for hydrogen to meet the standard?

Members believe the market should determine this but if a minimum is set 98% H_2 as recommended by the Hy4Heat work seems reasonable, it is also the level being considered by CEN for a European standard.

b. What could the potential implications of setting minimum purity and pressure requirements be?

Too high a pressure or too high a purity level could disadvantage certain technologies. It may also lead to unnecessary additional costs if end-users do not require purity at the levels stipulated, which could make hydrogen unattractive to some or increase the subsidy required under the business model.

The standard needs to be set in such a way as to support early deployment.

Q11. a. Do you agree that embodied emissions should be omitted from the calculation of GHG emissions under a low carbon hydrogen standard, to ensure comparability with global and UK schemes?

YES

To include them would seem to add considerable complexity and be inconsistent with other global schemes

b. If no, what are the benefits to including embodied emissions in the calculation of GHG emissions, and what should be done to ensure that hydrogen is on a level playing field to other energy vectors

No comment

Q12. a. Do you agree that a UK low carbon hydrogen standard should include the global warming potential of hydrogen?

NO, but should be guided by scientific understanding

The IPCC does not consider hydrogen to be a greenhouse gas at this time[1]. Any impacts are indirect and uncertain, there is no agreed GWP for hydrogen and any fugitive emissions are likely to be small. See also BEIS report from 2018[2]. Furthermore, no other standards include it and research is still ongoing.

If the GWP of hydrogen were to be considered, we would like to better understand how this could be included in the standard with a boundary at the point of production if the idea is to account for fugitive emissions through the supply chain downstream of this point?

b. If no, are there other options for accounting for the GWP of hydrogen outside of a UK low carbon hydrogen standard that could support compatibility with existing standards/schemes?

No comment

Q13. a. Should a materiality threshold for total emissions be included in the life cycle assessments of hydrogen pathways?

YES, this will simplify the administration of the standard and still account for emission contributions that would be difficult to quantify.

b. If yes, what would the most appropriate level be and why?

No comment

[1] https://www.ipcc.ch/assessment-report/ar6/
[2] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/760538/Hydrogen_atmospheric_impact_report.pdf

Q14. a. Should CCU with proven displacement or permanence be included as an allowable benefit in GHG calculations under a UK low carbon hydrogen standard?

No comment

b. If yes, what should a suitable minimum time be for proven permanence and which applications should be eligible?

No comment

Q15. Should CCU credits only be allowed for biogenic carbon, and not allowed for fossil carbon sources?

No comment

Q16. As the grid is decarbonising rapidly, so will grid connected hydrogen production pathways. How should government policy take into consideration hydrogen production pathways using grid electricity as primary input energy now? Please explain the benefits to the approach you have suggested.

Energy UK agrees with the expectation that the electricity grid will progressively decarbonise in the coming years and that grid connected electrolysers will therefore also have declining carbon intensity, also that the rapid growth of electrolytic production in the next decade is a key part of the hydrogen strategy. However, it is important to address the issue of grid connected electrolysers and the carbon intensity of the electricity used in the coming years and potentially in the longer term.
We agree that there are a number of options, including direct connection, PPAs, and cancellation of guarantees of origin.

BEIS needs to consider whole system decarbonisation with the development of the hydrogen economy being one part of that, on the route to net zero by 2050 and in line with carbon budget pathways It controls the levers to manage project deployment via the business models and net zero hydrogen fund, so needs to consider all this in a joined-up manner.

Q17. a. What options should we consider for accounting for the use of electricity under a UK low carbon hydrogen standard? Do the options outlined seem appropriate? Are any of these particularly problematic? Please explain your reasoning.

Members generally favour direct connection or grid connection with a PPA as pragmatic way of supporting the development of hydrogen production from electrolysis.

b. Of the options considered, should further conditions be included to mitigate any negative impacts or potential unintended consequences, such as driving additional high carbon power generation, and what could these conditions be?

Temporal considerations could be managed via certification, see Qn 19 below,

Q18. What evidence should BEIS consider ahead of making decisions around the use of electricity as primary input energy for hydrogen production?

BEIS has already stated that Business models support will only be available for projects able to meet the low carbon hydrogen standard.

Q19. How should low carbon electricity use in hydrogen production be accounted for in order to support the deployment of hydrogen production via electrolysis, whilst avoiding unintended consequences such as increased generation from high carbon power sources (impacting grid decarbonisation)?

. Early electrolytic projects will be small with any impact on grid carbon intensity being limited, but these early projects will enable learning to support scaling and wider deployment which will offset this in due course.

Accounting for this could be via certification, we call on BEIS to explore the measurement of carbon content in the gird and contracted offtake agreements. We also note BEIS' call for evidence on 'Designing a Framework for Transparency of Carbon Content in Energy Products' will help to inform this.

This will be a reducing problem as the grid decarbonises, which is anticipated to happen progressively in parallel with the growth of electrolytic hydrogen production, so it is essentially a short-term issue

Q20. Should a UK low carbon hydrogen standard include a requirement on additionality and why? Please explain the benefits to the approach you have suggested.

Members views range from a direct NO to a direct YES, with most agreeing that electricity used for electrolysers should be demonstrably from renewable sources, but not necessarily new build.

Additionality would provide the strongest link to carbon savings, but brings challenges.

Comments include:

- Pragmatic flexible approach is needed
- Risk early electrolysers projects are held back
- Difficulties in aligning electrolyser and renewable generation project timescales,
- Need to consider whole system perspective
- Consider the impact of time and geography
- The definition of 'new' for additionality
- Has not been needed for additional electricity demand previously eg. For EVs
- May be needed in the future, if so, should be phased in
- Need to consider EU additionality principles

A whole system view with respect to additionality will need to be mindful of, deployment of batteries and longer-term electricity storage options, and hydrogen storage alongside any requirement for intermittent operation of electrolysers being sub-optimal.

Q21. Should additionality considerations also apply to renewable heat and other input energy vectors such as biomethane, in the same vein as for low carbon electricity and why?

No comment

Please explain the benefits to the approach you have suggested.

Q22. a. Should waste fossil feedstocks be considered with counterfactuals under a UK low carbon hydrogen standard?

Yes/no. Please explain the benefits to the approach you have suggested.

b. What are the potential implications of supporting the use of any particular waste streams in hydrogen production?

No comment

Q23. What is the most appropriate way to account for hydrogen produced from a facility that has mixed inputs (high and low carbon)?

Please explain the benefits to the approach you have suggested.

Averaging over too long a period is not favoured, as all granularity of input sources is lost, consignments managed by certification would seem a reasonable approach. Otherwise, there may be a risk of blending 'grey' hydrogen with 'green' to meet the low carbon standard rather than supporting switching to clean production technology.

Q24. What are the most appropriate units to calculate GHG emissions of low carbon hydrogen?

We agree with the use of gCO_2e/MJ LHV

Q25. What allocation method should be adopted for by-product hydrogen and why?

No Comment

Q26. Should the standard allow for negative emissions hydrogen to be reported?

YES, or this needs to be reported via certification

Q27. a. Should non GHG impacts be taken into account?

No

b. If yes, what criteria or factors should be taken into account and how?

c. If no, please set out your rationale for your answer.

These are often addressed by other regulatory mechanisms

Q28. Given the many potential end uses of hydrogen, and the rapid expansion of low carbon supplies required, do you agree that an absolute emissions threshold be adopted, rather than a percentage saving based on a fossil comparator?

YES, this is more straightforward and more transparent, so it will build confidence in the robustness of the standard

Q29. Should the standard adopt a single threshold or several, and why?

Energy UK agrees that there needs to be a way of identifying different carbon intensities of production, this could be by the standard containing different threshold or via certification.

Most agree that a single threshold, for business models support would be the simplest solution and more consistent with other schemes.

Certification provides for additional differentiation and information for end-users. Further we consider that differentiation can be managed by the allocation process, which is already anticipated to differentiate between technologies. The differentiation could simply be by technology or include a different threshold.

Q30. a. Should the GHG emissions threshold be set at a higher level in the early stages of hydrogen deployment, with a trajectory to decrease over time?

It is important that the initial threshold is set to enable early projects to proceed, and there already is an expectation that the balance of support will shift to lower intensity projects over time.

The trajectories / new levels for emissions can be set at a later time, as the evolution of the GB power mix and natural gas mix becomes clearer.

This could be managed by the allocation process if greater funds are provided for pot(s) with lower intensity. A declining path or step changes risks cliff edge effects.

Please explain the benefits to the approach you have suggested.

b. If yes, should this decreasing trajectory be announced from the offset?

A balance needs to be struck between setting a trajectory well in advance so that participants can have knowledge of this in developing projects and retaining some flexibility based on a visible pipeline of projects by allocation of funds to pots, but still with a reasonable notice period. This could allow flexibility in determining which technology types are supported, and could be particularly useful if there are target production levels of hydrogen.

Please explain the benefits to the approach you have suggested.

Q31. What would be an appropriate level for a point of production emissions threshold under a UK low carbon hydrogen standard? Please set out your rationale for your answer.

BEIS needs to consider which technologies it wants to support and set the threshold consistent with that.

Q32. a. Could some net zero compliant hydrogen production pathways be disadvantaged by the introduction of an emissions threshold set at 15-20gCO2e/MJLHV?

Here we assume BEIS means production that does not currently meet the proposed standard but has the potential to do so in the future. Ideally production should not be supported until it can meet the standard.

b. If yes, please explain which methods are likely to be disadvantaged and why.

Grid connected electrolysers are mentioned but the appropriate mitigating measures of PPAs and separate consignments are identified

Methane reforming using LNG as a feedstock is also mentioned but there is little detail on how the carbon intensity of gas used for reforming will be determined in the rest of the document, absent further detail it is not possible to comment further.

33. a. How could we ensure that a low threshold does not negatively impact projects on a trajectory to net zero and learning by doing at the early stages of hydrogen market development?

b. What impact could this have on the UK achieving 5GW production capacity by 2030?

There seems to be sufficient projects in the timeline to meet the 2030 target, but this will be aided by a flexible approach to additionality and temporal considerations. That said, a low threshold might preclude some CCUS-enabled projects (due more to upstream emissions than CO_2 capture rates) which the UK expects to contribute most to the 5GW target.

Beyond 2030 if there ambitions to ramp up production significantly, this will need clear signalling so the project pipeline can develop.

Q34. a. Should the UK low carbon hydrogen standard provide for some limited leeway on the threshold for existing hydrogen production facilities?

No comment

Please explain the benefits to the approach you have suggested.

b. If yes, is a 10% leeway suitable?

Yes/no.

Q35. What would be an appropriate level for a UK low carbon hydrogen standard if it were considering point of use emissions? Please set out your rationale for your answer.

Energy UK does not support this approach

Q36. Which type of organisation would be best placed to deliver and administer a Low Carbon Hydrogen standard? Please include examples where possible of effective delivery routes for comparable schemes.

The standard should be developed jointly by BEIS, as the standard is linked with business model support and to ensure joined up approach, and the industry. BEIS should administer it.

Q37. Should default data, actual data or a hybrid approach be used to assess GHG emissions? Please explain the benefits to the approach you have suggested.

A hybrid approach would seem reasonable, with natural incentive to report actual emissions

Q38. What should the options be for reporting and verification of low carbon hydrogen? Do any of the options outlined seem appropriate? Are any of these particularly problematic?

A balance needs to be struck between a bureaucratic approach and one that provides confidence in the arrangements. Annual third-party verification seems appropriate

Q39. Are any other options not listed here that are better suited for low carbon hydrogen reporting? Any thoughts on how possible trade-offs between accessibility and robustness or between accuracy and simplicity could be addressed?

No comment

Q40. What would be an appropriate frequency for verification or audit?

Annually

Q41. Over what period of time should the standard be introduced?

The standard needs to be introduced in parallel with the business model and certification as the definitions would likely impact the design of the projects seeking to apply for business model support.

Q42. Do you have any other comments relating to the carbon standard proposals set out in this document?

It would be useful to better understand how the carbon intensity of natural gas used in reforming is taken into account?

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