Designing a UK low carbon hydrogen standard – Consultation:
Submission to BEIS, October 2021

Q1. Do you agree that the standard should focus on UK production pathways and end uses whilst supporting future export/imports opportunities? Yes/no. Please expand on your response.

Yes, we are first and foremost supportive of the standard focusing on production pathways and end-use cases within the national geography, followed by international supply chain elements that accelerate the development of a global hydrogen economy. However, the standard should not seek to dilute inward investment opportunities for UK plc, through disproportionate support for import opportunities over domestic hydrogen. Otherwise, we risk dilution of domestic inward investment opportunities in the early 2020s, when competition for public funding is heavily strained.

However, more action is still needed, to ensure the UK does not fall behind versus other international ambitions, or indeed risk litigation for failure to comply with its own Climate Change Act. For example, China and Europe are now reasonably advanced in the development of fuel cell vehicles, hydrogen generation, distribution and use. The European Commission has identified hydrogen as one of the key future technologies for Europe, developing support in this area for some time.

The UK has a leading position in a) many of the key decarbonised gas technologies, including fuel cells, electrolysers and advanced methane reforming, and b) the projects that could fit them all together at scale, including the various cluster decarbonisation plans, and the considerable offshore CO2 storage capacity. So, we are well placed to take advantage of the global growth in decarbonised gas – revitalising energy intensive industry and developing new manufacturing and service industries.

But these opportunities will only be realised if the UK produces hydrogen at home. If we wait for other countries to take the lead – and there are plenty of countries that are keen to take the lead – then the UK will lose a huge opportunity to establish a valuable domestic supply chain and become increasingly dependant on imported skills.

Q2. Would there be benefits in developing the standard into a certification scheme? Yes/no. Please provide detail.
In principle there may be some benefit to this but not until the hydrogen market is more substantially developed and hence should not be a focus at the present time.

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.
There is an opportunity for this country to lead the way on developing a UK hydrogen standard, underpinned by the Hydrogen Strategy, the Transport Decarbonisation Plan, and presumably supportive sentiments to hydrogen within the future Heat and Buildings Strategy and Net Zero Review. In doing so, the UK will provide the right conditions for investment, by providing clarity and confidence on which hydrogen production pathways are permissible under regulatory rules, and eligible for Government capital and subsidy support.

However, the Alliance does recognise the importance and value of internationally consistent standards, regardless of whether such standards originate in the UK. Should any country decide to adopt a less rigorous standard for low-carbon hydrogen, in so far as that standard is not in keeping with the requirements of end-case users and international GHG emissions targets, it is possible that market forces would incentivise industrial relocation from the UK and attribute to carbon 'leakage'. This would effectively render our national carbon abatement measures less effective. UK efforts should therefore proceed in step with international efforts wherever possible, provided there is a commonality of scale, ambition, effectiveness and clarity that is at least proportionate to UK ambitions.

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? Yes/no/unclear at this stage. Please provide detail.

No comments

c. If answering yes to 3b, what elements of existing low carbon hydrogen standards or definitions are most important to ensure international consistency?
No comments
Q4. a. Should the standard specify a list of hydrogen production pathways, which would be updated periodically or on request? Yes/no.

No. Any production pathway that can demonstrate it meets the performance criteria (most importantly carbon intensity) should be classed as acceptable and therefore able to access business model support. Any specification of production techniques (as a pre-requisite for the standard and consequently business model support) risks distorting technology development.

This would also have the added benefit of avoiding an unnecessary administrative burden of maintaining and updating a list to account for innovative technology development.

b. If yes, we would welcome respondents' views on what production methods could have significant potential in the UK in the near term.
N/A
c. If no, we would welcome respondents' views on alternative options.
Many hydrogen facilities would fall under the remit of the EU Industrial Emissions Directive and hence will need to comply with the determined guidance on Best Available Technique (BAT) to be consented. Continued reliance on this mechanism, alongside the Low Carbon Hydrogen Standard should be sufficient to ensure appropriate technologies are deployed.

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?

The most important aspects for the low carbon hydrogen standard are the required minimum GHG intensity threshold and the origin of feedstock. The former ensures our Net Zero Carbon trajectory is not threatened by cheaper and more carbon-intensive production routes such as coal without CCUS. The latter encapsulates the distinct benefits of using renewable sources.

Beyond that, we recognise that there is an opportunity to improve consumer choice and confidence by way of labelling different forms of hydrogen according to their respective societal benefits and technical specifications. However, we believe HMG should only pursue this course of action if and when the success criteria stated in the response to Q5 (b) is taken into consideration. Otherwise, the introduction of a labelling system may be seen as unhelpful, add unnecessary complication, or even be potentially detrimental to the UK's 5GW hydrogen production target by 2030.

The DGA supports the deployment of all forms of low-carbon hydrogen. However green hydrogen is likely to need additional support in the near to medium term to be competitive and it may therefore be worth considering how this is achieved, whether through separate categories of hydrogen, or a differentiation within the business models.

b. If multiple categories, what benefits would we get from adopting this approach in terms of emissions reduction and consumer confidence?
As part of the design of this labelling system, we believe the following success criteria should be taken into consideration in order to obtain the desired effect:

- Greater diversity of consumer choice: According to Britain's Hydrogen Network Plan by the Energy Networks Association, gas networks are currently supporting consumers ability to choose by delivering innovation trials on a range of new and established hydrogen technologies and smart systems. This ensures that consumers have a wider choice of cleaner alternatives as possible when it comes time to replace gas boilers, or from the outset for new assets. A labelling system for hydrogen could in future support the consumer in choosing a preferred energy tariff, with a verification system in place that links to the low carbon hydrogen standard. This would be similar to current options available for electricity tariffs, albeit mostly on a contractual basis, rather than the physical molecules supplied to the consumer.

- Faster attainment of consumer confidence: Whilst it is clear the public care about the environment and support the concept of Net Zero Carbon, findings from several public opinion studies (including the DGA commissioned 'Getting Net Zero Done' report by Public First last year) have determined there is a limited understanding of its meaning, especially on the specifics and trade-offs involved in hydrogen as an energy solution. As the country begins to return to a reasonable level of normality following the initial implications of the COVID-10 pandemic, HMG should start to prepare the public and industry for the opportunities available and changes required to realise the benefits of hydrogen, boosting consumer confidence ahead of widespread implementation. The DGA will continue to play our part through our communication and public advocacy work in support of hydrogen, but we recognise that more can always be done. A government-led labelling system could therefore expedite the attainment of consumer confidence for a particular form of hydrogen (e.g., electrolytic hydrogen with dedicated renewables or CCUS-enabled hydrogen with low upstream emissions and high CO2 capture rates.), providing a cautious approach is taken to ensure public acceptability advances for a particular form of hydrogen, are not at the expense of another. All forms of low carbon hydrogen must be brought to bear in order to reach the UK's legally enshrined Climate Change targets.

- Encouraged investment: Today, the RED II objective extends the existing Guarantees of Origin (GoOs) EU scheme to include decarbonised gases, including hydrogen. This has encouraged investment into hydrogen and facilitated cross-border trading, driving competition and downward pricing. The envisaged labelling scheme may wish to build upon the success of this programme by considering its principals when designing the UK standard, which in term support international cohesion across differing standards.

Ultimately, if a labelling system is put in place, we believe it should correspond to the level of societal good represented by the different forms of hydrogen.

Q6. a. Do you agree that a UK low carbon hydrogen standard should be set at the 'point of production'? Yes/no.
b. If no, what would the advantages be of the standard making assessments at 'point of use' or 'point of use + in use emissions'?

Yes, given the variety of end uses required, PoU would be much more complex to administer.

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.
No comments

Q8. Should other CoC options be considered instead? Yes/no. If yes, please provide detail.
No comments

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/no.
Yes
No comments

b. If yes, what should they be?
c. If no, what are the benefits to not defining reference purity and pressure levels?

Q10. a. Should there be minimum pressure and purity requirements for hydrogen to meet the standard? Yes/no.
No
b. What could the potential implications of setting minimum purity and pressure requirements be?
We believe this should be left for the market (i.e., the end-user/customer) to set as it could lead to unnecessary costs when it is not needed by end-users.

Recent fuel switching trials at Pilkington Glass also show that a relatively low purity of hydrogen could be used in the process (which could potentially be sourced from deblending of network transmitted hydrogen/methane blends). This suggests that lower purity hydrogen could still play a role in helping to stimulate market demand and therefore it may be detrimental if it were excluded through means of a purity standard.

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/no.
Ultimately it is important that hydrogen is not produced from either electricity or natural gas with a high embedded GHG content. The advantages of UK indigenous natural gas in this respect are evident in terms of its low emission intensity. This includes low methane emission levels at around 0.2%, already close to the OGCI global standard.

However, in the initial period it is appropriate to exclude embodied emissions. This would minimise ambiguity and complexity in the calculation particularly in the infancy of the regime.

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 comments

Q12. a. Do you agree that a UK low carbon hydrogen standard should include the global warming potential of hydrogen? Yes/no.
No, as the impact is uncertain, and research is ongoing in this area.

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 comments

Q13. a. Should a materiality threshold for total emissions be included in the life cycle assessments of hydrogen pathways? Yes/no.
Yes, to simplify the administration of the LCHS and still account for GHG contributions that would otherwise be difficult to quantify.

b. If yes, what would the most appropriate level be and why?
A 5% threshold would be in line with other standards.

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? Yes/no.
No comments

b. If yes, what should a suitable minimum time be for proven permanence and which applications should be eligible?
Q15. Should CCU credits only be allowed for biogenic carbon, and not allowed for fossil carbon sources? Yes/no.
No comments

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.
No comments

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.
No comments

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?

Q18. What evidence should BEIS consider ahead of making decisions around the use of electricity as primary input energy for hydrogen production?
No comments

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)?
No comments

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.
No comments

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

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 comments

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.
No comments

Q24. What are the most appropriate units to calculate GHG emissions of low carbon hydrogen?
No comments

Q25. What allocation method should be adopted for by-product hydrogen and why?
No comments

Q26. Should the standard allow for negative emissions hydrogen to be reported? Yes/no.
No comments

Q27. a. Should non GHG impacts be taken into account? Yes/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.
No comments

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/no. Please provide detail.
Yes. It is our understanding that most hydrogen standards already employ the use of an absolute emissions value for assurance purposes but advertise these thresholds as a % savings versus a fossil comparator. The use of an absolute emissions value for the standard seems sensible, providing it recognises the full extent of advantageous characteristics possessed by different production pathways (e.g., the renewable credentials of ‘green’ hydrogen, or the waste treatment benefits of hydrogen from waste plastics) and promotes a commercial level playing field

Q29. Should the standard adopt a single threshold or several, and why?
Yes, we support this provided every production pathway is fairly and proportionally rewarded according to the societal benefits they provide through policy.

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? Yes/no. Please explain the benefits to the approach you have suggested.
Yes. This sentiment is in keeping with the HMG commitment to take a ‘twin-track’ approach to hydrogen production, supporting electrolytic and CCUS-enabled hydrogen. A variety of production pathways will be needed to deliver the hydrogen capacity needed to meet Net Zero, including pathways yet to reach full technical maturity. Once this has been achieved, such that CCUS-enabled hydrogen has successfully fulfilled its role as a ‘steppingstone’ to Net Zero and made a material difference to emissions in the Sixth Carbon Budget, future endeavours may focus almost exclusively on renewable hydrogen. As such, a downward trajectory in the emissions intensity of the UK hydrogen market in the years to come is likely.

However, as stated in the recently unveiled Hydrogen Strategy, the nascent hydrogen market is constantly evolving. Policy decisions and subsequently this hydrogen standard must be able to adapt as trends develop and investment appetite is influenced by those decisions. This can only be tested by the market’s reaction to the hydrogen standard once it is established, which provides an understanding of how this impacts the ability to secure capital and operational support, especially for production pathways at earlier stages of technical maturity which will benefit from learning by doing. Therefore, the adoption of a predetermined downward trajectory may be premature at this time. We would, however, support an appropriately determined downward trajectory once the hydrogen standard is up and running, when more information is available on what effect this would have on the UK hydrogen economy. By such time, observations on the progress of the rapid decarbonisation of the grid, as well as developments in carbon capture technology and the underpinning capture rates obtainable, would be conducive to this effort.

As a further consideration, in the near term, blue hydrogen would likely deliver hydrogen at a lower carbon intensity than green hydrogen, which would likely need to be grid-connected. Fossil-fuel derived hydrogen may gain credibility by having a more stringent GHG emissions threshold yet applying a less stringent GHG emissions threshold to electrolytic hydrogen may enable the deployment of more grid-connected hydrogen generation and subsequent market & technology development. Once established, the GHG Threshold for green hydrogen could then be reduced over time.

b. If yes, should this decreasing trajectory be announced from the offset? Yes/no. Please explain the benefits to the approach you have suggested.
Yes. We believe the threshold should adopt a pre-announced set of conditions for revision ("will revise if X and Y occur") and if possible, the intended methodology for recalculating the threshold.

In doing so, the threshold will provide industry some certainty over time and increase investor confidence in the eligibility of projects with long lifespans. This allows the inclusion of identical conditions within industrial contracts, enabling facilities to more easily adapt to policy decisions if process or technology changes are needed, to retain eligibility for the hydrogen standard.

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.
No comments

Q32. a. Could some net zero compliant hydrogen production pathways be disadvantaged by the introduction of an emissions threshold set at 15- 20gCO_2e/MJLHV? Yes/no.
Yes. According to the 'Options for a UK low carbon hydrogen standard' report commissioned by BEIS, an emissions threshold set at 15-20 gCO_2e/MJ LHV would exclude a number of production pathways including grid electrolysis (where an average grid intensity factor is used), hydrogen from the chloro-alkali process, maize biomethane ATR, waste gasification without CCS.

Of these production pathways, only the potential exclusion of grid electrolysis, for reasons explained in Q32 (b) is worth further consideration.

b. If yes, please explain which methods are likely to be disadvantaged and why.
Based on the report findings, we are concerned by the potential exclusion of grid electrolysis from the hydrogen standard, in the event that use of low-carbon electricity via traded activities was out of scope. If grid electrolysis is not sufficiently supported by HMG policy, we believe this would detrimentally affect the ramp-up of renewable hydrogen in the UK in subsequent years.

For context, an electrolyser is equally capable of delivering hydrogen using grid electricity or dedicated renewable electricity- it is insensitive to the origin of its electrons. In order to demonstrate renewability, the plant owner can procure low-carbon electricity into the national grid system through traded activities (e.g., a PPA), removing the need for a direct physical connection to renewable assets. Consequently, electrolytic hydrogen can verifiably be determined as originating from a renewable source, whist also accounting for transmission losses and protection measures against the double counting of renewability where grid average intensities are used. This approach is in widespread use by developers in the UK today.

Because of this, the commercial development of electrolytic hydrogen is on-track to progress from the sub-20MW plant capacities currently in place, to much larger units (e.g., 100MW) by the mid-2020s, thus enabling the growth of the hydrogen customer base and underpinning infrastructure. Once current efforts in the rapid decarbonisation of the grid are complete, electrolyser plants already connected to the grid would no longer have to rely on PPAs to demonstrate renewability. Instead, they will simply be physically supplied with low-carbon electricity.
But should the design of the hydrogen standard seek to undermine the roll-out of grid electrolysis, the market penetration of renewable hydrogen may happen at a slower pace and could even rely solely on dedicated renewable production until the grid is decarbonised. By 2050, significantly less renewable hydrogen capacity would be available to the UK hydrogen economy, compared to a scenario that supports the development of grid electrolysis from the 2020s.

We therefore encourage the adoption of grid electrolysis as a production pathway, providing renewability is demonstrated (as opposed to using a grid average intensity factor). Note also that period of high electricity cost would co-incide with period of high grid carbon intensity, and that will act as a self-correcting mechanism that will prevent the electrolyser operating at the highest carbon intensity periods.

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?
Although the hydrogen production technologies currently proposed for blue hydrogen production are relatively mature (e.g., SMR/ATR and POX), there is significant learning to be done in relation to the integration of these technologies

with CO_2 capture technologies, and in the deployment of the full CCUS chain more broadly, and therefore scope for improvements in energy efficiency and capture rates, and therefore carbon intensity. Initiatives to reduce upstream emissions from the gas chain will also contribute to this reduction.

There is also potential for GHG intensity reductions in later years from grid-connected electrolytic production, driven primarily by grid decarbonisation.

The setting of the GHG emissions threshold should recognise the differing potential for later GHG intensity reductions between CCUS-enabled hydrogen and electrolytic hydrogen, at a level that includes both from the outset. This is likely to require separate thresholds/labels for blue and green hydrogen as setting a threshold at a level that enables grid electrolysis would risk allowing deployment of higher-emissions blue hydrogen technologies whilst to set a lower threshold that drives carbon intensity reductions in blue hydrogen would exclude grid electrolysis in the short term.

b. What impact could this have on the UK achieving 5GW production capacity by 2030?
We expect most of the 5GW production capacity target to be met with blue hydrogen production. Given the scale of blue hydrogen projects announced in industrial clusters thus far exceeds the 5GW target, it is unlikely that this will be compromised.

Q34. a. Should the UK low carbon hydrogen standard provide for some limited leeway on the threshold for existing hydrogen production facilities? Yes/no. Please explain the benefits to the approach you have suggested.
b. If yes, is a 10% leeway suitable? Yes/no
No comments

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.
No comments

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.
No comments

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.
No comments

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?
No comments

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 comments

Q40. What would be an appropriate frequency for verification or audit?
No comments

Q41. Over what period of time should the standard be introduced?
The timeline should be aligned with that of the business models.

Q42. Do you have any other comments relating to the carbon standard proposals set out in this document?
No comment

About the DGA

The Decarbonised Gas Alliance (DGA) represents nearly 30 expert organisations who have come together to promote decarbonised gas as a stable pathway to help meet the UK's target of net zero climate emissions.

Our aim is to articulate a shared view on how decarbonised gas of all types can help the UK reach net zero effectively by both retaining funding for existing projects whilst shaping the future of the decarbonised gas industry.

The DGA offers a unique perspective to decarbonised gas markets including green, blue and other 'colours' of hydrogen, gaseous fuels from biomass and plastics as well as biogases and synthetic gas.

The development of attractive market structures and business models will be critically important in stimulating and underpinning decarbonised gas demand and supply side investment opportunity. The DGA is ready to help shape that process.

Since inception in 2017, the Secretariat and Alliance members have:

- Completed 18 responses to date on strategic government consultations
- Commissioned detailed public opinion research 'Getting net zero done' to understand consumer attitudes in detail to understand how domestic heating, transport and industry could be decarbonised (using gas), and worked with an external agency to produce a detailed report for government on how the sector could be supported https://www.dgalliance.org/wp-content/uploads/2020/05/DGA-Getting-Net-Zero-Done-final-May-2020.pdf
- Provided advice to BEIS through their Hydrogen Advisory Council Working Groups, and Business Model Expert Groups on Hydrogen and CCUS as well as cooperating with the Hydrogen Task Force
- Ensured representative responses to key BEIS, Treasury, All Party Parliamentary Groups, Climate Change Committee and Select Committee consultations
- Played a leading role in the design of the Industrial Decarbonisation Challenge, which secured £170 million of funding from the Industrial Strategy Challenge Fund.

The DGAs Primary Goal

Today, we remain focused on being a unified voice to support the deployment of low carbon gas solutions that make best use of our existing infrastructure and enable quicker and cheaper decarbonisation. We are committed to working with government and expert organisations of all levels to create a deliverable pathway net zero emissions.