



Department for
Energy Security
& Net Zero

Low Carbon Hydrogen Certification Scheme

Government Response



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Any enquiries regarding this publication should be sent to us at: hydrogenproduction@energysecurity.gov.uk

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General information

Background

Low carbon hydrogen will be critical to supporting the UK's energy independence and ambition to reach net zero by 2050. It has the potential to support the decarbonisation of the UK economy, particularly in 'hard to electrify' industrial sectors, and can provide greener, more flexible energy across power, transport and potentially heat. Low carbon hydrogen produced in the UK could also create thousands of jobs across the country, and provide greater domestic energy security, lowering our reliance on energy imports.

In the British Energy Security Strategy (BESS), the government renewed its commitment to hydrogen by doubling its ambition to up to 10GW of new low carbon hydrogen production capacity by 2030¹, with at least half of this coming from electrolytic hydrogen production. To achieve this ambition, the government has designed a suite of measures which will support a thriving low carbon hydrogen industry, including the Net Zero Hydrogen Fund² (NZHF) and Hydrogen Production Business Model (HPBM)³. With this investment package in place, we aim to have up to 1GW of electrolytic hydrogen in construction or operational by 2025, with up to 2GW of production capacity overall (including CCUS-enabled hydrogen) in operation or construction by 2025.

To define what 'low carbon hydrogen' is, government developed the Low Carbon Hydrogen Standard⁴ (LCHS). The LCHS sets a maximum threshold for greenhouse gas emissions allowed in the production process for hydrogen to be considered 'low carbon hydrogen', and a methodology for calculating these emissions. The LCHS forms part of the eligibility criteria used for some government subsidy schemes and has been recently reviewed and updated to ensure that its requirements can be effectively applied under the HPBM contract.

To build on the LCHS, government committed in the BESS to setting up a hydrogen certification scheme from 2025. A low carbon hydrogen certification scheme could create benefits for the whole hydrogen value chain, including producers, those in the midstream and off-takers, and support decarbonising the hydrogen economy. Certificates could help scheme participants to access new low carbon markets, report progress towards decarbonisation targets to corporate stakeholders, demonstrate eligibility and compliance for subsidy schemes, or be used to meet government obligations and prove compliance with regulations. Certification will also play an important role in facilitating the import and export of hydrogen by demonstrating the emissions credentials of the hydrogen when traded.

¹ Subject to affordability and value for money.

² www.gov.uk/government/publications/net-zero-hydrogen-fund-strand-1-and-strand-2

³ www.gov.uk/government/publications/hydrogen-production-business-model

⁴ www.gov.uk/government/publications/uk-low-carbon-hydrogen-standard-emissions-reporting-and-sustainability-criteria

In February 2023, government consulted on proposals for a Low Carbon Hydrogen Certification Scheme, covering scheme objectives, basic design features, and delivery considerations. The consultation received 72 responses in total from a range of stakeholders across the UK. Annex A contains a summary of respondents by type. This government response summarises the feedback received through consultation, resulting policy decisions and next steps.

Enquiries to the Low Carbon Hydrogen Certification team

Please direct any enquiries to:

Address: Hydrogen Production Team
Department for Energy Security and Net Zero
3 Whitehall Place
London
SW1A 2AW

Email: hydrogenproduction@energysecurity.gov.uk

Executive summary

Government intends to launch a domestically focused certification scheme (“the scheme”) from 2025. At first, the scheme will focus on the UK domestic market, before significant volumes of low carbon hydrogen begin to be traded internationally. The government’s aim is for the scheme to be available UK-wide and initially voluntary. It will demonstrate compliance with the Low Carbon Hydrogen Standard (LCHS) to show the emissions credentials from hydrogen production (“well-to-gate”). The scheme will therefore be open to producers of hydrogen that can meet the LCHS, and their supply chains.

In the first few years of the scheme, we expect most producers seeking certification to be those supported through the government’s Hydrogen Production Business Model (HPBM) and Net Zero Hydrogen Fund (NZHF), which require volumes of hydrogen to comply with the LCHS to award support. The scheme will be led and delivered by government to ensure good alignment across schemes which use the LCHS. It is intended that the Low Carbon Contracts Company⁵ (LCCC) will act as delivery body for the certification scheme.

We want the UK to become a key player in the international market for hydrogen and related goods and services, particularly with regard to exporting hydrogen to continental Europe where we see an increasing hydrogen demand. In the longer term, we also recognise the role that hydrogen imports could play in ensuring energy security, as part of a diverse mix of supplies. This is why we are taking steps to facilitate the international trade of hydrogen, continuing to increase international cooperation, understanding options for international transportation, networks, and storage, and reviewing offshore and international regulation.

Certification will play an important role in facilitating imports and exports of hydrogen and will allow producers to demonstrate the emissions credentials of their hydrogen for export, as well as a providing a tool for assessing the emissions of imports. As stated in the recent Update to Market⁶, we will seek to keep both standards and certification aligned with international schemes where appropriate. We are in the process of joining work which looks at the development of an International Organization for Standardization (ISO) technical specification⁷ methodology for determining emissions for hydrogen, and are taking part in key multilateral forums, namely the International Partnership for Hydrogen and Fuel Cells in the Economy⁸ (IPHE) and the Hydrogen Technology Collaboration Programme (TCP)⁹ to look at how certification schemes can support international trade through interoperability and mutual recognition.

⁵ www.lowcarboncontracts.uk/

⁶ Hydrogen Strategy Update to the Market: August 2023, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1175825/hydrogen-strategy-update-to-the-market-august-2023.pdf

⁷ ISO/DTS 19870, www.iso.org/standard/65628.html?browse=tc

⁸ International Partnership for Hydrogen and Fuel Cells in the Economy, www.iphe.net/

⁹ IEA - Hydrogen TCP: Tasks in Definition, www.ieahydrogen.org/tasks/tasks-in-definition/

In future phases of the certification scheme, government expects it will need to work towards expanding the emissions scope to address transport, storage, carriers and derivatives such as ammonia, to ensure the scheme remains fit for international trade and is in-keeping with international developments. Government understands the need to provide industry with assurance that the scheme will be able to support both imports and exports. Therefore, ahead of the scheme being launched, we will set out our envisioned pathway to international alignment for both standards and certification. This will be in line with the UK’s commitments under the World Trade Organisation (WTO). Government may also consider introducing legislation in future to underpin the scheme to ensure it remains robust as the number of scheme participants grows.

Summary of decisions

Table 1 below outlines the key policy decisions set out in this government response. These reflect our intention to design a certification scheme which can both support HPBM and NZHF producers from 2025, and which is prepared to evolve as the UK begins to trade low carbon hydrogen internationally.

Table 1: Summary of Policy Positions

Policy Decision	Rationale
<p>Geographical Scope</p> <p>Government’s aim is for the scheme to be available UK-wide.</p>	<p>This would maximise standardisation and consistency across the UK-wide hydrogen market, allowing the whole of the UK to benefit from certification.</p>
<p>Participation requirements</p> <p>Participation in the scheme will be voluntary initially.</p>	<p>An initially voluntary scheme will enable government to refine the certification scheme as the market for low carbon hydrogen develops. This position may need to be reviewed over time.</p>
<p>Certificate Unit</p> <p>Certificates will be issued in MWh (HHV).</p>	<p>Certificates will be issued in MWh (HHV) in alignment with the HPBM. This unit matches the unit used in some European schemes, so will also set up the scheme for international alignment in the future.</p>
<p>Labelling</p> <p>The certificate label will show a simple label such as “LCHS compliant” and the emissions associated with its volume.</p>	<p>A simple label, showing that the volume of hydrogen complies with the LCHS and displaying its emissions, will give buyers the information they need to inform their purchase. It will also reflect the government’s ‘twin-track’ approach in the UK Hydrogen Strategy by taking a technology neutral approach. This position does not preclude government from adopting an international labelling system if one emerges in future.</p>

Policy Decision	Rationale
<p>Mandatory Data Fields</p> <p>Mandatory data fields will cover the key data requirements of the LCHS to provide the essential information to certificate users.</p>	<p>Certificates will contain a set of data fields which the producer must fill out to receive certification. Mandatory data fields will contain the key information needed in line with the LCHS (such as emissions intensity) for transparency and credibility, but the list will be kept relatively short to avoid over-burdensome reporting.</p>
<p>Voluntary Data Fields</p> <p>Voluntary fields will not be initially available under the scheme from 2025 but will be reviewed as the scheme is adapted for international alignment.</p>	<p>Given most respondents stated that they wanted to use these fields for export to the European Union (EU), government will assess the role of voluntary fields as we evolve and expand the scheme for international alignment.</p>
<p>Legacy Certificates</p> <p>The certification scheme will follow the latest version of the LCHS as it is updated. When an update is made to the LCHS, Government will assess whether there is a need to certify against a previous version (i.e. offer a 'legacy' certificate) based on the nature of the update.</p>	<p>The nature of updates to the LCHS will vary: sometimes these will be minor clarifications or technical changes. In these cases, offering certificates for different versions of the LCHS may not be necessary. Therefore, government will assess the need for legacy certificates as each update is made to ensure the scheme remains as clear and simple as possible.</p>
<p>Chain of Custody</p> <p>Certificates will be traded using a mass balance chain of custody.</p>	<p>A mass balance system will ensure the scheme can meet its primary objective to connect producers and end users by providing a method of verifying and trading the emissions of low carbon hydrogen use. Further work is needed to set out detailed guidance for the chain of custody and government will continue to work with industry on this up to the scheme's launch from 2025.</p>
<p>Consignment Approach</p> <p>The certification scheme will allow the submission of both discrete and averaged consignments within a month.</p>	<p>The certification scheme will be based on the LCHS. Allowing both discrete and averaged consignments reflects the approach of the LCHS and the HPBM.</p>
<p>Midstream Considerations</p> <p>The certification scheme will evolve to facilitate the import and export of low carbon hydrogen alongside expanding to cover emissions from transport, storage, conversion and other derivatives such as ammonia.</p>	<p>As mentioned above, government will assess how the scheme should be amended for international alignment as the UK starts to export and import low carbon hydrogen. To enable compliance with other international schemes, the certification scheme will need to address emissions from the rest of the supply chain.</p>

Policy Decision	Rationale
<p>Delivery Model and Delivery Partner</p> <p>The scheme will be led by government. The Low Carbon Contracts Company (LCCC) is intended to act as the certification and issuing body in delivering the scheme.</p>	<p>A scheme led by government has the advantage of being able to facilitate smooth coordination with other government policies such as funding for hydrogen production. Government backing also instils confidence in the scheme, including for investors in the hydrogen market.</p>
<p>Frequency of Data Reporting</p> <p>Producers will need to submit the required emissions data per consignment, monthly and will be subject to annual audits. The users will be issued certificates on a monthly basis.</p>	<p>To minimise duplicate reporting requirements, the approach of monthly data reporting and annual auditing for certification scheme will be aligned as much as possible with approach taken by HPBM.</p>
<p>Retirement of Certificates</p> <p>Government will continue to consider policy on certificate retirement.</p>	<p>The approach to certificate retirement is closely connected to the preferred chain of custody system and approach to certificate expiry. As government policy evolves on these two areas, we will further consider the approach for retirement of certificates.</p>

Interaction with other government schemes

Table 2 below clarifies how the certification scheme will interact with other government schemes from its launch from 2025. We will revisit these interactions as the scheme evolves.

Table 2: Interaction with other government schemes

Government scheme	Interaction
Low Carbon Hydrogen Standard (LCHS) ¹⁰	The certification scheme will be based on the LCHS. This means it will certify hydrogen which meets the requirements set out in the LCHS for hydrogen to qualify as ‘low carbon’.
Hydrogen Production Business Model (HPBM)	Both the HPBM and certification schemes require compliance with the LCHS, and government anticipates the LCCC will be the counterparty for the HPBM, subject to successful completion of administrative arrangements. Therefore, data reporting and auditing requirements will be aligned where possible to minimise burden for producers.
Renewable Transport Fuel Obligation (RTFO) and sustainable aviation fuel mandate (SAF)	<p>Under the RTFO, suppliers of relevant transport fuel in the UK must be able to show that a percentage of the fuel they supply comes from renewable and sustainable sources, which includes renewable hydrogen. The SAF mandate will require at least 10% (~1.5 billion litres) of UK aviation fuel to be made from sustainable sources by 2030, including low carbon hydrogen¹¹.</p> <p>Because the SAF mandate and RTFO are transport sector focused, there are necessary differences when it comes to calculating emissions for low carbon hydrogen when compared to the LCHS, such as the RTFO’s ‘well-to-wheel’ approach. The certification scheme will be based on the LCHS and therefore its certificates will not be applicable to the RTFO and SAF mandate.</p> <p>In future, as the scheme expands to cover emissions from transport and storage, government will review the interaction between the certification scheme and the RTFO and SAF mandate to see where further efforts towards interoperability can be made.</p>
UK Emissions Trading System (UK ETS)	Certificates will not provide evidence for reduced UK ETS bills for hydrogen users. The UK ETS will continue to monitor Scope 1 emissions from fuel usage and charge accordingly.

¹⁰ UK Low Carbon Hydrogen Standard: emissions reporting and sustainability criteria (2023), <https://www.gov.uk/government/publications/uk-low-carbon-hydrogen-standard-emissions-reporting-and-sustainability-criteria>

¹¹ Mandating the use of sustainable aviation fuels in the UK: Consultation outcome (2023), <https://www.gov.uk/government/consultations/mandating-the-use-of-sustainable-aviation-fuels-in-the-uk>

Government scheme	Interaction
Carbon Leakage Policies	Earlier this year, the UK government consulted on a range of potential policy measures to mitigate future carbon leakage risk ¹² . Government will seek to ensure there is a coherent approach to imported hydrogen across both the certification scheme and any future carbon leakage policies.

Next steps

Government remains committed to delivering a certification scheme from 2025 as set out in the British Energy Security Strategy. To meet this commitment, government will begin its delivery phase for the certification scheme, working in partnership with the Low Carbon Contracts Company as the intended delivery body. Engagement on design and delivery of the scheme will also continue with the Scottish Government, Welsh Government and Northern Ireland Executive in line with the intention for the scheme to operate across the UK.

There are also several areas that will require further development after we launch the scheme from 2025. These include:

- Alignment with international schemes;
- Approach to emissions beyond “well-to-gate”; and
- Further interactions with other government schemes (e.g. the RTFO and the SAF mandate).

Government recognises the need to provide industry with suitable reassurance that the scheme will support imports and exports. Therefore, ahead of launching the scheme, we will set out our envisioned pathway to international alignment for both standards and certification. This will be in line with the UK’s commitments under the WTO.

Government will continue to work with industry and to ensure the scheme meets the needs of the hydrogen economy. We will centre this around engagement with the Hydrogen Delivery Council¹³ (formerly the Hydrogen Advisory Council) and its working groups, which was set up by the Secretary of State in July 2020, as well as international organisations such as the IPHE and the Hydrogen TCP.

¹² Addressing carbon leakage risk to support decarbonisation (2023), www.gov.uk/government/consultations/addressing-carbon-leakage-risk-to-support-decarbonisation

¹³ Hydrogen Delivery Council, www.gov.uk/government/groups/hydrogen-delivery-council

Consultation exercise

Conducting the consultation exercise

In total, Government received 72 responses to the consultation. 28 respondents used the Citizen Space survey, and 44 respondents submitted responses via email only. Some respondents submitted feedback through both channels.

While the consultation was open, Government conducted several live stakeholder engagement events, which included:

- one open-access webinar introducing consultation content;
- four in-depth workshops discussing different focus topics;
- seven trade association members' meetings, including hydrogen trade associations in Northern Ireland, Scotland and Wales; and
- a large number of 1:1 meetings on request with UK-based and international stakeholders.

We would like to thank all respondents and event attendees for their engagement. We have considered the views expressed in these live events when forming policy, but they are not included in the figures used in the summary under each question.

Approach to analysis and government response

The approach taken to analysis has varied depending on the nature of the question asked. For open questions, we have provided qualitative analysis of response themes. For 'closed' questions with a 'yes/no' answer format, we have provided a list to show the quantity of responses in each category, and percentages.

Responses submitted via email have been treated similarly to those submitted on Citizen Space where possible, but where it was unclear if a respondent agreed or disagreed with a proposal, this has been categorised under "no preference indicated". Some responses came in the form of statements or documents which did not relate directly to the consultation questions. Where possible, we have included these in the themes for relevant questions.

Throughout this document, we have used the following terminology:

- "Most" or "the majority" indicates over 50% of the responses in question;
- "Many" indicates 25% to 50% of the responses in question;
- "Some" indicates 10% to 25% of the responses in question; and
- "A few" indicates less than 10% of the responses in question.

Government response

Introduction and Chapter 1: Fundamental scheme design

Question 1

Q1. Do you agree with the design features set out in the introduction?

- a. Please explain your answer and suggest any alternative or additional features and how they should be prioritised.

Summary of responses

Yes: 46

No: 5

Don't know: 1

No preference indicated: 9

Total: 61

No response: 11

61 respondents answered this question. Many respondents gave mixed answers, commonly including both broad support for the proposed design features and further suggestions.

75% of those who responded to this question agreed with the design features proposed. Some of these respondents noted the balance and trade-offs between the primary and secondary priority design features:

- The **primary priority design feature** is connecting producers and end users by providing a reliable method of verifying and tracing the emissions of low carbon hydrogen use; and
- The joint **secondary priority design features** are stimulating market growth and facilitating cross-border trade.

While many supported the relative prioritisation, there was also some support for reprioritising these so that all three design features could be equal, or either of the secondary priority design features could take precedence. Some respondents noted that the prioritisation of design features could change over time and called for flexibility and review. Extra design features suggested included ensuring wide participation, through minimising the administrative burden and including intermediaries such as traders.

8% of respondents disagreed with the design features proposed. In these answers, the most common theme was reprioritising the primary and secondary design features. 'Stimulating market growth' was seen as particularly important by these respondents.

Respondents from all groups highlighted potential interactions with other government schemes, such as UK Emissions Trading Scheme (UK ETS) and Renewable Transport Fuel Obligation (RTFO), noting that this could increase the value of a certificate and impact investor certainty.

Government response

Government confirms that the priority design features will remain as proposed, under the overall objective of supporting the decarbonisation of the hydrogen economy. These priority design features support the government's wider strategy for hydrogen by building confidence in the growing low carbon hydrogen economy and enabling users of hydrogen to make evidence-based, sustainable purchasing choices. We acknowledge the widespread support consultation respondents showed for these design features.

All three of these design features will inform the development of the scheme. In many cases, there will be mutual benefits for two or more features. When considering trade-offs, we will take into account the relative prioritisation of these, as outlined in the consultation.

We note respondents' references to interactions with other government schemes. We will continue to shape these interactions as we develop the certification scheme. Some of these have been outlined in more detail in Section 2, Table 2 above.

Question 2

Q2. Do you agree with the principles set out in the introduction?

- a. Please explain your answer and suggest any alternative or additional principles for the development of the scheme.

Summary of responses

Yes: 52

No: 3

No preference indicated: 4

Total: 59

No response: 13

59 respondents answered this question. Of those who responded, 88% agreed with the principles set out, which were:

1. Inclusive
2. Accessible
3. Transparent
4. Compatible
5. Informative

6. Robust
7. Predictable

Some respondents who agreed emphasised individual principles to prioritise, of which the most common was 'robustness'. Further topics mentioned included data control and accessibility, including preferences for 'digital first' certificates, and references to a robust audit trail and traceability.

5% of respondents disagreed with the principles and 7% did not indicate a clear preference. Respondents in all categories had extra suggestions for principles to add to the list. The most common were flexibility, progressiveness, or ability to evolve. Some respondents referenced financial considerations, such as cost-effectiveness or safeguarding investment value. Others suggested adding a more active principle, such as attractiveness to the market, and there were some calls for simplicity.

Across all answer categories, there were references to interactions with other government schemes, and in particular the UK Emissions Trading Scheme (UK ETS). Some argued for interoperability with UK ETS so that certificates could be used to offset bills, including in blending scenarios; on the other hand, it was noted that using certificates for the UK ETS could reduce decarbonisation ambition.

Government response

Government confirms it will use the scheme principles as set out in the consultation. These were broadly supported by those who responded to the consultation.

We will also add one further principle which a number of respondents suggested. This will be:

8. Adaptable
 - The scheme is designed to expand as the hydrogen economy develops, remaining sensitive to industry needs.

This principle reflects government's intention to ensure the scheme remains fit for purpose as the hydrogen economy changes and grows, and particularly as international trade becomes a more significant feature.

Interaction with UK Emissions Trading Scheme

As already confirmed in the consultation, there will be no interaction between the certification scheme and UK Emissions Trading Scheme (UK ETS). Certificates for low carbon hydrogen cannot be used as a means of reporting emissions for low carbon hydrogen production under the UK ETS, nor as a way to offset UK ETS obligations.

The UK ETS¹⁴ is a 'cap and trade' system where participants monitor their GHG emissions and then surrender allowances to cover their reportable emissions. The UK ETS applies to energy

¹⁴ www.gov.uk/government/publications/participating-in-the-uk-ets/participating-in-the-uk-ets#overview

intensive industries, the power generation sector and aviation, therefore some hydrogen producers and end users of hydrogen will be covered by the UK ETS.

Hydrogen producers that are required to comply with the UK ETS to account for the fuel used in the hydrogen production process should continue to monitor Scope 1 emissions (i.e. direct emissions) and purchase and surrender allowances under the UK ETS as normal, alongside participating in the certification scheme.

End users of low carbon hydrogen may see a reduction in their Scope 1 emissions where there are no GHG emissions associated with the hydrogen at point of use, but should also continue to monitor these emissions and comply with their ETS obligations accordingly. Certificates for low carbon hydrogen can be used by end users to demonstrate Scope 2 and 3 emissions (i.e. indirect emissions), which are not covered by the UK ETS.

Question 3

Q3. Do you agree that there should be a single certification scheme covering the UK?

a. Please explain your answer.

Summary of responses

Yes: 58

No: 3

No preference indicated: 2

Total: 63

No response: 9

63 respondents answered this question. Of those who responded, 92% agreed that there should be a single UK-wide certification scheme. The most common reasons were simplicity, consistency and standardisation across the UK, and the benefits for trade within the UK and internationally. Multiple respondents noted that further collaboration with Devolved Administrations will be needed to make a UK-wide scheme feasible. Some specifically noted the interconnectedness of the UK hydrogen market in their responses, pointing out that a UK-wide scheme reflects having UK-wide supply chains.

5% of respondents disagreed with a single UK-wide scheme. These respondents most commonly advocated an approach more like the EU's, where private schemes apply to the European Commission to be recognised as certifying to the EU standard. Some argued that this creates greater flexibility for businesses, who can choose schemes which suit their needs. In these respondents' opinion, a single UK-wide certification scheme, backed by government, would limit the scope for other schemes and standards to provide choice for users.

Some stakeholders also noted differences in regional needs and priorities for a certification scheme.

Government response

Government intends for the certification scheme to be available UK-wide, which would facilitate the development of a consistent, cohesive domestic market for low carbon hydrogen. We will continue to work closely with Devolved Administrations on the development of the scheme and to consider and accommodate different regional contexts within it where possible, while aiming to retain the benefits of offering a single, UK-wide scheme. We will confirm the geographical scope of the certification scheme ahead of the launch from 2025.

Question 4

Q4. Do you agree that participation in the scheme should be voluntary initially?

a. Please explain your answer.

Summary of responses

Yes: 43

No: 9

Don't know: 2

No preference indicated: 4

Total: 58

No response: 14

58 respondents answered this question. Of those who responded, 74% agreed that participation should be voluntary initially. Some of these respondents noted that an initial voluntary period would be useful to test and evolve the scheme in the more flexible environment it would provide. Others highlighted that the initial voluntary period would also help to build trust and confidence in the scheme as it developed and would facilitate a quicker and easier rollout than a mandatory scheme. These respondents also noted that a voluntary scheme would need to be attractive to end users, ensuring that costs would not outweigh potential benefits to encourage sign-up. Many asked for government to provide a clear timeline or plan for making the scheme mandatory in the longer term.

16% disagreed with initial voluntary participation. Some were concerned that an initial voluntary scheme left space for greenwashing in the early years, reasoning that until a mandatory element came in, organisations would still be able to market their products as 'low carbon' or 'green' without being certified as such. Other respondents indicated that, without a mandatory element, there would be a lack of consistency and fairness in the market. Some indicated that a scheme that was initially voluntary might not signal enough ambition towards decarbonisation.

Government response

Government confirms that the certification scheme will be launched on a voluntary basis from 2025. In the early years of the scheme, we expect that most hydrogen producers will be

supported by the NZHF/or HPBM, which require compliance with the LCHS as a condition for support. Implementing a mandatory scheme under these circumstances is likely to be unnecessary. This forms part of the government's Smarter Regulation programme of regulatory reform announcements that began in May 2023 with the publication of Smarter Regulation to Grow the Economy¹⁵. Smarter regulation is about improving regulation across the board, ensuring it is clear and proportionate.

An initial voluntary scheme will also enable us to test and review the scheme, and we aim to design a scheme that has sufficient benefits to encourage industry to sign up voluntarily. As mentioned in the consultation, mandatory participation may become appropriate to ensure the hydrogen economy continues to drive decarbonisation as it grows, particularly once there is a greater proportion of low carbon hydrogen production which is not subsidised by government. If we revisit this question, we will engage further with industry.

Question 5

Q5. If the Low Carbon Hydrogen Standard (LCHS) changes through time, do you think the certification scheme should offer 'legacy' certificates based on compliance with previous versions of the LCHS?

Summary of responses

54 respondents answered this question. A majority supported legacy certificates, often referencing the need for investor confidence or investment certainty. Legacy certificates were seen to provide this certainty, ensuring that producers could continue to access the low carbon hydrogen market and reduce investment risk. Similarly, some respondents referenced first movers or early projects; these respondents noted that legacy certificates could be a way to avoid penalising those who take the first steps to produce low carbon hydrogen, since these producers are the most at risk of becoming unable to keep up to date with LCHS changes. Some respondents noted the link between legacy certificates and the HPBM. Some of these respondents indicated that legacy certificates should be specifically tied to Low Carbon Hydrogen Agreements (LCHAs)¹⁶ or should be made available only to producers supported by the HPBM.

Some respondents were ambivalent about legacy certificates or supported them only with specific conditions. Some respondents highlighted a need for specific and appropriate limits on any legacy certificates, such as providing them only for a limited time. A few respondents indicated that the provision of legacy certificates should be tied strictly to when a project first comes online (for example, those who begin production in 2025 should continue to access legacy certificates from the LCHS version in place in 2025).

Some respondents also shared views on whether legacy certificates should be the same as or distinct from certificates for compliance with the current LCHS. Of these, a majority specifically

¹⁵ Smarter regulation to grow the economy (2023): www.gov.uk/government/consultations/designing-a-uk-low-carbon-hydrogen-standard

¹⁶ The contracts signed between the counterparty and producers under the Hydrogen Production Business Model.

advocated for making a distinction, while a few suggested that legacy and current LCHS-compliant certificates should be equal or indistinguishable. Key considerations included end users' need to differentiate between up-to-date and older levels of compliance for their own sustainability claims, and whether the creation of two separate certificate types would meet scheme objectives.

Some respondents broadly disagreed with the scheme providing legacy certificates. They shared concerns that legacy certificates would lead to reduced ambition from industry, less incentive to continue decarbonising, and potential greenwashing. Some respondents also raised concerns that allowing legacy certificates would lead to a lack of standardisation across the certificate market, confusion for end users, or an unfair outcome for producers who were compliant with up-to-date, more stringent standards.

Government response

Government will decide whether to introduce legacy certificates when updates are made to the LCHS. We acknowledge the majority support for legacy certificates and understand the need to encourage investor confidence in low carbon hydrogen production, as well as support first movers. However, we also acknowledge the need to maintain a transparent, standardised, accessible certification scheme, where hydrogen users can easily understand what a certificate means and make judgements on whether a volume of hydrogen meets their needs.

To strike a balance between these different needs, we will approach the question of legacy certificates on a case-by-case basis, in coordination with updates to the LCHS. In practice, this is likely to involve government:

- gathering more detailed evidence on the expected impacts of a particular LCHS update on producers' access to certification;
- assessing what changes may be necessary to the certification scheme, including whether legacy certificates are necessary in that specific case; and
- publishing this decision alongside the LCHS update and amending the certification scheme's terms and conditions.

This approach will enable us to tailor the certification scheme to the LCHS update in question, avoiding complexity in the certification scheme where it is not necessary. For example, where updates to the LCHS are minor and technical, we would expect that producers will comply with the most up-to-date version. In these cases, offering legacy certificates for the previous version would be counterproductive, leading to unnecessary differences in what a certificate means which could confuse end users.

On the other hand, where an LCHS update is more significant, this approach will allow us to consider the impact on producers in more detail. We can then weigh this evidence together with end users' needs for the certification scheme and overarching strategic direction for the hydrogen economy and come to a decision on whether to provide legacy certificates for a previous version of the standard. Government will therefore be able to make informed

decisions with better knowledge of the specific LCHS changes in question and the impact on producers' access to certification.

We also note that some respondents referenced adjustment periods around changes to the LCHS. This refers to a period following an update to the standard during which producers could equally certify their hydrogen against the preceding version or the newly introduced version. Adjustment periods allow time to update systems and transition to the most up-to-date version. We see these adjustment periods as distinct from legacy certificates and will approach the issue of adjustment periods alongside the delivery of the certification scheme.

Question 6

Q6. How do you think 'legacy' certificates would impact the certification scheme and the market for certified hydrogen?

Summary of responses

50 respondents answered this question. Many of these suggested that there would be no significant impact on the market or scheme. A few respondents noted the positive impact of legacy certificates on investment certainty, leading to better market growth.

Some noted that legacy certificates would create complexity in the market and could cause confusion (particularly among end users). A few respondents emphasised greenwashing and credibility risks to the certification scheme if legacy certificates were to be issued. A few respondents also noted that providing legacy certificates removed an incentive for producers to continue to decarbonise their production, leading to higher emissions over time.

Government response

Government notes the concerns from some respondents that legacy certificates could create new risks to the certification scheme. As we assess the need for legacy certificates in coordination with LCHS updates moving forward, we will continue to consider the risks respondents have outlined, alongside the scheme principles of transparency, robustness and predictability.

Question 7

Q7. Do you agree that certificates should be issued based on MWhs of hydrogen?

- a. If you answered "no" to Q7, please state your concerns and suggest your preferred alternative.

Summary of responses

Yes: 55

No: 5

No preference indicated: 2

Total: 62

No response: 10

62 respondents answered this question. 89% of these agreed that certificates should be issued based on megawatt hours (MWhs) of hydrogen. These respondents felt that MWh provides a standard metric for consumers and aligns with the current energy and gas markets.

Respondents also noted that a MWh unit supports alignment with other schemes, both domestically with the HPBM and internationally. These respondents especially referenced alignment with EU Guarantees of Origin, under the Renewable Energy Directive (REDII), and CertifHy.

8% of respondents disagreed, and the remaining 3% neither agreed nor disagreed. Those who disagreed stated that certificates should be issued in kilograms (kg). These respondents cited alignment with the US's Inflation Reduction Act and ease of measuring hydrogen derivatives (i.e. ammonia). A common suggestion from respondents, regardless of whether they agreed or disagreed with MWh, was that standard conversion factors should be provided for customers who require a different unit from that used on the certificate.

Some respondents also noted the need to define the heating value for the certification scheme. Most of these respondents suggested that the scheme use a higher heating value (HHV). This was due to alignment with the gas market, and with the subsidy provided under the HPBM.

Government response

Government confirms that certificates will be issued in MWh. This enables the scheme to align with the current energy and gas markets, as well as with international schemes. Under the Renewable Energy Directive (REDII), European Hydrogen Guarantees of Origin (GOs) will also be issued in MWh, and there was strong support throughout the consultation responses for the certification scheme to be closely aligned with the EU. The MWh unit also supports our mass balance position (see Q13 and Q14 below) and aligns with the HPBM which awards payment per MWh (HHV) of hydrogen produced – a common unit facilitates trading the hydrogen and the certificates together.

We note that using MWh does not align with every scheme, however, and that kg were the preferred choice of respondents who did not agree with MWh. We also note that many respondents recommended providing conversion factors. The LCHS¹⁷ Data Annex already does this in a table that gives the most common conversions, allowing users to work out the equivalent values. Government will explore the best way to offer conversions for the certification scheme.

Government did not make a proposal in the consultation regarding the heating value the scheme would use. Currently, the LCHS uses lower heating value (LHV) for the purposes of

¹⁷ UK Low Carbon Hydrogen Standard: emissions reporting and sustainability criteria (2023), www.gov.uk/government/publications/uk-low-carbon-hydrogen-standard-emissions-reporting-and-sustainability-criteria

emissions accounting and the HPBM uses HHV to align payments with the gas market. Given that we expect most producers in the early years to be part of the HPBM and to facilitate the sale of hydrogen and the certificate under the same unit, we propose that the certification scheme will use HHV. We will work closely with the delivery partner to design the best way to provide the simple conversion from LHV.

Chapter 2: Information disclosure

Question 8

Q8. Do you agree with our indicative list of mandatory disclosure fields?

a. Please explain your answer and suggest any additional mandatory disclosure fields.

Summary of responses

Yes: 42

No: 11

Neither agree nor disagree: 4

Total responses: 57

No response: 15

57 respondents answered this question. Of these, 74% agreed with our indicative list of mandatory disclosure fields, which were:

- Actual emissions associated with the production of hydrogen calculated according to the LCHS methodology
- Compliance with input and electricity sustainability criteria
- The method, including feedstocks, used to produce the hydrogen
- Whether production is supported by government
- Other fields to enhance traceability, including production facility, location, time and date of production

These respondents noted that the proposed list covers the crucial aspects of hydrogen production and enables demonstrating compliance with the LCHS. Some of these respondents also stated that the list should be kept relatively short, ensuring that the reporting burden remains minimal, particularly given the scheme will be voluntary (as set out in Q4 above). A few respondents also suggested that some additional fields could be added to align with EU Guarantee of Origin (GO) requirements as set out in Article 19(7) of the Renewable Energy Directive (REDII)¹⁸.

¹⁸ Directive (EU) 2018/2001, <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32018L2001>

Of those who disagreed, their main objection was with the inclusion of ‘government funding’ in the list of mandatory fields. Some of these respondents did not see the value of its inclusion, suggesting that it added complexity. Some suggested that it could be misconstrued as a government endorsement, creating a disadvantage for producers who do not access government funding and resulting in a disincentive for end users to buy non-government funded hydrogen.

A number of respondents were concerned that fields such as time and date of production would add complexity and additional reporting burden, particularly for hydrogen which has been put in storage. There were strong representations both for and against production method being a mandatory field.

Specific additional fields suggested were as follows:

- Power Purchase Agreements (PPAs)
- Country of origin
- Power source
- Purity

Government response

Government confirms that the mandatory disclosure fields will follow the essential reporting requirements in line with the LCHS. This will create a credible and transparent scheme while avoiding burdensome reporting. Mandatory fields are likely to include emissions intensity (according to the LCHS), production method and compliance with input criteria, but the finalised list of data will be developed as the scheme starts its delivery phase, taking into account the feedback received in the consultation.

Although other schemes (particularly internationally) have additional requirements, these fields will not be mandatory reporting requirements at this stage, given the scheme’s initial UK focus and links to the LCHS. Government plans for the scheme to be flexible, and evolve as the hydrogen market develops, and extra data reporting in line with other schemes and standards may be introduced in the future.

A number of respondents questioned the value of having ‘government funding’ as a mandatory disclosure field. The rationale behind this field is to enhance the traceability of government-funded hydrogen through the supply chain and gain insights into its use. We are inclined to include this field, both to trace government subsidies and ensure volumes are not receiving funding from two sources, but also as it is a field required by some international schemes (EU GOs, article 19(7d.) of REDII).

Question 9

Q9. Do you have any suggestions for potential voluntary fields that may be of use?

Summary of responses

49 respondents answered this question. All of these supported the voluntary fields approach proposed. 35 respondents made suggestions for voluntary fields; the main purpose behind these suggestions was to demonstrate compliance with other schemes, most notably with the EU and with the Renewable Transport Fuel Obligation (RTFO). A few respondents also identified transport emissions as a particularly important field. The most common suggestions were:

- Compliance with REDII and associated delegated acts
- Compliance with RTFO
- Purity
- Emissions from transporting hydrogen
- Transport or carrier type
- GHG emissions by scope
- Additionality
- Environmental impact metrics

Many respondents noted that robust mechanisms were needed to verify and audit any additional data, so that consumers could have confidence in the credibility of this information.

Many respondents recommended that there should be the opportunity to add additional fields at a later point, providing flexibility as the market develops.

Government response

Government will introduce the certification scheme with mandatory fields outlined above, and will not initially include voluntary fields. However, government acknowledges that additional fields will be a useful mechanism, and will consider offering them as the scheme expands, as a type of 'modular approach'. This will give the opportunity for us to consider policy on full lifecycle emissions, as well as additional factors required for other international schemes (such as wider sustainability requirements). The modular approach has been suggested by international bodies¹⁹ and allows for the scheme to evolve in a pragmatic manner.

Introducing additional fields later will allow government to also introduce robust verification processes for anything beyond what the LCHS currently covers. Without adequate verification,

¹⁹ IRENA - Creating a global hydrogen market: certification to enable trade (2023), www.irena.org/Publications/2023/Jan/Creating-a-global-hydrogen-market-Certification-to-enable-trade

these data fields would risk both undermining the integrity of the scheme and not being accepted by international markets.

Question 10

Q10. What markets or schemes would you like to use the voluntary disclosure field to demonstrate compliance with?

Summary of responses

47 respondents gave suggestions for what markets and/or schemes they would use voluntary fields to demonstrate compliance with. The most common answer was demonstrating compliance with international schemes and standards for exporting hydrogen. The EU was the most widely cited, given it is likely to be the first market that UK producers will look to trade with. Other markets mentioned were the United States, Norway, Japan, Singapore, China and Australia. The most frequently mentioned other schemes were RTFO, CertifHy, UK Emissions Trading Scheme (UK ETS), the International Sustainability & Carbon Certification (ISCC), related ISO standards, and the Green Hydrogen Organisation standard.

Many respondents valued the ability to demonstrate compatibility with a wide range of schemes. Respondents also noted that voluntary fields should be able to adapt and change over time as the market evolves. Respondents further noted that the fields should be regularly reviewed to ensure they remain useful and up to date for the markets and schemes that users require compatibility with.

A few respondents noted that in the early stages of the scheme (approximately 2025-2030), cross border trade of hydrogen will be minimal. They stated that the scheme's initial focus should be on the needs of the UK market, ensuring that the scheme is simple and facilitates domestic production and use.

Government response

As mentioned in Q9 above, we will not introduce voluntary fields at the beginning of the scheme, but government envisages expanding the scheme to cover many of the suggested additional fields in a second phase, taking a modular approach. To be useful for the markets and schemes mentioned above, these modules will need to be suitably audited and verified. It is unlikely that certificates with these fields will gain international recognition and credibility otherwise. We recognise that respondents saw voluntary fields as a way to facilitate exports of hydrogen. Please see Q16-18 for more detail on our approach to supporting international trade.

Questions 11 and 12

Q11. Would you prefer a single label, or multiple tiers?

a. Please explain your answer.

Q12. If stating a preference for multiple tiers to Q11, do you have any suggestions on how tiers should be structured?

Summary of responses

Single label: 21

Multiple tiers: 28

Don't know: 2

No preference indicated: 11

Total responses: 62

No response: 10

62 respondents answered this question. Of these, 34% preferred a single label for certificates to show compliance with the LCHS. Many respondents stated that a single label would be the simplest approach, and that consumers will be most interested in emissions intensity which will be included in the mandatory disclosure fields (see Q8 above). A few respondents suggested that a tiering approach would not generate price differences for different production methods, since consumers make purchasing decisions based on their contractual arrangements rather than the emissions intensity of a volume of hydrogen. Some respondents noted that a single label supports government's 'twin track' approach, allowing certificates to be technology neutral and creating a more liquid market.

45% of respondents who answered this question supported having multiple tiers on the certificate. Most of these respondents stated that this would ensure low carbon hydrogen from renewable electricity could gain a higher 'green premium'. Respondents also noted that a tiering system could incentivise hydrogen producers to decarbonise further below the threshold set by the LCHS towards zero emissions. Some respondents suggested that a tiering system would support government's 'twin track' approach by 'closing the gap' between CCS enabled production and electrolytic production, allowing renewable hydrogen the higher premium it needs to remain competitive. A few respondents noted that tiering could support the government's proposal to provide legacy certificates against previous versions of the LCHS, since tiers could be used to demarcate hydrogen which meets an older LCHS threshold with an updated threshold.

Both groups of respondents cited international alignment as an important consideration. Respondents in favour of a single label noted that displaying actual emissions on a certificate would allow for the most interoperability with international schemes, whereas respondents in favour of a tiering system noted that tiers could be designed for alignment with international schemes.

34 respondents gave feedback on how tiers should be structured (Q12). Many respondents advised that the tiers suggested in the consultation should be reversed, so that “Tier 1” represented the lowest emissions, and “Tier 4” represented the highest emissions. This would also allow additional tiers to be added as a “Tier 0” or “-1” for zero emissions and negative emissions respectively, or if the tiers used letters A-D (following precedent from energy efficiency labels) then “A+” and “A++” could be used. Tiers using this structure could also support the legacy certificates proposal (see Q5-6 above) if the emissions threshold set out in the LCHS was lowered. For example, “Tier 4” could become the tier that shows compliance with a previous version of the standard.

There was a mixture of views on whether tiers should be based on emissions intensity or production method. Some respondents said that there should be fewer tiers which showed the production pathway (comparable to the system used in the China Hydrogen Alliance Standard). A few respondents who advocated for tiers based on emissions intensity said that tiers would not need equal size bands. For example, the lowest tiers could have a narrow emissions range to show distinction between negative emissions, zero emissions, and very low carbon, but bands above this could represent a wider range of emissions intensities. This could reflect the different emissions from different production methods.

Other respondents suggested that tiers should be aligned with EU schemes to facilitate interoperability between schemes. A few respondents said tiers align with government’s net zero targets, with tiers labelled (e.g. ‘bronze’, ‘silver’ and ‘gold’) against different carbon budgets.

Government response

Certificates will contain a single label to show that a volume of hydrogen is LCHS-compliant, alongside the GHG emissions of the hydrogen. The main rationale for this approach is to allow consumers to make an informed purchasing decision based on emissions, while still providing a simple label that is technology agnostic, in line with the government’s ‘twin track’ approach²⁰. However, government acknowledges that some producers, particularly very low carbon hydrogen producers, supported multiple tiers so labelling could be used to access a further green premium. Other information that the producer may wish to display, such as the production pathway, will be accessible through the mandatory disclosure fields.

This approach also does not preclude the scheme adopting a carbon emission-based tiering system in future, recognising the arguments made in favour of a tiering system and the feedback respondents gave on international alignment. An international tiering system, such as the one proposed by the International Energy Agency²¹, could help facilitate imports and exports, provided there is alignment in the underlying methodology. See the response to Q17 below for further information on international alignment of certification schemes.

²⁰ UK Hydrogen Strategy (2023), www.gov.uk/government/publications/uk-hydrogen-strategy

²¹ IEA - Towards hydrogen definitions based on their emissions intensity (2023), www.iea.org/reports/towards-hydrogen-definitions-based-on-their-emissions-intensity

Chapter 3: Chain of custody

Question 13

Q13. Do you agree with a Mass Balance system of Chain of Custody?

- a. Please explain your answer and suggest the alternative you'd recommend if you disagree.

Summary of responses

Yes: 35

No: 16

Don't know: 2

No preference indicated: 11

Total responses: 64

No response: 8

64 respondents answered this question. Of these, 55% agreed with a mass balance chain of custody. Many of these cited similar reasoning to that set out in the consultation, such as enhancing traceability and transparency, providing protection against greenwashing, and ensuring consumer confidence in the scheme. Some noted that the credibility of Renewable Energy Guarantees of Origin (REGO)s had suffered from adopting a book and claim system. Respondents also stated that the physical link between hydrogen and its certificate was integral to ensuring that only users of low carbon hydrogen could claim the credentials. However, respondents noted that under a mass balance system, the scheme should be flexible on other areas such as temporal requirements, following the precedent set by the biomethane industry and avoiding more stringent requirements such as those set out under the RTFO. Some respondents stated that a mass balance chain of custody was more practical than identity preserved and segregation approaches in the context of the developing hydrogen economy.

25% of those who responded disagreed with a mass balance chain of custody. The majority of these preferred a book and claim system, suggesting that this can be just as robust as mass balance if the scheme has these other appropriate requirements:

- A rigorous audit process
- Transparent data processes
- Secure IT systems
- Credible certification and issuing bodies
- Requirements for the retirement of certificates
- Punitive measures for non-compliance

Some respondents also stated that a book and claim system would provide a more direct financial link between producers and end users where certificates are traded separately to the physical supply of hydrogen and therefore are not tied to the midstream. This would better support the commercialisation of certificates, allowing producers to gain more revenue from certification in the early stages.

The most common criticism of a mass balance system raised by respondents was around the loss of traceability when blending hydrogen into the grid. Views were split across all respondents on how certificates should be treated in a blending scenario. Some suggested that only end users with a physical connection to a producer (through a grid, pipeline or other infrastructure) should be able to purchase certificates. These certificate purchases could be limited to the amount of hydrogen of which they could technically receive, coupled with ensuring that the amount of low carbon hydrogen injected equals the amount used. Others felt that limiting the purchase of certificates in this way could hinder decarbonisation for those who would otherwise purchase more certificates than hydrogen they could use, or those who do not have a physical connection to the grid but still wanted to benefit from certification (for example, in areas where infrastructure development is further behind).

A few respondents promoted a book and claim system so that certificates could be used to comply with the UK ETS alongside surrendering allowances. Many respondents also preferred a book and claim system due to its simplicity and lower administrative burden compared to a mass balance system.

Regardless of whether respondents agreed or disagreed with a mass balance chain of custody, many cited international alignment (particularly with the EU) as being an important factor in the chain of custody decision. They highlighted that clear guidance on the rules set for the chain of custody approach will be important, particularly for blending and storage scenarios.

Government response

Government confirms that the certification scheme will have a mass balance chain of custody. This will ensure the scheme can meet its primary objective to connect producers and end users by providing a method of verifying and trading the emissions of low carbon hydrogen use. We will carefully consider respondents' feedback and will continue to engage with industry as we shape the exact requirements for the mass balance system, aiming to strike a balance between consumer confidence and maximising benefits for the hydrogen supply chain.

Respondents noted that international alignment should be an important consideration when choosing a chain of custody. Solutions for interoperability between schemes which have differing chains of custodies are yet to be developed, however government will continue to engage with international forums and partners as part of its wider work on international alignment.

Many respondents also asked for clarification on how the chosen chain of custody will work in a blending scenario. Government has recently published a consultation²² which seeks to

²² www.gov.uk/government/consultations/hydrogen-blending-into-gb-gas-distribution-networks

further understand the potential strategic and economic value of blending into the gas distribution networks. This consultation also tests our assessment of aspects of the commercial, market and technical arrangements to accommodate blending, should it be supported and enabled by government. Chapter 5 of the blending consultation sets out how certification and blending could interact. This includes a proposal that we prevent certificates from being traded after the point of injection, to support a strategic role of blending and ensure it does not 'crowd out' other end users of hydrogen who require it to decarbonise. Further details of this position will be developed alongside the government response to the blending consultation.

Question 14

Q14. Do you agree that a Mass Balance system of Chain of Custody would provide the most consumer confidence over the credentials of the hydrogen?

a. Please explain your answer.

Summary of responses

Yes: 32

No: 16

Don't know: 2

No preference indicated: 6

Total responses: 56

No response: 16

56 respondents answered this question. Of these, 57% agreed that a mass balance chain of custody would provide the most consumer confidence. Most of those who agreed said that it was the strict relationship between the hydrogen and its certificate which would provide consumers with confidence, noting that this approach has worked well in other sectors such as biomethane. Some also noted that mass balance would be able to strike a balance between generating consumer trust while allowing for the mixing of certified and non-certified hydrogen.

29% disagreed and 11% did not indicate a preference. Of those who disagreed, most respondents stated that a book and claim system can also provide good consumer confidence, with the robustness of the scheme will be based on other design features (such as those mentioned above in Q13), rather than on the chain of custody.

In general, many respondents reiterated the need for clear guidance and compatibility with international schemes. Some also noted the limitations raised in Q13 with regards to blending, as well as the limitation of access to users with a physical connection to hydrogen production.

Government response

As per Q13 above, government confirms the certification scheme will use a mass balance chain of custody.

Chapter 4: Further design considerations

Question 15

Q15. Do you have any thoughts on how our consignment approach should be structured?

Summary of responses

45 respondents answered this question. Many respondents stated that the consignment approach should align with the LCHS, like the approach taken by the HPBM. Responses indicated that any misalignment would introduce additional complexity for producers, which could affect confidence in and uptake of the scheme. Some noted that misalignment could also undermine the value of the LCHS as a central UK standard.

Most respondents agreed with the consignment approach of the LCHS, where producers can submit both discrete and weighted average consignments within a month. Respondents recognised the flexibility this approach provides for producers to operate in a way that suits them, maximising overall output of low carbon hydrogen. The majority of those who agreed stated that weighted average consignments should be used initially to help foster the development of the hydrogen market. Over time, as the market matures, this approach should be reviewed to align with emerging international best practice, and a mandatory discrete consignment approach could be considered.

Some respondents did not agree with monthly averaging, indicating a preference for annual averaging to allow for greater flexibility in production, including seasonal differences. However, it was also noted that annual averaging could reduce the traceability and credibility of emissions reductions and could favour large scale players.

A small proportion of respondents raised concerns about a potential time lag between production and certification, where certificates would be issued at the end of the month to allow for averaging. 'Balancing' may be required when producers must wait until the end of the month to submit their weighted average consignments. The administration of validating the required information for each consignment could also cause a further delay. Respondents expressed a need for digitally focused applications to ease reporting burdens, with suggestions of machine-to-machine trusted infrastructure to allow for self-certifying and self-reporting consignments.

Government response

Government confirms that the certification scheme will follow the consignment approach set out in the LCHS (as briefly described above) and already followed by both the HPBM and NZHF. This will allow producers to submit both discrete and weighted average consignments when assigning emissions intensities to low carbon hydrogen volumes. The certification scheme will also use the LCHS methodology to calculate emissions intensities in the hydrogen it certifies. Alignment with these schemes will minimise the complexity for producers in

reporting and verifying their information. This could also encourage higher uptake of the scheme where producers are already familiar with the methodology of LCHS.

The LCHS option to average consignments allows more flexibility for producers who may experience periods of high grid intensity or CO2 transport and storage network outages outside of their control, while maintaining incentives to keep emissions low across a month. It enables more LCHS-compliant consignments of hydrogen to be certified and enter the early-stage market, boosting the availability of low carbon hydrogen for near-term emissions reduction in difficult-to-decarbonise sectors.

Since the call for responses to this consultation, the LCHS guidance has been updated to allow more than one weighted average consignment per month. Producers will now be able to submit multiple weighted average consignments within a month to prove compliance under the schemes using the LCHS.

The LCHS guidance²³ will be updated at regular review points to ensure it remains fit for purpose and reflects our growing understanding of how production technologies work in practice. In the future, we may review the consignment approach in the LCHS to align with best international practice as the hydrogen market develops. Our overall intent is to use the LCHS and its subsequent updates as the basis for the certification scheme. However, in very specific circumstances, there may be a divergence between the updated LCHS and certification scheme, such as if government decided to offer a 'legacy certificate' (as explained above in Q5-6).

Question 16

Q16. Are you planning to import or export hydrogen? If yes, where to/from?

Summary of responses

Yes:17

No:19

Potentially: 5

Total responses: 41

No response: 31

41 respondents answered this question. 41% stated that they were planning to import or export hydrogen. 46% stated that they did not have plans to import or export hydrogen. 12% noted that they currently have no plans to import or export hydrogen but may consider this in the future.

²³ UK Low Carbon Hydrogen Standard: emissions reporting and sustainability criteria (2023), www.gov.uk/government/publications/uk-low-carbon-hydrogen-standard-emissions-reporting-and-sustainability-criteria

Of those who stated they are planning on importing/exporting, the most common export market cited was to mainland Europe. Many respondents particularly noted trade with the Republic of Ireland (RoI). North and South America, Japan and Africa were mentioned as likely import markets for the UK. Many respondents that noted that, although importing and exporting is their goal for the future, their primary focus is currently on projects geared towards the domestic UK market, with trade coming later once infrastructure and offtakers are more certain and developed. Around half of respondents were looking at both importing and exporting.

Those who do not have plans for importing and exporting stated that they are looking to focus on the UK, as the hydrogen market is not yet mature enough to make decisions regarding importing and exporting. However, some noted that those producers who do have plans to do so should be able to use the scheme to facilitate trade.

12% of respondents have long-term plans to import and export in the future. This was due to the nascency of the market and an inclination to use and produce hydrogen domestically as much as possible in the near future.

Government response

Government recognises that both importing and exporting will be part of a number of organisations' plans in the developing hydrogen economy. As our 2021 Hydrogen Strategy sets out, in the near-term government will focus on securing the domestic market through the HPBM and the NZHF (which do not subsidise exported hydrogen volumes). However, we expect that UK companies will be able to take advantage of export opportunities before 2030 and our most recent Update to Market²⁴ signals government's ambition for the UK to play a key role in exporting hydrogen to others, especially to continental Europe. Our goal is to design the scheme for it to be suitable to expand into the international market, and this decision is behind many of our policy choices.

Alignment with schemes in Europe was the major focus of responses when considering international trade. The EU's Renewable Energy Directive (REDII) and associated delegated acts sets out requirements for low carbon hydrogen, both domestically produced and for import into a member state. Our current understanding is that the methodologies underpinning the LCHS and REDII are fairly aligned; however, the delegated acts set out extra requirements, including additionality, and full lifecycle emissions²⁵. The EU has ambitious import targets²⁶, representing an export opportunity for UK producers. Imports may play a role to diversify our energy supply in the long term, though government has indicated its focus on leveraging domestic capabilities and strengths first²⁷.

²⁴ Hydrogen Strategy Update to Market: August 2023, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1175825/hydrogen-strategy-update-to-the-market-august-2023.pdf

²⁵ EU Delegated Acts (2023), https://energy.ec.europa.eu/news/renewable-hydrogen-production-new-rules-formally-adopted-2023-06-20_en#:~:text=EU%20Commissioner%20for%20Energy%20Kadri,to%20decarbonise%20our%20energy%20system.%22

²⁶ EU Commission – Hydrogen, https://energy.ec.europa.eu/topics/energy-systems-integration/hydrogen_en

²⁷ UK Hydrogen Strategy (2021), www.gov.uk/government/publications/uk-hydrogen-strategy

We want to ensure that the certification scheme will be an enabling factor for exports and imports, providing a robust way to demonstrate the hydrogen's low carbon credentials. This will require international cooperation and developments in international standards, and work has already begun to look at conditions for interoperability between schemes and potential solutions. The IPHE, the International Energy Agency (IEA) and other initiatives under the Breakthrough Agenda²⁸ are leading work to establish general principles for mutual recognition of certification. The IPHE developed a Methodology for Determining the Greenhouse Gas Emissions associated with the Production of Hydrogen²⁹, which the LCHS is closely aligned with. There is also ongoing work by the International Standards Organisation (ISO) to develop a Technical Specification for the Methodology for Determining the Greenhouse Gas Emissions associated with the production, conditioning, and transport of hydrogen to consumption gate³⁰. The UK is in the process of becoming a member of this group and will look to influence and align (where appropriate) with the specification when it is finalised.

The UK recently joined the Clean Energy Ministerial (CEM) 'International Hydrogen Trade Forum' (IHTF). The IHTF will bring together hydrogen importing and exporting countries to accelerate international hydrogen trade, promote collaboration, and address barriers in the emerging hydrogen market. The UK also has Memorandums of Understanding (MoUs) for Hydrogen with countries such as Norway and Belgium, and standards and certification are one of the focus points of these. We will use both bilateral relationships and our influence in multilateral forums to advocate for solutions which will put the UK in a strong position for the international trade of hydrogen, and look to evolve the certification scheme in its second phase as this work progresses. Government understands the need to provide industry with assurance that the scheme will be able to support both imports and exports in the near future. Therefore, ahead of launching the scheme, we will set out our envisioned pathway to international alignment for both standards and certification.

Question 17

Q17. Do you have any suggestions on how the certification scheme can best enable imports of hydrogen, and ensure that imported hydrogen can be certified accurately?

Summary of responses

49 respondents answered this question. The majority of these noted that international alignment of certification schemes, especially with the EU, would help support imports of hydrogen. Mutual recognition was mentioned by many respondents, with some suggestions that certificates be swapped (original certificate is retired and replaced with a UK certificate) when the hydrogen reaches the UK. Most respondents noted that imported hydrogen needs to meet the LCHS to avoid undermining the credibility of the standard. The theme of protecting

²⁸ Hydrogen Breakthrough: Priority International Outcomes, https://climatechampions.unfccc.int/wp-content/uploads/2022/11/Hydrogen-Breakthrough-Priority-International-Actions-for-2023-final1.docx?_gl=1*ye2bih*_ga*MTQyMTg2MTQ3MS4xNjkyMjgwMjIx*_ga_7ZZWT14N79*MTY5MjYxNjc0MS4yLjAuMTY5MjYxNjc1OC4wLjAuMA..

²⁹ IPHE Working Paper (2021), www.iphe.net/iphe-working-paper-methodology-doc-oct-2021

³⁰ ISO/DTS 19870, www.iso.org/standard/65628.html?browse=tc

the UK market was also prevalent in many responses, with some people noting that the use of the certification scheme should protect the UK market being flooded with high emissions hydrogen.

When discussing imports of hydrogen, respondents often noted that this would be in the form of ammonia, and therefore the certification scheme should account for both hydrogen and its derivatives.

Government response

Government sees a role for imported hydrogen in the long term to diversify our energy supply and increase energy security. In the short to medium term, the focus will be on growing the UK market to meet our domestic demands, though we envisage that the scheme will be open to importers to show compliance with the LCHS. Imports of hydrogen may need to meet the LCHS in order to claim 'low carbon' credentials, and in due course we intend to assess how the LCHS treats transport and conditioning emissions from imports in line with the development of international standards. These additional components could form a part of our modular approach. As outlined in Q16, we will continue to work closely with international partners on the development of international standards and solutions for interoperability between certification schemes.

Question 18

Q18. Do you have any suggestions on how the certification scheme can best support exports of hydrogen from the UK?

Summary of responses

51 respondents answered this question, giving suggestions for how the certification scheme can best support exports. As in previous questions, many respondents noted that the EU would be the major market for UK exports, and that alignment or mutual recognition would be a key enabling factor for these exports. Wider international alignment was also a key theme from respondents. Many respondents further noted that voluntary fields, and the ability to disclose further information to meet the requirements of different markets and schemes, would help to support exporting hydrogen.

Government response

Participating in the trade of hydrogen will help UK industry play a key role in the future of the sector's international markets, allowing us to benefit from the economic opportunities that trade creates whilst continuing to uphold our international trade obligations, and maintaining sufficient supply for domestic use.

As noted above in Q16, the UK hydrogen economy will play a key role in exporting hydrogen to others, including to continental Europe where we see increased hydrogen demand, alongside established energy trading and interconnection with the UK through pipelines. As mentioned

above, the initial focus of the scheme will be domestic, but will expand to consider exports and imports as international engagement progresses. We see the modular approach as an appropriate way for the scheme to expand to focus on the international markets, and additional requirements that importing countries might hold, whilst still supporting domestic supply chains.

Question 19

Q19. Are there any additional areas to consider in the midstream beyond those set out in the consultation document?

Summary of responses

33 respondents answered this question. The majority of respondents referenced expanding the scope of the scheme to capture midstream emissions. Most of these indicated that midstream emissions should be captured on a certificate, so that end users could see full lifecycle emissions. Some suggested that this didn't need to be included initially and could be added or refined later. There were differing opinions on how exactly these emissions should be calculated and recorded, and respondents highlighted that government should provide clarity on this.

Some respondents referenced the need for the certification scheme to take account of hydrogen derivatives and carriers such as ammonia, including conversion processes. They also suggested that the scheme should include design features such as an ability to 'swap' certificates, immediately retire certificates on conversion, and include emissions from conversion on the certificate.

Some respondents noted the need for further consideration of how the certification scheme will interact with blending. A few respondents noted that handling leakage would also need further consideration.

A few respondents referenced the evolution of the market as it grows. This included taking into account the expected role of intermediaries, traders and trading hubs in a more complex developing market and positioning the UK's scheme advantageously in an international certificate market.

Government response

Government acknowledges the wide range of suggestions and will continue to assess how the certification scheme should evolve to include midstream emissions, take account of carriers, derivatives and conversion, and respond to diverse scenarios including storage, market complexity and leakage. We particularly note the support for a 'full lifecycle emissions' certificate and intend to work towards including emissions beyond production in line with developing a scheme that facilitates imports and exports.

Government will also develop detailed guidance for how certificates will interact with the midstream as part of the mass balance chain of custody. This includes assessing what should

happen to certificates as hydrogen is transported or stored and how to account for losses. We will engage further with industry as we start the next stage of policy and delivery design.

As mentioned above in Q13 and Q14, government is yet to take a decision on the role of blending hydrogen into the distribution network but has recently published a consultation on its minded-to position. Please see Chapter 5 of the blending consultation to see government's proposal for how certification and blending could interact.

Chapter 5: Delivery and administration

Question 20

Q20. Do you agree that monthly self-reporting with light touch verification is the most appropriate reporting method?

a. If answering yes to Q20 please state why. Or if answering no, what would you consider more appropriate?

Summary of responses

Yes: 32

No: 11

Don't know: 2

No preference indicated: 7

Total responses: 52

No response: 20

52 respondents answered this question. Some of these indicated that more information was needed to make a decision.

62% of respondents agreed with the proposed reporting method. Many of these respondents stated that robust reporting, verification and audit would be important to minimise non-compliance and avoid reputational damage to the scheme. The majority of these respondents also noted that a digital and automated reporting mechanism would significantly minimise the administrative costs associated with reporting. Some respondents also noted that monthly light touch verification is consistent with the reporting methods adopted by many other schemes, such as Renewable Energy Guarantees of Origin (REGOs) and the Green Gas Certification Scheme (GGCS) and would therefore be familiar to many users.

One major concern was around users committing fraud in the verification or audit process, and some respondents suggested that government should consider introducing penalties. Some respondents also raised concerns that for CCUS-enabled hydrogen producers, the upstream data needed to calculate emissions may not be available at the frequency and level of detail required.

Some respondents also suggested that initial assessments to understand plant operations could facilitate efficiency.

21% did not agree with the proposed reporting method. Some suggested that a more thorough third-party verification approach would be more appropriate for building initial confidence in industry. Many of these respondents also raised concerns that, since most low carbon hydrogen technology is untested in a commercial environment, relying on self-reporting or default values may not be most appropriate to accurately measure carbon intensity. Others who disagreed said that the proposed approach was too burdensome and suggested having a longer reporting cycle.

Government response

Government confirms that producers will be required to submit data monthly to demonstrate compliance with the LCHS. We confirm that audits will be required on an annual basis.

Since complying with the LCHS is a prerequisite to award HPBM funding, the above reporting and verification requirements are also aligned with the approach taken by the HPBM. This will minimise duplicate reporting requirements for these producers, and we will work with our delivery partner (see more detail in Q25) to ensure reporting is as streamlined as possible.

We recognise the importance of striking a balance between the need for robust reporting and keeping the reporting burden proportionate for producers, which we will consider further as we develop the detailed requirements. We also acknowledge some respondents' concerns regarding fraud prevention. We will continue to address this risk as we shape and evolve the scheme.

Question 21

Q21. Do you think there is anything else that should be assessed during annual audits?

Summary of responses

41 respondents answered this question. Of these, many agreed with the proposed broad approach for annual audits, as set out in consultation, which was:

- Producers would provide data through self-reporting to demonstrate compliance with LCHS on monthly basis. Additionally, the exploration of potential methods for collecting and verifying the data in least burdensome manner, including automatic metering and creation of an IT system to identify inconsistencies, was also suggested.
- Monthly verification would be light touch, with the main verification method being annual audits carried out by approved third parties.

Some indicated that more information was needed to answer the question. Most respondents made suggestions for further inclusions in annual audits. Suggestions included verifying data immutability and considering integration of system audits. Some respondents suggested using

globally recognised standards of reporting. Some respondents noted the need for auditing both voluntary and mandatory disclosure fields (see Q8 above).

Other suggestions included: allowing flexibility in audits to account for uncertain markets and including health and safety adherence in audits.

Government response

Government confirms that the certification scheme will require annual audits conducted by accredited third parties (e.g. verification bodies). As with the approach to monthly reporting and verification, we intend to balance robustness with proportionate burden for producers. We will continue to develop our policy on monthly reporting and verification, taking the suggestions received into consideration.

Question 22

Q22. Which would you prioritise, immediacy of certificates or the flexibility of averaging consignments across a month?

Summary of responses

42 respondents answered this question. The majority of those who responded stated that they would prioritise flexibility of averaging consignments over immediacy of certificates. Most of these respondents noted that this would reduce the administrative burden as well as the cost and complexity of issuing certificates. Some respondents questioned whether issuing certificates immediately would be practical in real time: noting that in some other schemes, certificates are always issued retrospectively to match market activity. There were also suggestions that since hydrogen plants, and associated transport and storage infrastructure, will still be developing in the early years of the certification scheme, the flexibility of averaging could help to tackle the obstacles associated with an early, developing market.

Some stated that they would prioritise immediacy of certificates. Some of these respondents stated that certain production methods do not utilise weighted average consignment reporting, since their energy inputs have consistent emissions.

Others noted that in a nascent market where producers' requirements are not yet clear, having the option for immediate certificates would be useful.

Many respondents suggested that both options should be open to hydrogen producers. These respondents noted that requirements may vary depending on the operations of each project, and producers should have the flexibility to submit either monthly weighted average consignments or discrete consignments, depending on feasibility and commercial arrangements. Some of these respondents also stated that both options should be accessible to enable the consignment approach to align with other government schemes, such as the LCHS, to avoid unnecessary complexity for producers who need to report to the LCHS elsewhere (e.g. under the HPBM). There were also suggestions that producers should be able to change their preferences monthly if that helps their operations.

A few respondents stated that since the market is still developing, they are not able to determine which option would be best suited to the commercial needs.

Government response

Government confirms that certificates will be issued on a monthly basis. For data reporting, the certification scheme will follow the consignment approach set out in the LCHS (see Q15 above) and already adopted by the HPBM and NZHF. This will allow both discrete and weighted average consignments to be submitted when reporting the emissions intensity of low carbon hydrogen volumes.

As well as consultation responses not presenting strong evidence for why more frequent issuing of certificates would be required, certificates issued in between the regular monthly cycle could only act as 'provisional' certificates, due to the averaging principles under the LCHS consignment approach. Therefore, we consider that issuing monthly definite certificates is most appropriate.

As stated above and in the response to Q15, the alignment with these schemes (HPBM and NZHF) will minimise the complexity for producers in reporting and verifying their information and will encourage higher uptake of this scheme if producers are already familiar with the LCHS approach though use in the HPBM.

Question 23

Q23. Do you have any suggestions for the approach to certificate retirement?

Summary of responses

47 respondents answered this question. Most respondents suggested that certificates should be retired after the associated hydrogen is consumed, emphasising the need for an IT system capable of metering and automatically retiring certificates after consumption. Some also expressed a strong preference for retaining access to the certificates after retirement for auditing purposes.

Some respondents stated that retiring certificates in the system is not necessary, and questioned whether the associated administrative burden and financial costs are worth the value of retiring certificates (which some saw as limited to data collection).

Many respondents noted that the need for retirement is directly linked to the preferred chain of custody approach. A few respondents agreed with the notion in the consultation that retirement is necessary in a book and claim system, whereas a mass balance chain of custody may mitigate the need to retire certificates. On the other hand, some respondents stated that they needed more information on the features of the certification scheme's mass balance proposal to form an opinion on retirement.

Some respondents noted the link between retirement and expiry of certificates. Pointing to the impact on the viability of long-term hydrogen storage, some suggested that date of retirement

should allow storage of hydrogen for at least 2 years. Some respondents noted that lessons could be learned from other schemes like Green Gas Certification Scheme and the approach adopted by REGOs when considering the interaction between certificate retirement and expiry dates.

Government response

Government will continue to develop policy on certificate retirement ahead of delivering the scheme. We recognise that certificate retirement is closely connected with the preferred chain of custody approach. We are working on developing the detailed requirements for the mass balance chain of custody which will inform a decision on retirement of certificates. We will also consider the situations where users may want to retire certificates to prove carbon credentials for other schemes, for example, if they would want to swap their certificates for claiming benefits of an international scheme. Furthermore, we intend to consider retirement of certificates in tandem with expiry of certificates to ensure a coordinated approach.

We acknowledge concerns raised by respondents on the long-term storage of hydrogen, as well as the administrative and financial costs associated with retirement and expiry of certificates. We will continue to consider these as we develop our policy.

Question 24

Q24. Are you aware of any industry-led hydrogen certification schemes being developed? If yes, please give details.

Summary of responses

45 respondents answered this question. Of these, most indicated an awareness of industry-led hydrogen schemes. Many of these mentioned the UK's Green Gas Certification Scheme (GGCS), the EU's CertifHy scheme, or TÜV SÜD CMS 70.

In addition to these, the other schemes which were mentioned in the responses included:

- Hydrogen for Net Zero Initiative (a Global Scheme)
- European Standards for Hydrogen- prEN16325 and EN16326
- Zero Carbon Certification Scheme (ZCCS), a scheme launched by Australian Smart Energy Council
- a collaboration between SAP and GIZ (German Agency for International Cooperation)
- I-REC (HX) energy certification

However, many respondents stated that they are not aware of any hydrogen certification schemes.

Government response

Government notes the range of schemes cited by respondents which has been useful to better understand the industry landscape.

Question 25

Q25. How important is government backing to provide confidence in the scheme?

Summary of responses

56 respondents answered this question. Of these, the majority indicated that government backing is important to instil confidence in the scheme, particularly to ensure investors have confidence in the validity of the low carbon claims. It was highlighted that this in turn could increase the number of scheme users and minimise the risk of greenwashing.

Some respondents also noted that a government-backed scheme would facilitate alignment with other governments' schemes, ensuring that market development is sustainable in the long term.

Some appreciated the level playing field that a government-backed scheme would provide, indicating that this could have the effect of maximising potential export synergies for all producers, for example by encouraging equitable regulation and standards between countries.

Some respondents expressed concern that in absence of government backing, different certification schemes would emerge in the hydrogen market; these respondents emphasised that a single certification scheme would ensure compliance with government's net zero targets, allowing for more effective UK-wide decarbonisation.

Government response

Government confirms that the certification scheme will be led by government. This will instil market confidence and provide credibility to the scheme. The intention is to deliver the scheme with the Low Carbon Contracts Company (LCCC) as the delivery partner. The LCCC is a private limited company, wholly owned by the Secretary of State for the Department for Energy Security and Net Zero (the Department). It works with the Department to deliver a number of other schemes, including the Contracts for Difference scheme, the Regulated Asset Base for new nuclear and the Dispatchable Power Agreement for Power CCUS. Through its sister company, the Electricity Settlements Company, LCCC staff also delivery the Capacity Market.

Under this delivery model, government would act as the competent authority and the scheme owner, with LCCC as the certification body and the issuing body. LCCC as the anticipated counterparty for the HPBM contract, (subject to successful completion of administrative arrangements), could already be collecting LCHS compliance data from many producers; allowing us to streamline data reporting.

Question 26

Q26. What would you consider to be the main advantages of government oversight of a certification scheme?

Summary of responses

54 respondents answered this question. Respondents outlined the following as being the main advantages of government oversight of certification scheme:

- Providing confidence in the scheme, since government would act as a neutral third party and not a beneficiary of the scheme, making it a non-biased overseer with an interest in achieving decarbonisation;
- Providing credibility and consistency in the scheme, instilling investor confidence in markets;
- Aligning with the other government policies and schemes;
- Providing a level playing field for all producers, ensuring uniformity in markets and enhancing bilateral cross-border trade by reducing market barriers; and
- Providing assurance for a long-term market.

Some respondents suggested that government should consider having a third-party delivery partner for effective implementation of the scheme.

Government response

Please see our response to Q25 (above) which sets out the intended role of government as the competent authority.

Question 27

Q27. Noting that a decision has yet to be taken on whether to go out to external tender, do you have an interest in being considered as a delivery partner for the certification scheme, and if yes, in what role?

Summary of responses

47 respondents answered this question. The majority did not express an interest in becoming a delivery partner, and some stated that it would be more appropriate for a government Arm's Length Body to take up the role of delivery partner.

Some respondents expressed their interest in being considered as delivery partner. A number of roles were referenced, including the roles of certificate and issuing body, as well as project management roles and technology partnerships. A number of specific organisations were recommended for government to consider.

Government response

As noted in Q25 (above), government intends to deliver the scheme with the LCCC as the delivery partner. LCCC will function as the certification body and issuing body, while government will act as the competent authority and owner of the scheme. When making this decision, the Department has considered various factors, including the following considerations:

- As a government-owned company run with day-to-day operational independence from government, LCCC has the desired level of political independence. Government oversight can also help ensure the Company is meeting its obligations and ensure oversight of their delivery of the certification scheme.
- The LCCC are anticipated to be the counterparty for the HPBM, subject to successful completion of administrative and legislative arrangements. Since both schemes require compliance with the LCHS, we could take advantage of synergies with IT systems and data reporting requirements if LCCC were involved in both schemes.
- The LCCC have valuable market knowledge and a detailed understanding of hydrogen production methods and would be responsible for assessing HPBM producers' emissions in accordance with the LCHS if they become a counterparty to the HPBM.

We acknowledge the diverse range of skills and expertise offered by organisations who responded to the consultation. We will keep a note of the companies who expressed their interest in various roles for the future operation of the scheme as it evolves.

Question 28

Q28. If you are a producer of hydrogen, would you sign up to a government-led certification scheme?

a. Please give your reasons.

Summary of responses

Yes: 26

No: 0

Don't know: 2

Not a producer: 19

Total responses: 47

No response: 25

47 respondents answered this question. 55% of these respondents were producers of hydrogen who expressed their willingness to sign up for the proposed government-led certification scheme, as proposed or with slight modifications. Key reasons stated were higher consumer confidence in the quality of hydrogen, facilitating international trade and compatibility with other government schemes. A few of these noted that there would need to be appropriate incentives in place, such simplicity for users and low-cost participation.

40% of respondents were not producers of hydrogen but a few of these nonetheless indicated their support for a government-led certification scheme. 4% of respondents did not know whether they would sign up.

Government response

As mentioned in Q25 (above), the certification scheme will be led by government. We will continue to consider how best to make our certification scheme attractive to participants based on market expectations and demand.

Question 29

Q29. If you are a purchaser of hydrogen, do you see the value in a government-led certification scheme?

a. Please give your reasons.

Summary of responses

Yes: 24

No: 0

Don't know: 1

Not a purchaser: 18

Total responses: 43

No response: 29

43 respondents answered this question. 56% of respondents stated that, as purchasers, they saw value in a government-led certification scheme. Similarly to reasoning in responses to Q25-28, these purchasers stated that government-led certification would provide more legitimacy and credibility to the scheme.

42% of respondents were not purchasers of hydrogen and so did not give a substantive answer. None of the respondents expressed disinclination towards a government-led scheme, and 2% of respondents stated that they did not know.

Government response

As covered above in Q25, the certification scheme will be led by government. We will continue to consider how best to make our certification scheme attractive to participants based on market expectations and demand.

De minimis assessment

Question 30

Q30. Would there be any significant costs of participating in the certification scheme that are not captured?

a. Please provide details.

Summary of responses

36 respondents answered this question. The majority of respondents did not expect any significant costs beyond those outlined in the consultation, and a few responded that they did not know. A few respondents indicated additional costs not captured in the de minimis assessment, including those associated with data collection and verification and setting up the IT systems.

Government response

We have not included the suggested additional costs in the accompanying impact assessment. While data collection and verification are necessary for participation in the certification scheme, we do not expect these to be beyond what would already be required for producers receiving subsidy under the HPBM, and we will explore opportunities to streamline data collection across the HPBM and certification scheme.

Question 31

Q31. Are the assumptions about the time taken for, and the cost of, each activity reasonable?

- a. Please provide details.

Summary of responses

35 respondents answered this question. Most respondents felt that the assumptions in the de minimis assessment were reasonable. Many responses noted the uncertainty in estimating the time for each activity. Where responses did suggest different times than assumed in the de minimis assessment, there were often mixed views on whether a particular estimate was too high or too low.

Government response

Government acknowledges that the consultation responses have indicated how uncertain these assumptions are. In the accompanying impact assessment, we account for the uncertainty associated with these 'time taken' assumptions by undertaking a sensitivity analysis which reflects the range of estimates from the responses. In this, we vary the time taken for each of the activities to illustrate the potential cost impacts on the scheme.

Question 32

Q32. Do you expect there to be a green premium associated with the certification of hydrogen?

- a. If so, please provide details, including indications – if possible – of how large you expect this green premium to be.

Summary of responses

41 respondents answered this question. Most respondents did expect a 'green premium' associated with certified low carbon hydrogen. A few respondents were uncertain or did not expect a premium. The longer answers reflected that a green premium would be a product of end users' demand for low-carbon hydrogen, while also noting the uncertainty over how large the premium might be.

Government response

We expect there will be a low carbon premium for certified hydrogen, however the value of this premium and how it unfolds in the market is uncertain. The de minimis assessment classified this premium as a benefit but did not attempt to quantify it. This is because under a mass balance chain of custody, the value generated from a certificate (i.e. the "low carbon premium") will form part of the overall price paid for a volume of low carbon hydrogen as negotiated between the producer and customer.

Annexes

Annex A: List of respondents

N.B. This list does not include individuals who responded to the consultation.

- Acorn Hydrogen
- Ammonia Energy Association
- Arup
- Association for Decentralised Energy (ADE)
- Assystem Energy & Infrastructure Limited
- Avance, Evident, and I-REC Standard Foundation
- BP
- Centrica
- Ceres/Barrow
- Chemical Industries Association (CIA)
- Clean Air Task Force (CATF)
- Digital Catapult
- Dŵr Cymru (Welsh Water)
- EasyJet
- EDF Energy
- EDP Renewables
- Emerald Green Hydrogen
- Empati
- Energy UK
- Equinor UK
- Eurogas
- Fortescue Future Industries
- Gemserv
- Green Cat Hydrogen
- Green Gas Certification Scheme (part of Renewable Energy Assurance Limited)
- Green H2
- Greenergy
- H2V Hydrogen Projects UK Ltd.
- HiiROC Ltd

- Hydrogen NI
- Hydrogen UK
- HYRO
- Individual
- Individual
- INEOS Grangemouth
- Interconnector
- Iogen
- Jacobs
- Kellas Midstream
- Kelton Engineering Limited
- MCS Charitable Foundation
- Meld Energy
- Ministry of Defence
- Mineral Products Association (MPA)
- Mutual Energy
- NGT
- Orsted
- Powerledger
- Progressive Energy
- Renewable Energy Association (REA)
- Renewable UK
- Ricardo plc
- Royal Mail
- RWE Generation
- Scotch Whiskey Association
- Scottish Government
- Sembcorp Energy UK
- Shell
- Shetland Islands Council
- Siemens Energy Limited
- Sizewell C
- SSE
- Statera Energy
- Statkraft

- The EnergyTag Initiative Ltd
- Transitus
- UK Hydrogen Fuel Cell Association (now UK Hydrogen Energy Association)
- UK Petroleum Industry Association (UKPIA)
- Uniper
- Vertex
- Wood
- World Energy

Annex B: Consultation questions list summary

1. Do you agree with the design features set out in the introduction?
 - a. Please explain your answer and suggest any alternative or additional features and how they should be prioritised.
2. Do you agree with the principles set out in the introduction?
 - a. Please explain your answer and suggest any alternative or additional principles for the development of the scheme.
3. Do you agree that there should be a single certification scheme covering the UK?
 - a. Please explain your answer.
4. Do you agree that participation in the scheme should be voluntary initially?
 - a. Please explain your answer.
5. If LCHS changes through time, do you think the certification scheme should offer 'legacy' certificates based on compliance with previous versions of the LCHS?
6. How do you think 'legacy' certificates would impact the certification scheme and the market for certified hydrogen?
7. Do you agree that certificates should be issued based on MWhs of hydrogen?
 - a. If you answered "no" to Q7, please state your concerns and suggest your preferred alternative.
8. Do you agree with our indicative list of mandatory disclosure fields?
 - a. Please explain your answer and suggest any additional mandatory disclosure fields.
9. Do you have any suggestions for potential voluntary fields that may be of use?
10. What markets or schemes would you like to use the voluntary disclosure field to demonstrate compliance with?
11. Would you prefer a single label, or multiple tiers?
 - a. Please explain your answer.
12. If stating a preference for multiple tiers to Q11, do you have any suggestions on how tiers should be structured?
13. Do you agree with a Mass Balance system of Chain of Custody?
 - a. Please explain your answer and suggest the alternative you'd recommend if you disagree.

14. Do you agree that a Mass Balance system of Chain of Custody would provide the most consumer confidence over the credentials of the hydrogen?
 - a. Please explain your answer.
15. Do you have any thoughts on how our consignment approach should be structured?
16. Are you planning to import or export hydrogen? If yes, where to/from?
17. Do you have any suggestions on how the certification scheme can best enable imports of hydrogen, and ensure that imported hydrogen can be certified accurately?
18. Do you have any suggestions on how the certification scheme can best support exports of hydrogen from the UK?
19. Are there any additional areas to consider in the midstream beyond those set out above?
20. Do you agree that monthly self-reporting with light touch verification is the most appropriate reporting method?
 - a. If answering yes to Q20 please state why. Or if answering no, what would you consider more appropriate?
21. Do you think there is anything else that should be assessed during annual audits?
22. Which would you prioritise, immediacy of certificates or the flexibility of averaging consignments across a month?
23. Do you have any suggestions for the approach to certificate retirement?
24. Are you aware of any industry-led hydrogen certification schemes being developed? If yes, please give details.
25. How important is government backing to provide confidence in the scheme?
26. What would you consider to be the main advantages of government oversight of a certification scheme?
27. Noting that a decision has yet to be taken on whether to go out to external tender, do you have an interest in being considered as a delivery partner for the certification scheme, and if yes, in what role?
28. If you are a producer of hydrogen, would you sign up to a government-led certification scheme?
 - a. Please give your reasons.
29. If you are a purchaser of hydrogen, do you see the value in a government-led certification scheme?
 - a. Please give your reasons.

30. Would there be any significant costs of participating in the certification scheme that are not captured?
 - a. Please provide details.
31. Are the assumptions about the time taken for, and the cost of, each activity reasonable?
 - a. Please provide details.
32. Do you expect there to be a green premium associated with the certification of hydrogen?
 - a. If so, please provide details, including indications – if possible – of how large you expect this green premium to be.

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