



Department for  
Energy Security  
& Net Zero

# Government response to Market Engagement on the second Hydrogen Allocation Round

December 2023



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# Section 1: Introduction

## Background

The UK has set a world-leading net zero target by 2050, the first major economy to do so, and confirmed that hydrogen will play a vital role in delivering on this commitment. In November 2020, the government published the Prime Minister's Ten Point Plan for a Green Industrial Revolution<sup>1</sup> with commitments focused on driving innovation, boosting export opportunities, and generating green jobs and growth across the country to level up the UK. The Plan announced that, working alongside industry partners, the UK is aiming to develop 5GW of low carbon hydrogen generation by 2030 and set out a range of measures to support this, including the Hydrogen Production Business Model (HPBM) - a contractual business model for hydrogen producers to incentivise the production and use of low carbon hydrogen through the provision of ongoing revenue support<sup>2</sup>.

In April 2022, in line with the package of measures announced by the Prime Minister to support greater UK energy independence in the British Energy Security Strategy<sup>3</sup>, the government announced that we have doubled our ambition to up to 10GW of low carbon hydrogen production capacity by 2030, subject to affordability and Value for Money (VfM). At least half of this will come from electrolytic hydrogen, drawing on the scale up of UK offshore wind and other renewables and new nuclear.

In July 2022, we launched the first Hydrogen Allocation Round (HAR1) to support up to 250MW of electrolytic hydrogen projects, subject to affordability and VfM, with projects able to apply for Hydrogen Production Business Model (HPBM) revenue support as well as CAPEX support through the Net Zero Hydrogen Fund (NZHF). In August 2023, we announced a list of projects that were invited to the next stage of negotiations<sup>4</sup> and alongside the publication of this document, we have announced a final list of successful projects<sup>5</sup> who will be awarded a Low Carbon Hydrogen Agreement.<sup>6,7</sup>

Building on the success of HAR1, we are now moving to implement the second Hydrogen Allocation Round (HAR2). We remain committed to reaching our ambition<sup>8</sup> of having 1GW of electrolytic hydrogen production projects being in operation or construction by 2025, and will award contracts of up to 875MW in order to achieve this, subject to affordability and VfM.

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<sup>1</sup> [Ten Point Plan for a Green Industrial Revolution \(2020\)](#)

<sup>2</sup> [Design of a business model for low carbon hydrogen \(2021\)](#)

<sup>3</sup> [British Energy Security Strategy \(2022\)](#)

<sup>4</sup> [Hydrogen Production Business Model/Net Zero Hydrogen Fund: Projects invited to negotiations](#)

<sup>5</sup> <https://www.gov.uk/government/publications/hydrogen-production-business-model-net-zero-hydrogen-fund-shortlisted-projects/hydrogen-production-business-model-net-zero-hydrogen-fund-har1-successful-projects>

<sup>6</sup> The Low Carbon Hydrogen Agreement is the contract which underpins the hydrogen production business model.

<sup>7</sup> The Grant Funding Agreement is the contract which underpins the Net Zero Hydrogen Fund.

<sup>8</sup> Set out in the British Energy Security Strategy.

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Our Market Engagement document<sup>9</sup>, published on 17 May 2023, sought views on a proposed approach to the design of HAR2. This included an indicative timeline, proposed changes to eligibility and evaluation criteria, and a proposed approach to selecting successful applicants and agreeing an offer of support with shortlisted projects. As set out in our Market Engagement document, our aims for HAR2 are as follows:

- Kickstart the low carbon hydrogen economy, helping meet the ambition of up to 1GW of electrolytic hydrogen capacity in operation or construction by 2025, and by doing so help grow hydrogen supply chains.
- Support projects to deploy at scale, advancing the government’s ambition to deploy up to 10GW of low carbon hydrogen production capacity by 2030, subject to affordability and VfM, with at least half from electrolytic hydrogen production capacity.
- Establish the frameworks to put the market on a pathway to deliver cost reductions and VfM, supporting the market to transition to a future price-based competitive allocation regime.
- Deliver carbon savings to allow us to stay on track to meet Carbon Budget 5, Carbon Budget 6 and other net zero commitments.

This document summarises responses received to the Market Engagement exercise and the government’s response, organised under each Market Engagement question. Alongside this, we have published an Application Guidance document and provide further detail on the application and assessment process. We have also published the HAR1 Process Evaluation<sup>10</sup>, an important document which has identified broad feedback and lessons learned which has also informed the design of HAR2.

## Summary of responses and industry input

Engagement with industry on our proposed HAR2 design took place over a six-week period running from 17 May 2023 to 30 June 2023. Stakeholders submitted views by attending a workshop or via written feedback online, via our Citizen Space portal.

We held three workshops which were attended by a total of 63 participants. 21 attended workshop 1, 19 attended workshop 2, and 23 attended workshop 3. We received a total of 48 written responses online via Citizen Space and email. Where respondents responded via both Citizen Space and email, this has been counted once.

The majority of respondents were project developers and partners in potential hydrogen production projects, or trade associations representing them.

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<sup>9</sup>[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/1160110/hydrogen-har2-market-engagement.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1160110/hydrogen-har2-market-engagement.pdf)

<sup>10</sup> <https://www.gov.uk/government/publications/hydrogen-allocation-round-2022-process-evaluation>

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## Analysis of responses

### Written responses

We have analysed the written responses to each question set out in the market engagement document and have identified the key themes submitted by respondents. We have presented the results including the percentage of respondents that have answered each question. We have further provided a broad picture of the views and comments made. The following qualitative terms have been used:

Majority: More than half of respondents to that question.

Many: A significant number, but less than half of respondents to that question.

A small number of respondents / a few / several / some: A small number of respondents or a limited subgroup

Mixed / range of views: a lack of clear consensus, or expressive of a wide diversity of views.

### Workshop responses

We have provided a summary of the key themes and comments made during the workshops relevant to each question. Our final positions detailed below take into account both written and workshop feedback received.

## Next steps

The Government has considered the responses from the Market Engagement exercise, and this has informed our final design of HAR2.

The Application Guidance document<sup>11</sup> published alongside this government response sets out the finalised details of HAR2, providing guidance and supporting information for projects seeking to participate.

Government opened HAR2 for applications on 14 December 2023. Please refer to the application guidance for further details.

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<sup>11</sup> <https://www.gov.uk/government/publications/hydrogen-allocation-round-2>

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## Section 2: The role of CAPEX

Q1: Should it be available, would you look to seek CAPEX co-funding in HAR2? Please explain your answer. If yes, please provide a summary of the reasons for seeking CAPEX support and the impact of not receiving CAPEX support would have on your project.

Written response summary	
Yes	41%
Yes, but CAPEX is not essential	20%
No	15%
Don't know	24%

### Summary of written responses

Many respondents answered 'Yes' to this question, stating that CAPEX funding through the NZHF will help to de-risk private investment, reduce upfront project costs and reduce the levelised cost of hydrogen. Some respondents also suggested CAPEX support could help to accelerate the timeline for construction and deployment and provides credibility to projects. A small number of these respondents indicated that a lack of CAPEX may potentially delay projects progressing.

However, many respondents who also answered 'Yes' stated that CAPEX support is not essential and that they would be able to deliver their projects without upfront capital support. The majority of these projects suggested revenue support via the Hydrogen Production Business Model is the priority consideration that enables projects to reach a Final Investment Decision (FID) and deploy. This was also the case for the majority of those that answered 'Don't know'.

Some of those who answered 'Don't know' also noted the positives of CAPEX, for example some mentioned it will lower the strike price and provide value for money for government and consumers. There was also acknowledgement by a couple of respondents who answered 'No' that smaller projects may benefit from CAPEX funding.



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Feedback from those who answered 'No' felt that CAPEX support should not be provided via HAR2. This included suggestions that CAPEX adds additional complexity to the allocation and agreeing the offer process and that when considering the scale of growth of the market, a CAPEX-focused approach may slow deployment down because government capital is required.

## Summary of workshop responses

In workshop 1, the majority of participants stated CAPEX will most likely be needed. However, the majority of participants in workshop 2 and 3 were largely ambivalent to the inclusion of CAPEX when asked to expand on responses.

In workshop 2, the majority of participants acknowledged the role of CAPEX, but many did not see CAPEX funding as essential. Uncertainty and higher electricity costs meant a small number of projects were not yet in a position to make decisions on whether CAPEX support would be required.

In workshop 3, the majority of participants agreed that CAPEX is not essential, however, some participants mentioned smaller, less mature projects may appreciate the inclusion of CAPEX to a greater degree. Some projects felt ambivalent about applying for CAPEX, as they felt the potential funding envelope available would not make a significant difference to costs after the development phase.

There were also concerns raised by some workshop participants about the CAPEX process within HAR1, with one participant suggesting the process could be streamlined for future applicants.

**Q2: In HAR1, NZHF support was made available for up to 20% of eligible CAPEX costs. If your organisation is likely to apply for NZHF CAPEX co-funding supporting in HAR2, if possible, please provide the estimated size bid required to support the deployment of your projects. Please present this bid as a percentage of your overall costs.**

## Summary of written responses

The majority of respondents did not specify the estimated size of bid required to support the deployment of their project, with even more not specifying this as a percentage. A few respondents suggested this was due to them not requiring CAPEX, and a small number needed more information on the calculation methodology, finalised costs, and capacity of plants before they could provide an estimated size of bid required.

Of those who specified the estimated size of bid required as a percentage, the majority agreed that support for up to 20% of eligible CAPEX costs, the same as HAR1, would be preferable. One respondent agreed with this but also noted that more may be needed for non-electrolytic projects. A small number of respondents stated that a higher percentage may be required.

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## Summary of workshop responses

There were very few responses to this question in the workshops, as discussion was primarily around whether CAPEX co-funding is necessary. One participant disclosed the estimated size of bid required is likely 25%, as it would help with additional unknown costs discovered during the design process. Another participant said their estimated size of bid would be 5% of total CAPEX, as it is material enough to lower the levelised cost of hydrogen.

## Government response to section 2 (question 1 and 2)

Many respondents highlighted the benefits CAPEX funding provides to projects in helping to de-risk private investment and reduce upfront project costs. However, feedback confirmed that most projects view revenue support as the main factor that drives decisions towards FID, rather than CAPEX support.

Government recognises the value of providing up-front CAPEX to reduce the amount of ongoing revenue support projects require through the HPBM. However, industry has called for a more streamlined application process for HAR2, and most projects do not view CAPEX as the main factor that drives decisions towards FID. Therefore, we have decided not to include CAPEX at this stage. HAR2 will, therefore, open offering only Hydrogen Production Business Model revenue support, and there will be no NZHF CAPEX available at application. However, this position will remain under review, and government will inform applicants at the earliest opportunity should NZHF CAPEX be introduced at a later stage.

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## Section 3: Eligibility criteria

### Q3: Do you agree with the proposed eligibility criteria for HAR2?

Written response summary	
Yes	43%
No	50%
Don't know	7%

#### Summary of written responses

A significant number of respondents, although not a majority, agreed with the proposed eligibility criteria. Half of the respondents disagreed with the proposed eligibility criteria, however, most of these cited just one of the eligibility criteria as their reason for disagreeing. Of those who said 'Yes', many respondents welcomed the introduction of three delivery years for HAR2, with some welcoming the greater flexibility this provides as well as the recognition of longer lead-times for larger projects.

More generally, a few respondents welcomed how the HAR2 approach builds on HAR1's. A few respondents asked for clarity on evidence requirements required to meet each of the eligibility criteria, including whether future phases of HAR1 projects would be eligible for HAR2.

A few respondents raised concerns on the requirement to reach FID within three months of contract signature, including that it could be challenging for larger projects to meet. A few respondents asked for clarity on how delivery years would be evaluated against deliverability.

Of those who said 'No', most respondents disagreed with the eligible offtakers. The majority of respondents who disagreed, expressed Risk-Taking Intermediaries (RTIs) should be an eligible offtaker, citing reasons including the development of a liquid market, as developers would not need to match supply and demand themselves. There was a general recognition that blending is excluded as an eligible offtaker given the outstanding strategic decision, however, many respondents strongly supported a review of this decision, if a positive decision were to be taken by the end of the year. Some respondents explicitly welcomed the continued exclusion of export as an ineligible offtaker.

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A few respondents raised concerns around a funding gap for revenue support for projects that do not meet the minimum hydrogen capacity threshold for HAR2 and do not qualify for support from the RTFO.

A few respondents stated that the version of the Low Carbon Hydrogen Standard that projects would be required to meet at eligibility stage should not change between the round opening and contract award, or if it was updated, change significantly to the detriment of the project application.

## Summary of workshop responses

The majority of workshop participants were supportive of the proposed HAR2 eligibility criteria. Many participants supported the introduction of delivery years, offering greater flexibility for projects given supply chain issues, grid connection delays as well as enabling larger more ambitious projects to apply into HAR2.

Some participants expressed concern on the offtaker requirement, suggesting blending should be introduced as an eligible offtaker and RTIs should be eligible to support smaller projects in becoming operational.

Finally, some participants asked for greater flexibility for HAR2 through lowering the minimum hydrogen production capacity threshold to support project scale-out and, therefore, encourage a greater number and variety of end-users.

## Government response

We have considered feedback provided by respondents when finalising the eligibility criteria for the second allocation round. We recognise that during industry engagement, many respondents were supportive of the eligibility criteria set out in the Market Engagement document. Our response to feedback received on non-electrolytic technologies has been considered as part of section 4 below, and our position on this is detailed there.

Projects will only be eligible for HAR2 if they meet the following criteria:

<b>Criteria</b>	<b>Definition</b>
Project location	Project plant located entirely in the United Kingdom and the Applicant is a UK registered business
Delivery years	Demonstrate that the project is able to be operational within one of three delivery years, between 31 March 2026 – 31 March 2029

Technology Type	<p>Be using one of the following hydrogen production methods:</p> <ul style="list-style-type: none"> <li>• electrolytic</li> <li>• gasification/pyrolysis of biomass/wastes (without CCS)</li> <li>• gas splitting with solid carbon</li> </ul> <p>(See next section for definitions and further information)</p>
Technology Readiness	Using core technology that has been tested in a commercial environment, Technology Readiness Level (TRL) 7 or more
New build production facility	New build hydrogen production facilities. This also includes new phases of existing low carbon hydrogen production facilities, where at least 5MW HHV (output) of new capacity is added to the plant
Identified offtaker	Has identified and engaged with at least one qualifying offtaker
Identified core production technology supplier	Has identified and engaged with their core production technology suppliers
Hydrogen production capacity	Minimum hydrogen production capacity of 5MW HHV (output)
Meets the Low Carbon Standard	Capable of meeting the requirements of the Low Carbon Hydrogen Standard (LCHS <sup>12</sup> )
Financial Access	Can demonstrate access to finance

## Qualifying offtakers

Non-qualifying offtakers will include:

- risk-taking intermediaries as offtakers
- export offtake
- hydrogen blending offtake

Following significant feedback gathered both online and via engagement sessions, we have reviewed our position regarding qualifying offtakers. However, we will maintain the positions

<sup>12</sup> The LCHS is subject to review and may be updated from time to time. The version of the LCHS that will be applicable to HAR2 will be detailed in the application guidance and the relevant LCHA.

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set out in the market engagement document relating to ineligible offtakers for HAR2. Hydrogen volumes sold for export purposes remain ineligible for this allocation round to receive HPBM support. This is because our priority continues to be kickstarting and supporting hydrogen economy to deliver successfully carbon savings. However, we do not propose to prohibit unsubsidised volumes of hydrogen and hydrogen derived products from being exported by projects that may receive support under the HPBM.

The sale of hydrogen volumes to Risk Taking Intermediaries (RTIs) will also remain ineligible for support due to concerns surrounding the traceability of hydrogen and ensuring value for money. Through this position, the Government is not excluding intermediaries from playing a role in the market. Hydrogen volumes may qualify for support where non-risk-taking intermediaries charge a fee to a hydrogen producer or end user for a service (for example, brokerage or hydrogen storage) but do not take ownership of the hydrogen. In addition, volumes of hydrogen not supported under the HPBM may be sold to an RTI or may be claimed under the RTFO. The government will consider the need to review the position on RTIs in future, both for existing contracts and future allocation rounds.

The Government is also considering the treatment of hydrogen for heat, which may require use of risk-taking intermediaries, to enable it to be supplied by HPBM-subsidised hydrogen. The potential role of hydrogen in heating is subject to strategic decisions in 2026.

On 15 September 2023, we published a consultation on hydrogen blending into the gas distribution network in Great Britain<sup>13</sup> that seeks views on the potential strategic and economic value of blending and our lead options for its implementation, if enabled. Given we aim to publish the consultation response on blending by the end of this year, setting out our strategic position on how and whether to support blending, and we must also await the outcome of the safety case, due to be completed by the end of next year to ensure blending hydrogen into the gas distribution network is safe, blending will remain a non-qualifying offtaker for HAR2 applications.

However, subject to a positive strategic decision on how and whether to support blending and outcome to the safety case, we may review whether and how successful HAR2 projects may be able to receive support for blending in the future, aligned with our position on blending.

## Delivery years

Significant positive feedback was welcomed within our industry engagement with regards to a change from Commercial operation Dates (COD) to a new position of Delivery years. Not only will the delivery year approach offer greater flexibility for projects, it also will reduce risks related to planning and the regulatory process.

The Government expects projects to select the most appropriate delivery year in line with their own project development and expects projects to set out ambitious but deliverable timelines.

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<sup>13</sup> <https://www.gov.uk/government/consultations/hydrogen-blending-into-gb-gas-distribution-networks>

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Provided projects can evidence they can be operational within one of the three delivery years, projects will be deemed eligible for HAR2.

## New Capacity Added to Existing Plants

For the purpose of this eligibility criterion, 'new build production facility' will also include new phases of projects, where at least 5MW HHV (output) of new hydrogen production capacity is added to an existing facility. New phases will only be eligible to receive support on the CAPEX and OPEX costs associated with the new capacity added.

We have updated the proposed exemption to this criteria, in line with the recently published Government response to the consultation on revenue support regulations<sup>14</sup> that set out projects will need to be new build facilities to receive HPBM revenue support. NZIP-funded projects will need to meet the new build production facility eligibility criteria, however we may consider an exemption to the rule around eligible costs for new phases of projects on a case-by-case basis, for systems that include existing NZIP-funded electrolysis equipment, whereby they might be deemed eligible for Hydrogen Production Business Model revenue support for existing elements of the NZIP-funded capacity.

Organisations are not able to submit applications for multiple project phases at the same time, where future phases are dependent on the deployment of the initial phases.

## Requirement to Reach FID Within Three Months of Contract Signature

Due to feedback from respondents and in line with the final approach for HAR1, we are no longer requiring projects to reach FID within three months of contract signature.

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<sup>14</sup> <https://assets.publishing.service.gov.uk/media/654103cc46532b000d67f630/hydrogen-production-icc-business-models-government-response.pdf>

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## Section 4: Expansion to non-electrolytic technologies

**Q4: We are seeking information from biomass or waste gasification, and pyrolysis to hydrogen and solid carbon production projects interested in HAR2 funding, should it be available.**

### Summary of responses

A number of respondents answered this question. Whilst the question asked for information from biomass or waste gasification and pyrolysis to hydrogen and solid carbon projects, following further engagement the responses have been categorised the following groups:

- gasification or pyrolysis of biomass / wastes projects, which refers to the thermochemical decomposition of solid or liquid biomass or waste feedstocks in the presence of limited or no oxygen
- gas splitting producing solid carbon, which refers to the heating or ionisation of fossil / biogenic hydrocarbon gases, to generate hydrogen and solid carbon.

The responses suggested a pipeline of projects should the round be opened to these technology types. Due to the commercially sensitive nature of the information provided in response to this question and the small sample size, it will not be summarised in any further detail.

**Q5: Are there any other non-electrolytic hydrogen production technologies that we should be considering funding in this round?**

Written response summary	
Yes	26%
No	41%
Don't know	32%



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## Summary of written responses

There was no clear consensus amongst written respondents on whether other non-electrolytic production technologies should be considered for this round. Of those who answered yes, a few suggested ammonia cracking should be considered. One suggested “Electrolysis – advanced gasification hybrid route – where advanced gasification and electrolysis could form a hybrid hydrogen production route (synergies identified such as O<sub>2</sub> supply from electrolysis for our advanced gasification).”

Of those who said ‘No’, a few respondents raised concerns that opening the round up to new technology types could complicate the allocation process. One suggested that allowing biomass gasification projects to apply was not the most efficient use of limited biomass resources.

Of the respondents who answered ‘Don’t know’, a few suggested that an opening of the round should be accompanied by an increase in target capacity, whilst a few others raised concern around the unintended environmental impacts of other technologies.

We also received some feedback regarding the expansion of this round to include non-electrolytic technology types through question 3 of the market engagement. Two respondents identified the need to adapt the eligibility criteria to consider the two technology types the government is considering allowing to apply into HAR2. Further, there was some support for a technology agnostic approach to HAR2. Some projects expressed concerns regarding the 875W target for the round and whether this should be increased if non-electrolytic technologies are also able to apply.

## Summary of workshop responses

Similarly, there was no clear consensus across the three workshops on this question. Some attendees across all workshops raised the need to either ringfence the up to 875MW capacity aim for electrolytic only or increase the aim if the round were open to other technology types. A few attendees again suggested ammonia should be considered eligible and raised concerns around the scarcity of biomass.

## Government response

### **Gasification / Pyrolysis of Biomass / Wastes**

The government has considered the feedback submitted from Gasification / Pyrolysis of Biomass / Wastes projects wishing to apply to HAR2 for support. We see the greatest value in supporting these technologies where carbon capture and storage (CCS) can be added to the production process to reduce overall emissions. In the case of biomass projects, CCS will enable projects to deliver negative GHG emissions under the Low Carbon Hydrogen Standard<sup>15</sup>, in line with the priority use principles and priority uses of biomass detailed in the

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<sup>15</sup> DESNZ is currently developing its approach to the rigorous standards negative emissions projects will need to meet on monitoring, reporting and verification.

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2023 Biomass Strategy<sup>16</sup>. In the case of waste projects, it will reduce their GHG emissions and in some cases allow them to deliver negative GHG emissions. Biomass / waste gasification projects that have potential access to the CCS networks to add CCS technology might wish to consider applying for support via the Cluster Sequencing process, via Track-1 expansion or Track-2 where possible. We will launch a process shortly to begin further expansion of Track-1 clusters, beyond the initial deployment, identifying and selecting projects to fill the available storage and network capacity anticipated to be available in and around 2030.

However, we acknowledge that in the near term there is value in allowing biomass / waste gasification or pyrolysis to hydrogen projects without CCS to apply to HAR2, as this will kickstart supply chains and develop new technologies in the market. Therefore, we propose that these technologies will be eligible to apply to HAR2.

As part of our hydrogen production strategy workstream we are looking at the system and environmental impacts of different hydrogen production technologies, which include biomass and waste production routes. This includes consideration of the best use of biomass, waste hierarchies, air quality and other environmental impacts. The Department for Energy Security and Net Zero (DESNZ) will continue to work closely with the Department for Environment, Food and Rural Affairs, the Environment Agency and other relevant partners to ensure support for these technologies aligns with the broader policy landscape.

Projects may not make an application to a Hydrogen Allocation Round and Cluster Sequencing round at the same time. An unsuccessful application to a Cluster Sequencing round would not preclude a project from making a future application to a Hydrogen Allocation Round (and vice versa).

We recognise the possibility that some biomass or waste gasification or pyrolysis projects in receipt of LCHA may wish to add CCS to their hydrogen plant at a later date (beyond COD) and that this will reduce their overall emissions and may enable them to deliver negative emissions.

The ability of biomass or waste gasification hydrogen projects in receipt of an LCHA to apply for policy support to add CCS would be conditional on at least (i) the availability of future suitable business model support and funding, (ii) meeting all relevant eligibility criteria in future allocation rounds, and (iii) access to an approved CO<sub>2</sub> transport and storage solution (which may include non-pipeline transport for projects in dispersed locations), and (iv) compliance with subsidy control principles.

The government will consider the need, rationale and any potential options for enabling existing low carbon hydrogen projects to apply for CCS costs in future, subject to the caveats above. The government cannot guarantee that support will be available for adding CCS, however, we will provide an update on this in the future.

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<sup>16</sup> <https://www.gov.uk/government/publications/biomass-strategy>

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## **Gas Splitting producing Solid Carbon**

We acknowledge that gas splitting producing solid carbon is a production route that could have strategic potential. Evidence gathered via the Market Engagement process also suggested this production technology is potentially capable of meeting all other eligibility criteria. Therefore, we propose to allow this production route to apply to HAR2. To be eligible to apply projects must demonstrate the ability to meet the LCHS, which for this production route includes specific rules around permitted end uses of the carbon black produced. This is set out in Version 3 of the LCHS and accompanying data annex.

## **Other technologies**

We did not consider there to be compelling evidence that we should open the round up to additional non-electrolytic technologies beyond the two mentioned above. We will not be allowing ammonia cracking technologies to apply to this round, as the HPBM only supports domestic hydrogen production, and because ammonia requires projects to have already produced or sourced the hydrogen elsewhere to then convert to ammonia it is not considered “domestic hydrogen production.” We also note that ammonia cracking has a low TRL and is yet to be demonstrated at scale.

We are in favour of adding new technology types incrementally, as evidence emerges on their TRL and their potential contribution to the decarbonisation of the economy, rather than declaring the round completely “technology neutral”, as this ensures the integrity of the scheme and avoids any unintended environmental impacts.

A few respondents raised concern that opening the round to alternative technology types would detract from the up to 1GW electrolytic hydrogen in construction or operational ambition. In August 2021, the UK Hydrogen Strategy set out the government’s intention to develop multiple low carbon technologies to meet our stretching hydrogen production ambitions. The Strategy also committed government to go further in developing our hydrogen production strategy, considering the role of other technologies and supply routes. There are strategic benefits in supporting these nascent alternative technologies, for both the short and long term, and it will diversify our supply of hydrogen and support a wider range of technologies to better position us to meet the increase in hydrogen demand during the Sixth Carbon Budget (2033-37, as set out in the Net Zero Strategy). When considering the project pipeline and expected trajectory to 10GW and beyond, we do not consider that the inclusion of alternative technologies at this stage will impact on the growth we need from electrolytic production routes.

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## Section 5: Evaluation criteria

Q6: Do you agree with the proposed evaluation criteria for HAR2?

Written response summary	
Yes	54%
No	34%
Don't know	13%

### Summary of written responses

The majority of respondents agreed with the proposed evaluation criteria for HAR2. Many respondents expressed strong support for the deliverability criteria retaining a 35% weighting. Respondents also agreed that deliverability should be at the forefront of the evaluation assessment and should remain the main objective in which value for money can be delivered.

There were mixed views on the proposed cost criterion. A majority of projects who disagreed with the proposed evaluation criteria cited cost as the reason for not agreeing. Of this group of respondents, the majority noted concern that cost had been given too substantial a weighting, considering the nascent conditions of the hydrogen market and supply chain. The majority of this group of respondents also believed HAR2 was not the time to begin to place greater emphasis on the cost of hydrogen production and believed supporting a developing market held higher value.

Many projects also expressed support for the expansion of the supply chain development and economic benefits criterion. Projects noted this criterion could successfully support the wider domestic hydrogen market, which in turn is important to support a range of competitive hydrogen production technologies. Some projects requested further detail as to how this criterion would be scored and the relevant evidence requirements to be submitted alongside at application stage. There was also an expectation across some respondents that procurement should be finalised as well as understanding how working with non-UK supply lines would affect scoring. Feedback received on the location and additionality criterion will be detailed in the next section.

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## Summary of workshop responses

Feedback gathered from the workshops on the proposed evaluation criteria was similar to written responses. Participants agreed that deliverability should remain the most important criterion and its weighting should reflect this. Some respondents also called on the government not to place any advantage on projects selecting earlier years to come online over those who select a later delivery year.

Some participants expressed concern over the increased weighting of the cost criterion. These respondents highlighted the nascency of the market as the main reason for disagreeing with the evaluation criteria. Furthermore, some respondents stated an increased focus on cost may stifle further growth of the hydrogen economy.

Some participants expressed concern that the proposed removal of the carbon emissions criterion would mean that HAR2 would be placing reduced focus on wider decarbonisation ambitions. However, some projects did note that the eligibility criterion requiring compliance with the LCHS ensured projects remained committed to lower carbon emissions.

## Q7: Do you agree that we should reward project locations that provide wider electricity system benefits, as set out above, as well as additionality?

### Summary of workshop and written responses - Additionality

The majority of respondents agreed we should reward projects that provide wider electricity system benefits as well as additionality. Many respondents agreed that retaining an additionality incentive was important to reward and incentivise projects that do not divert electricity from other grid users and where they help add capacity of new build or life-extended generation to the wider electricity system. However, regarding additionality, some respondents also felt that the proposed change to a stricter definition of additionality set out in the market engagement document (that hydrogen production is, or will be, a decisive factor in the specific asset being built, life-extended or recommissioned) may be challenging to implement, as it is hard to determine whether a hydrogen producer was a decisive factor in a renewable project going ahead, and renewable projects may have many off-takers.

### Summary of workshop and written responses – Location relative to network constraints

Many respondents agreed that well-sited projects should be rewarded if they locate optimally from an electricity network constraints perspective and where they offer additional demand to the grid to help reduce constraints, especially where they use excess renewable electricity. Some positive respondents felt projects that are well-sited would be most beneficial from a cost perspective as they help reduce system costs and would be able to utilise the cheapest cost

electricity, especially in future as the system operator manages growing amounts of intermittent generation on the system.

Most respondents that disagreed with inclusion of this criterion referred to the fact that hydrogen producers may need to site close to hydrogen demand, especially in the absence of established hydrogen transport and storage, making it difficult for all projects to meet this criterion. Furthermore, some respondents felt the criteria should be broadened out to also consider wider decarbonisation benefits, for example, projects that bring forward new hydrogen infrastructure or that help to decarbonise specific end use sectors. Some respondents also felt network constraints may be better dealt with through potentially changes emerging from reforms to the wider electricity market, such as those being considered by the Review of Existing Electricity Market Arrangements (REMA).

### Government response to section 5 (question 6 and 7)

We have considered the feedback provided by respondents when developing the evaluation criteria for HAR2.

Projects who apply into HAR2 will be evaluated against four evaluation criteria, which are set out below and in more detail in the application guidance.

<b>Criteria</b>	<b>Weighting</b>	<b>Definition</b>
Deliverability	40%	The project's capability and capacity to deliver successfully by the selected commercial operation date
Cost	30%	Whether the project will deliver cost-effective hydrogen
Economic benefits and supply chain development	20%	The contribution the hydrogen plant will make to the economy and the development of hydrogen supply chains
Wider system benefits	10%	<p>Additionality: Whether a project's low carbon electricity source is met by new low carbon generation and does not divert low carbon electricity from other users to avoid negative impacts on wider decarbonisation</p> <p>Network constraints: Whether projects are located in areas that will help alleviate electricity network constraints.</p>

Given the feedback received, we have amended the weighting for both 'Deliverability' and 'Cost' criteria. Projects expressed concerns over cost weighting being increased to 35% given the nascency of the market where the need to check the deliverability of projects should be paramount. We acknowledge that at the point of assessment we will still not have large scale

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hydrogen projects in operation in the UK, and, therefore, there is still a need to have a strong focus on deliverability. As a result, deliverability will be increased to 40% of the total evaluation. We have taken on feedback from industry and have worked to streamline the overall assessment process. For deliverability, this has been achieved by stripping back the approach from HAR1 and assessing if a project meets the agreed minimum credibility requirements, which provides the ability to assess a project's capability and capacity to deliver successfully by the selected commercial operation date. Within this, we are proposing to assess organisational capability, project deliverability and technical deliverability to constitute the deliverability score. As under HAR1, projects will be required to meet a minimum deliverability score to pass deliverability and be assessed against all other criteria. If projects do not meet the minimum deliverability score, they will not be taken forward. No preference will be given to projects able to deploy to earlier timeframes, however, we expect projects to set out ambitious and realistic timeframes for their project to be commercially operational.

The cost criteria weighting will be increased from HAR1 to 30% rather than 35%, representing the second highest weighted criterion and reflecting our strategic aim to put the market on a pathway to deliver cost reductions and support it to transition to a future price-based competitive allocation regime. Projects will be asked to provide data on their expected CAPEX, OPEX, electricity/fuel costs and production volumes. Projects will also be asked to provide evidence to support their data inputs and cost classes for each cost element.

We have kept the economic benefits and supply chain development criterion at 20%, as it remains an important objective for this allocation round that we continue to develop the hydrogen economy and developing hydrogen supply chains, including in the UK. Projects will be scored relative to one another on the basis of their projected economic benefits. On supply chain development, projects will be assessed on supply chain resilience (assessing what processes projects have in place to mitigate risks to the supply chain), promoting new entrants and SMEs into the supply chain and addressing skills challenges within the project.

To reflect a broadly positive response from industry to the inclusion of locational factors in assessment, we will expand the additionality criteria to also score projects in relation to their location relative to network constraints. Similarly to HAR1, we will score projects based on their ability to meet our additionality principles, considering the % of additionality the project can demonstrate over time. Projects that can prove hydrogen production is, or will be, a decisive factor in a specific generation asset being built, life-extended or recommissioned, will score most highly on additionality, but it is not mandatory to meet this definition. Network constraints will be scored based on a project's location, with a score assigned to each different region, defined using the map published in the application guidance. Scores will be weighted to reflect the actual benefit of different locations on the electricity system. Projects that are not connected to the electricity grid ('non-grid connected') and non-electrolytic projects (that is, gasification, pyrolysis or gas splitting producing solid carbon) projects will also be scored for additionality. For network constraints, non-electrolytic projects will be scored at a median value, in recognition of the fact these different technology types will have different siting considerations and dependencies. For non-grid connected projects, network constraints will

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also be scored at median value, to reflect these types of projects do not significantly improve or exacerbate network constraints.

We can confirm the Carbon Emissions and Environmental Factors and Market Development criteria will not be included as standalone criteria for HAR2. Important information previously collected under these criteria will be captured elsewhere in the deliverability section and eligibility criteria ensuring HAR2 will continue to consider wider decarbonisation ambitions. For example, Carbon Emissions are considered as part of the eligibility requirement to meet the LCHS, and we will ask for information on environmental risks, and these will be assessed under deliverability.



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## Section 6: Delivery approach

### Q8: Do you agree with our proposed delivery approach?

Written response summary	
Yes	69%
No	7%
Don't know	24%

#### Summary of written responses

The majority of respondents agreed with our proposed delivery approach, with many understanding the benefit of grouping projects together for assessment and applying portfolio factors to achieve aims. However, many of those who agreed highlighted that clarity and/or transparency over these processes were required as soon as possible. Some respondents supported the idea of staggering the application and assessment according to delivery years, giving projects with later delivery years longer to develop their application.

Only a few respondents disagreed, with the majority of these indicating broad agreement to the delivery proposals but requiring more clarity about how they would be applied before they could agree fully. Of those who answered 'Don't know', a few also cited lack of clarity as a justification for their answer.

#### Summary of workshop responses

The majority of attendees across all workshops agreed with the proposed delivery approach and many indicated support for a phased approach to assessment with phased contract signatures with projects. Some attendees raised concerns that sub-dividing the applicants into pathways could disadvantage projects if only a select number of projects would proceed from each subdivision.

#### Government response

##### Delivery Pathways

We recognise that feedback received during the market engagement period was largely supportive of including pathways in HAR2, with many respondents being supportive of

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pathways from the point of application. However, following an assessment of delivery options, we will not be splitting projects into pathways for application or assessment. We believe that requiring all projects to compete in a single pathway for assessment will ensure the best projects overall are selected, offering the best value for money for the government and mirroring the HAR1 process of having all projects follow the same pathway through this stage. We will be designing the HAR2 delivery approach to enable us to group projects into pathways after shortlisting if necessary or helpful.

The decision whether a project is allocated to a particular pathway after shortlisting is anticipated to be taken by DESNZ by reference to factors including, but not limited to, the size (capacity or hydrogen production volume) of the projects, the delivery year selected by the project, the project's indicative strike price, the deliverability score, the project's ranking at the evaluation stage and the operating and business models (including the electricity supply and the end user)

Further detail will be communicated to selected projects in the invitation to participate in the agreeing the offer stage after the evaluation of submissions and shortlisting.

## Portfolio factors

Within the delivery of HAR2, we intend to have the option to use portfolio factors to select the shortlist of projects being taken through to due diligence and agreeing an offer stage when, in limited circumstances, the allocation round is oversubscribed and there is considered to be an imbalance in the overall portfolio. The portfolio factors which may be used build on those listed for HAR1 and are the following:

- location
- project size (MW output)
- diversity of end use, technology type and electricity source/operating model

We have expanded the 'diversity of end use and electricity source/operating model' to also include diversity of technology type. This update is in response to the expansion of eligibility criteria to include non-electrolytic technologies, and seeks to ensure some diversity of technology types in the portfolio. Please note that this portfolio factor is only to be used in the event that we see there being a strategic benefit in supporting some alternative technologies to grow supply chains and diversify the market.

In the event of oversubscription to ensure HAR2 maximises value for money when selecting which of the shortlisted projects are awarded contracts, we will also assess the extent to which the final portfolio of projects aligns with HAR2 strategic objectives as well as considering whether the portfolio factors above should be applied as set out in the Application Guidance document on HAR2.

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## Section 7: Co-locating with a government subsidised renewable electricity source

Q9: If you are a project looking to apply for funding for this allocation round, are you planning on sourcing electricity from a CfD or RO-subsidised generator? Yes/No/Don't know.

Q10: If yes, are you planning to co-locate your hydrogen production facility with a CfD or RO-subsidised generator, what do you consider the main benefits and risks of co-location, and what is your project archetype e.g. co-location via private wire connection?

Written response summary	
Yes	54%
No	21%
Don't know	25%

### Summary of written responses

The majority of respondents who answered this question indicated that they plan to source electricity from a CfD or RO-subsidised generator. Of those who provided information on their project archetype, the majority of those who said 'Yes', planned on sourcing electricity via a private wire, whilst those who said 'No' mainly planned on sourcing electricity through the grid.

Of those who cited benefits to co-location, cost reduction was the most named, including avoiding network costs, cost savings and efficiency, due to sharing infrastructure and land costs, ultimately with the potential to lower the levelised cost of hydrogen. Some respondents cited the benefit to increase utilisation of renewable energy generators by producing hydrogen during periods of excess power generation. A few respondents suggested benefits from accelerated deployment and certainty around delivery given long-dated grid connections.

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Of those who cited risks to co-location, a few respondents expressed co-location could add project-on-project risk (the completion and financing risk involved with the co-located generator and the hydrogen facility) unless co-locating with an existing asset, raising concerns around risk of stranded assets. Some respondents suggested co-locating with a renewable electricity source may not be optimal at system-level, for example, when considering offtake or water availability, and could add significant CAPEX costs due to additional costs of transportation and storage if located away from offtake. Some suggested that co-location would risk lower load factors. Generally, many respondents expressed co-locating with a renewable electricity source was not a decisive factor in choosing project location given offtaker availability takes precedence. A few respondents asked for consistency between government subsidies and schemes to ensure alignment and access to funding and for further clarification on regulatory and policy frameworks surrounding the HPBM, CfD and RO schemes.

## Summary of workshop responses

Feedback from the workshops largely reflected written responses, with many respondents considering co-location via private wire to lower costs, with a few participants unsure as to their project configuration. Some participants cited the benefit of co-location in saving time as opposed to seeking a grid connection. Many suggested co-location can be beneficial, but ultimately offtaker availability takes precedence for decisions around project location, given the current challenges associated with transporting hydrogen.

## Government response

The government will use information received to continue to further our understanding of the benefits and risks of co-locating hydrogen production facilities with low carbon electricity generators, including any opportunities and barriers. In addition, we are planning on consulting on a hybrid metering approach in the CfD scheme shortly, which could reduce barriers that currently prevent some innovative, co-located generation models from being viable. As part of this, once the consultation is published, we would welcome views on the extent to which the hybrid metering proposal could or should remove barriers to the deployment of low-carbon hydrogen co-located with CfD-supported generation assets.

We expect to do further work over the coming months to consider how hydrogen production may scale up and integrate alongside deployment of renewables and other forms of low carbon generation, including on issues related to co-location.

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