



Department for  
Energy Security  
& Net Zero

# Hydrogen production and industrial carbon capture business models

Consultation on revenue support regulations  
relating to directions to a counterparty,  
publication of information and eligibility

Closing date: 10 May 2023



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# Introduction

Low carbon hydrogen and carbon capture, usage and storage (CCUS) have a key role in the UK's Net Zero Strategy<sup>1</sup> and helping meet our legally binding commitment to achieving net zero by 2050.

CCUS is important for the deep decarbonisation of industries including those for which other options are limited, such as the chemicals, refining, and cement sectors. Its deployment has the potential to create world-leading low carbon manufacturing clusters, while attracting investment in new facilities and sectors.

Low carbon hydrogen has the potential to play a role in decarbonising vital UK industry sectors and provide flexible energy deployment across power, transport, and potentially heat. It has the potential to strengthen our energy security and reduce reliance on fossil fuels. The UK Hydrogen Strategy, published in August 2021, outlined a comprehensive roadmap for the development of the wider hydrogen economy.<sup>2</sup>

In April 2022, the British Energy Security Strategy<sup>3</sup> re-stated the government's ambition to deliver CCUS in four industrial clusters and capture and store 20-30 megatonnes of carbon dioxide (MtCO<sub>2</sub>) by 2030, where industrial emissions make up 6 MtCO<sub>2</sub> by 2030, increasing to 9 MtCO<sub>2</sub> by 2035. We also doubled our ambition, we are now looking to secure up to 10GW of new low carbon hydrogen production capacity by 2030, with at least half of this from electrolytic hydrogen, subject to value for money and affordability. The introduction of business models for low carbon hydrogen production and industrial carbon capture to unlock private investment and scale up deployment of these technologies will play a key role in delivering the government's ambitions.

## Hydrogen Production and Industrial Carbon Capture Business Models

The Hydrogen Production Business Model (HPBM) is intended to incentivise the production and use of low carbon hydrogen through the provision of revenue support in order to overcome the cost gap between low carbon hydrogen and higher carbon counterfactual fuels.

Government confirmed the high level scope and key principles of the design of the HPBM in the response to the consultation on the design of a business model for low carbon hydrogen, published in April 2022.<sup>4</sup> Heads of Terms were also published in December 2022.<sup>5</sup>

The Industrial Carbon Capture (ICC) and Waste ICC business models (the "ICC business models") aim to incentivise the deployment of carbon capture technology by industrial users

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<sup>1</sup> [www.gov.uk/government/publications/net-zero-strategy](https://www.gov.uk/government/publications/net-zero-strategy)

<sup>2</sup> [www.gov.uk/government/publications/uk-hydrogen-strategy](https://www.gov.uk/government/publications/uk-hydrogen-strategy)

<sup>3</sup> [www.gov.uk/government/publications/british-energy-security-strategy/british-energy-security-strategy](https://www.gov.uk/government/publications/british-energy-security-strategy/british-energy-security-strategy)

<sup>4</sup> [www.gov.uk/government/consultations/design-of-a-business-model-for-low-carbon-hydrogen](https://www.gov.uk/government/consultations/design-of-a-business-model-for-low-carbon-hydrogen)

<sup>5</sup> [www.gov.uk/government/publications/hydrogen-production-business-model](https://www.gov.uk/government/publications/hydrogen-production-business-model)

and waste management facilities who often have no viable alternative to achieve deep decarbonisation.

The design of the ICC business models are detailed in a series of publications from August 2020 to the present.<sup>6</sup> The most recent consultation was published in April 2022, seeking views from stakeholders on the proposed form of the draft ICC business model support package prior to the due diligence and negotiations stage of the Track-1 Phase-2 Cluster Sequencing for CCUS Deployment process. A government response to the consultation along with an update on the ICC business models, including latest ICC and Waste ICC Contract terms, were published in December 2022.<sup>7</sup>

Similar to the Contracts for Difference (CfD) scheme, the government's main mechanism for supporting low-carbon electricity generation, revenue support will be delivered through a private law contract between an eligible low carbon hydrogen producer or eligible carbon capture entity and the hydrogen production counterparty or carbon capture counterparty respectively.

## Legislation

The Energy Bill ("the Bill"), introduced to Parliament on 6 July 2022, contains provisions to underpin delivery of the hydrogen production and ICC business models. References in this consultation to a numbered "Clause" or "Part" of the Bill or a "Schedule" to the Bill are references to that Clause, Part or Schedule as amended in Committee and as published on 16 January 2023,<sup>8</sup> unless otherwise specified.

Clause 57 of the Bill confers a power on the Secretary of State to make regulations about revenue support contracts ('revenue support regulations'), which include hydrogen production revenue support contracts and carbon capture revenue support contracts. These contracts are intended to underpin delivery of the hydrogen production and ICC business models.

This consultation considers provisions needed to be able to enter into business model contracts, in line with the government's stated ambitions. The Energy Security Plan sets out our aim to award electrolytic hydrogen contracts in Q4 2023. ICC and CCUS-enabled hydrogen contracts are expected to be awarded in 2024.

The intention is for the revenue support regulations that are to implement the proposals in this consultation to cover both hydrogen production and ICC business models – applying the same provisions to the business models where there is conformity and applying different provisions, where appropriate, to reflect the specific requirements of each business model. Given the similarities with the CfD regime, regard has been had to relevant regulations made in relation to that regime.

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<sup>6</sup> [www.gov.uk/government/publications/carbon-capture-usage-and-storage-ccus-business-models](https://www.gov.uk/government/publications/carbon-capture-usage-and-storage-ccus-business-models)

<sup>7</sup> [www.gov.uk/government/consultations/carbon-capture-usage-and-storage-ccus-industrial-carbon-capture-business-model](https://www.gov.uk/government/consultations/carbon-capture-usage-and-storage-ccus-industrial-carbon-capture-business-model)

<sup>8</sup> <https://bills.parliament.uk/bills/3311/publications>

It is anticipated that the related revenue support regulations will be laid in draft before Parliament later this year in accordance with the affirmative resolution procedure.

## Scope of consultation

This consultation sets out proposals on the following matters relating to the hydrogen production and ICC business models:

- **Direction to offer to contract:** the process by which the Secretary of State may direct a counterparty to offer to contract.
- **Information publication:** requirements that certain information about contracts and projects must be published.
- **Eligibility:** the meaning of “eligible” in relation to a low carbon hydrogen producer and carbon capture entity to determine the type of projects that could be supported through the business models.

## Consultation details

**Issued:** 30 March 2023

**Respond by:** 10 May 2023

**Enquiries to:**

Hydrogen Production and Industrial Carbon Capture Business Model Teams  
Department for Energy Security and Net Zero  
5th Floor  
1 Victoria Street  
London  
SW1H 0ET

Email: [HICClawlegislation.businessmodels@beis.gov.uk](mailto:HICClawlegislation.businessmodels@beis.gov.uk)

**Consultation reference:** Hydrogen production and industrial carbon capture business models: Revenue support regulations relating to directions to a counterparty, publication of information and eligibility.

**Audiences:**

Clause 79 of the Bill provides for the devolved administrations to be consulted if the regulations contain provision that would be within their legislative competence, and any other persons as the Secretary of State considers appropriate.

The proposals in this consultation cover areas within devolved competence and we continue to engage with devolved administrations on these. Given the technical nature of the revenue support regulations and the questions set out in the consultation document, the Secretary of State considers it appropriate to consult more widely than the statutory consultees specified in clause 79. It is expected that the consultation will be of particular interest to hydrogen, ICC and Waste ICC project developers and other stakeholders who would be directly affected by the proposals for the revenue support regulations. It is expected that these persons will be well placed to input on the technical aspects associated with the hydrogen production, ICC and Waste ICC business models. We also welcome responses from any person with an interest in this policy area.

**Territorial extent:**

In accordance with the territorial extent of Chapter 1, Part 2 of the Bill, these revenue support regulations are intended to extend to England, Wales, Scotland and Northern Ireland. This consultation is therefore relevant UK-wide.

## How to respond

Your response will be most useful if it is framed in direct response to the questions posed, though further comments and evidence are also welcome.

When responding, please state whether you are responding as an individual or representing the views of an organisation.

**Respond online at:** <https://beisgovuk.citizenspace.com/industrial-energy/hbpm-icc-si-consultation>

or

**Email to:** [HICClawislation.businessmodels@beis.gov.uk](mailto:HICClawislation.businessmodels@beis.gov.uk)

**Write to:**

Hydrogen Production and Industrial Carbon Capture Business Model Teams  
Department for Energy Security and Net Zero  
5th Floor  
1 Victoria Street  
London  
SW1H 0ET

## Confidentiality and data protection

Information you provide in response to this consultation, including personal information, may be disclosed in accordance with UK legislation (the Freedom of Information Act 2000, the Data Protection Act 2018 and the Environmental Information Regulations 2004).

If you want the information that you provide to be treated as confidential please tell us, but be aware that we cannot guarantee confidentiality in all circumstances. An automatic confidentiality disclaimer generated by your IT system will not be regarded by us as a confidentiality request.

We will process your personal data in accordance with all applicable data protection laws. See our [privacy policy](#).

We intend to summarise all responses and publish this summary on [GOV.UK](#). The summary will include a list of names or organisations that responded, but not people's personal names, addresses or other contact details.

## Quality assurance

This consultation has been carried out in accordance with the government's [consultation principles](#).

If you have any complaints about the way this consultation has been conducted, please email: [beis.bru@beis.gov.uk](mailto:beis.bru@beis.gov.uk).

# Background on business model legislation

The Bill makes provision for the implementation of the hydrogen production and ICC business models:

- **Financial assistance:** providing the Secretary of State with UK-wide powers to incur expenditure and provide financial assistance to support the establishment of CCUS and low carbon hydrogen production, including revenue support through a contractual mechanism.
- **Counterparty:** The contractual nature of the hydrogen production and ICC business models requires a counterparty to manage the contracts and act as a conduit for funding. The Bill provides the Secretary of State with powers to designate and direct a counterparty.
- **Competitive Allocation:** Initial projects are expected to be allocated support through a bilateral process. In the medium term, the business models are expected to move to a more competitive allocation process (e.g. an auction-based system), similar to the CfD, to reduce costs to government and the consumer. The Bill provides the Secretary of State with powers to appoint an allocation body and set out the allocation process in regulations and allocation frameworks.
- **Hydrogen Production Levy:** Payments made to projects under the HPBM will be levy funded, subject to consultation and legislation being in place. HPBM payments for hydrogen projects operational before the levy comes into force, will be funded by the government until the levy comes into effect. The Bill provides the Secretary of State with powers to appoint a levy administrator and to make regulations that will establish the levy.

Initial hydrogen production, ICC and Waste ICC projects will be selected through the ongoing 2022 Electrolytic Hydrogen Allocation Round (offering joint HPBM and Net Zero Hydrogen Fund support)<sup>9</sup> and Track 1, Phase-2 of the CCUS Cluster Sequencing Process.<sup>10</sup> Phase-2 Cluster Sequencing process projects were shortlisted in August 2022 to proceed to the due diligence stage.<sup>11</sup>

The shortlist for the 2022 Electrolytic Hydrogen Allocation Round has been published alongside the Energy Security Plan. In accordance with the shortlisting process set out in the Application Guidance, 20 electrolytic hydrogen projects have been selected to be shortlisted and are invited to proceed to the next step of the agreeing an offer stage, consisting of due diligence and value for money assessment. We also decided the Track-1 Project Negotiation

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<sup>9</sup> [www.gov.uk/government/publications/hydrogen-business-model-and-net-zero-hydrogen-fund-electrolytic-allocation-round-2022](https://www.gov.uk/government/publications/hydrogen-business-model-and-net-zero-hydrogen-fund-electrolytic-allocation-round-2022)

<sup>10</sup> [www.gov.uk/government/publications/cluster-sequencing-for-carbon-capture-usage-and-storage-ccus-deployment-phase-2](https://www.gov.uk/government/publications/cluster-sequencing-for-carbon-capture-usage-and-storage-ccus-deployment-phase-2)

<sup>11</sup> [www.gov.uk/government/publications/cluster-sequencing-phase-2-eligible-projects-power-ccus-hydrogen-and-icc/cluster-sequencing-phase-2-shortlisted-projects-power-ccus-hydrogen-and-icc-august-2022](https://www.gov.uk/government/publications/cluster-sequencing-phase-2-eligible-projects-power-ccus-hydrogen-and-icc/cluster-sequencing-phase-2-shortlisted-projects-power-ccus-hydrogen-and-icc-august-2022)

List which includes three ICC, two Waste ICC and two hydrogen projects. This list constitutes those projects which will be invited to participate in the next stage of the process and a full list of projects is available on gov.uk.

Under clauses 62(1) and 64(1) of the Bill, the Secretary of State can direct a counterparty to offer an eligible low carbon hydrogen producer or an eligible carbon capture entity to enter into a 'revenue support contract'. For the HPBM, the hydrogen production revenue support contract is known as the low carbon hydrogen agreement (LCHA) outside of the legislation. Similarly, carbon capture revenue support contracts for the ICC business models, are referred to as the Industrial Carbon Capture and the Waste Industrial Carbon Capture Agreements (the "ICC Contracts").

Once negotiations are completed, it is anticipated that successful projects would receive an offer to contract from the relevant counterparty, following a direction to do so by the Secretary of State. In line with clause 58 of the Bill, the relevant counterparty will be under a duty to offer to contract in accordance with any such direction.

In the future, the expectation is that hydrogen production and carbon capture revenue support contracts will be awarded by way of a more competitive allocation process (not covered by this consultation). In this scenario, it is expected that an allocation body<sup>12</sup> would give an allocation notification to the relevant counterparty specifying an eligible low carbon hydrogen producer or an eligible carbon capture entity (as appropriate) and such other information required for the counterparty to make an offer to contract pursuant to clause 72 of the Bill. The government is considering how to evolve our approach towards more competitive allocation processes for the hydrogen production and ICC business models. For example, we have set out our aim in the British Energy Security Strategy to move to price competitive allocation for electrolytic hydrogen by 2025 as soon as legislation and market conditions allow.

The government anticipates that the Low Carbon Contracts Company Ltd (LCCC)<sup>13</sup>, who is the existing counterparty for Contracts for Difference and the planned counterparty for the Dispatchable Power Agreement, will be the counterparty to these revenue support contracts, subject to the successful completion of administrative and legislative arrangements. LCCC was created specifically to be the CfD counterparty and has carried out this role since the scheme's introduction in 2014. Given LCCC's proven track record in administering the CfD, stakeholders can be confident in LCCC's ability to carry out the counterparty functions required under the hydrogen production and ICC business models.

It is proposed that the hydrogen production and ICC business models will replicate much of the successful and highly investable CfD revenue regime and accompanying regulations which has enabled industry to cover costs with certainty and helped to reduce costs of capital. This consultation sets out proposals for making provisions in revenue support regulations regarding

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<sup>12</sup> An allocation body would be responsible for administering the more competitive allocation process. A decision is yet to be taken on the appropriate entity/entities to fulfil the role of allocation body for the hydrogen production revenue support contracts or carbon capture revenue support contracts.

<sup>13</sup> [www.lowcarboncontracts.uk](http://www.lowcarboncontracts.uk)

the following matters, including some that are needed to enable the award of revenue support contracts:

- the process that will govern how the Secretary of State can direct a counterparty to offer to contract.
- counterparty requirements to publish business model contracts and establish a register of information.
- the ability of a counterparty to carry out its functions and to meet its liabilities in relation to a revenue support contract.
- proposals to determine the meaning of “eligible” in relation to a “low carbon hydrogen producer” in line with clause 61(3) of the Bill.
- proposals to determine the meaning of “eligible” in relation to a “carbon capture entity” in line with clause 63(3) of the Bill.

Further revenue support regulations, for example those to implement the more competitive allocation regime, will be brought forward in due course.

# Secretary of State direction to offer to contract

For initial business model contracts, it is proposed that revenue support contracts would be negotiated between the Secretary of State and the relevant hydrogen production, ICC or Waste ICC project. Once this process is completed, the Secretary of State would direct the relevant revenue support counterparty to offer to contract with the eligible low carbon hydrogen producer or eligible carbon capture entity of a successful project using the direction powers in clauses 62(1) and 64(1) of the Bill.

The direction powers may also be used after the transition to a more competitive allocation process in case support needs to be allocated outside of that process, for example for major and/or novel one-off projects.

Clauses 62(2) and 64(2) of the Bill state that revenue support regulations may make further provision about a direction. We intend for revenue support regulations to set out further details on the process surrounding a direction to ensure that the responsibilities of parties involved in the direction process are clear.

## Proposal

We propose to follow a similar approach to regulations 57 to 59 of the Contracts for Difference (Allocation) Regulations 2014 (as amended) and regulations 37 and 39 of the Nuclear Regulated Asset Base Model (Revenue Collection) Regulations 2023. It is proposed that revenue support regulations would provide for the following:

1. Require a direction given by the Secretary of State to:
  - a. be in writing and be dated;
  - b. specify a date by when the counterparty must comply with the direction;
  - c. specify the period for which the counterparty must keep the offer of a contract on the terms specified in the direction ('the specified terms') open for acceptance.
2. That the date by which the counterparty must comply with the direction must be no earlier than 20 working days from and including the date on which the direction is given.
3. That the Secretary of State must give a copy of the direction to the person who the counterparty has been directed to contract with ('the specified person'), no later than 5 working days after the date on which the direction is given.
4. That a direction would cease to have effect if the specified person:
  - a. rejects the offer to contract on the specified terms; or

- b. does not accept the offer to contract on the specified terms before the expiry of the period specified in the direction.
5. That the counterparty must immediately withdraw any offer to contract that it has made in compliance with a direction that has ceased to have effect.
6. That the counterparty would not be permitted to modify the specified terms when making an offer to contract unless it has received the prior written consent of the Secretary of State.
7. That the Secretary of State can revoke a direction to offer to contract at any point before an eligible low carbon hydrogen producer or eligible carbon capture entity accepts an offer to contract on the specified terms made by the counterparty in compliance with the direction (if revoked, the revenue support counterparty would be under an obligation to immediately withdraw its offer to contract).
8. “working day” means a day that is not a Saturday or Sunday, Christmas Day, Good Friday or any day that is a bank holiday in England and Wales under the Banking and Financial Dealings Act 1971.

**Question 1:** Do you agree with the proposals relating to the Secretary of State’s power to direct a counterparty to offer to contract? Please provide reasons for your response.

# Publication of information

Under the CfD regime, LCCC is required to publish the full terms and conditions of any CfD that is entered into following a direction to offer to contract given by the Secretary of State, subject to redactions of confidential information. LCCC also maintain a “CfD Register”<sup>14</sup> which includes key information for all investment contracts and CfDs to which LCCC is a party, including the strike price, target commissioning date and the generation technology. LCCC is only required to include information in the register for projects where a CfD has been entered into through the competitive allocation process, after having been notified by the CfD delivery body (National Grid Electricity System Operator).

Given the emergent stage of low carbon hydrogen production and carbon capture projects in the UK, with no commercial scale projects in operation, it is important that information about their deployment is made available publicly. Sharing information and data in a transparent and open way will help ensure the business models are better understood and enable potential applicants to plan accordingly.

## Contract publication proposal

It is proposed that revenue support regulations mandate a counterparty to publish each hydrogen production and carbon capture revenue support contract once the contract is entered into, ensuring that any confidential information and personal data is excluded.

We propose that confidential information will be defined to mean:

1. information which is identified in the direction, in the opinion of the Secretary of State at the time the relevant direction is given, it is information—
  - a. which constitutes a trade secret;
  - b. the disclosure of which would or would be likely to prejudice the commercial interests of any person; or
  - c. the disclosure of which would constitute a breach of confidence actionable by any person.or
2. in relation to which it is an initial term of the revenue support contract that it must not be disclosed.

For the avoidance of doubt, we propose that revenue support regulations make clear that the following are not to be treated as confidential information:

- the Strike Price<sup>15</sup>;

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<sup>14</sup> [www.lowcarboncontracts.uk/cfd-register/](http://www.lowcarboncontracts.uk/cfd-register/)

<sup>15</sup> For Initial ICC contracts this means the Opex component of the Strike Price.

- the Capex Payment Rate<sup>16</sup>;
- the Reference Price<sup>17</sup>.

This approach would be similar to regulation 60 of the Contracts for Difference (Allocation) Regulations 2014 (as amended).

### Register of contracts proposal

To ensure important information is readily accessible, we also propose that revenue support regulations place an obligation on a counterparty to establish and maintain a public register that would capture key project information. The information we propose a counterparty must publish in a register, where applicable to the project, is set out in Table 1.<sup>18</sup> We are considering whether and how CO<sub>2</sub> transport and storage fees may be included in the Register.

**Table 1: Information to be published in a register for LCHAs, ICC and Waste ICC Contracts**

<p><b>General details</b></p>	<ul style="list-style-type: none"> <li>• Unique identifier of the contract, to be assigned by the counterparty</li> <li>• Description of the Facility/Installation, including the geographical coordinates</li> <li>• Applicant name, applicant registered address, and registration number (where applicable)</li> </ul>
<p><b>Contract milestone dates</b></p>	<ul style="list-style-type: none"> <li>• Target Commissioning Date</li> <li>• Target Commissioning Window Start and End Date</li> <li>• Start Date (Expected and Actual)</li> <li>• Longstop Date</li> <li>• Termination date</li> </ul>
<p><b>Payment</b></p>	<ul style="list-style-type: none"> <li>• Initial Strike Price</li> <li>• Current Strike Price</li> <li>• Changes to the Strike Price (difference between Initial and Current Strike Price)</li> <li>• Capex Payment Rate (for ICC &amp; Waste ICC projects only)</li> <li>• Reference Price (for ICC &amp; Waste ICC projects only)</li> </ul> <p>For hydrogen projects, we propose that the Strike Price will be split by production costs, hydrogen transport costs and hydrogen storage costs.</p>

<sup>16</sup> In relation to ICC and ICC Waste contracts only.

<sup>17</sup> This refers to the reference price as stated in the revenue support contract. For hydrogen producers, it does not refer to the data on Achieved Sales Prices provided by hydrogen producers to the counterparty.

<sup>18</sup> Please refer to the published Heads of Terms for the LCHA and the December version of the draft ICC Standard Terms and Front End Agreement where these terms have been defined.

	<p>We also propose to publish the Non-Variable Costs Strike Price that will be used to calculate the Sliding Scale Top Up amount.</p> <p>For CCUS-enabled hydrogen projects, we propose that the production costs element of the Strike Price will be split by the natural gas cost component (including the agreed proportion of hydrogen to natural gas based on the Facility’s design efficiency) and the non-gas (all other costs) component. We also propose to publish the Strike Price Deduction that may be applicable during an outage in the CO<sub>2</sub> Transport &amp; Storage network (i.e. the allowed return on investment component of the Strike Price).</p>
<p><b>LCHA Project Information</b></p>	<ul style="list-style-type: none"> <li>• Facility Hydrogen Production Technology</li> <li>• Facility Feedstock</li> <li>• CO<sub>2</sub> Transport and Storage Company or Provider</li> <li>• Initial Installed Capacity Estimate</li> <li>• Final Installed Capacity</li> <li>• Initial LCHA Production Cap</li> <li>• LCHA Production Cap following determination of Final Installed Capacity commissioned</li> </ul>
<p><b>ICC Project Information</b></p>	<ul style="list-style-type: none"> <li>• Installation Capture Technology</li> <li>• Industrial Installation Technology</li> <li>• CO<sub>2</sub> Transport and Storage Company or Provider</li> <li>• Maximum Annual CO<sub>2</sub> Capture Quantity</li> <li>• CO<sub>2</sub> Capture Rate Estimate</li> </ul>
<p><b>Waste ICC Project Information</b></p>	<ul style="list-style-type: none"> <li>• Installation Capture Technology</li> <li>• Waste Installation Technology</li> <li>• CO<sub>2</sub> Transport and Storage Company or Provider</li> <li>• Maximum Annual CO<sub>2</sub> Capture Quantity</li> <li>• CO<sub>2</sub> Capture Rate Estimate</li> </ul>

A counterparty would have the flexibility to choose to enter into the register any other information they consider would facilitate the administration of revenue support contracts within the bounds of the confidentiality provisions of the LCHA and ICC/Waste ICC Contracts.

A counterparty may also exclude from publication information on the expected Start Date which in its opinion it would be entitled not to disclose in response to a request for its

disclosure under the Freedom of Information Act 2000 or the Environmental Information Regulations 2004. A counterparty must give the other party the opportunity to make representations before deciding what information to exclude from publication.

This approach would be equivalent to regulation 12 of the Contracts for Difference (Standard Terms) Regulations 2014 (as amended).

A counterparty must also, so far as it is reasonably practicable, ensure that entries in the register are accurate.

The government will continue to keep provision on the publication of data under review to ensure appropriate transparency and scrutiny of the hydrogen production and ICC business models.

**Question 2:** Is there any information not listed in Table 1 you think should be published in a contract register?

**Question 3:** Is there any information in the contracts you think should not be published?

Please provide reasons to support your responses.

# Revenue support counterparty's ability to carry out its functions

Fundamental to the successful implementation of these business models is a robust revenue stream that ensures a secure and consistent flow of revenues between a counterparty and both hydrogen producers and carbon capture entities for the duration of the contracts.

The role of a revenue support counterparty is to manage the revenue support contracts, including the administration of payment.

In the event that, for example, a revenue support counterparty cannot satisfactorily carry out its functions, the Secretary of State may need to appoint another counterparty to take over. Clause 75(1)(b) of the Bill makes provision for a hydrogen production or carbon capture counterparty to withdraw its consent to remain designated as a counterparty by giving no less than 3-months' notice in writing to the Secretary of State (which mirrors the position under the CfD regime).

However, in addition to the requirement to give no less than 3-months' written notice, it is considered appropriate that the revenue support counterparty should flag issues to the Secretary of State before giving notice. This is for the following reasons:

- Sufficient time would be needed for the government to undertake selection processes to find a replacement revenue support counterparty and carry out various assessments and due diligence on the transferee's suitability for the role.
- A revenue support contract would be specific to each application (hydrogen production, ICC and Waste ICC). This means that should the revenue support counterparty's role need to be transferred to another body, that body would need to familiarise itself with each revenue support contract and begin the process of ensuring that it has the resources and systems in place to carry out the required functions for the role. This would involve a handover from the existing revenue support counterparty, implementation of customised systems to carry out their functions in respect of, for example, calculating and collecting payments etc, for each revenue support contract.
- The role of the revenue support counterparty is a specialist role which requires significant expertise so would involve a great deal of planning and resourcing by a new body, which would likely take longer than 3-months.

## Proposals

Clause 75(4) allows the Secretary of State to make provision in regulations about the period of time for which a person who has ceased to be a counterparty is to continue in that role to support such a transition.

For the reasons above, it is proposed that in addition to the 3-months' notice period in the Bill and the powers in clause 74(4), revenue support regulations include a requirement on the

relevant counterparty to promptly notify (i.e. potentially before any written notice is given) the Secretary of State if it considers it may be, or become, unable to fulfil its functions as revenue support counterparty, including its duties and obligations under the revenue support contracts. It would be required to provide any further details requested by the Secretary of State. This is so that the Secretary of State can start making arrangements for a replacement where appropriate.

**Question 4:** Do you agree with the proposal for including a requirement in regulations on a revenue support counterparty to promptly notify the Secretary of State at the point that it considers that it may become unable to carry out its functions (in addition to the formal 3-months' notice period in the Bill)? Please provide reasons for your response.

# Low carbon hydrogen producer eligibility

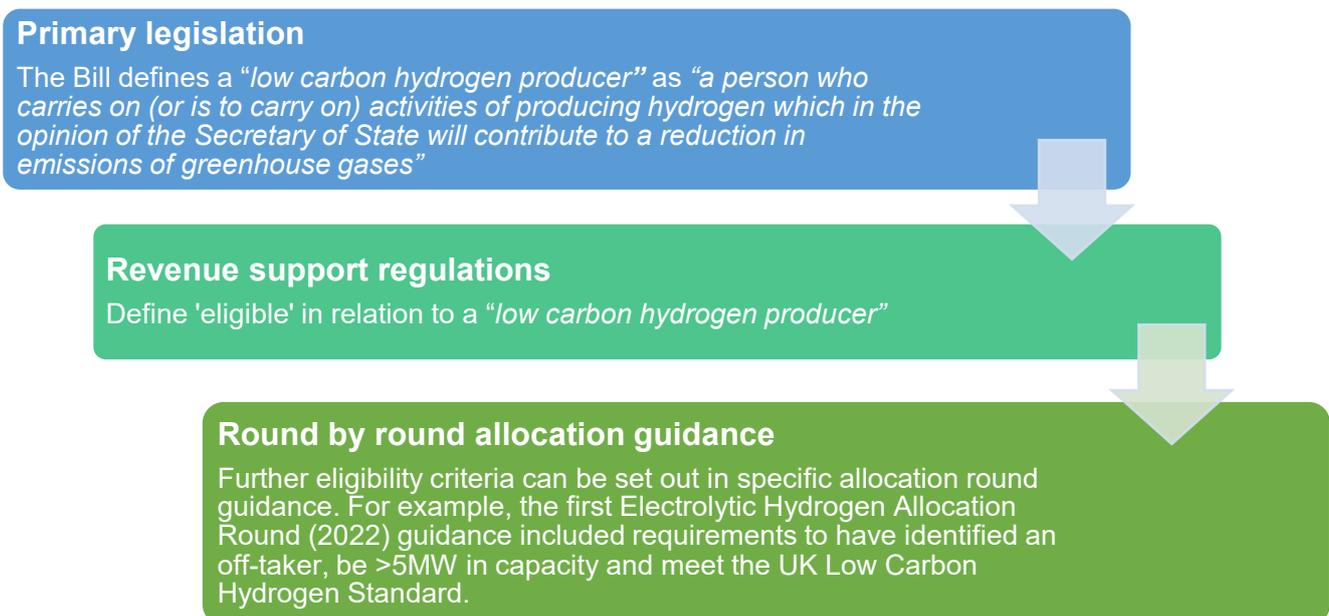
This section of the consultation sets out our proposals to determine the meaning of “eligible” in relation to a “low carbon hydrogen producer” in revenue support regulations, in accordance with clause 61(3) of the Bill. It is not practical to define an ‘eligible low carbon hydrogen producer’ on the face of the Bill as eligibility may change over time as the industry and technologies evolve.

Clause 61(1) of the Bill states that the Secretary of State can only direct a counterparty to offer to contract with an “eligible low carbon hydrogen producer”. Similarly, clause 72 states that a counterparty must offer to contract with an “eligible low carbon hydrogen producer” specified in an allocation notification. Clause 61(8) defines a “low carbon hydrogen producer” as “*a person who carries on (or is to carry on) activities of producing hydrogen which in the opinion of the Secretary of State will contribute to a reduction in emissions of greenhouse gases*”, where “greenhouse gas” has the meaning given by section 92(1) of the Climate Change Act 2008.

The intention is for revenue support regulations to define eligibility by setting out the types of low carbon hydrogen production that can potentially be supported under the HPBM. The specific types of production which are to be supported in an allocation round will be set out in guidance published in advance of each allocation round alongside any further eligibility requirements.

Therefore, to be eligible for a hydrogen production revenue support contract, a hydrogen producer must meet the definition of a “low carbon hydrogen producer” in the Bill, the eligibility requirements set out in revenue support regulations, and any further eligibility criteria set out in each allocation round guidance (Figure 1).

**Figure 1: Approach to hydrogen production revenue support contract eligibility**



We have taken into consideration the eligibility criteria in the first Electrolytic Hydrogen Allocation Round (2022) and Track 1, Phase-2 of the CCUS Cluster Sequencing Process, as well as responses to the consultation on the design of a business model for low carbon hydrogen. In the government response to that consultation we confirmed that the HPBM is intended to:

- be applicable on a UK-wide basis to a range of hydrogen production pathways to facilitate the growth of the nascent hydrogen economy and that the technologies in scope of each round of allocation to award support will be guided by the UK Hydrogen Strategy;
- support domestic production and consumption of hydrogen, and that volumes of hydrogen exported would not be eligible for support;
- apply to newly constructed facilities built for the specific purpose of producing hydrogen that can meet the requirements outlined in the UK low carbon hydrogen standard ('the standard') to stimulate investment in new low carbon production capacity;
- not support existing producers of hydrogen looking to retrofit using CCUS technology, but they may be eligible to apply for support through the ICC business model;

## New facilities built specifically for producing hydrogen

The primary objective of the HPBM is to incentivise the production and use of low carbon hydrogen through the provision of ongoing revenue support in order to overcome the cost gap between low carbon hydrogen and cheaper higher carbon counterfactual fuels.

The HPBM is designed to stimulate investment in new low carbon hydrogen production capacity. Only newly constructed facilities built for the specific purpose of producing hydrogen would be eligible for revenue support.

### Proposal

It is proposed that revenue support regulations make clear that only new facilities – that is, a facility which is 'not already operational or under construction' – would be considered eligible for revenue support. This would include any new production capacity to be added to an existing production facility. We do not intend to set any production capacity limits or thresholds in revenue support regulations to provide the flexibility to target support to both large- and small-scale facilities, to be determined on an allocation round by allocation round basis.

**Question 5:** Do you agree with the proposal that new hydrogen production capacity added to an existing production facility would be eligible for support? Please provide reasons for your response.

## Producer requirements

Clause 61(8) of the Bill already defines the meaning of a “low carbon hydrogen producer”. We propose to build upon this definition to further clarify the type of entities that can apply for support under the HPBM and be party to a LCHA.

### Proposal

We intend to follow a similar approach to regulations 3(2) to (4) of the Contracts for Difference (Definition of Eligible Generator) Regulations 2014. It is proposed that revenue support regulations would define an eligible producer to be an entity that meets one of the following:

1. A person (“A”) who intends to carry on activities of producing hydrogen (in respect of which, please see section above on “New facilities built specifically for producing hydrogen”) in relation to an eligible hydrogen production facility (in respect of which, please see sections below on options to define eligible pathways); or
2. A person (“B”) who intends to operate or to participate in the operation of an eligible hydrogen production facility in respect of which A is an eligible producer; or
3. A corporate body (“C”) who is associated with person “A” or “B” (where “A” or “B” is also a corporate body), where “associated” has the same meaning as it has in section 67 of the Energy Act 2008.

**Question 6:** Do you agree with the proposals for the type of entities that can be party to a LCHA? Please provide reasons for your response.

## Support a range of hydrogen production pathways

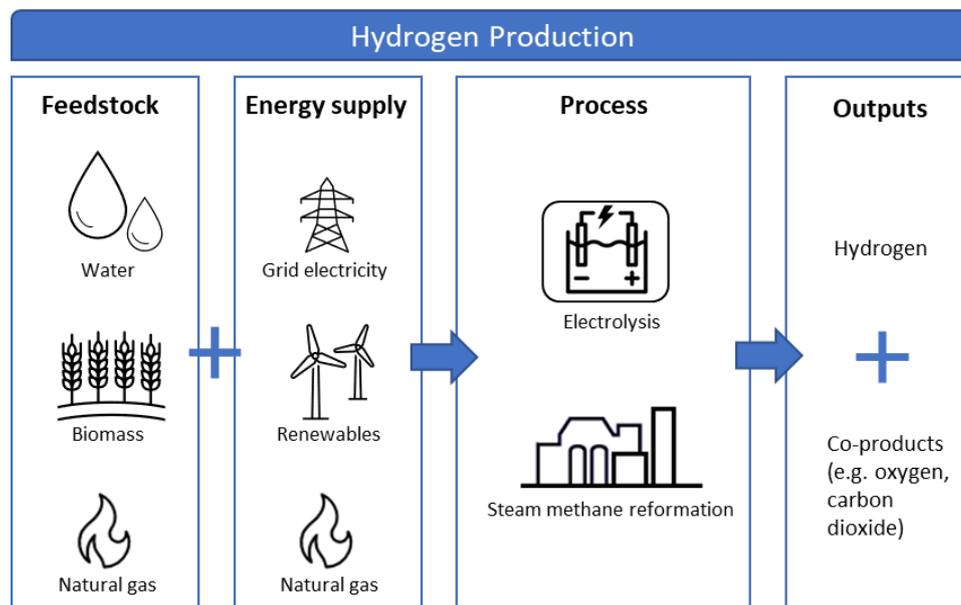
There is a variety of ways to produce low carbon hydrogen. Electrolysis, predominantly powered by renewable energy, and CCUS-enabled steam methane reformation (SMR), currently make up the bulk of the potential capacity identified in the UK project pipeline. However, we are aware of a growing number of projects and companies developing other production routes such as gasification of biomass.

The UK Hydrogen Strategy set out the government’s intention to support multiple low carbon technologies to meet our stretching hydrogen production ambitions. We therefore intend for the revenue support regulations to allow for a range of hydrogen production pathways while ensuring projects eligible for revenue support meet our decarbonisation ambitions and the Bill definition of a “low carbon hydrogen producer”.

Hydrogen production pathways involve key inputs and outputs (Figure 2). The inputs include the use of a ‘feedstock’ i.e. the raw material processed to produce the hydrogen, and an energy supply to power the specific process. Hydrogen would be the primary output, alongside other outputs such as oxygen (O<sub>2</sub>), carbon dioxide (CO<sub>2</sub>), carbon monoxide (CO) and other

emissions. Whether the hydrogen produced is low carbon or not depends on the inputs, outputs (including GHG outputs) and technologies used for the production process.

**Figure 2: Illustrative inputs and outputs of hydrogen production**



When developing our approach to eligibility, we have compared the emissions of different hydrogen production pathways with the present-day counterfactual – SMR – to consider which pathways align with our policy objectives and the Bill definition of a “low carbon hydrogen producer”. We have used emissions data from the ‘options for a UK low carbon hydrogen standard’ report<sup>19</sup> published in August 2021 as part of the consultation process for designing the standard – see Table 2. The data reflects the methodology used in the standard which allocates emissions based on a ‘point of production’ system boundary.<sup>20</sup>

To achieve our aim of supporting a range of hydrogen production pathways, we consider there to be three ways to define eligible low carbon hydrogen production pathways in revenue support regulations:

- Option 1: Set out eligible feedstocks
- Option 2: Set out eligible production pathways
- Option 3: Refer to the UK low carbon hydrogen standard
- We also welcome views on other approaches which achieve our policy aims and meet the Bill definition of a “low carbon hydrogen producer”.

We are considering the potential to define eligibility by reference to a point in time, for example the point of entering a contract.

<sup>19</sup> [www.gov.uk/government/publications/options-for-a-uk-low-carbon-hydrogen-standard-report](https://www.gov.uk/government/publications/options-for-a-uk-low-carbon-hydrogen-standard-report)

<sup>20</sup> This considers Scope 1, Scope 2 and part Scope 3 emissions. Further information can be found in the UK Low Carbon Hydrogen Standard guidance: [www.gov.uk/government/publications/uk-low-carbon-hydrogen-standard-emissions-reporting-and-sustainability-criteria](https://www.gov.uk/government/publications/uk-low-carbon-hydrogen-standard-emissions-reporting-and-sustainability-criteria)

**Table 2: Indicative GHG emissions (in gCO<sub>2</sub>e/MJ (LHV)) of pathways without CCS, under a central baseline scenario in 2020 and 2030**

Process	Energy supply <sup>a</sup>	Feedstock	2020	2030
Electrolysis	Renewable	Water	0.1	0.1
Electrolysis (High temp)	Nuclear	Water	4.8	4.5
Gasification (Forestry residues)	Grid	Biomass	6.8	6.5
Auto Thermal Reformation (Biomethane from food waste)	Grid	Biomass	9.3	3.4
Electrolysis	Grid	Water	78.4	22.7
Gasification (Residual waste)	Grid	Waste	80.8	70.8
Auto Thermal Reformation (Natural gas)	Grid	Fossil fuel	83.4	80.5
Steam Methane Reformation (Natural gas)	Grid	Fossil fuel	83.6	82.5

Source: BEIS 'Options for a UK low carbon hydrogen standard'.

Note: This table summarises the report data from Table 36 for electrolysis emissions before sensitivity analysis, and Table 44 for hydrogen production processes not using carbon capture. The figure for Steam Methane Reformation represents an SMR with no CCS installed. Table 44 assumes that CCS is installed but no carbon is captured. The emissions are therefore slightly higher than if the CCS were not installed due to the lost efficiency from the CCS plant. Table 44 data has been used for consistency of comparing production processes and does not change the position of SMR being the highest emitter. Please refer to the full report for details of the scenarios modelled. Grid Electrolysis emissions represent a Grid average emissions intensity; in practice, the emissions intensity of the Grid would vary according to the sources of electricity generation at a given time. We have not included emissions data for processes using carbon capture as these would be lower than the counterfactual.

<sup>a</sup> Grid factor data based on the UK TIMES model of the UK energy system.

## Option 1: Set out eligible feedstocks

The use of a feedstock is essential in any hydrogen production process. Different feedstocks can be used to produce low carbon hydrogen. For example, electrolysis splits water into hydrogen and oxygen and our counterfactual production method, SMR, uses methane from

natural gas. It is therefore possible to define eligibility based on the type of feedstock used by the facility from which the hydrogen is produced.

## Proposals

### **Feedstock definitions**

For this option, “feedstock” means the material or substance used in the production process from which the hydrogen molecules will be produced, excluding where it might be used solely for energy purposes to power the process.

We propose to set out four categories of permitted feedstock that a facility could use to produce hydrogen and therefore be eligible for support. These are:

- Water
- Biomass
- Waste
- Fossil fuel

Initial consultation with technical experts has identified that these four categories of feedstock should be sufficient to capture current known hydrogen production pathways. The definitions for these feedstocks would be based upon those in the Contracts for Difference (Definition of Eligible Generator) Regulations 2014, adjusted in some cases including to acknowledge differences between the two schemes and reflect the UK’s withdrawal from the European Union.

Hydrogen derivatives and carriers are not deemed eligible for revenue support and would be excluded from these categories of permitted feedstock, whether by way of revenue support regulations or allocation round guidance. In this context, hydrogen derivatives and carriers refer to any downstream molecule produced from hydrogen, either for a specific end use or to enable transportation or storage. For example, this would include ammonia, methanol, and synthetic hydrocarbons. The HPBM aims to support the domestic production of hydrogen. We do not consider the reconversion of the derivative or carrier back into hydrogen as ‘production’ of hydrogen.

### **Carbon capture and storage**

To ensure only processes that are low carbon are eligible, we propose that where a fossil fuel-based feedstock is used to produce hydrogen, and that production process produces carbon dioxide, a complete carbon capture and storage (CCS) system must be installed. We propose to define a complete CCS system to mean a system of plant and facilities for—

- capturing some or all of the carbon dioxide (or any substance consisting primarily of carbon dioxide) that is produced by, or in connection with, the production of hydrogen by a production facility;
- transporting (including by way of non-pipeline transport methods) the carbon dioxide (or substance) captured; and

- disposing of it by way of permanent storage.

However, we do not intend to mandate the use of CCS for projects using biomass or waste feedstocks. Whilst some processes using biomass or waste feedstock could also emit some levels of carbon dioxide, those processes are not expected to result in higher emissions than the counterfactual production process of unabated steam methane reformation (see Table 2).

However, as set out above, various factors will need to be considered on a project-by-project basis to determine whether CCS is required for the hydrogen produced to meet the standard and qualify for payment. For this option, compliance with criteria relating to the standard is proposed to be addressed in individual allocation rounds and the terms of the LCHA.

### **Other types of feedstock**

We expect that the four categories of feedstock should capture the majority of substance or material types that could be used to produce low carbon hydrogen. Still, there may be other subcategories where it may not be immediately clear which category they belong to. In particular, we have considered how residues, industrial off gases and mixed feedstocks should be treated under a feedstock-based approach.

**Industrial Off Gases:** An industrial off-gas is a gas that is produced as a by-product of a chemical process, such as refining. Off-gases may be composed of a range of component gases including carbon dioxide, carbon monoxide, hydrogen, hydrocarbons, and others. Off-gases typically have relatively low purity and/or energy content, but may still have useful applications, for example as a feedstock to a subsequent chemical process or to provide heat energy. Where industrial off-gases have the potential to produce hydrogen, these typically come from fossil fuel processing, such as oil refineries (refinery off gas) and coke processing for iron and steel production (coke oven gas). Industrial off-gases may be captured under a definition for fossil fuel or may form its own category of permitted feedstock. Either way, as a substance directly or indirectly produced from a fossil fuel source, we propose that regulations require a CCS system to be installed if the production process produces carbon dioxide.

**Residues:** Industry often refer to residues as a distinct category of feedstock and different emission allocation and sustainability criteria may apply under the standard. Residues are often unavoidable when a material is manufactured via a production process or generated from agriculture, aquaculture, fisheries or forestry. A residue has a low economic value in relation to the (co-)products from a process. We do not intend to define a separate feedstock category for residues in regulations. We consider that the definitions for feedstocks would be sufficiently broad to capture residues to ensure their use to produce hydrogen could be eligible.

**Mixed feedstocks:** We do not consider that additional definitions for mixed feedstocks and how they should be treated is needed. We expect residual waste (mixed household and industrial waste) would be the dominant mixed feedstock of interest for low carbon hydrogen production. Residual wastes are typically assumed to be composed of 50/50 biogenic and non-biogenic content. Residual waste could therefore fall under the proposed definitions for biomass and waste for which the regulations are not proposed to set out any different requirements.

## Advantages

This option has the benefit of delivering a key aim of the HPBM to support multiple production routes. We would not expect there to be a need to update the regulations often, meaning they would be somewhat futureproofed, providing a good level of certainty for industry. Following a feedstock approach would ensure that low carbon hydrogen production projects we are currently aware of in the UK pipeline would be considered eligible.

We would welcome information on any upcoming projects using low carbon hydrogen production technologies which might be excluded under this approach.

## Disadvantages

The ability for a given production pathway to contribute to a reduction in emissions of GHGs and therefore be compliant with the Bill definition is project specific and dependent on a number of variables, such as upstream emissions of the feedstock source, potential GHG leakages, adherence to best practice along the supply chain and the carbon capture rate.

The GHG emissions data of known production pathways set out in Table 2 indicates that the proposed feedstocks may be compliant with the Bill definition. However, we would like to be confident that eligible feedstocks cannot be used to produce hydrogen which does not contribute to a reduction in emissions of GHGs. If it is possible for feedstocks to be used to produce hydrogen which exceeds the SMR counterfactual, we may need to place additional requirements in regulations to ensure only low carbon hydrogen production is eligible.

## Option 2: Set out eligible production pathways

In the same way low carbon hydrogen can be produced from a range of feedstocks, a number of pathways can also be deployed – as shown in Table 2. It is therefore possible to define eligibility based on the type of pathway used by the facility to produce the hydrogen. This approach is similar to the Contracts for Difference (Definition of Eligible Generator) Regulations 2014 (as amended), which sets out types of eligible generation (e.g. wind).

## Proposals

Under this option, the eligible pathways would be those that would have a lower emission than the SMR counterfactual and are therefore able to meet the Bill definition of a low carbon hydrogen producer. We would propose including all the pathways in Table 2 and, similar to Option 1, we would mandate the use of CCS for pathways using fossil fuel as a feedstock.

In specifying the eligible pathway, regulations would address the variables that would impact emissions, including process technology, energy source, type of feedstock, and the installation of CCS. For example:

- A water electrolysis facility powered by grid or renewable electricity.
- A steam methane reformation facility using fossil fuel as a feedstock with CCS installed with a minimum capture rate of X.

We propose to keep the definitions for feedstock as broad as possible, using the proposed wording as set out under Option 1. The intention with this option is that the list of pathways set out in regulations would be updated by amendments as technologies emerge, and data becomes available to allow for an assessment of the GHG emissions.

### **Advantages**

This option provides investors the certainty on the eligibility of specific production pathways. By following a prescriptive approach, it addresses the limitations of the feedstock option to ensure pathways permitted by regulations will meet the Bill definition of a low carbon hydrogen producer.

### **Disadvantages**

Regulations would need to be prescriptive to account for the range of hydrogen production technologies and parameters. It is therefore expected that this approach would require regular amendments to the regulations to facilitate updates to capture market changes. As set out under option 1, various project specific factors will determine the carbon intensity of the hydrogen produced.

For example, the capture rate of a CCS plant would be essential for pathways such as SMR using natural gas to be considered low carbon. Regulations could specify a minimum capture rate, though the disadvantage is this risks being an inflexible tool that does not reflect project-specific characteristics.

To effectively prescribe which pathways are eligible, regulations are likely to be complex and may become more so as amendments to update them are made.

This prescriptive approach may also limit the ability of the HPBM to support innovation as only near commercial pathways with supporting data would be included in regulations.

## **Option 3: Refer to the UK low carbon hydrogen standard**

The standard defines what constitutes 'low carbon hydrogen' at the point of production. The intent of the standard is to ensure new low carbon hydrogen production supported by government makes a direct contribution to GHG emission reduction targets under the Climate Change Act. Where government schemes and policies adopt the standard, it ensures new low carbon hydrogen production makes a direct contribution to our carbon reduction targets.

The standard sets out in detail the methodology for calculating the emissions associated with hydrogen production and the steps producers are expected to take to prove that the hydrogen they produce is compliant. This includes setting a maximum threshold for the amount of GHG emissions allowed in the production process for hydrogen to be considered 'low carbon hydrogen' (currently set at 20gCO<sub>2e</sub>/MJ<sub>LHV</sub>).

The standard is set out in guidance, and we expect for it to be updated over time to ensure it remains fit for purpose and reflects our growing understanding of how new technologies work in practice, including how hydrogen production interacts with the broader energy system.

## Proposal

Under this option, regulations would require compliance with the standard to be deemed eligible. This could either take the form of referencing a fixed version of the standard, or a reference to the live standard, where the regulations would automatically reflect the latest version of the standard. Regardless of the approach taken, projects would only be required to comply with the version of the standard in effect when the contract is entered into, and would not be required to comply with amendments to the standard after the agreement date of the LCHA. This concept of 'grandfathering' aligns with provisions in the LCHA itself.

If this option is taken forward, we would need to further consider how it would work in practice, for example:

- what compliance with the standard means within the regulations, given some plants will not be able to comply with the standard at all times (e.g. if the CO<sub>2</sub> transport and storage (T&S) network is unavailable).
- how to deal with a situation where the standard changes in between projects bidding for support and entering into contracts.
- How to ensure that the version of the standard is grandfathered once a contract is signed so existing projects won't have to comply with an updated version of the standard.

## Advantages

The standard sets out what government considers to be 'low carbon hydrogen' up to the point of production, including an emissions threshold and detailed methodology. This approach would help ensure strong alignment between the regulations and round by round allocation guidance, with the most direct link to the standard. If we were to reference a fixed version of the standard, this would provide certainty to industry as the requirements would be settled. Alternatively, if we were to reference the live standard, this would be agile to updates to the standard, ensuring eligibility requirements would always be aligned.

## Disadvantages

If we were to reference a fixed version of the standard, this would require regulations to be updated to reflect any changes to the standard over time. As set out in clause 57(9)(b) of the Bill, these regulations are subject to the affirmative resolution procedure and therefore must be debated in both houses of Parliament, taking up valuable Parliamentary time. As a result of this process, there would also likely be a delay between an updated version of the standard being published in guidance and regulations being updated to reflect this. Similar to the disadvantage of option 2, there are only a limited set of pathways currently captured by the standard which could restrict innovation.

If we were to reference the live standard, this would not provide certainty to Parliament or industry as the regulations would be linked to an evolving standard.

**Question 7:** Do you agree with the advantages and disadvantages set out under option 1? Are there any other considerations for option 1 that we should take into account?

**Question 8:** If we proceed with option 1, do you agree with the list of proposed feedstocks?

**Question 9:** Do you agree with the advantages and disadvantages set out under option 2? Are there any other considerations for option 2 that we should take into account?

**Question 10:** If we proceed with option 2, do you agree with the proposed pathways set out in Table 2?

**Question 11:** If we proceed with option 1 or option 2, do you agree with the proposal to only mandate installation of CCS for fossil fuel feedstocks?

**Question 12:** Do you agree with the advantages and disadvantages set out under option 3? Are there any other considerations for option 3 that we should take into account?

**Question 13:** Which of the proposed options to define eligible low carbon hydrogen production pathways do you prefer:

- i) Set out eligible feedstocks
- ii) Set out eligible production pathways
- iii) Refer to a fixed version of the standard
- iv) Refer to the live standard

**Question 14:** Are there any other approaches to define eligible low carbon hydrogen production pathways which would achieve our policy aims whilst also meeting the Bill definition of a “low carbon hydrogen producer”?

Please provide reasons for your responses.

## Other

**Question 15:** Do you have any other comments on the proposals for the hydrogen eligibility regulations? Please provide reasons for your responses.

# Carbon capture entity eligibility

## Legislation

Similar to the measures for the HPBM, clause 63(2) of the Bill defines a “carbon capture revenue support contract” as a contract between a “carbon capture counterparty” and an “eligible carbon capture entity”. A “carbon capture entity” means a person who carries on (or is to carry on) activities of capturing carbon dioxide (or any substance consisting primarily of carbon dioxide) that has been produced by commercial or industrial activities, with a view to the storage of carbon dioxide, where “storage”, in relation to carbon dioxide, means any storage with a view to the permanent containment of carbon dioxide (Clause 63(8)).

Clause 63(3) places a duty on the Secretary of State to determine the meaning of “eligible” in relation to a carbon capture entity in revenue support regulations. Revenue support regulations will thus need to set out the requirements for an entity to be considered an “eligible carbon capture entity”; and therefore, be able to receive revenue support funding through a carbon capture revenue support contract. The regulations are, at present, being drafted to ensure support for ICC projects through either the ICC Contract, or the Waste ICC Contract, and CCS Infrastructure Fund (CIF) grant support through the Grant Funding Agreement. However, it is anticipated that other business models will be developed for other sectors such as bioenergy with carbon capture and storage which may rely on the same Bill provisions in providing support under a carbon capture revenue support contract. In that instance, the revenue support regulations may need to be amended further to accommodate this.

To be eligible for a carbon capture revenue support contract and receive revenue support, a person must meet the definition of a “carbon capture entity” in the Bill and the eligibility requirements set out in the revenue support regulations. Outlined in the sub-sections below is our proposed approach for what should be specified within the revenue support regulations.

It is worth noting that in any given allocation round, government may wish to focus on narrower sectors or technologies to ensure delivery of CCUS is consistent with wider government policy objectives at the time of such allocation. To that end, additional criteria may be set out in allocation round guidance, as, for example, in the Track 1 Phase 2 Cluster Sequencing guidance.<sup>21</sup> These additional criteria may include delivery, technical or sector specific criteria that entities must also meet in order to be considered for support within a particular allocation round.

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<sup>21</sup> [www.gov.uk/government/publications/cluster-sequencing-for-carbon-capture-usage-and-storage-ccus-deployment-phase-2](https://www.gov.uk/government/publications/cluster-sequencing-for-carbon-capture-usage-and-storage-ccus-deployment-phase-2)

## Scope of ICC eligibility requirements

This section of the consultation sets out our proposals to determine “eligible” in relation to a “carbon capture entity” within the revenue support regulations, in accordance with the duty under Clause 63(3) of the Bill.

The ICC business models have been designed to support the development of initial and early-stage ICC projects and to incentivise the deployment of carbon capture technology for commercial and industrial users who often have no other option to achieve deep decarbonisation. The models will evolve as the technology, investor confidence and the markets for low carbon products develop. As such, we intend to keep eligibility as broad as possible within the regulations, to ensure that we do not inadvertently limit the development of new carbon capture technologies and applications.

### Eligibility

#### **Technology**

A carbon capture entity (which meets the other requirements of the revenue support regulations) will be eligible whatever the technology type used to capture the carbon dioxide, including but not limited to full-scale carbon capture, modular carbon capture and all carbon capture configurations (including pre- and post-combustion, oxyfuel and emerging technologies). We intend to take a technology neutral approach. As such, we do not intend to include any limits within the regulations on how an entity captures carbon dioxide.

#### **Entities**

We recognise that a variety of different entities with different corporate structures and based in different jurisdictions may wish to seek support under the revenue support regulations. We consider those seeking support are best placed to decide how to arrange themselves in this regard and so do not propose to include any restrictions in the revenue support regulations as to the class of persons who can be eligible.

#### **Emissions Source**

The ICC business models have been developed to support decarbonisation of the industrial sector (including the waste management sector), and have been designed to meet the needs of industrial users. We do not consider they are appropriate to support CCUS deployment for certain parts of the power sector, such as carbon dioxide captured from power generation facilities that do not supply a majority of their electricity output to industrial facilities.

Therefore, we propose to make explicit in the regulations that an entity capturing carbon dioxide from power generation facilities that are solely connected to the electricity transmission or distribution network will not be eligible under the ICC business model for support. This is because such a power generation facility would only export its electricity output to the electricity grid and not to industrial facilities directly. This is not the case for generators connected to private wire networks and so emissions captured from such generators are not intended to fall within this exclusion.

However, capture from Combined Heat and Power (CHP) plants and Energy from Waste (EfW) plants would be eligible regardless of whether such plants are connected solely to the electricity transmission or distribution network.

We intend to define within the regulations, the “power generation facilities”, “CHP Plants” and “EfW plants” referred to above. We propose to base these definitions on those set out in the Contracts for Difference (Definition of Eligible Generator) Regulations 2014 (as amended). See below:

- A “generating station” means a station which generates electricity;
- A “combined heat and power generating station” means a station which generates electricity and is (or may be) operated in order to supply to any premises—
  - (a) heat produced in association with the electricity generated;
  - (b) steam produced from, or air or water heated by, such heat.

When defining a CHP generating station, we plan to remove ‘(b) steam produced from, or air or water heated by, such heat;’ from the definition above because, in this case, steam and heat are essentially the same. A CHP is designed to produce power (electricity) and heat, usually in the form of steam or hot water, which will be used for a specific purpose, for example, steam for industrial processes.

- An “energy from waste with CHP station” means a generating station which—
  - (a) is an accredited CHP station; and
  - (b) is fuelled by biomass or waste (or both), excluding—
    - (i) gas formed by the anaerobic digestion of material, where that material is, or is derived from, waste; or
    - (ii) gas or liquid formed by gasification or pyrolysis of biomass or waste.<sup>22</sup>

When defining EfW plants, we plan to replace (a) ‘an accredited CHP station’, in the definition above with ‘a combined heat and power generating station’.

## **Existing or operational CCUS plants**

The business models are designed to encourage the deployment of new carbon capture and storage activities; it is not, therefore, government’s intention to support projects which have existing and/or already operational CCS plants which are connected to the T&S network.

However, our intention is that existing and operational carbon capture and usage (CCU) projects, or CCS projects where the carbon dioxide is captured with a view to its permanent containment other than in geological storage (i.e. where the project is not connected to the T&S network) could still be eligible. For example, a person with existing CCU equipment on its

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<sup>22</sup> [www.legislation.gov.uk/ukdsi/2014/9780111116807](http://www.legislation.gov.uk/ukdsi/2014/9780111116807)

site who later sought revenue support to adapt to CCUS and connect to the T&S network to access permanent geological storage could still be eligible under the regulations.

Therefore, we propose that the revenue support regulations set out that a person who (i) is carrying on activities of capturing carbon dioxide (or any substance consisting primarily of carbon dioxide) that has been produced by commercial or industrial activities, with a view to its permanent geological storage and (ii) is not party to a carbon capture revenue support contract; will not be eligible under the revenue support regulations.

**Question 16:** Do you agree with the proposal to take a technology neutral approach, and not place restrictions within regulations on the types of technologies that may be used by a carbon capture entity to capture carbon dioxide?

**Question 17:** Do you agree with the approach to not limit within regulations the class of person that may be eligible for a revenue support contract?

**Question 18:** We have proposed to exclude from eligibility entities that capture carbon dioxide which have been produced from a power generation facility that is solely connected to the transmission or distribution network (exempting CHP and EfW facilities). Do you agree with this proposed approach?

**Question 19:** In drafting the regulations, we propose to define a generating station, a combined heat and power generating station and an energy from waste with CHP station, based upon similar definitions laid out in the Contracts for Difference regulations. Do you have any comments on this approach?

**Question 20:** Do you agree with the approach to exclude from eligibility a carbon capture entity which is, without already being party to a revenue support contract, capturing carbon dioxide with a view to its permanent geological storage through an existing or operational CCUS plant?

Please provide reasons for your responses.

## Other

**Question 21:** Do you have any other comments on the proposals for the industrial carbon capture eligibility regulations? Please provide reasons for your response.

# Consultation questions

1. Do you agree with the proposals relating to the Secretary of State's power to direct a counterparty to offer to contract?
2. Is there any information not listed in Table 1 you think should be published in a contract register?
3. Is there any information in the contracts you think should not be published?
4. Do you agree with the proposal for including a requirement in regulations on the counterparty to promptly notify the Secretary of State at the point that it considers that it may become unable to carry out its functions (in addition to the formal 3-months' notice period in the Bill)?
5. Do you agree with the proposal that new hydrogen production capacity added to an existing production facility would be eligible for support?
6. Do you agree with the proposals for the type of entities that can be party to a LCHA?
7. Do you agree with the advantages and disadvantages set out under option 1? Are there any other considerations for option 1 that we should take into account?
8. If we proceed with option 1, do you agree with the list of proposed feedstocks?
9. Do you agree with the advantages and disadvantages set out under option 2? Are there any other considerations for option 2 that we should take into account?
10. If we proceed with option 2, do you agree with the proposed pathways set out in Table 2?
11. If we proceed with option 1 or option 2, do you agree with the proposal to only mandate installation of CCS for fossil fuel feedstocks?
12. Do you agree with the advantages and disadvantages set out under option 3? Are there any other considerations for option 3 that we should take into account?
13. Which of the proposed options to define eligible low carbon hydrogen production pathways do you prefer: i) Set out eligible feedstocks, ii) Set out eligible production pathways, iii) Refer to a fixed version of the standard or iv) Refer to the live standard
14. Are there any other approaches to define eligible low carbon hydrogen production pathways which would achieve our policy aims whilst also meeting the Bill definition of a "low carbon hydrogen producer"?

- 15. Do you have any other comments on the proposals for the hydrogen eligibility regulations?**
- 16. Do you agree with the proposal to take a technology neutral approach, and not place restrictions within regulations on the types of technologies that may be used by a carbon capture entity to capture carbon dioxide?**
- 17. Do you agree with the approach to not limit within regulations the class of person that may be eligible for a revenue support contract?**
- 18. We have proposed to exclude from eligibility entities that capture carbon dioxide which have been produced from a power generation facility that is solely connected to the transmission or distribution network (exempting CHP and EfW facilities). Do you agree with this proposed approach?**
- 19. In drafting the regulations, we propose to define a generating station, a combined heat and power generating station and an energy from waste with CHP station, based upon similar definitions laid out in the Contracts for Difference regulations. Do you have any comments on this approach?**
- 20. Do you agree with the approach to exclude from eligibility a carbon capture entity which is, without already being party to a revenue support contract, capturing carbon dioxide with a view to its permanent geological storage through an existing or operational CCUS plant?**
- 21. Do you have any other comments on the proposals for the industrial carbon capture eligibility regulations?**

## Next steps

The consultation period will last for 6 weeks and close on 10 May 2023.

Stakeholders should respond to the consultation questions during the consultation period so that we can capture a range of views on our proposals in relation to the hydrogen production and carbon capture revenue support regulations.

Following our analysis of responses, we intend to publish a government response on the outcome of the consultation and how we will take the responses into account in drafting the revenue support regulations ahead of laying them before Parliament.

# Acronyms

Acronym	Definition
ATR	Autothermal reformation
CCUS	Carbon capture, usage and storage
CfD	Contract for Difference
CHP	Combined heat and power
CO <sub>2</sub>	Carbon dioxide
gCO <sub>2e</sub>	Grams of carbon dioxide equivalent
GHG	Greenhouse gas
GW	Gigawatt
HMG	His Majesty's Government
ICC	Industrial carbon capture
LCCC	Low Carbon Contracts Company
LCHA	Low carbon hydrogen agreement
LHV	Lower heating value
RAB	Regulated asset base
SMR	Steam methane reformation

# Glossary

Term	Definition
Achieved sales price	The value a hydrogen producer achieves selling hydrogen on the market (defined in further detail in the LCHA Heads of Terms)
Allocation	The process of allocating revenue support through the business model
Biomass definition in the Contracts for Difference regulations	Defined in the Contracts for Difference (Definition of Eligible Generator) Regulations 2014 to mean material which is, or is derived directly or indirectly from, algae, animal or plant matter, bacteria or fungi, including where such material is contained in waste; but does not mean fossil fuel or peat.
CCUS cluster sequencing process	The process by which CCUS industrial clusters are chosen, with two anticipated by the mid-2020s, and a further two clusters by 2030 as outlined in the 10 Point Plan
CCUS-enabled hydrogen production	Low carbon hydrogen produced from methane reformation with CCUS
Contract for Difference	A Contract for Difference, as set out in the Energy Act 2013, is a contract between a generator and the Low Carbon Contracts Company (LCCC), to encourage the generation of low carbon electricity where-by LCCC will pay an electricity generator the difference between the CfD reference price and the CfD strike price
Fossil fuel definition in the Contracts for Difference regulations	<p>Defined in the Contracts for Difference (Definition of Eligible Generator) Regulations 2014 to mean:</p> <ul style="list-style-type: none"> <li>(a) coal and substances produced directly or indirectly from coal;</li> <li>(b) crude liquid petroleum or petroleum products;</li> <li>(c) lignite; or</li> <li>(d) natural gas</li> </ul>
Hydrogen business model	Business models aim to address the key risks and barriers that prevent low carbon hydrogen from developing without policy support

Term	Definition
ICC business models	Designed to incentivise the deployment of carbon capture technology for industrial users, the ICC business model is a private law contract, similar to a CfD, that provides the emitter with a payment per tonne of captured CO <sub>2</sub> . Projects looking to retrofit carbon intensive hydrogen production will be eligible for support through this scheme
Low carbon hydrogen	Hydrogen that is produced with significantly lower greenhouse gas emissions compared to current methods of production – methods include methane reformation with CCUS and electrolysis using renewable electricity
Methane reformation	A process for hydrogen production in which methane is the input fuel
Net zero	Legislation passed by the government to reduce greenhouse gas emissions to net zero by 2050
Waste definition in the Contracts for Difference regulations	<p>Defined in the Contracts for Difference (Definition of Eligible Generator) Regulations 2014 (as amended) to have the meaning given in Article 3(1) of Directive 2008/98/EC of the European Parliament and of the Council on waste but does not include</p> <ul style="list-style-type: none"> <li>(a) landfill gas;</li> <li>(b) sewage gas; or</li> <li>(c) any substance intentionally modified or contaminated to fall within the meaning given in Article 3(1) of that Directive</li> </ul>

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This consultation is available from: [www.gov.uk/desnz](http://www.gov.uk/desnz)

If you need a version of this document in a more accessible format, please email [HICClawlegislation.businessmodels@beis.gov.uk](mailto:HICClawlegislation.businessmodels@beis.gov.uk). Please tell us what format you need. It will help us if you say what assistive technology you use.