Cluster Sequencing for Carbon Capture Usage and Storage Deployment: Phase-2

Hydrogen Project Plan

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# Hydrogen Plan Introduction

In November 2020, the Government published the Ten Point Plan for a Green Industrial Revolution[[1]](#footnote-2), with commitments focused on driving innovation, boosting export opportunities, and generating green jobs and growth across the country to level up regions of the UK. In doing so, government has set its agenda for a clean, resilient and sustainable economic recovery, as the UK builds back from the impacts of Covid-19.

Included in the Ten Point Plan was a commitment to deploy Carbon Capture, Usage and Storage (CCUS) in two industrial clusters by the mid-2020s, and a further two clusters by 2030 with an ambition to capture 10mtCO₂/year by 2030. The Net Zero Strategy[[2]](#footnote-3) goes even further by setting out an ambition to capture 20-30MtCO₂ per year across the economy by 2030. Also set out in the Ten Point Plan, is the ambition for 5GW of low carbon hydrogen production capacity by 2030, and for a potential hydrogen heated town by the end of the decade. Low carbon hydrogen is considered critical for meeting the UK’s legally binding commitment to achieving net zero by 2050.

In May this year, BEIS launched Phase-1 of the Cluster Sequencing Process to select Track-1 CCUS clusters and in October announced the Clusters that have been selected to participate as Track-1 Clusters; Hynet and East Coast Cluster. In addition, BEIS also announced the Scottish Cluster as a reserve cluster if a back-up is needed. In November BEIS launched Phase-2 of the Cluster Sequencing Process to select which Projects will progress through to negotiations and due diligence and could connect to a Track-1 or Reserve Cluster.

This document sets out the questions that Hydrogen Projects should answer as part of their Phase-2 submission. The information and relevant supporting evidence provided by projects within the completed Hydrogen Project Plan will, alongside the Economic Benefits template (Annex B), Cost and Emissions template (Annex C3) and Financial Statement template (Annex D), form the basis of the assessment to determine which Hydrogen Projects are shortlisted to enter into negotiations for a Hydrogen Business Model contract. This document is an Annex to the Phase-2 Guidance Document and should be read alongside it. Please see the Phase-2 Guidance Document, Section 5 for Hydrogen Projects, for further guidance on the assessment process, including how the information will be assessed and note that the caveats and reservations to that document set out in Section 1.5 of that document apply equally here.

The Phase-2 CCUS Cluster Sequencing Process will be run by the Department for Business, Energy and Industrial Strategy (BEIS). If applicants have any general questions about the submission process or about filling in any part of the submission documentation, please email queries to [hydrogenccusphase2@beis.gov.uk](https://beisgov.sharepoint.com/sites/beis/367/CCUS/CCUS%20Policy/CCUS%20Infra%20Fund/Cluster%20selection/Phase-2/PHASE-2%20SHARED/hydrogenccusphase2@beis.gov.uk).

## Important information regarding this process

* **The deadline for finalised Phase-2 submissions is 23:59 on 21st January 2022.**
* The assessment process will be run fairly, transparently, and objectively in accordance with the published Phase-2 Guidance.
* The information provided within this form will be used throughout the Phase-2 process and the negotiations/due diligence phase. Entering a negotiation does not mean that a Hydrogen Business Model contract will be awarded. Any decision to award support would only be made subject to the successful completion of any negotiation and due diligence.
* The detailed timetable for this process is set out in the Phase-2 Guidance Document.
* BEIS will not be responsible for any costs incurred in the preparation of any submission, irrespective of whether the Hydrogen Project is successful in the Phase-2 process.
* Hydrogen Projects will need to pass the eligibility criteria to be considered within the evaluation, as described in the Phase-2 Guidance Document.
* The evaluation will be based on five evaluation criteria with relative weightings of: Deliverability (30%), Emissions Reduction (20%), Economic Benefits (20%), Costs (15%) and Market Development and Learning (15%).
* This document, the Hydrogen Project Plan, is divided into nine sections:
  + Section 1, Applicant Information.
  + Section 2, Hydrogen Project Summary, this information will provide background and context to assessors when reviewing the rest of the submission.
  + Section 3, Eligibility, information submitted in this section will be used to determine eligibility.
  + Section 4, Hydrogen Project Overview, information submitted in this section will be used to improve BEIS’ understanding of the project.
  + Sections 5-9 each focus on the information required to support one of each of the five evaluation criteria (listed in bullet above).
* Section 2 and section 4 do not apply to specific criteria, but BEIS may draw on information submitted in these sections to support the assessment of any of the relevant assessment criteria.
* Alongside the Hydrogen Project Plan the assessment of the Hydrogen Project will be supported by the submission of several templates:
  + Annex B – Economic Benefits template will be used to assess in more detail quantitative information associated with the assessment of Economic Benefits.
  + Annex C3 – Cost and Emissions template will be used to assess the Levelised Cost of Hydrogen (LCOH) for the Cost Considerations criterion and CO₂e intensity and average total emissions reduced for the Emissions Reduction criterion.
  + Annex D – Financial Statements template will be used to support the assessment of the financial and commercial health of each company participating in the development of the Hydrogen Project. This template should be considered supplementary to the questions to assess the Project’s deliverability. The figures included in the template should be supported by relevant accounting notes and documentation.
* Across the assessment BEIS will place significant emphasis on the credibility and consistency of information provided.
* BEIS reserves the right to use information provided within the submission for any part of the assessment; such that information provided in one section, for example for a particular criterion, could be used to inform assessments against another criterion. This is to allow for consistency and credibility checks and not so answers can be continued in other sections. Any obvious continuation of answers will be removed.
* After the Hydrogen Project submissions have been individually assessed, BEIS will carry out a shortlisting process of the Hydrogen Projects to ensure they meet the Government’s strategic objectives. More detail on the shortlisting process can be found in section 5.4 of the Phase-2 Guidance Document.
* BEIS reserves the right not to accept any submission and reserves the right to cancel the process before it has completed or at any time before any support has been awarded.
* BEIS reserves the right not to consider a submission further if an applicant fails to disclose information requested.
* Each individual piece of supporting evidence can be referenced multiple times in the Hydrogen Project Plan but should be uploaded only once to the portal.
* Please note that the word limit does not cover the references sections. This is so applicants can be specific as to where information can be found in any documents provided. If this section is used to continue answers, the words will be removed before the assessment. To aid with document referencing please also fill in the References Matrix provided in Annex E3.
* Any information provided above the word limits will be removed before information is provided to assessors and will not count towards the score. We will remove words in excess of the count from the end of the relevant question or section. This will be completed before the documentation is provided to assessors.

## Disclosure of information

Reasons for decisions on submissions will be recorded at all stages for good administration and to ensure that there is a clear audit trail for all decisions. Administrative records will be maintained for all submissions irrespective of whether they are successful or not.

Please refer to Section 2.2 (Entry Process) of the Phase-2 Guidance Document for additional detail on entry into non-disclosure agreements and Section 1.6 (General Considerations) for additional detail on parties involved in the Phase-2 process.

All information provided by applicants may be disclosed in accordance with BEIS’s legal obligations (including under the Freedom of Information Act 2000 (FOIA), the Data Protection Act 2018 (DPA), General Data Protection Regulation (GDPR) and the Environmental Information Regulations 2004 (EIR) in the event that a request for information is received). More information on the FOIA, DPA, GDPR and EIR (including information on exemptions) can be found at: <https://ico.org.uk/for-organisations/>

To help BEIS deal with information requests and without prejudice to the paragraph above, in the box below, please set out the reasons why you consider any specific information should not be disclosed, including (if possible) by reference to the specific exemption contained in the relevant legislation (for example, because disclosure of the information would prejudice your commercial interests under section 43 of the FOIA), explaining why this is the case.

Where appropriate, please also state whether you consider your reasons for non-disclosure only apply for a particular time period. If we receive an information request, we will consider your views as stated on the submission form. However, BEIS will ultimately decide how to respond to an information request and whether any information should be withheld, subject to the Information Commissioner's Office decision in the event of the requestor appealing the decision.

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| Please detail what specific information, if any, within this submission should not be disclosed and the reasons why. Please include (if possible) reference to the specific exemption contained in the relevant legislation. |
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## Glossary of terms

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| Acronym | Meaning |
| CAPEX | Capital Expenditure |
| CO₂ | Carbon dioxide |
| CO2e | CO2 equivalent |
| COD | Commercial Operation Date |
| DCO | Development Consent Order |
| FEED | Front-End Engineering Design |
| FID | Final Investment Decision |
| GHG | Greenhouse Gas |
| HoT | Heads of Terms |
| KKD | Key Knowledge Deliverable |
| MJ/kg | Mega-joule per kilogram |
| MoU | Memorandum of Understanding |
| MWh or MW | Mega-Watt Hour or Mega-Watt |
| OPEX | Operating Expenditure |
| T&S | Transport and Storage |
| T&SCo | Transport and Storage Company |

## Definitions

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| Term | Definition |
| Battery Limit | The geographic boundaries identifying scope of works for process units or the Hydrogen Project. |
| CO2e | Carbon Dioxide equivalent. The amount of carbon dioxide emission that would cause the same radiative forcing, over a given time horizon, as an emitted amount of greenhouse gases (GHG). As calculated using global warming potential (GWP) values for a 100 year time horizon, relevant to reporting under UNFCCC, published by the IPCC in its Fourth Assessment Report (AR4). |
| Cluster | Transportation and storage network (incorporating the onshore and offshore network and offshore storage facility) and an associated first phase of carbon capture projects. |
| Commercial Operation Date | The date when hydrogen production begins alongside the ongoing export of CO₂ volumes into the T&S.  Note: This should not be taken to represent the definition of the COD that will be used within the business model. |
| Cost of Connection | The costs incurred by the Hydrogen Project to deliver CO₂ compliant with the T&S specification (pressure, phase and composition) to the Hydrogen Project boundary limit. This would include any compression/pumping and CO₂ treatment required but does not include the costs of extending the T&S network to the project battery limit. |
| Hydrogen Production Plant | Facility producing CCUS-enabled low carbon hydrogen. |
| Hydrogen Production | CCUS-enabled hydrogen production. |
| Hydrogen Project | Project to develop, construct and commission a new build CCUS-enabled Hydrogen Production Plant and where applicable, any associated hydrogen infrastructure. |
| Levelised Cost of Hydrogen | Calculation to consider overall cost of hydrogen production.  *Note: Please see Section 8.* |
| Mitigation | Mitigation refers to actions taken to reduce the overall risk either pre- or post-event. |
| Offshore | The offshore element of the CO₂ transportation network up to the point where CO₂ enters the geological Storage.  Note: This excludes shipping transportation. |
| Offtaker | In the context of the Phase-2 application process, an offtaker is both the end user of low carbon hydrogen and, where relevant, any intermediary party who may purchase and resell hydrogen to end users. Where end users do not purchase hydrogen directly from producers and there is an intermediary party, information and evidence of both end users and the intermediary need to be included in the application form and templates. |
| Onshore | The onshore element of the CO₂ transportation network which may include intermediate CO₂ storage for T&S operational purposes.  Note: This excludes road and rail transportation. |
| Transport & Storage Network (T&S Network) | The network consisting (wholly or mainly) of:   * pipelines used for the transportation of carbon dioxide from one capture plant to a storage facility or to or from any CO₂ pipeline network; or * routes used for the transportation of carbon dioxide from one capture plant to a storage facility or to or from any CO₂ pipeline network; and * storage facilities for the permanent storage of carbon dioxide. |

## Units

Where possible please use units of measurement defined by the International System of Units (SI) within your answers. For example:

* Electrical energy and Power: MWh and MW.
* Thermal energy and Power: MWh and MW.
* Gas energy and power: MWh and MW – Gross Calorific Value basis.
* Gas calorific value: MJ/kg – Gross Calorific Value basis.

## Applicant information

Please provide the contact information for the Hydrogen Project through the online portal[[3]](#footnote-4). Completed versions of this document, the Economic Benefits template (Annex B), Hydrogen Cost and Emissions template (Annex C3) and Financial Statement template (Annex D) are to be uploaded to the online portal alongside any supporting evidence and a completed References Matrix (Annex E3).

## Hydrogen Project summary

### 2.1 High-level project description (300 words)

Please provide a concise summary description of the Hydrogen Project. Respondents should include, but are not necessarily limited to:

1. Proposed hydrogen production technology, plans for hydrogen end use including distribution method.
2. CO₂ capture process, CO₂ treatment, any storage (H₂or CO₂), compression facilities and, connection point to the Transport and Storage (T&S).
3. Location of the Hydrogen Plant in relation to the T&S and proposed offtakers.
4. A clear diagram/schematic of the Hydrogen Project.

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| References to supporting documentation for Section 2.1 |
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### 2.2 Hydrogen producer and partners (300 words)

Please summarise the organisational structure of the Hydrogen Project including any relationships with partner organisations such as the CO₂ transport and storage provider(s) and hydrogen offtakers. Please include the status and details of agreements that exist between these organisations.

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| References to supporting documentation for Section 2.2 |
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### 2.3 Hydrogen Project status and key metrics (250 words)

Please provide a concise description of the Hydrogen Project’s stage of development. Please also fill in the metrics within the table provided below (metrics marked with an astriex\* can be populated using Annex C3 – Cost and Emissions template). Any additional graphs to summarise the hydrogen production profile would be beneficial.

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| Metric | Value |
| Final Investment Decision date |  |
| Commercial Operation Date |  |
| Total stored volumes to end of 2050 (MtCO₂) |  |
| Total produced hydrogen volumes before 2030 (GWh) |  |
| Overall capital costs to end of 2050 (£m) |  |
| Overall operational costs to end of 2050 (£m) |  |
| Levelised Cost of Hydrogen to end of 2050\* |  |
| CO₂e intensity of hydrogen\* |  |
| Average total emissions reduction\* |  |

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| References to supporting documentation for Section 2.3 |
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### 2.4 Regional context of Hydrogen Plant (300 words)

Please summarise the importance of existing and future industry to the region in terms of jobs and infrastructure. How does the Hydrogen Project link into the local regional development plans? The response may include descriptions of historic, current and future planned activities related to regional initiatives and local developments.

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| References to supporting documentation for Section 2.4 |
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### 2.5 Documentation sign-off (250 words)

Please confirm the information and accompanying documentation provided within your submission has received appropriate level of internal sign off, such as Board level sign off. For those areas that do not have appropriate approvals, please highlight, and explain the reasoning within your responses, making sure to include any associated uncertainties.

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| References to supporting documentation for Section 2.5 |
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## Eligibility

Eligibility Criteria are fully described in the Phase-2 Guidance Document. In summary to be eligible a Hydrogen Project must:

* Be located in the UK
* Have access to a CO₂ transport solution and Track-1 or Reserve Cluster CO₂ storage site
* Be operational\* no later than the end of December 2027
* Have commenced pre-FEED or be ready to commence pre-FEED no later than the end of December 2022\*
* Be a new build CCUS-enabled hydrogen production plant
* Have identified an offtaker or multiple offtakers

\*definitions of operational/commercial operation date and pre-FEED are outlined in the Phase-2 Guidance document (Section 5.2).

Please confirm and evidence how the Hydrogen Project meets the Eligibility Criteria and provide appropriate supporting evidence.

Eligibility will be checked against the evidence submitted within this section, section 2, section 4 and section 5. Applicants will be notified [via email] on whether or not they have met the eligibility criteria. Only eligible projects will progress to the next stage where they will be assessed against the evaluation criteria.

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| References to supporting documentation for Section 3 |
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## Hydrogen Project overview

### 4.1 Hydrogen Project description (2000 words)

The description of the Hydrogen Project should include reference to appropriate supporting information and address the following (please note this is not an exhaustive list and projects should include any additional information they consider relevant):

1. What stage of development the project is at and when is FID programmed / anticipated.
2. Detail of any engineering work completed thus far and the status of ongoing work.
3. The design life of the Hydrogen Plant, including the whole hydrogen production and distribution chain and overall plant life for any pre-existing elements
4. Anticipated hydrogen production volumes, production profile, how this matches offtaker demand and production efficiency
5. The transport solution to supply hydrogen to the offtakers
6. A description of plans for storage of hydrogen if relevant.
7. A description of the production process including any additional power / thermal energy requirements and the proposed technology type (including the extent to which this is a firm position)
8. The feedstock source for hydrogen production e.g. national gas transmission system
9. The hydrogen production technology provider, if known, and capture technology process, if separate to the hydrogen production process.
10. The CO₂ capture volumes anticipated, capture efficiency and any associated emissions from the hydrogen production process.
11. The captured and uncaptured CO₂ sources across the whole Hydrogen Plant, including annual CO₂ volumes from these
12. To what extent the Hydrogen Plant is dependent on future market sales / offtaker(s) or other agreements (e.g., fuel supply) to be able to confirm programme delivery dates and hydrogen production and captured CO2 volume certainties

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| References to supporting documentation for Section 4.1 |
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### 4.2 Hydrogen offtakers (2000 words)

Please describe the hydrogen offtakers, including the route to end use if this involves more than one party. Please describe any dependencies they have on the hydrogen plant including (please note this is not an exhaustive list and projects should include any additional information they consider relevant):

1. A description of who the hydrogen offtakers are including where they are and what their product/service is.
2. The hydrogen offtakers demand profile, including any variation or seasonality, and how this matches the supply profile and capacity
3. The purpose of the hydrogen supplied and whether it is displacing an existing fuel demand or creating a new demand. If displacing existing demand, what fuel is being displaced. The status of contracts or agreements between the hydrogen producer and offtakers
4. The development the offtakers requires to receive and use the hydrogen, the engineering completed to date, the status of ongoing work and any technology risk in the design of the development
5. Planning and consents related to the hydrogen transport or development the offtakers requires to receive and use the hydrogen

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| References to supporting documentation for Section 4.2 |
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## Deliverability

The deliverability criterion will consider the Hydrogen Project’s capability and capacity to deliver successfully and the timeline on which the project will be operational by.

We will assign a Deliverability score based on performance against two key factors:

* Government’s confidence that the Hydrogen Plant can credibly be operational by the end of 2027
* Government’s confidence that the Hydrogen Plant has commercial and technical arrangements in place with viable offtakers for all of their hydrogen volumes

For this section we are asking projects to provide information on their planned installed hydrogen capacity by 2027, projects should not include any capacity expansion plans beyond 2027. Credibility and consistency of information is a critical factor within the assessment such that the information provided within this section will be used throughout the assessment.

The deliverability criterion contributes 30% to the final Hydrogen Project score.

### Organisational structure

5.1.1 Organisational structure company level (750 words)

What is the company structure? Please provide a chart which positions the project vehicle within any wider company structure highlighting the following information for each entity within the structure:

1. Primary activity and location
2. Ownership (including details of any stock market listings)
3. Where within the company structure will key investment decisions be taken.
4. If a new legal entity is to be created for the purpose of this project, where in the company structure this will sit and the expected timing of its incorporation.

Please provide a capability statement, which includes relevant corporate experience and identifies personnel with key roles and responsibilities. Please also provide brief details of the company’s approach to ensuring Corporate Governance best practice.

Please provide details of the ultimate beneficial owner of the corporate group, as well as the details of any shareholder (or group of related shareholders) owning more than 5% of the group’s equity capital.

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| References to supporting documentation for Section 5.1.1 |
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5.1.2 Organisational structure project level (750 words)

Please describe the organisational structure at a project level including how the delivery of the project will be managed and the experience of key personnel. Please describe the status of any commercial agreements between parties within the delivery structure alongside plans to progress future agreements, including key milestones and any dependencies.

Please describe the commercial arrangements with the T&S provider(s) and offtakers, in relation to the organisational structure referencing supporting documentation.

Please also provide details of any new legal entity to be created for the purpose of this project. Where relevant please include any anticipated partnership arrangements or agreements alongside the activities and associated timeline to finalise any partnership arrangements.

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| References to supporting documentation for Section 5.1.2 |
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### 5.2 Schedule: Level 1 integrated project schedule (1000 words)

Please provide an integrated Level 1 schedule for the Hydrogen Project including the development of both the Hydrogen Plant, hydrogen distribution network and any hydrogen storage to show the key milestones and high level activities across the project. This should show when the CO₂ T&S will be available, when the Hydrogen Plant comes onstream, when hydrogen offtakers connect, and any key milestones such as: planning, consents, decisions gates, long lead equipment items, gas grid connections, FID, COD etc. This should also show progress to date against the stated project schedule, with documentation and engineering information provided to demonstrate that the Hydrogen Project is progressing to plan.

Please provide a concise description of the schedule’s critical path with reference to important parts of the Level 2 plan that the critical path is dependent on. Please reference to a separate fully logic linked Schedule in native file format - Primavera P6 (XER) or MS Project (XML/MSP) which is required. This should be at least Level 2 detail, which means fully logic linked, integrated across the chain including critical path and float. Ideally this will be costed and resourced.

We recognise different projects are at varying degrees of development, so please provide the greatest level of detail currently available that is supportable with evidence. If relevant for your project, please cross-reference responses provided for 5.3 appropriately.

We recognise different projects are at varying degrees of development, so please provide the greatest level of detail currently available that is supportable with evidence.

Please describe areas of uncertainty in the schedule and possible interdependencies: if possible, please present the Base schedule with uncertainty ranges around individual activities and identify the key risks that could expand these ranges further.

Please also set out any assumptions made that are dependent on policy or regulatory milestones and how this could affect FID or COD.

Reference to separate ‘What if’ scenarios or Quantitative Schedule Risk Analysis of the schedules would be beneficial to increase confidence of deliverability within a given time. Reference to a commissioning plan and coordination of commissioning activities with the T&SCo and hydrogen offtakers would also be beneficial.

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| References to supporting documentation for Section 5.2 |
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### 5.3 Planning and consents (750 words)

Please provide a description of the status of the planning and consents for the Hydrogen Plant, hydrogen distribution network, hydrogen storage (if applicable) and any development the offtakers require consent for.

Please ensure that you highlight areas of risk and uncertainty surrounding planning and consents that could increase the durations or require design modifications to achieve approvals.

Please describe how the plant will comply with environmental emissions requirements.

Reference to a separate Planning and Consents Register would be helpful, as would any evidence of engagement with statutory bodies or preparation work for applications. We would anticipate planning and consent risk being an intrinsic element of the project risk register.

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| References to supporting documentation for Section 5.3 |
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### 5.4 Hydrogen Project execution plan (1000 words)

In this section, please describe how the Hydrogen Project intends to execute the project including the development and engineering stages. This should concisely describe the envisaged contracting strategy and the governance structure. Please provide a concise explanation of any aspects of the Hydrogen Project execution that apply novel construction / installation techniques.

Please provide a concise description of the Commissioning Plan and the key risks and uncertainties identified for the commissioning phase of the Project.

Please also highlight key risks and uncertainties for the Project execution phase and their potential to impact on project CAPEX and schedule.

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| References to supporting documentation for Section 5.4 |
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### 5.5 Risk management (1000 words)

In this section, please provide a concise description of the approach to Risk Management including the interactions with the T&S, hydrogen offtakers, hydrogen distribution and storage (if applicable).

Please provide a concise description of all the major risks to the Hydrogen Project and how are they going to be mitigated. It would be beneficial to evidence the risk management approach with a risk management plan

The separation of construction and operation phase risks would be preferable.

Please also summarise separate cluster-wide cross-chain risk and reference any collaboration with T&S risk register development.

Please set out how cyber security risks and digital resilience are addressed, including any business continuity management plan.

Please reference inputs to project’s risk registers where available.

The risk registers should include:

* Risks for all elements of the Hydrogen Project and downstream chain risks, including interface risks and details on risk owners
* Mitigations and how they will be managed (e.g., eliminate, reduce, transfer, insurance, etc.) alongside estimated mitigation costs
* Identification of risks that cannot be transferred to contractors or insurers or others
* Probability estimates both pre and post mitigation
* Three-point (high, low and most likely) impact estimates for cost and schedule impacts for both pre and post mitigation
* Identification of any schedule activities that are impacted by the occurrence of each risk
* Activity IDs included in the risk register
* Any significant residual safety risks
* Highlight Hydrogen Project innovation risks and mitigations

Below are examples of key risks that may need to be considered in relation to the Hydrogen Project (noting that this is not an exhaustive list of possible risks):

* Insolvency of key suppliers and offtakers
* Contractor interfaces
* Delays or cancellations of downstream projects – stranded asset risk
* Closure/bankruptcy of T&S – leaving Hydrogen Plant as stranded asset
* Underperformance of Hydrogen Plant, reducing volumes of produced hydrogen
* Low availability/high downtime of Hydrogen Plant
* Fluctuations in the demand for hydrogen from offtakers
* Covid-19/Pandemic/Epidemic external risks
* Force majeure events
* Limited design experience, codes and standards for hydrogen distribution and storage or blending with natural gas
* Regulatory risks for new technology or processes, for example, hydrogen – natural gas blending or other novel processes
* Significant failure or damage of downstream chain during construction/commissioning
* Delays in obtaining DCOs and other permits
* Workforce/key skills availability
* Other details such as extended lead times for supply of equipment or technical issues

To increase our understanding of the Hydrogen Project and its credibility, the inclusion of an opportunity register alongside the risk register would be beneficial for the assessment.

Please provide Quantitative Risk Assessment for cost and schedule where available to evidence confidence in the estimates.

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| References to supporting documentation for Section 5.5 |
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### 5.6 Stakeholder engagement (750 words)

Please provide a description of how the Hydrogen Project is identifying and engaging with key stakeholders (such as adjacent property owners, local industries and communities) during project execution, operation and post-cessation. This should include a description of the approach to developing and maintaining co-operation with key stakeholders to assure successful delivery. Reference to specific related activities in the project schedule would be helpful.

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| References to supporting documentation for Section 5.6 |
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### 5.7 Health, safety and environment

5.7.1 Health and safety (1500 words)

Please provide a concise description of the work that has been performed to identify and mitigate Health and Safety risks. Describe the work performed to demonstrate that all residual project and Health and Safety risks to staff, contractors and the local population during project development, execution, operational and post-cessation phases are as low as reasonably practicable. Supporting evidence of risk analyses or process hazard reviews would be beneficial.

Please also describe the systems, processes, and governance in place for Health & Safety Management. Please describe how the project complies with CDM 2015 and other relevant safety regulations. If the Construction Phase Plan has not yet been developed, please provide any information you do have, e.g. from the design risk registers. Please detail the health and safety indicators monitored at Board level and their current status against targets.

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| References to supporting documentation for Section 5.7.1 |
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5.7.2 Environmental (1000 words)

Please provide a concise description of the environmental impact of the Hydrogen Plant and any hydrogen storage and distribution (where applicable) during the project execution, operational and post-cessation phases. Please also provide a concise description of the further work required to prepare the necessary Environmental Statement(s).

Please describe how the Hydrogen Project will comply with environmental permit requirements and abstraction licensing and describe any uncertainties in the consenting process.

Please also describe the systems, processes, and governance in place for Environmental Management. Please detail the environmental indicators monitored at Board level and their current status against targets.

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| References to supporting documentation for Section 5.7.2 |
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### 5.8 Supply chain

5.8.1 Supply chain planning (1000 words)

Please provide a concise explanation of the assessment of the supply chain, labour and skills needed to support the proposed delivery timescales for the Hydrogen Project and any identified gaps. This should include:

1. A description of the key uncertainties linked to the supply chain, the consequential uncertainty in project costs and timelines, and when the uncertainty is expected to be resolved
2. A description of the key risks linked to the supply chain and how these will be managed
3. A description of the challenges anticipated and the associated potential mitigations / solutions to these
4. A description of the supply chain capacity and capability to support the project.

Reference to specific related activities in the project programme would be helpful.

Please also confirm the project developers will follow best practice in sourcing of labour and materials.

Where possible we would welcome seeing similar evidence from the proposed offtakers.

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| References to supporting documentation for Section 5.8.1 |
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5.8.2 Supply chain engagement (1000 words)

Please provide a concise explanation of the extent of the Supply Chain Engagement for the Hydrogen Plant, offtaker projects distribution network and storage, including which parts of the supply chain have been engaged with and where there are key contracts in place. Please also provide a description of the current view of capability and capacity and how any associated challenges are going to be addressed.

Please detail the extent to which technology licensors have been engaged with for items such as CO₂ compressors, hydrogen production, air separation, carbon capture technologies and other long-lead items. Please describe what agreements been entered into with third parties and their scope; please also confirm what preliminary studies have been performed.

Reference to specific related activities in the project schedule would be helpful.

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| References to supporting documentation for Section 5.8.2 |
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### 5.9 Financial and Commercial

5.9.1 (a) Business plan and financial health – company level (750 words per company)

This section aims to understand the financial and commercial health of all the companies involved in the development of the Hydrogen Plant and the project itself as well as understand the companies’ strategic objectives.

To support the assessment of the financial and commercial health of all the companies involved in the development of the Hydrogen Plant and the Project please also submit a copies of the Financial Statement template (Annex D) and associated financial documents as requested in the Annex D for each of the companies involved.

Note: Each company participating in the development of the Hydrogen Plant, hydrogen distribution and storage (if applicable) must provide a response and we welcome seeing similar evidence for proposed offtakers where possible. Multiple responses may be necessary where projects are being developed in partnership.

Please describe the following:

1. How your company/project’s business plans and industrial output have been impacted by events since the start of 2020.
2. What is the outlook for the company out to 2030? (your answer should include, but not be limited to, a description of, and rationale for, expected trends in revenue, overheads and profitability, plus a comparison of these to the historical period)
3. How the project aligns with the company’s overall strategic ambitions in the UK to 2030 and beyond.

Please provide copies of the latest two sets of filed accounts, any accompanying reports, management accounts covering the remainder of the current financial year, and forecast financial accounts covering the remainder of the current financial year and a further five years (or 10 years in the case of the project) for the following companies where applicable:

1. The company or companies operating the project
2. The company or companies financing the project
3. The company or companies responsible for key investment decisions in relation to this project
4. The group parent company or companies (e.g., consolidated accounts) and ultimate parent (where applicable).

In support of these accounts and reports for the above entities, please include key assumptions underlying forecasted information.

Please confirm that accounts for the above entities have not received a qualified audit report in any of the previous five years. Highlight any areas of material uncertainty raised by auditors in this period.

Please confirm if the corporate group currently has any financial obligation to HMG and provide details where applicable.

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| References to supporting documentation for Section 5.9.1 (a) |
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5.9.1 (b) Business plan and financial health – company level (750 words per company)

Note: Each company participating in the development of the Hydrogen Plant, hydrogen distribution and storage (if applicable) must provide a response and we welcome seeing similar evidence for proposed offtakers where possible. Multiple responses may be necessary where projects are being developed in partnership.

Please see Section 5.9.1 (a) for further details.

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| References to supporting documentation for Section 5.9.1 (b) |
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5.9.1 (c) Business plan and financial health – company level (750 words per company)

Note: Each company participating in the development of the Hydrogen Plant, hydrogen distribution and storage (if applicable) must provide a response and we welcome seeing similar evidence for proposed offtakers where possible. Multiple responses may be necessary where projects are being developed in partnership.

Please see Section 5.9.1 (a) for further details.

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| References to supporting documentation for Section 5.9.1 (c) |
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5.9.1 (d) Business plan and financial health – company level (750 words per company)

Note: Each company participating in the development of the Hydrogen Plant, hydrogen distribution and storage (if applicable) must provide a response and we welcome seeing similar evidence for proposed offtakers where possible. Multiple responses may be necessary where projects are being developed in partnership.

Please see Section 5.9.1 (a) for further details.

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| References to supporting documentation for Section 5.9.1 (d) |
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5.9.1 (e) Business plan and financial health – company level (750 words per company)

Note: Each company participating in the development of the Hydrogen Plant, hydrogen distribution and storage (if applicable) must provide a response and we welcome seeing similar evidence for proposed offtakers where possible. Multiple responses may be necessary where projects are being developed in partnership.

Please see Section 5.9.1 (a) for further details.

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| References to supporting documentation for Section 5.9.1 (e) |
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If additional boxes are required for companies participating in the development of the Hydrogen Plant, hydrogen distribution and storage, and offtakers where possible, please insert them below.

5.9.2 Financing plan – project level (1000 words)

This section aims to understand the credibility and maturity of financing plans of the Hydrogen Project.

Please describe the proposed financing arrangements for progressing the Hydrogen Project. Your response should distinguish between different stages of the Hydrogen Project and explain what is needed to achieve a final investment decision. Within your answer, please provide the timeline, dependencies, key risks and mitigations for the financing process. Please also detail the assumptions underpinning the financing plan including key ratios.

If the project will be financed by intragroup financing or external debt arrangements that already exist, then please provide a summary of those arrangements. Your summary of the debt arrangements should reference any factors that are material to the financing e.g., headroom, duration, security, and covenants.

If new capital needs to be raised then set out the type of finance anticipated, the level of market engagement that has taken place, feedback received, as well as the activities and timescale needed to secure the financing.

Please include a CAPEX schedule and describe how any funding gaps will be settled.

Please summarise the status of key agreements needed to realise the project and the plans to finalise them e.g., shareholder/sponsor documents, loan and security documents, and project documents. Shape, rectangle

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| References to supporting documentation for Section 5.9.2 |
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### 5.10 Operating philosophy (1000 words)

In this section, please explain who will be responsible for operating and maintaining the Hydrogen Plant, hydrogen distribution, off-take and storage if applicable – individually and as an integrated whole (where relevant).

This should include a description of who will be responsible for the operation and maintenance of the Hydrogen Plant, the hydrogen distribution network and any hydrogen storage; the control philosophy with the T&S; the extent to which any operations are to be contracted to a duty holder and how many roles are required to operate the Hydrogen Plant, hydrogen distribution network and any hydrogen storage.

Please describe the levels of redundancy in the Hydrogen Plant and hydrogen distribution network designs including the overall design availability of the Hydrogen Plant distribution network and any hydrogen storage. Please also describe alignment of maintenance periods with the T&S.

Please outline any plans for hydrogen storage and the role the storage is expected to play in matching supply with demand, particularly if the storage is being developed as part of the Hydrogen Project rather than by the offtaker.

Please provide an operational plant schedule to demonstrate alignment of hydrogen supply and demand including maintenance activities please reference any mitigation measures included to deal with inconsistencies, such as mis-aligned maintenance outages.

Please provide a concise description of the assumptions that have been incorporated into the operating expenditure estimate. This should confirm the level of uncertainty related to these assumptions and the extent to which any specific risks identified could require additional CAPEX or OPEX during operations to manage.

Reference to specific activities in the project programme to support the descriptions provided would be helpful.

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| References to supporting documentation for Section 5.10 |
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### 5.11 System Integration

##### 5.11.1 Specification of captured gas (1000 words)

Please describe quality controls and required processing for the CO₂ entering the T&S system and how this meets the T&S specification. This should include technical details of the phase envelope for this gas composition and a concise description of the impact of variation of this specification on the CO₂ treatment and processing. Please describe how the engineering solution is aligned to meet the T&S CO₂ specification.

Please also provide a description of the extent to which this specification causes an increased processing burden and the extent to which the Hydrogen Plant can vary the quality of the output CO₂.

To what extent is there uncertainty in the achievable specification for the costs presented to date? What would the cost / schedule impact of a tightening or loosening of the CO₂ entry specification be for the Hydrogen Project and which components will have the greatest influence on these?

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| References to supporting documentation for Section 5.11.1 |
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##### 5.11.2 System operating parameters (1000 words)

Please provide a concise description of the key system operating parameters for the operational monitoring and quality control of the produced CO₂. This should demonstrate the feasibility of the proposed system configuration with reference to control of composition, temperature, pressure and flow rate.

This should include a description of the key risks and uncertainties associated with the operation including any limits on transient operation and emergency shutdown scenarios.

Reference to risks within the risk register would be helpful.

Supporting information should include preliminary process description and process basis of design.

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| References to supporting documentation for Section 5.11.2 |
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##### 5.11.3 T&S Connection (1000 words)

With reference to agreements or discussions with the T&SCo, please describe the connection between the project and the T&S. This should include:

* The work completed to date by the project and the T&SCo, to understand the work required and anticipated costs to connect the T&S network and the project including the Cost of connection, and the cost of extending the T&S network to the project. Please include non-pipeline transport considerations such as shipping as required.
* The method of CO₂ transport, the intermediate pipework in private land or pipelines in public land to connect to the T&S, the battery limits of the project, the intended interface point where responsibility for the connection is assumed, and the eventual ownership and operational boundaries.

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| References to supporting documentation for Section 5.11.3 |
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##### 5.11.4 Hydrogen specification (750 words)

Please provide the specification for the hydrogen entering the distribution system including all components, pressure and temperature. This should include technical details of the process conditions expected in the system and a concise description of the impact of variation of this specification on the overall system.

Highlight any differences in specification between offtakers and how this is managed.

Please describe the offtakers sensitivity to changes in specification and the acceptable variation range.

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| References to supporting documentation for Section 5.11.4 |
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##### 5.11.5 CO₂ metering (500 words)

Please describe the CO₂ metering on entry to the T&S, explaining what the metering will be used for, the accuracy level(s), metering methodology and standards used. Please provide details of the CO₂ to be metered for fiscal purposes and custody transfer, in addition, also provide details of any other metering points across the entire process i.e. at the inlet to the capture plant (if provided).

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| References to supporting documentation for Section 5.11.5 |
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##### 5.11.6 Hydrogen metering (500 words)

Please describe the hydrogen metering on entry to a hydrogen distribution network, explaining what the metering will be used for, the accuracy level(s), metering methodology and standards used. Please provide details of the hydrogen to be metered for fiscal purposes and custody transfer, in addition, also provide details of any other metering points across the entire process such as hydrogen storage.

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| References to supporting documentation for Section 5.11.6 |
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## 6. Emissions reduction (Cost and emissions template and 1000 words)

The emissions reduction criterion will assess the potential offered by each Hydrogen Project to generate reductions in CO2e emissions (carbon dioxide, nitrous oxide and methane). The following two sub-criteria will be used:

* CO2e intensity – this will assess a Hydrogen Plant’s CO2e emissions per kg of hydrogen delivered. This will consider capture rates of the Hydrogen Plant, as well as the emissions intensity of the production and distribution of hydrogen and CO₂, including upstream emissions.
* Average total emissions reduced – this will be calculated using an average of CO₂e emissions reduced per annum over the plant’s first 15 years of operation, taking into consideration the emissions up to the production (including upstream emissions) alongside the emissions reduced from replacing an offtakers existing counterfactual fuel with low carbon hydrogen.

Both of these sub-criteria are calculated using the Cost and Emissions template (Annex C3). Please provide information within the Costs and Emissions template (Annex C3) and answer the question below. Although quantitively assessed information provided within this section will support the evaluation of the emissions reduction criteria.

This section is focussed on understanding the CO₂e intensity for the hydrogen production, upstream supply, CO2e transportation and hydrogen end use. In this section please provide a summary of the key design criteria and explain the uncertainty and assumptions for the information included within the Costs and Emissions template (Annex C3) including uncertainty in the hydrogen demand profile and seasonal or annual variation.

Please provide evidence for the figures entered in the template or an explanation of their basis ensuring consistency with operating profiles provided in the deliverability section.

The emissions reduction criterion contributes 20% to the final project score.

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| References to supporting documentation for Section 6 |
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## Economic Benefits

This criterion aims to assess the potential contribution that the Hydrogen Project can make to the government’s objective of supporting clean, resilient and sustainable economic growth as we build back from the impacts of Covid-19. Projects should look to demonstrate the contribution the Hydrogen Plant can make to the UK economy and government’s levelling up agenda.

Assessment against this criterion will be undertaken on the basis of information provided through the Economic Benefits template (Annex B) and answers provided within the Project Plan alongside any associated supporting documentation.

Projects will be assessed against the economic benefits criterion with reference to four key factors:

1. Number and quality of jobs
2. Transparency of supply chain procurement process
3. Investment in hydrogen skills
4. Wider economic benefits

The economic benefits criterion contributes 20% to the final project score.

### 7.1 Number and quality of jobs (Economic Benefits template and 500 words)

The assessment of number and quality of jobs will be mostly considered through the information outlined in the Economic Benefits template (Annex B); please complete the form to provide the jobs information.

Applicants should provide supplementary information and any clarifications or assumptions within the box below, referencing any supporting evidence.

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| References to supporting documentation for Section 7.1 |
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### 7.2 Transparency of supply chain procurement processes (750 words)

Please provide information on how the project will make their procurement strategies as transparent as possible. For example, identifying supply chain opportunities, advertising them as early as possible, and beginning meaningful engagement with hydrogen supply chain companies.

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| References to supporting documentation for Section 7.2 |
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### 7.3 Investment in hydrogen skills (Economic Benefits template and 750 words)

The assessment of investment in skills will be mostly considered through the information outlined in the Economic Benefits template (Annex B); please complete the form to provide the skills information.

Please also provide evidence that demonstrates where partnership organisations are individually or collectively investing in training programmes to develop skills in hydrogen, for example in apprenticeships and retraining programmes. We ask that Hydrogen Projects provide detail on time and duration of these programmes and specifically how they will support retraining workforces transitioning from other sectors – locally, regionally and nationally.

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| References to supporting documentation for Section 7.3 |
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### 7.4 Wider economic benefits (750 words)

Noting the commitments made in the Ten Point Plan which set out the government’s objective to drive local and regional growth to level up across the UK, please set out how the Hydrogen Project contributes to economic growth within the local area in line with the strategic priorities (for detail on strategic priorities, please refer to the economic benefits sub-section of section 5.3 in the Phase-2 Guidance document).

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| References to supporting documentation for Section 7.4 |
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## Cost considerations (Cost and emissions template and 1000 words)

Through the cost considerations criterion, BEIS will seek to determine a Levelised Cost of Hydrogen (LCOH) for the Hydrogen Plant and any hydrogen distribution and storage (if applicable). Please provide information within the Costs and Emissions template (Annex C3) and answer the question below.

This section is focused on understanding the overall cost of the project including the Hydrogen Project, CO₂ treatment and compression, hydrogen distribution costs, remaining cost uncertainty and financing costs.

Please provide a summary of the Hydrogen Project costs including expenditure to date, DEVEX, CAPEX, OPEX, and include the project’s financial model to support the assessment of these cost and any cost estimate models. The summary should include the level of estimates, benchmarking, accuracy, and contingency applied. Please also provide justification for any contingencies that have been applied or justification for not applying contingency. Supporting evidence and explanatory notes should be provided to allow understanding of the cost estimate and assumptions.

The Levelised Cost of Hydrogen Model within the Cost and Emissions template (Annex C3) must be populated and referenced in this section to enable evaluation and support the descriptions provided.

Please provide detailed comments in Annex C3, or in supporting documentation, to explain the Project costs, cost certainty and contingencies, or any other cost information submitted. This should be done at a granular level. Projects must also provide their own cost model as supporting documentation.

Please describe the level of uncertainties and risks that have been identified that could affect the CAPEX and OPEX estimates (either as a cost increase or reduction). This should clarify which uncertainties and risks will be reduced or eliminated before FID. Providing specific references to the project risk register(s) would be helpful.

The cost considerations criterion contributes 15% to the final project score.

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| References to supporting documentation for Section 8 |
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## Market development and learning

The UK has firm ambitions for the development of low carbon hydrogen capacity and infrastructure. The production and sharing of learnings from the development of hydrogen projects will be a crucial step in reducing future costs and de-risking projects for future deployment. The sharing of information will also promote innovations and collaboration both within and between projects.

The Market Development and Learning criterion will assess the extent to which:

* The project can help realise relevant aspects of a hydrogen economy
* The project offers learning and development in relevant production technologies and enables research & innovation across the wider hydrogen value chain

**In this section, please be clear where your plans are for hydrogen capacity built by end of 2027 and where they are plans for 2028 and beyond.**

The market development and learning criterion contributes 15% to the final project score.

### 9.1 Hydrogen market development (750 words)

Please highlight the contribution of the Hydrogen Plant to the UK Government’s Hydrogen ambition of 1 GW of hydrogen production capacity by 2025 and 5 GW by 2030. How is the hydrogen plant enabling the development of a hydrogen market in the UK?

The UK aims to develop the necessary hydrogen network infrastructure, including storage, to enable hydrogen offtakers from a range of sectors and applications. Please describe proposals or plans to support this aim.

Please describe plans, supported by evidence to support longer term market features that meet the aims of the Hydrogen Strategy and hydrogen ambitions in the Ten Point Plan and Net Zero Strategy. For example demand growth, supply chain growth, fostering public and consumer awareness and acceptance, and demonstration of the business case for private investment in the UK’s hydrogen economy.

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| References to supporting documentation for Section 9.1 |
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### 9.2 Cost reduction, replicability, and innovation (750 words)

This section is seeking information on how the project will generate potential benefits to subsequent CCUS and hydrogen projects.

Describe how the project will deliver replicability benefits, including any plans in place to reduce future costs of CCUS-enabled hydrogen plants.

Describe the innovative aspects of the Hydrogen Project design (hydrogen production, hydrogen or carbon dioxide transportation and storage, including non-pipeline transportation) and any novel end use of hydrogen, what technology maturation is required for these innovations and what future cost reductions are expected from them. How replicable are these innovations for future CCUS and hydrogen projects in the UK and globally?

Please outline any additional benefits from the project which will wider decarbonisation innovation e.g., use of low carbon materials in project supply chain.

Please explain if there are any subjects which could not be shared due to sensitivity around intellectual property.

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| References to supporting documentation for Section 9.2 |
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### 9.3 Knowledge sharing plan (750 words)

Please describe how the project will generate, disseminate, and promote new knowledge and best practice, including how the Hydrogen Project will drive delivery partners to share information. These plans should describe how the project will share knowledge with different stakeholders including local and national institutions to ensure maximum benefit of the learnings gained. Such plans could include supporting specific research and innovation initiatives aligned to hydrogen policy developments, such as the potential for a hydrogen-heated town.

Please also provide a list, or separate document, of the Key Knowledge Deliverables (KKD) that will be shared either in full or redacted as appropriate.

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| References to supporting documentation for Section 9.3 |
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1. <https://www.gov.uk/government/publications/the-ten-point-plan-for-a-green-industrial-revolution/title> [↑](#footnote-ref-2)
2. https://www.gov.uk/government/publications/net-zero-strategy [↑](#footnote-ref-3)
3. The online application portal is the system set up to collect all of the relevant information, documents and supporting evidence from the Hydrogen Project. [↑](#footnote-ref-4)