Department for
Business, Energy
& Industrial Strategy

Hydrogen BECCS Innovation Programme: Phase 2

An SBRI Competition: prj_776

Competition Guidance Notes

1 BEIS Hydrogen BECCS Innovation Programme - Overview

The Hydrogen BECCS Innovation Programme forms part of BEIS' £1 billion Net Zero Innovation Portfolio, which aims to accelerate the commercialisation of innovative clean energy technologies and processes through the 2020s and 2030s. Hydrogen BECCS for the purpose of this programme refers to generating hydrogen from biogenic feedstocks via gasification or other bioenergy conversion routes, combined with carbon capture and storage.

Low carbon hydrogen will be critical for meeting the UK's legally binding commitment to achieve net zero by 2050, and hydrogen generated via bioenergy has the potential to deliver negative emissions required to offset emissions from hard to decarbonise sectors.

The overall objective of the Hydrogen BECCS Innovation Programme is to support development of technologies which will enable the commercialisation and deployment of Hydrogen BECCS at scale to achieve negative emission and hydrogen production targets as outlined in the UK's Sixth Carbon Budget covering greenhouse gas emissions for the period 2033-2037.

The programme is split into two phases. Phase 1 (total budget £5m) supported 22 projects to scope and develop a feasible prototype demonstration project to be run in Phase 2. Phase 2 will select the most promising projects from Phase 1 and support the proposed physical demonstration of their innovation. **Only successful Phase 1 applicants, that have completed their Phase 1 project and submitted their final report to BEIS, are eligible to apply to Phase 2. The Phase 1 final report must be approved by BEIS before any contract for Phase 2 funding can be issued.**

This ITT (Invitation to Tender) is for Phase 2. The Competition Guidance Notes for the Hydrogen BECCS Innovation Programme Phase 2 Competition are provided within this document. A Small Business Research Initiative (SBRI) pre-commercial procurement process will be used to deliver this competition. Thus, this competition will **only support projects where the core technology being developed has not been previously operated widely or in a commercial environment.**

In both phases of the competition the development of technologies within three categories will be supported:

- Category 1: Feedstock pre-processing
- Category 2: Gasification components
- Category 3: Novel biohydrogen technologies

2 Competition Context and Objectives

2.1 Context

The UK has legislated for a net zero emissions target by 2050. Analysis by BEIS, the Climate Change Committee (CCC) the Intergovernmental Panel on Climate Change (IPCC) and other climate institutions show that Hydrogen BECCS will be essential to realising this target, due to its potential to deliver negative greenhouse gas emissions, and the opportunity it presents to support the decarbonisation of 'hard-to-treat' sectors (e.g. industry and heat).

As part of the previous Energy Innovation Portfolio funding scheme, BEIS commissioned a review and benchmarking study of Advanced Gasification Technologies, which are expected to play a significant role in the UK's net zero transition. This study has fed into the development of the Hydrogen BECCS Innovation Programme, and can be downloaded here: Advanced gasification technologies: review and benchmarking.

Following publication of the study in October 2021, BEIS launched the competition for Phase 1 of the Hydrogen BECCS Innovation Programme in January 2022. The competition funded 22 organisations to scope and develop a feasible prototype demonstration project to be run in Phase 2. These Phase 1 projects commenced in Summer 2022 and will conclude in January 2023. The full list of projects awarded funding in Phase 1 can be viewed here: Hydrogen BECCS Innovation Programme Phase 1: successful projects.

2.2 Objectives

The overall objective of the Hydrogen BECCS Innovation Programme is to support development of technologies which will enable the commercialisation and deployment of Hydrogen BECCS at scale to achieve negative emission and hydrogen production targets.

Specific objectives include:

1. Reduce the levelised cost of hydrogen (LCOH) production and improve efficiencies associated with Hydrogen BECCS technologies.
2. Develop feedstock pre-processing technologies which will reduce costs and improve gasification process performance.
3. Improve syngas treatment technologies to effectively control contaminant concentrations to improve gasification process performance.
4. Develop syngas upgrading technologies, which can be combined with Carbon Capture and Storage (CCS), to improve the levelised cost of hydrogen production.
5. Progress Technology Readiness Levels of novel biohydrogen conversion technologies, which can be combined with CCS.

3 Competition Structure

The Competition funding will be awarded using the Small Business Research Initiative (SBRI) approach. SBRI is a well-established pre-commercial procurement process that enables the development of innovative products and services in response to specific challenges faced by government departments and public sector bodies. Successful applicants receive finance to develop their innovative ideas, generating new business opportunities and routes to market. This competition and the SBRI process are **not** limited to small and medium sized organisations.

The Competition is being delivered in two consecutive phases; Phase 1 (total budget £5m) supported 22 projects to scope and develop a feasible prototype demonstration project to be run in Phase 2. Phase 2 takes the most promising projects from Phase 1 and supports the proposed physical demonstration of their innovation.

For each phase the competition is split into three categories:

- Category 1: Feedstock pre-processing
- Category 2: Gasification components
- Category 3: Novel biohydrogen technologies

An SBRI will fund 100% of eligible project costs (See Appendix 2: Eligible and Ineligible Costs). Applicants cannot provide match funding; 100% of eligible project costs must be covered by the SBRI contract.

3.1 Phase 1: Feasibility

During Phase 1, projects will have completed a feasibility study allowing applicants to demonstrate the feasibility of their proposed technology. For the purpose of the Phase 2 competition, the scope of work BEIS expects to have been completed by applicants during the Phase 1 feasibility study includes:

a) the Hydrogen BECCS technology concept,

b) an engineering design for Phase 2 (including an approach to testing the technology)

c) a costed project plan for Phase 2 and

d) a commercialisation plan.

3.2 Phase 2: Demonstration

Phase 2 will support the physical demonstration of the Hydrogen BECCS technology, including build, trial, decommissioning (if appropriate), market assessment, and knowledge dissemination. The demonstration project should demonstrate the Hydrogen BECCS

technology and test its effectiveness. Companies will also develop technical and business plans for market deployment beyond Phase 2.

This Phase 2 competition and the associated application form is being released to all teams undertaking Phase 1 projects to complete if they wish to bid for Phase 2 demonstration funding. As this is a closed competition, the project lead must have been successful in securing Phase 1 funding and have completed their Phase 1 project (the Phase 1 final report must be approved by BEIS before any contract for Phase 2 funding can be issued).

The Phase 2 activities procured in this Competition must be conducted largely in the UK and the majority, over 50%, of the eligible activity (resources and goods) must be incurred in the UK.

Phase 2 contracts will commence in Spring 2023 and end on 31st March 2025. Subject to applications received and assessment scores achieving the minimum pass mark of 60%, BEIS intends to fund at least two demonstration projects in each category. There will be a total budget of £25m available for Phase 2. Each category will have a maximum budget for funding Phase 2 projects, and a maximum cost per project (excluding VAT) as follows:

Category	Maximum cost per project (excluding VAT)	Total category budget (excluding VAT)
Feedstock pre-processing	£2.5m	£5m
Gasification components	£5m	£10m
Novel biohydrogen technologies	£5m	£10m

See Section 9 for contract size detail.

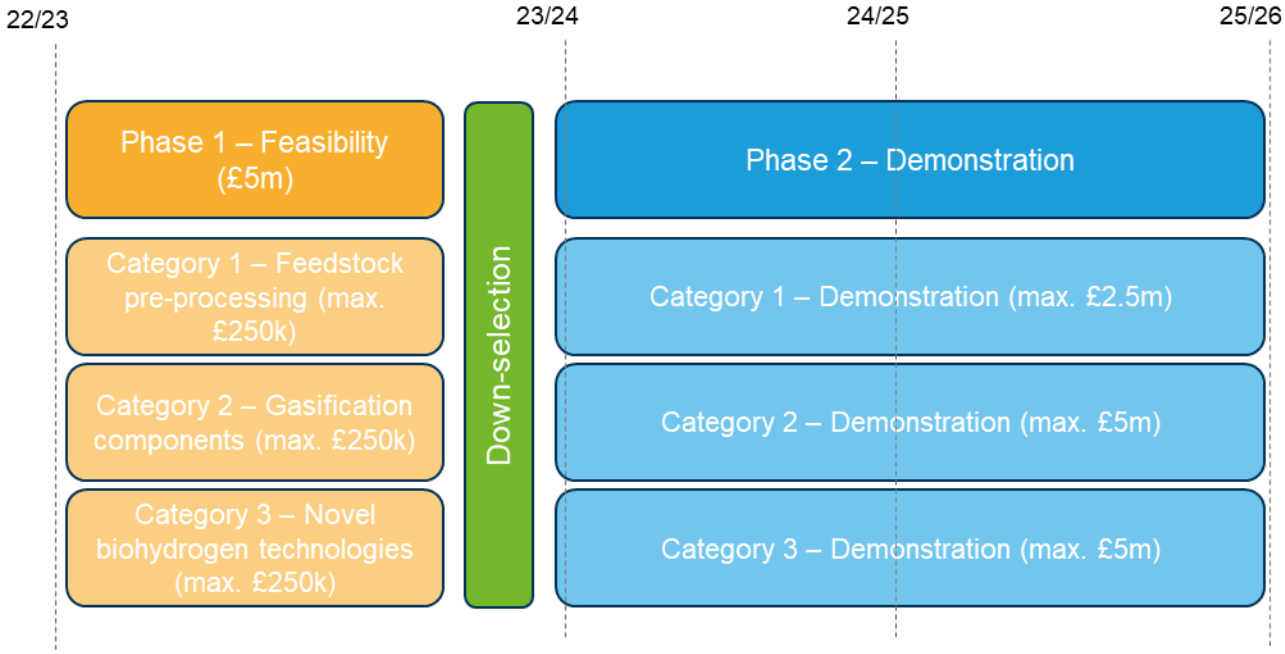

Figure 1: Competition structure and timeline

Phase 2 will run for approximately 23 months (including at least 2 months for approval of final deliverables by BEIS and project closure). A public report detailing the key findings will be provided by each project team and published on the gov.uk website at the end of Phase 1 and Phase 2.

3.2.1 Acceleration Support for SMEs

This Programme will offer Acceleration Support to successful applicants where the project lead organisation meets the definition of Small & Medium Enterprise (SME). Projects whose lead organisation is a large organisation or a university will not be eligible to receive this support. The support is highly recommended for SME SBRI awardees to help develop their business. This Acceleration Support is 100% funded by BEIS. This support will focus on helping the supplier to prepare commercial plans, develop marketing strategies, engage with investors and other actions that will increase the chance of successfully bringing the innovation to market or reduce the time to market.

All SME-led proposals that are awarded funding in Phase 2 and wish to receive Acceleration Support will need to participate in an Acceleration Support Planning meeting. This planning session will be conducted by The Carbon Trust who have been appointed to deliver Acceleration Support Services on behalf of BEIS. Following the planning meeting an acceleration plan will be created. These plans will be bespoke and based on the company needs identified. Further details about this support are provided in Appendix 6: Acceleration Support and additional information will be provided to successful projects following notification of award.

3.2.2 Environmental and Safety Considerations

Applicants will be required to consider the environmental and safety impact of their solution and the regulations which must be adhered to.

The Environment Agency is the principal regulator on environmental matters in England. The environmental regulators for Scotland, Wales and Northern Ireland are the Scottish Environment Protection Agency (SEPA), Natural Resources Wales (NRW) and the Northern Ireland Environment Agency (NIEA) respectively. BEIS strongly encourages applicants to consider the possible environmental impacts of proposed projects, and ways to minimise any negative impacts, as early as possible, to ensure that sufficient detail can be provided at application stage. For example, emissions and air pollution, water use, waste, use of scarce materials, noise and visual impacts should be considered. Please read and follow the regulatory guidance relevant to your technologies; some useful links and further guidance is found in Appendix 5: Environmental Considerations and Regulations, as well as contact details of the relevant authorities.

Air Quality: Applications to the competition should demonstrate that they have considered the impacts of the fuels and processes associated with their project and the targeted technology on air quality, including within their local area. Applicants must prove that they have taken steps that meet (ideally go over and above) existing local and national air quality regulations, to reduce emissions and mitigate impacts that are damaging to air quality. The response should also provide assurance that there is scope for the project/technology to be compliant with more stringent air quality regulations, which may be a requirement in future.

Where relevant, applications should pay attention to the damaging air pollutants that the UK currently has national emission reduction commitments for, including:

- fine particulate matter (PM2.5),
- ammonia (NH_3),
- nitrogen oxides (NOx),
- sulphur dioxide (SO_2), and
- non-methane volatile organic compounds (NMVOCs).

The gov.uk website provides guidance on air quality, including information on national and local regulations. As air quality is a devolved matter, regulations may vary amongst the devolved administrations.

Fugitive Hydrogen Emissions: Hydrogen itself can lead to global warming, with early research suggesting its Global Warming Potential is around 11±5 (see Fugitive Hydrogen Emissions study and Atmospheric Implications of Hydrogen study). Applicants to the competition should show that they have considered the level of fugitive hydrogen emissions (e.g. during start-up, shutdown and abnormal operation), throughout the technology chain / system, and made efforts to minimise these. Successful demonstration projects will also be expected to work with BEIS and BEIS contractors to monitor fugitive hydrogen emissions; applicants are not required to incorporate this in their costing or planning at this stage.

Safety: Due to the relatively innovative nature of hydrogen use in many settings, the design and installation standards are not as well developed as those for natural gas and LPG. However, the principles of the handling of hydrogen as an industrial gas are well

known. IGEM has published the IGEM/H/1 standard and is updating IGEM/SR/25 and applicants are expected to follow these where appropriate. The British Compressed Gases Association also provides detailed guidance. The primary regulations that will govern the handling of Hydrogen and the associated infrastructure are DSEAR (Dangerous Substances and Explosive Atmospheres Regulations), COMAH (Control of Major Accident Hazards) and PER (Pressure Equipment Regulations). The controlled quantity of Hydrogen for The Planning (Hazardous Substances) Regulations 2015 is 2 Tonnes. Hydrogen is a named dangerous substance under COMAH regulations. The threshold quantities are 5 Tonnes (lower tier) and 50 Tonnes (upper tier); more information can be found here. In the medium term the Health and Safety Executive (HSE) will regulate hydrogen under the Health and Safety at Work Act (HSWA) 1974, and will expect organisations to adopt both the principles and details (where appropriate) of the GS(M)R 1996 and the GS(I&U)R 1998. This means in practice the direct involvement of the HSE in relatively small and simple hydrogen installations is likely to be modest. For more information on safety expectations of Hydrogen BECCS demonstration projects see Appendix 5: Environmental Considerations and Regulations.

4 Technology Scope

In each phase the competition is split into three categories:

- Category 1: Feedstock pre-processing
- Category 2: Gasification components
- Category 3: Novel biohydrogen technologies

For the Phase 2 competition, a single project application must be submitted by the Phase 1 project lead. There should be a clear, linear continuation of a Phase 2 project from Phase 1, meaning that the Phase 2 project must be based on the project development work completed in Phase 1; this is an eligibility criterion. For this reason Phase 2 bids must also be submitted to the same technology category as in Phase 1. Project scopes will have evolved based on findings within Phase 1; however, introducing entirely new innovations is not permitted within the competition. The scope of the demonstration project can reflect greater ambition, in comparison to the scope originally proposed in Phase 1, but the project's core objectives must be recognisable.

This section describes the types of technologies that will be considered within scope for each of the three categories.

For the purpose of this innovation programme, the term **Advanced Gasification Technologies** refers to gasification as a thermal conversion technology used to convert biomass or waste feedstocks into a syngas which can be upgraded to produce bioenergy products. This programme is primarily concerned with improving Advanced Gasification Technologies for hydrogen generation.

Please see Section 7 for a full list of eligibility criteria.

4.1 Category 1 - Feedstock pre-processing

The scope for this category covers the development of low cost and energy efficient pre-processing technologies, which will optimise biomass and waste feedstocks for use in Advanced Gasification Technologies, with a preference for reducing costs and improving gasification process performance.

Example technologies for innovation:

a) Pelletising

b) Mechanical sorting

c) Thermal treatments such as torrefaction

Please refer to Section 4.5 for details on types of feedstocks which are considered in and out of scope.

4.2 Category 2 - Gasification components

The scope for this category covers the development of Advanced Gasification Technology ***components*** focusing on improving syngas quality (See Section 5.3.4) and upgrading for generation of hydrogen.

Where CO_2 is produced (for example in syngas upgrading) applicants must demonstrate that the innovation is compatible with carbon capture. This category will not fund the development and demonstration of standalone carbon capture systems. Innovations that intrinsically link carbon capture with the hydrogen production process will be eligible.

Example technologies:

a) Systems which control and contribute to improve syngas quality such as real time measurement capability.

b) Syngas treatment:

   i) Physical removal systems including wet scrubbers, gas cyclone separators, baffle filters, fabric filters and electrostatic precipitators.

   ii) Chemical removal systems

   iii) Catalytic and thermal tar removal

c) Syngas upgrading (Technologies that separate and extract Hydrogen & CO_2 from the syngas such as pressure swing adsorption).

d) Gasifier-integrated technologies and design that prevent the formation of contaminants and enable more effective downstream processing.

4.3 Category 3 - Novel biohydrogen technologies

The scope for this category covers the development of novel biohydrogen technologies producing hydrogen from biogenic feedstocks, where the core conversion technology is not gasification, and which can be combined with carbon capture. Where CO_2 is produced, applicants must demonstrate that the innovation is compatible with carbon capture.

Example technologies:

a) Dark fermentation (anaerobic digestion) to produce hydrogen

b) Photo fermentation to produce hydrogen

c) Wastewater treatment (e.g. recovery of ammonia and conversion to hydrogen)

d) Steam Methane Reforming of biogas from AD for biohydrogen generation

e) Pyrolysis

4.4 Innovation and Technology Readiness

This competition will support proposals that can develop and demonstrate Hydrogen BECCS technologies in the timescales indicated. BEIS requires applications to show that technologies were between TRL 4-6 at the beginning of the Phase 1 project, and that by the end of Phase 2 the technology readiness levels will have advanced considerably towards commercialisation depending on the initial state of maturity.

4.5 Technology Exclusions

The following technologies will be classified as out of scope and are not eligible to received funding via this innovation programme:

a) Technologies outside of Technology Readiness Levels (TRL) 4-6 at commencement of Phase 1.

b) Non-innovative technologies or technologies that have previously been operated widely or in a commercial environment (in the UK or internationally).

c) CCUS technologies which aren't intrinsically linked to the hydrogen production process.

d) Innovations using waste feedstocks with less than 25% content, by energy, of biogenic waste.

e) The use of biomass feedstocks which are not sustainably sourced as outlined in the 2021 BEIS Biomass policy statement[1]. Feedstocks in scope include perennial energy crops (Miscanthus and short rotation coppice), short rotation forestry and wastes, products (incl. forest derived products), agricultural residues, forest residues, and residues from processing, as well as marine-based and novel feedstocks.

f) Technologies generating hydrogen from non-biologically derived sources.

g) Technologies which generate hydrogen from a non-biological feedstock, such as electrolysis using Alkaline, Polymer Electrolyte Membrane (PEM) and Solid Oxide Electrolyser (SOE).

h) Technologies which generate power or generation of any fuel other than hydrogen as the primary product.

1 For more information, see Chapter 1 of the Biomass Policy Statement: https://www.gov.uk/government/publications/biomass-policy-statement-a-strategic-view-on-the-role-of-sustainable-biomass-for-net-zero

Microbial Electrolysis Cells (MEC) and other bio-electrochemical systems are **not** excluded from this competition, providing they meet all other eligibility criteria.

5 Deliverables

It should be noted that SBRI contracts require that project outputs are shared publicly – therefore all information apart from Commercial-in-confidence information will be required to be shared.

5.1 Phase 1: Feasibility

Deliverables expected of Phase 1 projects can be found in the Phase 1 Competition Guidance Notes[2].

5.2 Phase 2: Demonstration

Phase 2 projects will be required to deliver:

5.2.1 Application and Physical Demonstration

Application and physical demonstration of the innovation in a real-world, or suitably robust, setting including functional and performance testing (with reference to the testing requirements outlined in Section 5.3.4). This should include scope for iterations and ongoing quality assurance.

Projects should plan to provide BEIS with regular updates and progress reports (no less than quarterly). Updates should include, as appropriate, technical and financial updates, trial results, impact of work done, output costs and efficiencies, impact on Levelised Cost of Hydrogen, and any other information relevant to the stage of the programme. Please see Section 11.1.1 for details of Reporting requirements.

Projects should also make available on request from BEIS, in an agreed accessible format, Excel Spreadsheets or CSV files containing all testing data collected during the demonstration phase, with metadata that describes clearly each of the data fields collected, including units.

BEIS may ask for fully accessible copies of any models used and if requested, these must be provided. This includes any models developed to validate/analyse test results; documentation should be provided explaining the working of the model and the algorithms underpinning the model. These must be consistent with BEIS model QA guidance[3]. Additionally, appropriate explanations of the analysis undertaken, the raw data used and any substantive assumptions made should be provided.

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[2] https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1052852/hydrogen-beccs-phase-1-competition-guidance-notes-version-2.pdf

[3] https://www.gov.uk/government/collections/quality-assurance-tools-and-guidance-in-decc

Any data and models provided to BEIS will be treated as confidential and only be used for the purpose of reviewing project deliverables to enable payment of work carried out, and to review technical progress of the project at stage gates.

5.2.2 Progress Reporting

Reporting on progress against the commercialisation plan developed in Phase 1, including:

a) how the commercialisation plan has been updated and developed throughout Phase 2, including consideration of delivery, installation, commissioning and support functions (where appropriate); consideration of initial demand and marketing (including forecast costs of implementing the innovation).

b) how the wider market is and will continue to be engaged i.e. route to market plan; potential partners

c) consideration of how the innovation could be refined to align with market/client requirements

d) impacts from changes in the wider energy landscape

e) how the innovation is and will continue to be promoted to maximise impact

5.2.3 Final Report

An evidence-based final project report for BEIS (and other government departments) detailing:

a) An engineering design: the design and development of the innovation, including technical drawings and relevant data informing the design. The key concepts of the demonstrator design should be clearly explained and evidenced, showing the engineering design process and evidence of its results.

b) Updated cost estimates: an estimate of the costs of the Hydrogen BECCS innovation, including updated estimates for the Levelised Cost of Hydrogen (£/MWh) produced at the end of Phase 2 and 5 years after Phase 2 is complete. These estimates should be calculated with reference to the final costs of the demonstration system.

c) Demonstration and testing results: results should be presented in line with the Test Plan. Projects should identify at least one quantitative key performance metric that is used throughout Phase 2 demonstration, such as hydrogen yield, efficiencies achieved against a baseline, technology availability, cost reductions and potential profitability. These should be framed within relevant economic parameters.

d) An updated carbon life cycle assessment of the technology: this should include an assessment of the technology against the UK Low Carbon Hydrogen Standard (LCHS)[4]. The LCHS considers greenhouse gas emissions and other sustainability criteria associated with hydrogen production, including consideration of fugitive hydrogen emissions.

e) An updated Commercialisation Plan: this should detail how the innovation will continue to be developed after the Phase 2 project ends. The Commercialisation Plan should include a description of the target market for the innovation detailing its size and nature and the intended scale and deployment locations of your innovation for commercial viability. It should also include consideration of how, and to what extent, the innovation contributes to the commercialisation and deployment of Hydrogen BECCS at scale. This should be quantified using the same key performance metric identified above.

f) Key successes: these should include consideration of the wider environmental benefits or trade-offs (including air, soil, water, land use impacts).

g) Persistent barriers: these should include consideration of the wider environmental impacts and trade-offs (including air, soil, water, land use impacts).

h) Lessons learned and next steps: this should cover activities to take place after the end of the programme including plans to address any performance issues identified.

Applicants are also expected to provide a version of the Phase 2 final project report that can be made publicly available (if there are aspects of the main Phase 2 report that are commercially confidential).

5.2.4 Dissemination Activities

Contribution to knowledge dissemination activities and any other dissemination activity as outlined in project's dissemination plan.

[4] The Low Carbon Hydrogen Standard (LCHS) was published by BEIS in April 2022 and sets a maximum threshold for the amount of greenhouse gas emissions allowed in the production process for hydrogen to be considered 'low carbon hydrogen'. Compliance with the standard will help ensure new low carbon hydrogen production makes a direct contribution to our carbon reduction targets. Please note that technologies which do not comply with the LCHS are unlikely to be eligible to receive UK Government Hydrogen Business Model revenue support. For more information visit: https://www.gov.uk/government/publications/uk-low-carbon-hydrogen-standard-emissions-reporting-and-sustainability-criteria

5.3 Testing Requirements

5.3.1 Purpose

Performance testing is crucial for ensuring the long-term success of the innovations in this competition. This section provides guidance to applicants about testing that should be considered by project teams when outlining the approach to testing the innovation in Assessment Criterion 1.

Effective testing of the technologies during demonstration will provide assurance for further development of the innovations and validate or update key design assumptions. The key areas for testing are the following:

a) Performance: The technology achieves its desired outcome (e.g., tar clean-up, drying, conversion to hydrogen) effectively and to the designed level.

b) Quality: The end product is delivered to the quality criteria required for use, downstream processing etc.

c) Rating: Understanding the impact of changes in production load on the technology

d) Other: Environmental compliance, efficiency

Testing should consist of a short functional test and long-duration performance/reliability test.

5.3.2 Functional testing

Functional testing will evaluate the technology's ability to operate as per its design, feedstock characteristics' impact on performance, product characteristics and quality, emissions and waste outputs.

Functional testing is expected to be conducted before and after the long duration performance testing to also determine any deterioration in performance over the performance period.

5.3.3 Performance testing

Long-duration, continuous performance testing will provide assurance for viability of commercial operation, cumulative impacts of long-term operations, reliability, maintainability and plant cycling. Additional considerations can include scale-up challenges such as effective heat and mass transfer, changes in geometry, dynamic operations impact, etc.

Performance testing is expected to last a minimum of 1,000 hours unless a shorter duration can be fully justified. Performance testing durations longer than 1,000 hours should be considered if bidders believe this is what is necessary to provide assurance for

potential future customers/investors. During this period data should be collated that may include:

a) Operating Hours

b) Downtime due to planned maintenance

c) Downtime due to unplanned maintenance

d) Equipment and / or component failures, including root cause analysis

e) Gas leaks

f) Consumables used such as oils and greases

g) Energy consumed

h) Water consumed

i) Daily log of activities such as:

   i. throughput of material e.g. feedstock, syngas

   ii. quality and volume of product output

   iii. CO_2 separated

   iv. adjustments to operations, staff

   v. influencing factors

Noting the trial nature of this programme, a simple availability calculation should be applied:

$$Availability = \frac{Operating\ Hours}{Operating\ Hours + (Planned + Unplanned\ maintenance\ times)}$$

Availability is a metric that indicates the percentage of operational hours that the equipment will be performing as designed.

Operating Hours (Uptime) – Refers to the Performance trial period during which time the system is fully operational.

Planned Maintenance – Refers to all maintenance activities that are planned such as checks, inspections, changing of filters, application of consumables, greases, oils etc.

Unplanned Maintenance – Refers to all maintenance activities that were unplanned such as repairs and replacement following equipment or component failure.

Waiting times for spares or other resources should be noted but excluded from this calculation.

Effective testing can inform decisions for commercial scale-up such as material selection, mitigations for identified issues, practicality of commercial operation, operating condition optimisation. For testing to be effective, it needs to be carried out under realistic conditions that will be present during commercial operation, for instance realistic syngas composition post-gasification. It is also important that testing is used to improve design and not just as a pass/fail test, which necessitates adequate time for decisions to include testing results in their considerations. Whilst testing can be done in-house, independent analysis can provide assurance for the testing results and additional certainty for the ensuing scale-up steps.

5.3.4 Test Parameters

For each of the technology categories testing should aim to demonstrate the following:

Category 1

Feedstock pre-processing innovations should aim to achieve higher quality fuels by:

a) Reducing moisture

b) Improving the homogeneity of the fuel particle size and reducing variability

c) Minimising sulphur and chlorine

d) Minimising contaminants

e) Minimising ash/silicates

Category 2

Syngas quality improvement should aim to achieve part or all of the IGEM Hydrogen Gas Quality Specification[5] or equivalent standard based on end use requirements.

Category 3

Novel Biohydrogen Technologies should aim to reduce the cost of hydrogen production through one or more of the following methods:

a) Maximising hydrogen production

[5] https://www.igem.org.uk/technical-services/technical-gas-standards/hydrogen/igem-h-1-reference-standard-for-low-pressure-hydrogen-utilisation/ (See Appendix 4: Hydrogen gas quality specification)

b) Reducing energy penalty of CO_2 removal/transport

c) Maximising biogenic CO_2 content

d) Minimising input energy requirements

e) Reducing equipment capital costs or improving scalability

f) Reducing the costs of input fuels

g) Improving plant efficiency/availability/reliability

See the Levelised Cost of Hydrogen workbook spreadsheet published with this ITT for further details on cost reduction.

5.4 Administration

BEIS will appoint a monitoring officer[6] to support the delivery of the demonstration project and approve materials for publication. Please see Section 11.1.2 for details of Monitoring requirements.

BEIS requires the project teams to support the evaluation of their projects by providing data on key performance indicators. Details of key performance indicators and evaluation requirements are located in Section 11.1.3.

Similar to Phase 1, Phase 2 applicants will retain ownership of the intellectual property and physical assets generated from the project, subject to the Contract Terms and Conditions. See Section 11.2 and the Contract Terms and Conditions for further details.

[6] In some instances, the monitoring services will be provided by an external organisation. External organisations will be subject to a confidentiality agreement.

6 Competition Timetable, Application and Assessment Process

6.1 Competition Timeline Overview

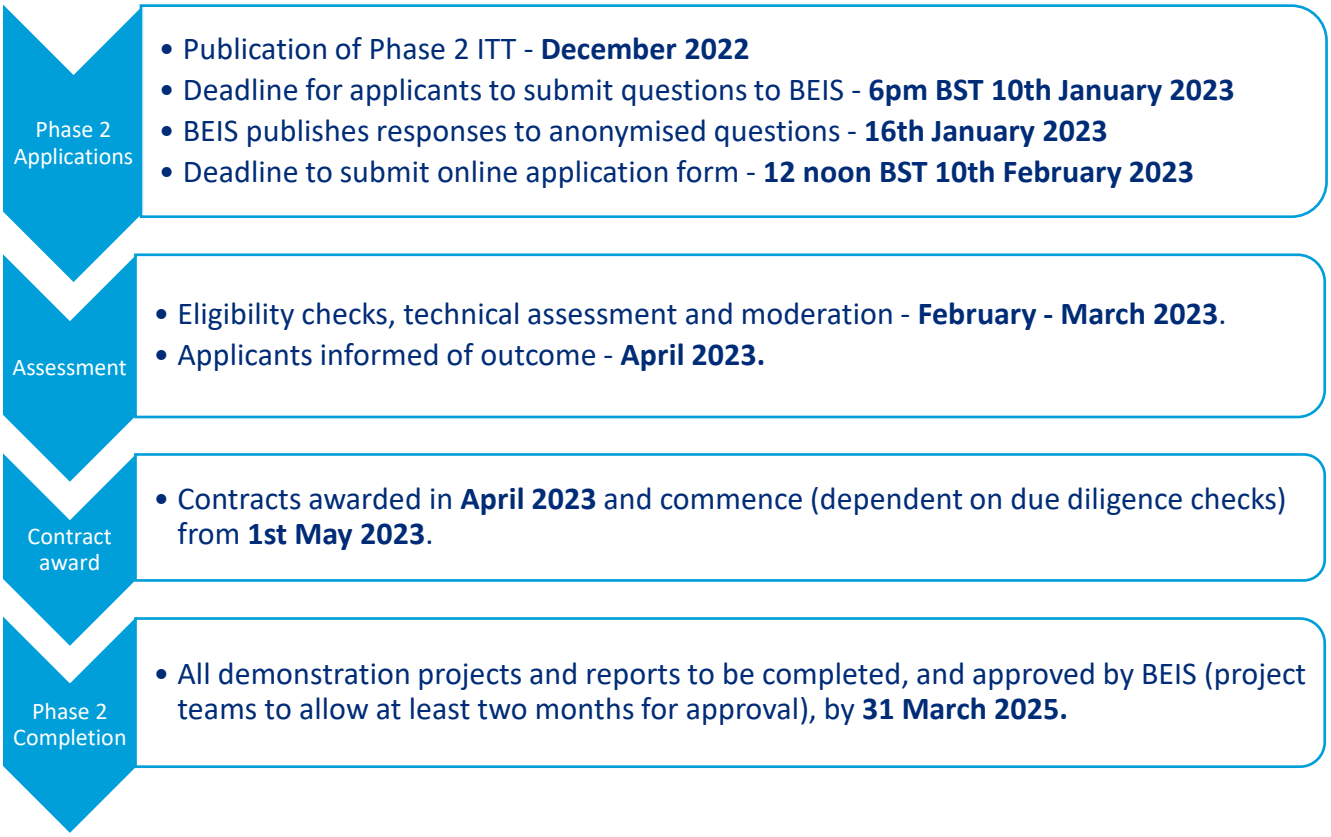

Figure 2: Phase 2 Competition Timetable (Launch to Completion). Please note dates may vary.

6.2 Competition Timeline and Process

6.2.1 Stage 1: Application

Applicants are asked to submit an online competition application form, with supporting information by **12 noon BST, 10th February 2023**. The notes below explain the details of the application process:

1) **Questions about the Competition:** If you have any questions on the competition process or require clarifications on the eligibility criteria after reading these Competition Guidance Notes, please submit queries to **h2beccs@beis.gov.uk**. All questions should be submitted **by 6pm BST, 10th January 2023.** Questions submitted after this date may not be answered. We will reply to any queries which, in our judgement, are of material significance through an anonymised Q&A sheet published on our website **by 16th January 2023**, so there is sufficient time for applicants to consider the responses

when drafting their applications. Please see Section 14 for further instructions on amendments to the competition documents. All applicants should take these replies into consideration when preparing their own applications and we will evaluate applications on the assumption that they have done so.

2) **Online Registration Form:** Phase 1 project leads will receive a password to access the online competition application form. There is no obligation on Phase 1 project teams to submit a Phase 2 application, although we would appreciate your notification if you do not intend to apply, in order to manage our review planning.
   a) **Submission of Application:** The full application for the Competition must be submitted online by the deadline: **12 noon BST, 10th February 2023**. The online application form will be closed for submissions after this time.
   b) **Application documents**: All application documents must be submitted via the online application form. In the form, there are opportunities to upload relevant supporting documents. In some sections, we specify the supporting information we would like to see uploaded.

3) **Submission Content:** Each online application must include the following:
   a) Completed Application Form (the online application form can be found here). Mandatory questions are marked with an asterisk.
   b) An outline Test Plan for the Phase 2 project (this should be uploaded alongside the answer to Assessment Criterion 1).
   c) Completed 'Levelised Cost of Hydrogen Workbook' (this should be uploaded alongside the answer to Assessment Criterion 2a).
   d) Completed 'Hydrogen BECCS Finance Form' (this should be uploaded alongside the answer to Assessment Criterion 4).
   e) A project delivery plan / Gantt Chart for the Phase 2 project (this should be uploaded alongside the answer to Assessment Criterion 5a).
   f) A detailed risk register for the proposed project (this should be uploaded alongside the answer to Assessment Criterion 5a).
   g) An organogram showing the key roles of each partner and of team members (this should be uploaded alongside the answer to Assessment Criterion 5b).
   h) Brief CVs of key individuals within the project (this should be uploaded alongside the answer to Assessment Criterion 5b).
   i) Completed Declaration Forms: 1. Statement of non-collusion, 2. Form of Tender, 3. Conflict of Interest, 4. Standard Selection Questionnaire, 5. Code of Practice, 6. GDPR Assurance Questionnaire. These should be downloaded, signed and uploaded into the application form. If convenient, you can use e-signature to sign the documents.

You should endeavour to answer all the questions on the application in full. Some questions will be 'required fields' in the form and you will not be able to proceed to the next section until these questions are complete. The assessment of each application will be

based on the information contained in the above list of specified Submission Content. Applicants who wish to support their responses to the Assessment Criteria with figures or references to published sources may attach these in the Further Information section of the application form. See Section 8.1 for further guidance.

Incomplete applications and any containing incorrect information may be rejected. However, BEIS may, at its discretion, request clarification before making a final decision. Any applications or supporting documentation received after the application deadline will not be considered. Applicants are advised to use the downloadable Word document version when working on a draft application, and to ensure they leave sufficient time to copy their application to an online version and answer all the compulsory questions. Applicants are also advised to make an early start on the application process as it may take considerable time, and to use the Q&A process to clarify anything they are unsure about.

4) **Submission Costs:** You will **not** be entitled to claim from the Department any costs or expenses that you may incur in preparing your application, whether or not your application is successful.

5) **Subcontracting Arrangements:** BEIS will contract solely with the project lead. However, BEIS recognises the need for projects to involve multiple organisations and therefore welcomes bids that include a project lead who then sub-contracts aspects of the project work to separate entities. In such instances, we would expect bids to detail the nature of such relationships, including the role, skills and expertise of the sub-contractors and their anticipated costs. BEIS may at its discretion ask for evidence of the working arrangements between the project lead and any sub-contractors to ensure that BEIS Terms and Conditions are reflected in any agreement with sub-contractors.

6) **Consortium Applications:** Applications from consortia are welcome. **Only one submission should be submitted for the project application,** but all consortium partners are required to sign the completed application form for their project(s) (see section 9.7 and Declarations published with this ITT).
   a) If a consortium is not proposing to form a separate corporate entity, the project partners will need to complete a Consortium Agreement (once a contract has been awarded) and nominate a lead organisation who BEIS will contract with. The lead organisation (project co-ordinator) will be the recipient of the contract (the supplier) and will be responsible for managing payment to the other project partners. Please note that BEIS reserves the right to require a successful consortium to form a single legal entity in accordance with Clause 19(6) of the Public Contracts Regulations 2015.
   b) BEIS recognises that arrangements in relation to consortia and sub-contractors may (within limits) be subject to future change. Applicants should therefore respond in the light of the arrangements as currently envisaged and are reminded that any future proposed changes in relation to consortia and sub-contractors must be submitted in writing to BEIS for consideration on a case-by-case basis.

7) **Multiple Bids:** No applicant can act as project lead for more than one bid. Applicants may be part of multiple bids, for unique projects delivering different innovations. BEIS

reserves the right to assess the capability and capacity of the team to deliver multiple projects and whether the different projects are unique at the eligibility stage. The capability and capacity of project teams to deliver multiple projects will also be assessed within Assessment Criterion 5b (see Section 8.1Assessment Criteria). Consortium members/sub-contractors may be part of multiple applications; however, it is the duty of the lead organisation to manage any arrangements with regards to conflict of interests with sub-contractors/consortium members where those sub-contractors/consortium members are part of other applications. Where consortium members are part of multiple applications, the lead organisation must provide assurance that the consortium members have sufficient resources to successfully deliver all work packages. The lead organisation must also ensure that funding is not requested more than once across separate applications for the same piece of work.

8) **Tender Validity:** Phase 2 proposals shall be valid for 120 calendar days from the bid submission deadline.

6.2.2 Stage 2: Assessment

Applications will initially be assessed against the Eligibility Criteria in Section 7. **Applications which fail the Eligibility Criteria will not be assessed further, so it is essential to ensure that your project meets these criteria before you submit your application.**

Eligible applications will be scored against the assessment criteria described in Section 8.1, by three reviewers, including reviewers external to BEIS operating under the Technical Third Party Support (TTPS) contracts. All reviewers, internal and external, will be required to consider and identify any conflicts of interest in advance of the assessment process. Reviews will only proceed once BEIS is in receipt of reviewers' declared Conflict of Interest forms.

Reviews and scores will be moderated to determine an overall ranking list that will be used to allocate the funding for the Competition. To be eligible to receive funding, an application must also achieve a minimum total score of 60% against these assessment criteria and must not receive a score of '1' in any criterion. A total available budget will be allocated to the three technology Categories as follows:

Category	Maximum cost per project (excluding VAT)	Total Category budget (excluding VAT)
1. Feedstock pre-processing	£2.5m	£5m
2. Gasification components	£5m	£10m
3. Novel biohydrogen technologies	£5m	£10m

The projects will be funded in ranked order within each Category until budget for that Category runs out or all successful applications have been funded (whichever happens first). If there is remaining budget in a Category (due to not enough applications or applications failing to score above the 60% threshold), this will be transferred to a central pot, where all remaining/unfunded projects across the Categories will be combined and ranked in order of merit. Funding will be assigned against order of merit to projects (with a minimum 60% threshold mark) until the central pot of money runs out.

If two or more projects score identically, and we are unable to take forward all these projects given our budget restraints then, in all categories, those projects scoring highest in Criterion 1 (Technical feasibility of demonstration project) will be taken forward.

In the event of identical scores on Criterion 1, the project applications will be reviewed by the Senior Responsible Officer of the programme, to make a final decision on funding allocation, based on the need to have a broad portfolio.

After the assessment stage, all applicants will receive a short summary of key feedback regarding their applications irrespective of whether they are successful or not. Feedback will be given at the same time as the successful/unsuccessful letters are sent to applicants.

Please note, this programme is being run with internal resource by BEIS, with some additional support from the Technical Third-Party Support (TTPS) contract procured by BEIS to assist with the delivery of the Net Zero Innovation Portfolio (NZIP). For this competition, TTPS will provide support in assessing bids and monitoring funded projects.

TTPS consists of five contracts (Lots) to provide a breadth of technical expertise, with services provided by:

- Lot 1: Pricewaterhouse Coopers LLP (technical coordination)
- Lot 2: Technopolis (social research and evaluation)
- Lot 3: Mott MacDonald (carbon control and storage)
- Lot 4: AECOM (energy consumption)
- Lot 5: Frazer-Nash Consultancy (energy generation and distribution)

In the event that any of the Lot providers involved in this competition submit a bid for a contract in this competition, they will be excluded from the appraisal of bids process to ensure transparency and avoid any conflict of interest. In addition, they will be required to declare and mitigate any actual or perceived conflict of interest in the same way as any other bidder. BEIS reserves the right to exclude any proposals where the bidder has an actual or perceived conflict of interest that cannot be mitigated to the satisfaction of BEIS.

6.2.3 Stage 3: Contract Award

Phase 2 contracts are expected to be issued in April 2023 and commence from **1st May 2023 and run for 23 months**. Please note the supplier is expected to attend a kick-off meeting taking place in May 2023 after the contract has been signed. note that BEIS will not back date the start date of contracts.

Contract terms: Contracts will be based on the BEIS pre-commercial procurement contract. The Contract Terms and Conditions for the Phase 2 contract are published with this ITT. These terms and conditions are final and non-negotiable. For this contract (Phase 2), clause 18.7 of the terms and conditions stipulates that liability is limited to £4m or twice the contract value, whichever is greater.

All applicants should review Conditions 27 and 28 of the Contract Terms and Conditions which contain important provisions relating to arising intellectual property and its exploitation.

7 Eligibility for Funding

Competition Eligibility Criteria (Phase 2)

To be eligible for funding, proposed projects must meet all the following eligibility criteria:

Eligibility Criteria	Eligibility Question	YES	NO	N/A
1. Innovation feasibility and technology readiness The purpose of this Competition is to support the development of innovative Hydrogen BECCS projects. a) A Phase 2 project can only be funded if the corresponding Phase 1 feasibility study has been successfully completed showing that the technology is feasible. b) Innovations must also have been between **Technology Readiness Levels (TRLs) 4 to 6 at the start of the Phase 1 project.** (Further information on TRLs can be found in the Competition Guidance Notes Appendix 1).	a) Has Phase 1 shown that your innovation is feasible for demonstration in Phase 2?			
	b) Was your technology / system at TRL 4 – 6 at the start of the Phase 1 project?			
2. Technology scope a) The technology must be in scope for the category applied for as per the guidance provided in the Competition Guidance Notes, Section 4. The Category selected must also	a) Is the category applied for the same as the category applied for in Phase 1 and is the technology in scope for the category applied for?			

be the same as the Category applied for in Phase 1 of the competition. b) There should be a clear, linear continuation of a Phase 2 project from Phase 1, meaning that the Phase 2 project must be based on the project development work completed in Phase 1. c) A Phase 2 project must aim to physically demonstrate the same core innovation that was the focus of the feasibility study in Phase 1 of the competition.				
	b) Does your proposal follow the project development work undertaken in Phase 1 of the programme?			
	c) Is your Phase 2 project aiming to physically demonstrate the same core innovation that was developed during Phase 1 of the competition?			
3. Exclusions Funding will not be provided for projects where the technology development focuses on any of the out-of-scope technologies as described in the Competition Guidance Notes Section 4.5.	a) Does your application exclude costing/budget for any of the technology exclusions listed in the Competition Guidance Notes Section 4.5?			
4. Project status	a) Can you confirm that your application does not seek			

a) BEIS is unable to fund retrospective work on projects. b) The project must have received Phase 1 funding and not have been cancelled by BEIS. c) The project must have submitted a Final Phase 1 report to BEIS (and this must be approved by BEIS prior to any contract being issued for Phase 2 funding).	funding for retrospective work on this project, including any outstanding Phase 1 project work, or work to be carried out prior to written notification of an award of contract?			
	b) Were you successful in receiving Phase 1 funding?			
	c) Have you submitted your Final Phase 1 report to BEIS?			
5. Project lead The project lead must be a UK registered company, academic, research, public, third sector or community organisation. A single project application must be submitted by the project lead. As this is a closed competition, the project lead must be a successful applicant from Phase 1 of the Hydrogen BECCS Innovation Programme.	a) Can you confirm that the project lead still meets the eligible organisation requirements and that the project lead is the successful applicant from Phase 1 for this project?			
6. Project location Phase 2 activities funded in the Competition must be conducted largely in the UK (and the majority, over 50%, of the eligible activity, resources and goods, must be incurred in the UK).	a) Can you confirm that over 50% of the eligible project activity (resources and goods) for Phase 2 will be incurred in the UK?			

7. Additionality Projects can only be funded where evidence is provided that innovation would not be taken forwards (or would be taken forwards at a much slower rate) without public sector funding.	a) Can you confirm that this project would not be taken forward (or would progress at a much slower rate) without public sector funding?			
8. Contract size Phase 2 – Demonstration phase (SBRI): The total budget for Phase 2 is £25m and BEIS intends to fund at least two demonstration projects in each technology category. Each category will have a maximum budget for funding Phase 2 projects, and a maximum cost per project (excluding VAT) as follows: Category 1: £2.5m Category 2: £5m Category 3: £5m	a) Can you confirm the funding you are requesting for your Phase 2 project cost is equal to or below £2.5m (excluding VAT) if applying to Category 1 or equal to or below £5m (excluding VAT) if applying to Category 2 or 3?			
9. Eligible project costs SBRI is aimed at organisations working on research and development (R&D) of an innovative process, material, device, product, or service prior to commercialisation. Funding is available for R&D activities only, including related dissemination activity. Projects requesting funding for commercialisation activities are not eligible. The full list of eligible project costs is set out in Appendix 2 of the Competition Guidance Notes. BEIS must fund **100% of eligible project**	a) Can you confirm that requested funding is for eligible costs only and you require BEIS to fund 100% of those costs?			

costs, no match or in-kind funding is allowed. Note that as this is a pre-commercial agreement; no income can be generated from any of the project deliverables. For example, hydrogen, feedstocks or other products created during Phase 2 cannot be commercially disposed of. See the Competition Guidance Notes Section 9 for more details.				
	b) Can you confirm that no income will be generated from any of the project deliverables during the Phase 2 project?			
10. Project end date Phase 2 demonstration projects and final deliverables must be completed and approved **by 31 March 2025**. Projects should allow at least two months for BEIS approval of the final deliverables.	a) Can you confirm that the project will meet the specified project end dates, allowing for BEIS approvals, and your bid does not include costs that will be incurred beyond 31 March 2025?			
11. Risk-Benefit sharing The sharing of *risks and benefits* is an important aspect to the SBRI approach. Projects receive financial support and retain any intellectual property generated, with certain rights of use retained by BEIS. Project outputs are also expected to be shared widely and publicly and project teams are not permitted to include profit in the eligible project costs.	a) Do you agree to this approach?			

12. Delivering multiple projects If project consortium member(s) are part of multiple successful applications, they must be able to deliver on them and they must not have applied for funding for the same piece of work more than once.	a) If you or your consortium/partnership are part of multiple successful applications, would you be able to successfully deliver all projects if necessary?			
	b) If you or your consortium/partnership are part of multiple applications to this competition, please confirm that you have not submitted the same application, or applied for funding for the same piece of work, more than once?			
13. Multiple applications If you intend to submit multiple applications, you must comply with the following limits of entry into the competition: a) Lead organisations may only enter **one** application into each Category as the project lead. b) A technology provider/OEM are limited to **one** application for a particular technology/solution requiring development per Category.	a) Can you confirm the lead organisation has only submitted one application per Category as the project lead?			

	b) If you are a technology provider or OEM, and you or your consortium are part of multiple applications, can you confirm that only one application per technology has been submitted per Category?			

8 Assessment Criteria and Scoring

8.1 Assessment Criteria

There are five assessment criteria for the Hydrogen BECCS Phase 2 Competition which are based on the competition's objectives and the likelihood of effective project delivery. Applications will be marked positively. Each criterion (including sub criteria where applicable) will be scored independently and will be given a score between 1-5.

Applicants should assume assessors have no prior knowledge of the project's Phase 1 bid or work. All material required to assess an application to Phase 2 must be included in the application as a standalone submission.

Assessors will **not read the Phase 1 Final Reports**, but excerpts from the Phase 1 Final Report may be quoted within the answers. Only text within the application form, and attachments where permitted, can be used to answer the criteria. Assessors will only mark the information contained within the application form (including attachments where permitted).

These guidance notes are designed to inform applicants of the information which should be provided in the application. The bullets listed under "applicants are expected to" in each criterion are there to provide applicants with BEIS's expectation of what should be covered when answering the assessment criteria. Each bullet has equal importance and applicants should try to cover each point where relevant and reasonable for the proposed innovation.

Applicants who wish to support their responses with figures where required (e.g., illustrations/PFDs/graphs/charts/schematics) may attach these as part of the **Referenced Figures single attachment** (max 25MB and 10 pages) in the Further Information section of the application form. **Applicants may only upload one 10-page Referenced Figures document for the entire application; all figures must be within that document.** Applicants must clearly label the figures in the attachment and reference the figures in their response within the respective criterion text box to ensure they are assessed. Figures that have not been referenced in the text box will not be assessed or cross-referenced as part of the assessment process. Any further text (i.e. written prose) submitted within the Referenced Figures single attachment will not be assessed. Any material beyond the tenth page will not be assessed.

Applicants who wish to support their responses with references to published sources where required may attach a references list as a **Referenced Published Sources** single attachment (max 5MB and 5 pages) in the Further Information section of the application form. Applicants must clearly include a short in-text citation in their response within the respective criterion text box. Any further text (i.e. written prose) submitted within the **Referenced Published Sources** single attachment will not be assessed.

Assessment Criteria	Weighting
1. Technical feasibility of demonstration project	25%
2. Cost reduction, emissions and environmental impact	20%
3. Social Value	10%
4. Project costs	20%
5. Project delivery	25%

The scoring guidance and the criterion weighting is summarised in the table below.

Criterion 1	Technical feasibility of demonstration project
Weighting	25%
Guidance	Maximum word count for responses: 2,000. This criterion will be used to assess the technical feasibility of the proposed demonstration project. Applicants should have already determined in the Phase 1 feasibility work that their Hydrogen BECCS solution is technically feasible and has the potential to contribute to the objectives of this programme. Applicants are expected to: • Clearly describe the solution, how it works and include a description of the engineering design proposed for the physical demonstration. Provide evidenced justification for why the demonstration is technically feasible. This should reference the outputs of the feasibility work carried out in Phase 1, including engineering designs, engineering calculations, any data generated and outputs of any other feasibility research. • Explain how the innovation is novel and how its performance compares to other state of the art solutions on the market. • Describe how the innovation will be compatible with Carbon Capture and Storage, and outline the predicted carbon capture rates stating any assumptions and justifying calculations. • Outline and justify the Technology Readiness Level (TRL) of the technology/system at the start of the Phase 1 project and the end of the proposed demonstration project. Demonstrate and evidence how the technology/system to be demonstrated was between TRL 4 and 6 at the commencement of the Phase 1 project, as defined in Appendix 1 of the Competition Guidance Notes. • Clearly list the objectives of the project. Clearly state the aim of the physical demonstration trials proposed, for example, by stating what levels of performance constitute a successful demonstration, including metrics that will be used to measure performance. • Detail the approach of the performance validation process that will be followed during the demonstration phase. Applicants should also outline what products may be produced during the test period and how they will be used (or stored) to ensure that no commercial advantage

	is gained. Please refer to the Competition Guidance Notes Section 5.3 for details on BEIS's expectations for testing innovations, and Section 9 for guidance on the commercial use of the asset and products during Phase 2. In addition to the text response to this criterion, **applicants should attach an outline Test Plan for the Phase 2 project (max 10MB and 10 pages), which will be assessed. The plan should outline the scale, type, description, purpose, and the duration for all tests planned.** • Describe how the innovation will be commercially deployed at scale beyond Phase 2 to deliver maximum biohydrogen production and biogenic carbon removal. Include the scale and likely location of the next stage of development beyond Phase 2, and how this development would be informed by knowledge gained during Phase 2. • Provide the latest evidenced justification for the regulatory feasibility, including regulatory compliance, of the proposed demonstration pilot. This should reference the outputs of Phase 1 feasibility work. • Clearly set out where there is remaining uncertainty about technical and regulatory feasibility and explain how the demonstration project will address these uncertainties. • Explain how the demonstrator will be used after this project has been completed or detail the decommissioning strategy. • Describe how the project will support the Hydrogen BECCS Innovation Programme objectives, as outlined in the Competition Guidance Notes Section 2.

Criterion 2	**Cost reduction, emissions and environmental impact**
Weighting	20%, split into: 2a 10%, 2b 10%
Guidance	This criterion will be used to assess how the demonstration and further development of the innovation will contribute to a reduced Levelised Cost of Hydrogen (LCOH) and reduced emissions and environmental impact in the Hydrogen BECCS process chain. Please refer to the Competition Guidance Notes Appendix 5: Environmental Considerations and Regulations which contain guidance provided to BEIS on behalf of the Environment Agency to assist applicants with considering the environmental impact of their technology and the regulations which must be adhered to.
Criterion 2a	**Cost reduction**
Weighting	10%
Guidance	Maximum word count for responses: 1,000. This criterion will assess the potential for the innovation to reduce costs in the Hydrogen BECCS process chain. With reference to the outputs of the Phase 1 feasibility study, applicants are expected to: • Complete the **Excel document 'Levelised Cost of Hydrogen workbook'.** The completed workbook should: ○ Show the specific cost reductions this innovation will deliver (e.g. Impact on OPEX, CAPEX, Material Costs, etc.).

	○ Estimate the overall reduction in LCOH that will be delivered by this innovation. In the text box response to this criterion, applicants should: • Describe the likely lifetime costs of the Hydrogen BECCS solution, broken down into CAPEX and OPEX. Where relevant, distinguish between the demonstration scale and commercial scale system. • Explain any differences in the above estimates since the workbook was first completed in the Phase 1 competition. • Explain how the cost reductions will be achieved and how this relates to the commercialisation approach outlined in Criterion 1. • Highlight the main uncertainties associated with these cost estimates and explain how the design and execution of your physical demonstration will address these uncertainties. • Provide calculations to support claims and justify any assumptions made.
Criterion 2b	**Greenhouse gas emissions and environmental impact**
Weighting	10%
Guidance	Maximum word count for responses: 1,000. This criterion will assess the potential environmental benefits and risks of the proposed innovation. With reference to the outputs of the Phase 1 feasibility study, applicants are expected to: • Describe all chemical and physical processes used, materials and substances required, and how they will be sourced, consumed or disposed of. • Describe all water, energy and fuel requirements for each stage or process, how they will be sourced, and the reasons for their selection. • Provide a clearly presented quantitative Life Cycle Analysis (LCA) that shows the expected Greenhouse Gas lifecycle emissions of the solution. Applicants may wish to refer to the UK Low Carbon Hydrogen Standard (LCHS; see Competition Guidance Notes Section 5.2.3 for further information). Key assumptions should be stated and justified, including the project/plant lifetime. The recommended lifetime is 20 years, with additional calculations required if the applicant wishes to use a different lifetime. • Provide an assessment of the potential environmental benefits and risks of the proposed innovation and demonstration project. • Explain how relevant environmental impacts would be monitored, measured and mitigated during the demonstration project. • Where significant environmental risks are identified, appropriate mitigation actions must be described, and possible improvements between the demonstration project and commercial scale should be identified and justified. • Depending on the project, relevant considerations may include: ○ Greenhouse gas emissions, including any fugitive hydrogen or methane emissions expected throughout the system and how they could be mitigated. ○ Energy demand ○ Water demand ○ Water quality impacts

	○ Air quality impacts ○ Biodiversity impacts ○ Land impacts.

Criterion 3	**Social Value**
Weighting	10%
Guidance	Maximum word count for responses: 750. This criterion will be used to assess plans for the proposed Phase 2 project to generate social value. Applicants are expected to: • Describe the commitment your organisation will make to ensure that opportunities under the Phase 2 demonstration contract deliver the Policy Outcome of *Creating new businesses, new jobs and new skills*, specifically any/all of the following benefits: ○ Create opportunities for entrepreneurship and help new organisations to grow, supporting economic growth and business creation, or ○ Create employment and training opportunities, particularly for those who face barriers to employment and/or who are located in deprived areas, and for people in industries with known skills shortages or in high growth sectors, or ○ Support educational attainment relevant to the contract, including training schemes that address skills gaps and result in recognised qualifications. • Provide information about how you will monitor, measure and report on your commitments and the social value impact of your project.

Criterion 4	**Project costs**
Weighting	20%
Guidance	Maximum word count for responses: 1,500. This criterion will be used to assess: • Phase 2 demonstration project costs, to ensure that all costs are eligible and represent a fair market value. • The robustness of the Phase 2 demonstration project costs, i.e. whether the proposed eligible project costs are realistic and justified in terms of the proposed project plans, and sufficient to provide the deliverables sought. Applicants are encouraged to consider the latest predictions of energy costs, inflation and other changes when costing their projects. Please also note, overheads must not amount to more than 50% of the value of the contract and, as a guide, BEIS would not expect overheads to amount to more than

	20% of the value of the contract unless fully justified. There must also be no element of profit in the eligible project costs. Applicants are expected to: Fill in and attach the '**Hydrogen BECCS Finance Form**' for Phase 2 project costs, noting the following: • For Capital items, include depreciation only (based on utilisation of item and residual value at the end of the project). For further guidance, see Competition Guidance Notes Appendix 3. • For Material costs, ensure this only includes materials and consumable items, including energy for the demonstration. • If an individual sub-contractor costs are more than 20% of the total project costs, please provide a high-level breakdown of the sub-contractor costs (5 to 10 items) in the text cell indicated in 'Sheet E' of the finance form. • Use the Project Location worksheet to demonstrate that at least 50% of the work (on a cost basis) is to be undertaken in the UK. Provide a description of the costs as detailed in the Finance Form, addressing the following: • Describe the basis of the project costs for Phase 2 with reference to delivery of the milestones in the project plan. • Justify that the proposed Phase 2 costs meet the competition's Eligibility Criteria, are realistic in terms of the project plan and are sufficient to yield the proposed deliverables. The full list of eligible project costs is set out in Appendix 2 of the Competition Guidance Notes. • Justify personnel, including actual labour costs, material costs and depreciation of capital items. • Provide a description of major cost items greater than £10,000 (material, capital items, sub-contract and other costs). • Describe, and justify, the selection and costing of suppliers and sub-contractors, for example: including quotations for high value contributors. • Provide certainty of availability and assurance of costs for high value materials, equipment and products that are required for the Phase 2 project. Please attach any evidence such as letters of support, contracts, existing agreements in the **Supporting Information** upload space in the application form. Applicants must reference the attachments in their response within the respective criterion text box to ensure they are assessed. • The key principle of an SBRI is a risk/benefit sharing arrangement and, as such, applicants should outline how they will manage unexpected cost variations, such as increased supplier costs and

	greater labour resource requirements. Applicants are reminded that contingency items are an ineligible cost. • Describe why the application represents good value for money for HM Government, including how the availability of public funding makes a material difference to the actuality and pace of moving the solution towards commercialisation. • Provide evidence for the additionality achieved with this funding, i.e. please demonstrate why public funding is required to deliver this project. • In recognition of the fact that the risks of the project development are shared with HM Government, but the applicant stands to gain all the benefits occurring after completion of the project, explain where cost savings, from the point of view of HM Government, will be provided. Please note that match funding to help cover eligible project costs is not allowed in an SBRI contract. However, cost savings should be included, where the eligible cost for a product or service has been reduced below commercial market rates. • Explain the proposed use of the assets post-demonstration (e.g. further RD&D uses) to maximise value for money.

Criterion 5	**Project delivery**
Weighting	25%, split into: 5a 15%, 5b 10%
Guidance	This criterion will be used to assess the proposed approach to delivering the Phase 2 project.
Criterion 5a	**Project plan**
Weighting	15%
Guidance	Maximum word count for responses: 1,500. This criterion will assess the proposed project plan for Phase 2 by looking at a range of factors. Applicants are expected to: • Complete and attach **a project delivery plan / Gantt Chart** and **a detailed Risk Register** (including technical, commercial, financial risks and consideration of environmental, health and safety, and other regulatory requirements) for the Phase 2 project. • Provide a comprehensive delivery plan for the Phase 2 project, including the scope of work, key work packages, deliverables and milestones. Each work package should also be shown on the project delivery plan / Gantt Chart. • Describe the approach to quality assurance, data quality, oversight and governance of the project. • Explain where planning permission/environmental permits are required. The applicant must justify and provide reasonings as to how these permits will be in place to successfully complete the

	demonstration before the end of the Phase 2 project. See Competition Guidance Notes Appendix 5 for further information. • Provide evidence of access to any specialist skills, facilities, materials or other resources needed to complete the project. Provide early information (e.g. letters of support or draft agreements) from key organisations and authorities (other than consortia members) to provide evidence that the delivery plan is feasible in the timeframes. For example, site/facility owners, planning authorities, Environment Agency and suppliers of long lead time capital items. These can be attached in the **Supporting Information** upload space in the application form. Applicants must reference the letters in their response within the criterion text box to ensure they are assessed. • Explain the current plans for taking the knowledge and experiences arising from the physical demonstration and ensure that these are effectively communicated and shared with the relevant stakeholders. Applicants should: ○ Identify the relevant stakeholders, including plant manufacturers, suppliers, end users, trade bodies and academia. ○ Describe how the lessons learnt and any challenges faced from this study will be disseminated. ○ List appropriate mechanisms for interacting with these stakeholders. ○ Explain the type of knowledge sharing and capacity building activities that will be pursued. ○ Present a timetable for these activities. The timetable may be included in the Referenced Figures single attachment.
Criterion 5b	**Project team and organisation**
Weighting	10%
Guidance	Maximum word count for responses: 1,000. This criterion will assess the capacity and expertise (both technical and project management) of the proposed project team to deliver the Phase 2 project. Applicants are expected to: • Provide **an organogram** as an attachment and use the text response to outline the key roles for each partner and the proposed governance arrangements between the partners to ensure effective project delivery. • List any external parties responsible for delivering goods or services worth more than 10% of the total project value and explain what contractual relationship will be in place (e.g. sub-contractor or consortium member) and how they will ensure that these parts of the project do not give rise to delays in the delivery of the project. • Where sub-contractors have not yet been identified, please describe the process for engaging and selecting appropriate suppliers during the project. • Provide details of the relevant skills, qualifications, and experience of the project team members, and their capability to successfully deliver the Phase 2 project. Include descriptions and evidence of previous relevant work carried out. • For any external parties delivering more than 10% of the work (by value) please provide name, organisation size, role/activities, where the work will be located and evidence of their commitment to the project

	(e.g. a signed letter of support), which can be attached in the **Supporting Information** upload space in the application form. Applicants must reference the letters in their response within the respective criterion text box to ensure they are assessed. • Attach, in a single document, **brief CVs of key individuals within the project**. (CVs should be no longer than 2 pages each.) • Where applicants/partners/sub-contractors are involved in multiple applications to the Hydrogen BECCS Phase 2 competition, applicants should detail how they will ensure they have capability and capacity to deliver if more than one of the applications is awarded a contract.

8.2 Scoring Guidance

We will select projects that offer the best value for money overall based on their assessment against the criteria outlined in Section 8.1. Each criterion will be scored using the five scoring descriptors set out in the table below.

Score	Description
1	**Not Satisfactory**: Proposal contains significant shortcomings and does not meet the required standard.
2	**Partially Satisfactory:** Proposal partially meets the required standard, with one or more moderate weaknesses or gaps.
3	**Satisfactory:** Proposal mostly meets the required standard, with one or more minor weaknesses or gaps.
4	**Good:** Proposal meets the required standard, with moderate levels of assurance.
5	**Excellent:** Proposal fully meets the required standard with high levels of assurance.

9 Contract Size and Restrictions on Funding

9.1 Competition Budget and Availability

See Section 6.2.2 for details of the available budget and funding allocation process. BEIS reserves the right to allocate more or less than the total budget depending on the number and quality of applications received and budget availability.

All project activities, including reporting and payments, need to be completed by **31st March 2025**. All costs should be provided excluding VAT, though where VAT applies, applicants should specify the amount. Your total costs excluding VAT should not exceed the maximum allowable budget per project. Any costs incurred during the delivery of the project that is greater than the agreed total project costs will not be covered by BEIS.

Note: Nothing in this funding call requires BEIS to award any applicant a contract of any particular amount or on any particular terms. BEIS reserves the right not to award any contracts, in particular if BEIS is not satisfied by the applications received or if the funding assigned to the scheme is required for other, unforeseen, purposes. BEIS will not, under any circumstances, make any contribution to the costs of preparing applications and applicants accept the risk that they may not be awarded a contract.

9.2 Eligible Costs

Applicants are instructed that the project costs quoted must reflect actual costs at a 'fair market value' and for this Competition, **profit must not be included,** including within labour costs which should include salary plus employer costs only.

Applicants **must** ensure all project costs are eligible (See Appendix 2). At any stage of the competition BEIS can ask for any ineligible cost to be removed from the project costs.

Applicants must justify all costs in their application.

All eligible project costs must be **100% funded by BEIS**. Projects which have higher costs than the maximum allowed in each Phase are ineligible, even if the project team are offering to provide the additional/in-kind funding. This is to ensure that each organisation has the same opportunity to be successful in their application

Please note this does not exclude projects from covering any ineligible costs at their own expense, however they will not be included in the assessment of the project or form part of the contract.

In Phase 2, eligible costs are those directly associated with the development, implementation, monitoring, and decommissioning (if necessary – see Section 9.3) of the Hydrogen BECCS demonstration projects.

Further details of eligible and ineligible costs are provided in Appendix 2. Applicants must complete the Competition Finance Form (separate spreadsheet available on the competition website) to provide the necessary cost information for the assessment process; further itemisation of costs and methods of calculation may be requested to support the application.

9.3 Decommissioning Costs

When the solution in Phase 2 includes a physical asset, the chosen suppliers will have responsibility for decommissioning the demonstration equipment when the project has been completed, if it is not feasible to continue to operate/develop the equipment. When bidding, suppliers need to include any decommissioning costs, at fair market value, in the total estimated costs for the Phase 2 project.

If any project decommissioning costs submitted as part of a successful application are: (1) incurred beyond the end of the programme (31 March 2025), or (2) no longer needed come the end of the programme, then BEIS will not fund these project decommissioning costs.

9.4 Commercial use of the asset / products during Phase 2

One of the key principles of the SBRI is that the agreement is a pre-commercial exercise. For Phase 2 projects, this means that the demonstration has to be pre-commercialisation i.e. for the specific innovation that BEIS is funding, the supplier cannot enter into commercial relationships related to the innovation or generate income from any of the project deliverables during the funding period. To do so would require early termination or reduction in scope / value of the project. The commercialisation plan produced in Phase 1 and updated/iterated in Phase 2 is designed to move the innovation projects to deployment, following the end of Phase 2.

If, as a result of a successful demonstration of the innovation technology (for which BEIS funded the input costs), there are products that could be sold on the open market, the SBRI agreement would need to be terminated early in order to allow participants to create commercial relationships with buyers for any products arising from the demonstration of the technology. Alternatively, products that are generated as a result of the demonstration of the innovation can be either stored or donated free of charge.

9.5 Financial Information

Applicants are requested to provide a fixed price quotation for the work. A detailed cost breakdown is required to enable assessment of value for money. Applicants are also encouraged to consider the latest predictions of energy costs, inflation and other changes when costing their projects.

Financial information should include costs for Phase 2 of the project, detailing labour (including manpower rates), material and capital equipment costs, and any travel and subsistence requirements. Applicants are required to complete a detailed financial summary template (the Finance Form) as part of the application process.

9.6 Financial viability checks

BEIS will undertake financial viability checks on all successful applicants. These will include reviewing the latest independently audited accounts filed on the Companies House database. BEIS reserves the right to also verify the financial viability of all members of the consortium and key sub-contractors. The outcome of BEIS financial viability checks/due diligence may result in preferred bidder(s) not being awarded a contract.

Where a business is not required to file accounts with Companies House, other financial information may be requested to enable an appropriate financial viability review to be undertaken. We will be looking for evidence of your ability to resource the cashflow for the project appropriately, so the information we request will be focused on understanding how your business operates in this respect.

Before your project starts, BEIS will ask for evidence that you have the funding mechanisms in place to manage your cash flow across the life of your project. This could include letters of credit or other such mechanisms.

BEIS will not make payments in advance of need and typically makes contract payments in arrears on satisfactory completion of agreed milestones and deliverables. BEIS understands, however, the difficulties which small businesses may face when financing this type of project. BEIS will explore cash flow issues with the applicant as part of developing the financial and milestone profile during the Contract Award process. BEIS will offer flexibility in terms of profiles and payments, within the confines of the requirements for use of public money within which it operates.

9.7 General BEIS procurement conditions

There are six declaration forms (contained in two files), which must be completed by each applicant, covering issues such as: conflict of interest, non-collusion, bribery, corruption and fraud, GDPR assurance and overall agreement to the terms of this pre-commercial procurement process.

These declarations are provided on the competition website. These should be downloaded, signed and uploaded into the application form. If convenient, you can use e-signature to sign the documents.

If you are bidding on behalf of a group or partnership (e.g. a consortium), or you intend to use sub-contractors, please note the following:

- For Declarations 1, 2, 5, and 4 Part 3, the lead applicant must complete all the questions on behalf of the consortium and/or any sub-contractors, providing one composite response and declaration.
- For Declaration 3, each member of the consortium and/or any sub-contractors should complete a separate Conflict of Interest form. Lead applicants should send a blank copy of Declaration 3 to all partners and sub-contractors. Please paste their Declaration 3 responses within the Declaration word document after the lead applicant's Declaration 3 response.
- For Declaration 4 Part 1 and Part 2, every organisation that is being relied on to meet the selection criteria (i.e. all sub-contractors and partners, as well as the lead applicant) must complete this self-declaration independently. Lead applicants should send a blank copy of Declaration 4 Part 1 and Part 2 to all partners and sub-contractors. Please paste their Declaration 4 Part 1 and Part 2 responses within the Declaration word document after the lead applicant's Declaration 4 Part 1 and Part 2 response.
- For Declaration 6, each member of the consortium and/or any sub-contractors should complete a separate GDPR Assurance Questionnaire form. Please use one excel file, adding additional sheets within this same file for each additional consortium member/sub-contractor.

As per Section 6.2.1, BEIS recognises that arrangements in relation to consortia and sub-contractors may (within limits) be subject to future change. Applicants should therefore respond in the light of the arrangements as currently envisaged.

If a project brings on a new partner or sub-contractor at a later date, then this partner/sub-contractor must complete the Declarations if requested by BEIS.

Conflicts of interest: The BEIS standard terms and conditions of contract include reference to conflict of interest and require contractors to declare any potential conflict of interest to the Secretary of State.

For research and analysis, conflict of interest is defined as the presence of an interest or involvement of the contractor, sub-contractor (or consortium member) which could affect the actual or perceived impartiality of the research or analysis.

Where there may be a potential conflict of interest, it is suggested that the consortium or organisation designs working arrangements such that the findings cannot be influenced (or perceived to be influenced) by the organisation that owns a potential conflict of interest. For example, consideration should be given to the different roles which organisations play in the research or analysis, and how these can be structured to ensure an impartial approach to the project is maintained.

This is managed in the procurement process as follows:

- During the application process, organisations may contact BEIS to discuss whether or not their proposed arrangement is likely to yield a conflict of interest.
- **Contractors are asked to sign and return Declaration 3** to indicate whether or not any conflict of interest may be, or be perceived to be, an issue. If this is the case, the contractor or consortium should give a full account of the actions or processes that it will use to ensure that conflict of interest is avoided. In any statement of mitigating actions, contractors are expected to outline how they propose to achieve a robust, impartial and credible approach to the research.
- When tenders are scored, this declaration will be subject to a pass/fail score, according to whether, on the basis of the information in the application and declaration, there remains a conflict of interest which may affect the impartiality of the research.

Failure to declare or avoid conflict of interest, or perceived conflict of interest, at this or a later stage may result in exclusion from the procurement competition, or in BEIS exercising its right to terminate any contract awarded.

10 Notification and Publication of Results

10.1 Notification

Applicants will be informed by email whether their application has been successful, subject to compliance with the terms and conditions of the Conditional Contract Offer (conditional on successfully passing due diligence).

BEIS may wish to publicise the results of the scheme, which may involve engagement with the media. At the end of the application and assessment process, BEIS may issue a press release or publish a notice on its website. These public documents may, for example, outline the overall results of competitions and describe some of the projects to be funded.

Some organisations may want their activities to remain confidential and you will be given a chance to opt out of any involvement in media relations activity and further case study coverage of projects, should you see this as being necessary. However, the public description of the project you provide in your application will be made available in the public domain if your application is successful, and you are not able to opt out of the project description being published, as such, you must provide a short description (<400 words) of your proposed hydrogen supply solution. In addition, all funded projects must include reporting and dissemination milestones – agreed with BEIS – as part of their project deliverables. Information about all contracts awarded will also be published on Contracts Finder as legally required under The Public Contracts Regulations 2015.

Any organisation that wishes to publicise its project, at any stage, must contact the Competition Project Manager or their Project Monitoring Officer at BEIS for approval.

10.2 Publication of results

SBRI involves a high degree of risk–benefit sharing. In return for provision of funding and non-financial support during demonstration activities, BEIS expects to be able to use and share the results and outputs of the demonstration activities with other government departments and on the government website (gov.uk).

BEIS also wishes to publicise details of the award recipients. Therefore, on or after issuing a SBRI contract, BEIS will publish the following information:

- Identity of the participant and its partners
- Project summary information including aims and expected outcomes of the project and technology area
- Total award value

Following completion of the funded projects, BEIS will publish on its website a summary of the funded activities and the outcomes achieved. This will include a final summary report from each project detailing technical approach, and key achievements. BEIS may also revisit projects at a later date and publish an evaluation report for the competition as a whole.

BEIS recognises the need to maintain confidentiality of commercially sensitive information. We will consult applicants regarding the nature of information to be published, to protect commercially sensitive information. The notice of the award on Contracts Finder will also include the value of the contract.

11 Reporting, Knowledge Sharing, Evaluation and Intellectual Property Requirements

11.1 Reporting, Monitoring, Evaluation and Knowledge Sharing Requirements

There will be several requirements on contractors during the project, including after the final payment milestone:

11.1.1 Reporting

One-off reporting deadlines

The following reporting milestones will take place (exact dates will be confirmed during Phase 2):

By December 2024, a draft report detailing the findings from the Phase 2 project submitted to BEIS.

A final report must be provided **by 31st January 2025,** this should address feedback provided from BEIS on the previously submitted draft report. Project teams will need to include sufficient time for the approval process to enable delivery of a final report before the project end date of 31st March 2025.

BEIS will publish the final project reports on .gov.uk. If the applicant wishes BEIS to publish an amended version of the final report with commercially sensitive information removed, this will need to be provided by **31st March 2025**.

Quarterly reports

A progress report will be submitted each quarter from each project. The report will follow a template (similar to that used in Phase 1).

We expect this report to cover, as a minimum:

- progress against the project delivery plan, updates to the commercialisation plan, progress towards project milestones
- upcoming work over the next quarter
- financial information (including budget spend so far and budget forecast)
- an updated risk register (including flagging where risk ratings have changed, or new risks/issues have emerged)
- any key lessons learned during delivery
- progress against relevant performance metrics e.g., KPIs (where applicable) and the benefits management plan

Stage gates

Stage gate reviews will be held at least every nine months after project commencement to assess the project's deliverables, progress, costs, risks, and spend against the project plan. The timing of stage gates will be agreed between BEIS and project leads, and will coincide with key decision or review points in the project, such as the end of a key development phase or prior to procurement of large items. Stage gates will be meetings between the BEIS programme team, the Monitoring Officer and the project team. The discussions will be based on a quarterly report and a presentation from the project team. These stage gate meetings will be used as an opportunity to discuss project highlights and updates, as well as any challenges facing projects, including if any remedial work is required, or in certain circumstances, if projects are deemed by BEIS to be undeliverable and so need to be considered for early contract termination. Criteria for each project will be determined at the outset of Phase 2, as there are likely to be distinct differences in scope and timescale for each project.

Criteria may include, but is not limited to, the following:

- Total spend to date within 25% (over or under) of margins determined at project outset. Note that this is a fixed price contract (see Section 9.5 Financial Information).
- Project milestones set at project outset have not slipped by more than three months.
- Technical work on demonstration project is progressing satisfactorily such that Phase 2 deliverables are likely to be complete according to the agreed schedule.

Projects that are deemed to have no realistic chance of completion may be cancelled and / or future funding withheld. Projects which fail the Stage Gate but deemed to have a realistic chance of completion will be given 1 month to demonstrate to BEIS that they have undertaken remedial action and can satisfy the Stage Gate criteria. If such action is not undertaken, or is unsatisfactory the project may be cancelled and future funding may be withheld.

Key Performance Indicators (KPIs)

BEIS requires all projects within the Net Zero Innovation Portfolio (NZIP; the portfolio that includes the Hydrogen BECCS Innovation programme) to report on key performance indicators (KPIs) to provide a consistent approach to reporting evidence and to track and measure key outputs, outcomes and impacts. BEIS will supply successful projects with a reporting template to complete at set intervals, including at the start of the project, annually during project delivery, at project closure and for up to three years after project closure. At the project start, your Monitoring Officer will provide further details about these KPIs.

Benefits Management Plan

At the project start, BEIS will provide successful projects with a template and structure for projects to develop a benefits management plan. This will be reported against on a quarterly basis and will include aspects such as social value commitments i.e., measurable improvements from change incurred by the project, examples of relevant

benefits include: supporting the rural economy, creating / maintaining jobs, community impact, regional benefits, promoting UK green industry.

11.1.2 Monitoring

Regular project monitoring will take two forms:

Monthly monitoring

BEIS will appoint a monitoring officer to work with each project in Phase 2. Project teams will be required to meet with their Monitoring Officer7 at least once per month to discuss project progress and highlight successes, issues, and risks. This reporting will be in confidence to BEIS and its technical advisers and will not be published. Any changes to schedules or project plans will need to be discussed with BEIS and applicants should expect significant interaction with the team during the project.

Project teams are required to work constructively with Monitoring Officers, responding in a timely manner to questions they might have about the progress the project is making, technical queries, and providing written information about project progress, should this be required by the monitoring officer.

Site visits

Monitoring Officers and the BEIS programme team will visit projects on site at least once per year during Phase 2. Project teams are required to work constructively with Monitoring Officers to facilitate these site visits.

11.1.3 Evaluation

BEIS requires all funded projects under the Net Zero Innovation Portfolio (NZIP) to report on key performance indicators (referred to as NZIP KPIs) to provide a consistent approach to reporting evidence, and to track and measure key outputs, outcomes and impacts. The evidence collected is used to demonstrate the impact of the NZIP on achieving the government's Net Zero ambitions and is necessary to be able to run future competitions.

Project lead organisations will be required to report on KPIs at various intervals for each project, including at the start of the project, during project delivery, at project closure and for three years after project closure. BEIS will supply funded projects with a reporting template to complete at set intervals, and recipients are expected to return the template to their Monitoring Officer upon completion, who will review and quality assure it. At project start, your BEIS Monitoring Officer will provide further details about the calculation of these KPIs and assist with the initial completion and measurement. Details of the KPIs which will be collected are provided in Appendix 4 – Net Zero Innovation portfolio Key Performance Indicators.

[7] Please note, in some instances the monitoring services will be provided by a third party organisation. Third party organisations will be subject to a confidentiality agreement.

Please note that it may at times be necessary to make changes to the NZIP KPIs, data collection modes or frequencies. We will endeavour to keep all changes to a minimum and communicate any implications to you via the Monitoring Officers in advance of collection.

Beyond these NZIP KPIs, BEIS conducts independent evaluations of many of its programmes. The funded project organisation will be required to collaborate in reasonable evaluation activities, including, but not limited to, providing programme-specific KPIs, completing questionnaires or surveys, participating in interviews and workshops, communicating the learnings from the project, providing costs/sales data and elaboration of any of the measures covered in the NZIP KPIs.

By submitting a bid, you agree that BEIS can hold your contact details for evaluation purposes for the duration of the competition, even if your bid is not successful. BEIS may, within that time, contact you to request your participation in an evaluation, exploring issues such as the application process or the development of your technology in the absence of BEIS funding. You are not required to participate in such an evaluation.

11.1.4 Knowledge Sharing

Knowledge sharing: effective dissemination and knowledge sharing are key requirements in this competition. Throughout the programme, BEIS will be exploring opportunities to facilitate knowledge sharing by funded projects, to ensure that the learnings from the programme are shared with relevant stakeholders.

During the Phase 2 programme participants will be expected to attend at least three dissemination events with other Phase 2 participants to discuss project findings. These are envisioned to occur at the start of Phase 2, at the mid-point and following submission of the final reports at the end of the programme.

11.2 Intellectual Property

The proposed arrangements for Intellectual Property Rights (IPR) and exploitation of IPR are set out in the Contract Terms and Conditions published with this competition ITT.

Subject to the requirements of Conditions 27(3), 28(5) and 28(7) of the pre-commercial terms and conditions (Contract Terms and Conditions), applicants will retain ownership of the intellectual property generated from the project. Applicants are required to identify and record any such intellectual property and to protect patentable knowledge in accordance with Condition 28 of the Contract Terms and Conditions. If within five years of its creation applicants have not commercially exploited intellectual property generated from the work (Arising Intellectual Property), then in line with clause 28(5) of the Contract Terms and Conditions, BEIS may request the applicant to assign the Arising Intellectual Property to BEIS. In line with clause 28(7), under the same circumstances, or if applicants have established a monopoly position, BEIS may require the applicant to licence the Arising Intellectual Property to third parties nominated by BEIS.

For further information please refer to the Contract Terms and Conditions, notably Conditions 27 and 28.

11.3 Ownership of Demonstration Devices

Subject to the terms and conditions applicable to intellectual property within the Contract Terms and Conditions, suppliers will retain responsibility and ownership for the technologies, demonstration devices and related equipment developed and used during the delivery of the contracts.

12 Feedback, Re-application and Right of Appeal

A short summary of key feedback regarding the applications will be provided to all applicants. This feedback will be based on the comments of technical assessors. No additional feedback will be provided and there will be no further discussion on the application.

The feedback from the assessors is intended to be constructive. Comments are not a checklist of points which must be answered or argued in a resubmitted application as the assessors/requirements may be different and it is your decision as to whether you act on the suggestions made.

13 Confidentiality and Freedom of Information

Where any request is made to BEIS under the Freedom of Information Act 2000 ("FOIA") for the release of information relating to any project or applicant, which would otherwise be reasonably regarded as confidential information, BEIS will notify you of the request as soon as we become aware of it. An applicant must acknowledge that any lists or schedules provided by it outlining information it deems confidential or commercially sensitive are of indicative value only and that BEIS may nevertheless be obliged to disclose information which the applicant considers confidential.

As part of the application process all applicants are asked to submit a public description of the project. This should be a public facing form of words that adequately describes the project but that does not disclose any information that may impact on Intellectual Property (IP), is confidential or commercially sensitive. The titles of successful projects, names of organisations, amounts awarded, and the description of the project may be published once the award is confirmed as final.

All reviewers, internal and external, used during the assessment of applications and project monitoring officers will be required to consider and identify any conflicts of interest. Reviews and project monitoring arrangements will only proceed once BEIS is in receipt of reviewers' declared Conflict of Interest forms.

14 Further Instructions to Applicants

Please refer to the Hydrogen BECCS Innovation Programme Competition website for responses to questions raised during this competition process.

The Department reserves the right to amend the enclosed Competition documents at any time prior to **6pm BST, 16th January 2023**. Any changes are most likely to correct editorial errors and may include further FAQs on the Competition Guidance Notes asked by stakeholders **before 6pm BST, 10th January 2023**. Any such amendment will be numbered, dated and issued on the competition website. Where amendments are significant, the Department may, at its discretion, extend the deadline for receipt of tenders.

The Department reserves the right to withdraw this contract opportunity without notice and will not be liable for any costs incurred by contractors during any stage of the process. Contractors should also note that, in the event an application is considered to be fundamentally unacceptable on a key issue, regardless of its other merits, that application may be rejected. By issuing this Competition document, the Department is not bound in any way and does not have to accept the lowest cost, or any application and reserves the right to accept a portion of any application unless the tenderer expressly stipulates otherwise.

Appendix 1: Technology Readiness Levels (TRLs)

Technology readiness levels are an indication of the maturity stage of development of a technology on its way to being developed for an application or product. The table below defines TRLs 1 to 9.

TRL 1 – Basic Research	Scientific research begins to be translated into applied research and development.
TRL 2 – Applied Research	Basic physical principles are observed, practical applications of those characteristics can be 'invented' or identified. At this level, the application is still speculative: there is not experimental proof or detailed analysis to support the conjecture.
Applied research and development	
TRL 3 – Critical Function or Proof of Concept Established	Active research and development is initiated. This includes analytical and laboratory studies to physically validate analytical predictions of separate elements of the technology. Examples include components that are not yet integrated or representative.
TRL 4 – Laboratory Testing/Validation of Component(s)/Process(es)	Basic technological components are integrated to establish that the pieces will work together.
TRL 5 – Laboratory Testing of Integrated/Semi-Integrated System	The basic technological components are integrated with reasonably realistic supporting elements so it can be tested in a simulated environment.
Demonstration	
TRL 6 – Prototype System Verified	Representative model or prototype system is tested in a relevant environment.
TRL 7 – Integrated Pilot System Demonstrated	Prototype near or at planned operational system, requiring demonstration of an actual system prototype in an operational environment.
Pre-commercial deployment	
TRL 8 – System Incorporated in Commercial Design	Technology is proven to work - actual technology completed and qualified through test and demonstration.
TRL 9 – System Proven and Ready for Full Commercial Deployment	Actual application of technology is in its final form - technology proven through successful operations.

Appendix 2: Eligible and Ineligible Costs

1. Eligible Costs

Directly incurred costs:

These are costs that are specific to the project that will be charged to the project as the amount spent, fully supported by an audit record justification of a claim. They comprise:

a) Labour costs for all those contributing to the project, broken down by individual salary and employer costs.
b) Material costs (including consumables specific to the project)
c) Capital equipment costs
d) Sub-contract costs
e) Travel and subsistence

Indirect costs:

Indirect costs should be charged in proportion to the amount of effort deployed on the project. Applicants should document the methodology they have applied to calculate them, using their own cost rates. They may include:

f) General office and basic laboratory consumables
g) Library services / learning resources
h) Typing / secretarial
i) Finance, personnel, public relations and departmental services
j) Central and distributed computing
k) Overheads (Overheads must not amount to more than 50% of the value of the contract, and as a guide, BEIS would not expect overheads to amount to more than 20% of the value of the contract unless fully justified.)

2. Ineligible Costs

Under no circumstances can costs for the following items be claimed:

a) Commercialisation activities
b) Profit (i.e. applicants should not include profit for themselves or the other project team members, including within indirect costs or as a separate project cost)
c) Contingency sums
d) Protection of IPR

e) For activities of a political or exclusively religious nature
f) In respect of costs reimbursed or to be reimbursed by funding from other public authorities or from the private sector
g) In connection with the receipt of contributions in kind (a contribution in goods or services as opposed to money)
h) To cover interest payments (including service charge payments for finance leases)
i) For the giving of gifts to individuals, other than promotional items with a value no more than £10 a year to any one individual
j) For entertaining (entertaining for this purpose means anything that would be a taxable benefit to the person being entertained, according to current UK tax regulations)
k) To pay statutory fines, criminal fines or penalties
l) In respect of VAT that you are able to claim from HM Revenue and Customs.
m) Costs associated with preparing and/or submitting an application for Phase 1 and/or Phase 2.

Appendix 3: Residual Value Guidance

Capital equipment costs are eligible for funding, but only those which are essential for the demonstration. The eligible capital cost excludes the value of assets at the end of the demonstration (i.e. the residual value). Applicants are asked to include in the **Project Finance Form** the capital costs at purchase and the residual value of the capital items at the end of the demonstration. The eligible cost is the difference between the purchase capital cost and residual value multiplied by utilisation of the item for the Hydrogen BECCS Phase 2 demonstration project (items which are used solely for the funded activities during the funding duration would have 100% Utilisation):

Eligible capital cost = (Purchase cost – residual value at end of demonstration) x Utilisation

This section provides basic guidance on our expectations around residual value.

Asset Classes

For the purposes of this competition we can divide capital assets into three classes, which can be treated differently:

1. **Mature assets:** Fully mature with functioning market (e.g. solar farm or new laptops). The eligible cost is only the depreciation costs for the duration of the project i.e. excluding the residual value at the end of the demonstration. The residual value should be calculated using standard accounting practices for depreciation, such as the reducing balance or straight line depreciation methods, with the key assumptions and the lifetime of the asset clearly stated and justified.
2. **Developing assets:** Assets without a mature market but with a potentially significant residual value. These may have a market developing (and therefore resale value), or may have a value in their continued use on the site of the demonstrator (value in use). For example, a mid-high TRL fermentation unit which is not significantly bespoke. A fair residual value for such assets should be calculated using the principles in this Appendix.
3. **Fully bespoke R&D assets** which only have value for the duration of the innovation project and have no residual value afterwards. An example of this asset class is a bespoke gas separation membrane for a specific pilot-scale application, but which cannot be used for commercial operation. The eligible cost of these assets is 100% less the scrap value.

Developing assets

With regards to the '**Developing assets'** above, if standard depreciation is not considered a fair and appropriate method, applicants could alternatively consider the:

A. **Resale value** – value which could be achieved in selling the asset to another party at the end of the demonstration.
B. **Value in Use** – the value of the asset for the current site or owner, for example through revenue generation in commercial operation.

C. **Scrap value** – for example the salvage value of the equipment when it is disposed of as scrap material/components after its useful life.

For these developing assets, applicants should use the highest of the above three values as the residual value, except where continued use is planned. The applicant must provide evidence that the asset is being used for the agreed purpose and time period, including after the end of the demonstration funding period.

Examples

For an applicant considering selling the hydrogen and/or captured CO2 after the funding period ends: the applicant could consider using standard depreciation on the asset, or could consider the value of the asset based on its estimated revenue generating ability through the remaining lifetime (e.g. using the expected market price of hydrogen and CO2).

For an applicant considering selling the hydrogen BECCS asset after the funding period ends: the residual value would be the resale value minus any costs of selling. The resale value is uncertain due to the emerging market and will depend on the technology, scale and condition. The value could be estimated based on:

- discussions with technology suppliers or potential purchasers
- standard accounting practices for depreciation
- the expected value of the asset in another application e.g. transport application under the RTFO (Renewable Transport Fuel Obligation).

The applicants would be expected to clearly justify the assumptions based on the particular circumstances of the project.

Application, assessment and delivery

Applicants are expected to select a reasonable approach for their assets and project and justify this in the application and **Project Finance Form**. The BEIS and external assessors will use their expert knowledge to determine if the residual value provided is appropriate. If the residual value provided is deemed too low, the project is likely to score lower on value for money. BEIS may request clarification on residual values during the assessment period and during due diligence prior to contract award.

At the end of the demonstrator, prior to project sign off, BEIS will review the residual value of the largest assets and if there is a material change in the residual value (e.g. due to market conditions or the outcome of the demonstrator), this may be adjusted and the final invoice amended (up to the maximum project contract value agreed). For example, if a sale price has been agreed for an asset that is greater than the anticipated residual value, this will be reflected.

Applicants are reminded that BEIS reserves the right to review the status of the project and assets 2 years after the end of the demonstrator to ensure the agreed funding, residual value and asset use remains valid and as agreed. If there is found to be a material change in the agreement or value, BEIS reserves the right to claw back any funds overpaid.

Appendix 4: Net Zero Innovation portfolio Key Performance Indicators

BEIS will be collecting the following KPIs, with data provided by Monitoring Officers marked in *italics*. Not all data will be collected annually.

KPI	KPI description	Metrics
KPI 1	*Number of NZIP projects supported*	• *Project start and completion.*
KPI 2	*Number of NZIP projects that have met objectives*	• *Extent to which project objectives have been met to date* • *Change in objectives and reasons for change*
KPI 3	*Number of organisations supported to deliver the project*	• *Lead partner delivering the project: name, organisation size and number of jobs supported within the organisation to deliver the project.* • *Other partner organisations involved in delivering the project as named on the Contract or Grant: name, organisation size and number of jobs supported within the organisation(s) to deliver the project.*
KPI 4	Number of active contractual and non-contractual business relationships supported	• Number of contractual relationships: name and type of contractual relationship. • Number of formal non-contractual business relationships: name and type of non-contractual relationship • Extent to which your organisation expanded its network of business relationships as a result of the project
KPI 5	Technology Advancement	• Technology Readiness Levels (current and anticipated) • Other technology improvement indicators: patents applied for or granted; academic, technical or non-technical publications generated and knowledge exchange events attended (such as conferences)
KPI 6i	*Initial Financial Leverage to deliver project*	• *Project funding structure: Amount in £m of BEIS, Other Public Sector and Private Funding.*

6ii	Follow-on Funding secured	• Amount of follow-on funding raised and the source (public or private).
KPI 7i	Reduction in energy costs	• Scope and scale of impact on reducing energy costs • Route to reducing energy costs
7ii	Increased energy efficiency/ Reduced energy demand	• Scope and scale of impact on reducing energy demand/ increasing energy efficiency
7iii	Increase in energy system flexibility	• Scope and scale of impact on energy system flexibility • Route to increasing energy system flexibility
KPI 8	Commercialisation advancement	• Commercial readiness levels (current and anticipated) • Steps towards commercialisation incl. licensing agreements, commercial partnerships, product certifications etc.; national/ international standards passed • UK and International sales secured and their value (£m)
KPI 9	CO_2 emissions reductions	• Scope and scale of project impact on carbon emissions • Route to achieving carbon emissions reductions
KPI 10	Policy impact	• Whether, how, and to what effect evidence from the project has informed policy development • Whether projects have engaged in activities with industry or civil society

Appendix 5: Environmental Considerations and Regulations

BEIS strongly encourages applicants to begin to consider the possible environmental impacts of proposed projects as early as possible, to ensure that sufficient detail can be provided at application stage. This consideration is needed at every stage of technology development to ensure that the risks to the environment and human health are adequately understood. Applicants should seek to design out and minimise environmental risks and maximise wider environmental co-benefits. There are three environmental principles that summarise how applicants should approach this:

1. **Consider environmental risks early and comprehensively**. This includes:
    a. Building environmental considerations into decision making at the earliest stage – not as an afterthought
    b. Providing robust evidence that allows the environmental risks to be effectively managed and regulated, and which considers risks of deployment at commercial scale
    c. Assessing all impacts from cradle-to-grave - including harvesting feedstocks & raw materials, decommissioning, and safe long-term recovery or disposal of waste
    d. Engaging the public so they understand the risks and benefits
2. **Minimise the impacts and risks to people and our environment** – air, land and water. This includes:
    a. Maximising decarbonisation and greenhouse gas reduction within safe environmental limits
    b. Maximising resource, energy and water efficiency – wasted resources, energy and water represent harm without benefits
    c. Maximising co-benefits for people and the environment
3. **Are fit for the future**, including resilience to the impacts of climate change

Environmental Regulation

Further suggestions for how projects can prevent or minimise their emissions and impacts on the environment is available through the Environment Agency's Best Available Techniques guidance.

Please read and follow the regulatory guidance relevant to your technologies, some of which are listed below. Please note that relevant authorities may charge for detailed pre-application and permitting advice. The scope and costs associated with this service will be discussed and agreed prior to providing detailed regulatory advice. Further details of the Environment Agency pre-application advice service can be found here.

Examples of guidance for specific Environment Agency regulation of relevance

Examples of guidance for specific Environment Agency regulation of relevance		
	Does your innovation project involve…	**Regulations you may need to consider**
	Planning Permission	• Environmental advice on planning proposals
	Getting an environmental permit	• Check if you need an environmental permit • Check if your proposal meets our research & development criteria • Risk assessments for specific activities: environmental permits
	Control of Major Accident Hazards regulations	• COMAH
Air	Carbon Capture and Storage	• Carbon Capture and Storage Best Available Techniques • Environmental Risk Assessment for Carbon Capture and Storage
	Hydrogen Production and Use	• Inorganic chemicals sector: additional guidance • Guidance in development for hydrogen production from methane/RFG with CCS is available on request. • We are in the process of developing other guidance to support hydrogen production and use. Please refer to Technical Guidance for regulated industry sectors: environmental permitting, for our latest publications.
	Gasification	• Gasification, liquefaction and refining installations: guidance
	Anaerobic digestion	• Regulation | Anaerobic Digestion (biogas-info.co.uk)
	Emissions to air	• Air quality in planning • Emissions Trading Scheme
Land	Waste management *(Think very carefully about potential waste status of each output and check guidance)*	• Check if your material is waste • Get an opinion from the definition of waste service • New waste management techniques • Waste and environmental impact • Register or renew waste exemptions • Incineration of waste (EPR5.01): guidance
	Spreading waste/ materials to land *(e.g. biochar, enhanced weathering)*	• Landspreading guidance • Storing and treating waste to make biochar: LRWP 60 • Storing and spreading biochar to benefit land: LRWP 61

Water	Water abstraction	• Fresh Water - Apply for a water abstraction or impoundment licence • Seawater - Do I need a marine licence Engage with Marine Maritime Organisation
	Effluent to water	• To Fresh Water and Sea water - engage with EA if novel, otherwise enhanced pre-application for Discharges to surface water and groundwater permit
	Farming	• Farming rules for water • Storing silage, slurry and agricultural fuel oil

If you have any further technology or regime specific queries, then contact:

- In England, Ross Lowrie, Senior Advisor (Decarbonisation & Net Zero), at ross.lowrie@environment-agency.gov.uk
- In Scotland, please contact SEPA: ppc@sepa.org.uk
- In Wales, please contact NRW: enquiries@naturalresourceswales.gov.uk
- In Northern Ireland, please contact NIEA: IPRI@daera-ni.gov.uk

Appendix 6: Acceleration Support

This annex provides information regarding support available for Small & Medium Enterprises (SMEs). The businesses that fall into the categories defined by Table 1 are classed as Small and Medium Enterprises (SMEs). A large business in this context means any enterprise which is not a SME.

Table 1 Categories for business size definitions

Company Category	Staff Headcount		Turnover		Balance Sheet Total
Medium	<250 people	**AND**	≤£45m	**OR**	≤£39m
Small	<50 people	**AND**	≤£9m	**OR**	≤£9m
Micro	<10 people	**AND**	≤£2m	**OR**	≤£2m

This programme will offer Acceleration Support (with no associated to cost to the project) to successful applicants where the project lead organisation meets the definition of Small & Medium Enterprise (SME). Projects whose lead organisation is a university will not be eligible to receive this support, however on request, may have access to recorded training materials. The support is highly recommended for SME SBRI awardees to help develop their business. This Acceleration Support is 100% funded by BEIS. This support will focus on helping the supplier to prepare commercial plans and actions that will increase the chance of successfully bringing the innovation to market or reduce the time to market.

The starting point for Acceleration Support is to consider the current stage of commercial preparation and identify (with the supplier) critical next steps, business strengths and gaps, benchmarked for the stage of the individual business across the following key Acceleration Support focus areas:

- Market engagement and proposition
- Strategy and sales
- Team and board
- Funding and investment
- Product-service design, development and launch
- Business processes and controls

Specialist advisers will be assigned by BEIS to support the company in the development of the appropriate knowledge and skills. Three types of support will be available dependant on company need:

1. Tailored support, including coaching and specialist support across the six focus areas
2. Group training and learning resources, including sector specific masterclasses and techno-market workshops
3. Access to industry and finance networks, providing companies with investor engagement opportunities, pitch training sessions, facilitated market engagement and networking opportunities

All SME-led proposals that are awarded funding and wish to receive Acceleration Support will need to participate in an Acceleration Support Planning meeting. This planning session will be conducted by The Carbon Trust who have been appointed to deliver Acceleration Support Services on behalf of BEIS. Following the planning meeting an acceleration plan will be created outlining the task delivery plan. These plans will be bespoke and based on company needs identified.

It is highly recommended that SBRI recipients take up the offer of Acceleration Support Services and co-operate with both the Acceleration Planning Session and the Acceleration Manager, who will oversee the delivery of the acceleration support.

Participants will also be asked to collaborate in monitoring and evaluation activities and to provide feedback on support provided through the programme.

Any enquiries regarding this publication should be sent to us at:
h2beccs@beis.gov.uk