Department for
Business, Energy
& Industrial Strategy

Domestic Hydrogen Appliance Development Innovation SBRI Competition

(Hy4Heat Work Package 4)

(An SBRI Competition: TRN: 1575/07/2018)

Invitation to Tender

30 August 2018

Department for Business, Energy & Industrial Strategy

Date: 30 August 2018

As part of the Hy4Heat Programme, the Department for Business, Energy & Industrial Strategy ("BEIS") wishes to appoint contractors to develop certified domestic gas appliances that can be run on hydrogen under a pre-commercial procurement competition.

Enclosed are the following sections (described in detail under Contents):

- Sections 1 to 10
- Annexes 1 to 8

See also the following separate documents:

- Contract Terms and Conditions
- Pricing schedule
- Questions & answers from Hy4Heat Domestic Hydrogen Appliances supplier event

Please register your interest in submitting a tender for this project at the following email address:

- builtenvironmentinnovation@beis.gov.uk

Your email must include the following subject line:

- 'RoI: Domestic Hydrogen Appliance Development Innovation Competition'

All notifications of updates to the Invitation to Tender (ITT) process or answers to questions raised by potential bidders will be issued by email, so it is important that you have registered your interest to receive them.

Please read the instructions on the tendering procedures carefully since failure to comply with them may invalidate your tender.

Your tender must be received by **12 noon on Friday 5 October 2018,** by email at the following email address:

- builtenvironmentinnovation@beis.gov.uk

Your email must include the following subject line:

- 'TENDER: Domestic Hydrogen Appliance Development Innovation Competition'

Further instructions are included in Section 4.

I look forward to receiving your response.

Yours sincerely,

Steve Loades

BEIS Programme Manager – Hy4Heat

Email: builtenvironmentinnovation@beis.gov.uk

PRIVACY NOTICE

Identity and contact details of the Data Controller (and where applicable, the controller's representative) and the Data Protection Officer.

The Data Controller is the Department for Business, Energy & Industrial Strategy (BEIS). You can contact the BEIS Data Protection Officer at: BEIS Data Protection Officer, Department for Business, Energy and Industrial Strategy, 1 Victoria Street, London SW1H 0ET. **Email:** dataprotection@beis.gov.uk.

Purpose of the processing and the legal basis for the processing

Any personal data contained within submitted tenders will be processed by BEIS or on behalf of BEIS for the purposes of the tender exercise described within the remainder of this Invitation to Tender, or in the event of legal challenge under The Public Contract Regulations 2015 or The Limitation Act 1980.

We are collecting your data as part of our public task.

Any recipient or categories of recipients of the personal data

The data may be shared with other Government Departments or public authorities where necessary as part of the tender exercise.

Details of transfers to third country and safeguards

The data you provide will not be transferred outside the European Union.

Retention period or criteria used to determine the retention period

Unsuccessful tenders will be kept for a period of six months following the date of contract signature. The successful tender will be retained as part of the contract documentation for a period of 6 or 12 years from the date of contract expiry, depending on the nature of the contract.

The rights available to individuals in respect of the processing

A list of your rights under the GDPR is accessible at: https://ico.org.uk/for-organisations/guide-to-the-general-data-protection-regulation-gdpr/individual-rights/

The right to lodge a complaint with a supervisory authority

You have the right to lodge a complaint with the Information Commissioner's Office (supervisory authority) at any time. Should you wish to exercise that right full details are available at: https://ico.org.uk/for-organisations/guide-to-the-general-data-protection-regulation-gdpr/individual-rights/.

The existence of automated decision making, including profiling and information about how decisions are made, the significance and the consequences.

The provision of the information you provide is not connected with individual decision making (making a decision solely by automated means without any human involvement) or profiling (automated processing of personal data to evaluate certain things about an individual)

Contents

1. Introduction

This Invitation to Tender (ITT) document sets out the context, scope, application process and assessment criteria for the Domestic Hydrogen Appliance Development Innovation Competition (Hy4Heat - Work Package 4).

This Competition focuses on the development of domestic hydrogen appliances to demonstrate the safe use of hydrogen as a fuel in providing domestic heating, hot water and cooking requirements. It aims to provide critical evidence of end use application, safety, in-use emissions, and functionality.

The key concept is that any new hydrogen appliance shall essentially be a variant on an existing and widely sold Natural Gas (NG) product in a similar fashion to a liquid petroleum gas (LPG) variant. This base natural gas product shall be called the 'reference product', and the hydrogen version should ideally be of similar size, efficiency, emissions (except CO_2), aesthetics and comfort. It is appreciated that due to the combustion characteristics of hydrogen this may not be fully achievable, but the essence is a 'like for like'[1] replacement. The only exception to this is the innovative domestic hydrogen appliance where manufacturers are encouraged to propose any appliance that may stimulate the market for domestic hydrogen appliances.

The essential requirement for this competition is to prove that safe, efficient, and low Nitrogen Oxide (NOx) hydrogen appliances can be created as a 'like for like' alternative to existing methane appliances. A UK transition to hydrogen would present a huge logistical challenge and products that simplify the switch-over process (e.g. 'dual fuel', 'hydrogen ready' or 'adaptable'[2]) would be highly desirable. Tenderers are invited to include 'dual fuel', 'hydrogen ready' or 'adaptable' appliances that can be developed alongside all essential deliverables detailed in Section 7, within the Competition timeframe and in line with the target funding.

The total potential value of the Competition is up to £9.0m (ex VAT) although BEIS may allocate less than this depending on the quality of the applications received. The Competition will be delivered in three main phases:

Phase 1 – Solution design for a domestic hydrogen appliance. A maximum of £960k will be available in total for Phase 1 solution designs, up to a value of £30k per project. BEIS will be looking for a portfolio of appliance types and diversity of suppliers to support and encourage innovation.

Phase 2a – Development of a first prototype (1.0) to be provided for demonstration trials. A maximum of £6.0m will be available in total for Phase 2a in accordance with the breakdown of target funds per project shown in the table below.

[1] 'Like for like' is defined as having a reference appliance that uses natural gas as a fuel.

[2] 'Dual-fuel' refers to the ability to interchange between gas types without the need to change over components; 'Hydrogen ready' refers to appliances that are optimally designed to run on hydrogen but initially configured to run on natural gas. These appliances then may require a minimum number of components to be changed at the point of switchover but will have been specifically developed to facilitate this process; 'adaptable' refers to the replacement of a minimum numbers of key components within existing natural gas appliances to allow them to run on hydrogen. Definitions adapted from BEIS commissioned report 'Appraisal of Domestic Hydrogen Appliances', Frazer-Nash Consultancy, February 2018

Phase 2b – Further prototype development (2.0) and full certification. A maximum of £2m will be available in total for Phase 2b projects in accordance with the breakdown of target funds per project shown in the table below.

Appliance category	Appliance type (one per project)	Target funds for Phase 2a & 2b (£)	% of funds in Phase 2a	% of funds in Phase 2b
Boiler	Combination boiler	720,000	75%	25%
	Regular/system boiler	720,000	75%	25%
Cooker	Stand-alone hob	170,000	75%	25%
	Stand-alone oven with grill	270,000	75%	25%
	Integrated freestanding cooker	370,000	75%	25%
Fire	Standard fire	370,000	75%	25%
	Mid-range fire	370,000	75%	25%
Innovative domestic hydrogen appliance		370,000	75%	25%

It is anticipated that between two and five projects per appliance type will be selected for Phase 1 and that two to three projects per appliance type will be selected to deliver Phases 2a and 2b. The number of projects funded will be dependent on the quality of applications and funding available within the value of the competition.

Note: All applications must be received electronically by BEIS by 12 noon on 5 October 2018, at the following email address:

- builtenvironmentinnovation@beis.gov.uk

See Section 4: Application Process of this document for details of how to apply.

1.1 Context

Background

The Climate Change Act 2008 (the Act) established a legally binding target to reduce the UK's greenhouse gas emissions by at least 80% below 1990 levels by 2050.

Heating and cooling in the UK accounts for nearly one half of primary energy consumption and one third of carbon emissions. Over 80% of homes and business are currently supplied by gas and the UK has one of the most comprehensive gas networks in the world with 282,000km of gas pipes feeding 22.7 million homes and businesses.

Achieving the UK's legally binding 2050 climate change targets is likely to require the almost complete decarbonisation of heat in domestic and non-domestic buildings. The most cost effective way to decarbonise buildings on the gas grid on the scale required to meet our 2050 targets has yet to be determined.

At this stage, it is not clear which technologies are likely to work best at scale and offer the most cost-effective, long term answer. Crucially, the costs and the barriers to the development of all the heat decarbonisation options are uncertain. For all options, further work on evidence, cost reduction, policy development and innovation is required to help de-risk them.

The hydrogen approach

To be able to inform any future assessment of the feasibility of the costs and benefits of undertaking a hydrogen conversion, a full understanding of issues from end-to-end (production to use) of the gas chain will be required.

The hydrogen gas chain can be split into the following stages:

- Production (including plant and CO_2 off-take, CO_2 sequestration and hydrogen storage).
- Transmission network (involving the pipework that transports the gas under a pressure of between 7 and 85 bar).
- Distribution network down to the end user's gas meter (involving pipework that transports the gas under a pressure of up to 7 bar).
- End-use (i.e. downstream of the meter).

This innovation programme seeks to demonstrate and de-risk the technologies downstream of the meter.

Hy4Heat Programme

The Department for Business, Energy and Industrial Strategy (BEIS) has appointed Arup+, a group of companies led by Ove Arup Ltd, as the Programme Management Contractor (PMC) to manage and successfully deliver Hy4Heat, a programme to demonstrate and de-risk the use of hydrogen for heating in GB homes and businesses.

The Hy4Heat programme's aim is:

- To establish if it is technically possible and safe to replace methane with hydrogen in commercial and residential buildings and gas appliances. This will enable the Government to determine whether to proceed to a community trial.

The Hy4Heat programme's overall objective is:

- To provide the technical, performance, usability and safety evidence to de-risk the use of hydrogen for heat in buildings whilst working with others to prepare for a potential future occupied trial.

The programme's focus is on researching, developing, testing and demonstrating within the end-use stage of the gas chain. This will involve the gas appliance and equipment sectors as well as consumer research.

The programme is aiming to demonstrate:

- That safe, reliable, efficient and affordable end-use appliances and equipment can be developed for the lower pressure, below seven bar domestic sector.
- That hydrogen can be safely distributed to the end user appliances in existing buildings' pipework, downstream of the meter.
- Initial findings of what the consumer experience of a hydrogen fuelled home will be. This includes testing through unoccupied trials appliance suitability, as well as developing requirements and options for progressing to a potential community trial.

Successful demonstration will lay the ground work for a potential follow-on project to undertake an occupied community trial.

The Hy4Heat programme will be completed by the end of March 2021. It is envisaged that it will consist of nine Work Packages:

1. Programme management
2. Definition of a hydrogen quality standard
3. Establishing an appliance and equipment testing capability
4. **Development of domestic hydrogen appliances (this Invitation to Tender (ITT))**
5. Understanding commercial appliances
6. Understanding industrial appliances
7. Assessment of suitability of hydrogen in existing buildings
8. Hydrogen demonstration trials in unoccupied building
9. Preparations for an occupied consumer community trial

Arup+, as the PMC, are responsible for delivering Work Packages 1 and 9 as part of their contract. Arup+ will manage the delivery of Work Packages 2 – 8 and, as part of the conditions for the PMC role, have agreed not to bid for the remaining Work Packages that will be delivered by other suppliers.

This ITT directly supports the delivery of Work Package 4, Development of domestic hydrogen appliances.

1.2 Small Business Research Initiative

The Small Business Research Initiative (SBRI) pre-commercial procurement (PCP) is a quick, simple and well-established process that enables the development of innovative products and services in response to specific challenges faced by Government departments and public sector bodies. Successful business partners receive finance to develop their innovative ideas, generating new business opportunities and routes to market. PCPs have been successfully run in the UK through Innovate UK and the SBRI.

1.3 The Challenge

The aim of the Competition is to develop 'like for like'[3] appliances which can demonstrate the safe use of hydrogen as a fuel to meet domestic heat requirements.

Objectives

The objectives of the Competition are to:

1. Deliver prototype appliances which can demonstrate safe use of hydrogen as a fuel in providing domestic heating, hot water and cooking requirements;
2. Contribute to positive stakeholder engagement through use of the prototype appliances in unoccupied demonstrations;
3. Understand, and where feasible address, the challenges and risks associated with progressing the appliances to a volume manufacturing stage;
4. Understand the challenges and potential solutions for a transition to hydrogen, including products that simplify the switch-over process (e.g. 'dual fuel', 'hydrogen ready' or 'adaptable').

Geographic scope

The competition is open to all organisations within the European Economic Area (EEA). Unoccupied trials and testing must be in done in Great Britain.

[3] 'Like for like' is defined as having a reference appliance that uses natural gas as a fuel.

1.4 Structure of the Competition

The Competition will be overseen by the BEIS Hy4Heat Programme Board, supported by a BEIS/Hy4Heat team that will manage and monitor the competition.

The main components of the Competition are:

Competition projects: Up to 24 innovation projects will be funded through the Competition (a maximum of two to three projects across each of the appliance types[4]). The Competition will be phased, initially developing a detailed design document (Phase 1). Followed by the development of a first prototype suitable for unoccupied demonstration trials (Phase 2a), and further prototype development to achieve full certification (Phase 2b), with supporting business plans for consideration of any potential future scale up. Further details on the activities and timescales of the phases are provided below.

The rationale for a phased approach is to facilitate the innovation process, providing the opportunity for the best solutions to be delivered, which have greater chance of commercial success after the Competition ends.

BEIS reserves the right to take a portfolio approach when awarding funding to projects in order to ensure that the Competition supports a range of appliance types across the three categories (boilers, cookers and gas fires). Within these categories, BEIS may therefore choose to allocate the budget to lower scoring projects to develop a wider range of appliance types. For a specific appliance type, if tenders received are only for 'hydrogen only' appliances with no acceptable tenders received for 'dual fuel', 'hydrogen ready' or 'adaptable' appliances, BEIS further reserves the right to only award part or none of the funding available for that appliance type.

[4] Depending on the quality of applications, BEIS may choose to not progress competitions in one or more categories (boilers, cookers and gas fires)

2. Activities and Timescales

Details of the activities and timescales for each of the three Competition phases are described below. This provides details on Phase 1 activities and high-level details on anticipated activities for Phases 2a and 2b[5]. Further administrative details for Phases 2a and 2b will be made available to successful participants during Phase 1.

2.1 Phase 1 (Solution Design) (November 2018 – February 2019)

The focus of Phase 1 is to develop solution design documents covering the detail of the prototype development described in objective 1 (see Section 1.3), which will subsequently be developed, tested and certified during Phases 2a and 2b.

Phase 1 should demonstrate that the concept hydrogen appliance is viable. Details should be provided regarding the necessary development and testing required to create the first prototype, including an understanding of any issues to be overcome and proposed solutions.

There are some key challenges that applicants will need to consider at this stage and make plans for within their applications:

Key challenges

1. **Functionality** – Manufacturers should demonstrate how they intend to meet the challenge of producing a functional hydrogen fired device. The appliance must light and operate in a controlled and sustained manner.
2. **Safety** – The primary hazards when considering the use of a flammable gas are fires and explosive gas/air mixtures. These usually result from a leak or unexpected event which causes a release of gas that is subsequently ignited. Manufacturers should provide evidence of how their appliance(s) will meet the challenge of reducing the likelihood and scale of such events. In particular, designs should incorporate delayed ignition and flame detection solutions. They should also be able to withstand worst case delayed ignition within the combustion chamber, flue and the appliance case.
3. **Efficiency** – Manufacturers should demonstrate how they will meet the challenge of achieving appliance efficiency (Net or Lower Heating Value (LHV) basis) that is comparable to that achieved for the reference natural gas product and as specified in the relevant product standard.
4. **Emissions** – Manufacturers should demonstrate how they intend to meet the challenge of achieving NOx emission levels that are compliant with (essential) or better than (highly desirable) Ecodesign limits (e.g. 56mg/kWh for boilers and 130mg/kWh for local space heaters). NOx levels will be primarily determined by the flame condition, which will be determined by the burner design. Balancing flame temperature and excess air requirements will be key to meeting the efficiency and NOx emissions requirements.

[5] This is because latter phases are subject to change depending on the successful projects funded in phase 1

5. **Fluing and Ventilation** – For hydrogen appliances, condensate is an important consideration as approximately 40% more water is produced (at stoichiometric combustion) per MJ of heat input than for natural gas (methane). Manufacturers must demonstrate how they will overcome the challenge of removing this water vapour to avoid/mitigate the risks to the building fabric associated with condensation such as corrosion, damp and mould development.

Phase 1 outputs: The Phase 1 output will be a feasibility report that describes the necessary product development steps and associated outputs necessary for Phase 2a (first prototype (1.0)) and Phase 2b (community ready prototype (2.0)). The output from Phase 1 will also form the application for subsequent phases of funding and therefore participants will need to set out their full costs covering both Phases 2a and 2b.

A presentation of the outputs may be requested by BEIS as part of knowledge dissemination. This will not be assessed and will not form part of the bid for future phases. Minimum requirements of the report are provided in Section 7.

Further administrative details on the report/application for Phase 2 and assessment criteria will be made available during Phase 1. The report will form the application to be assessed for progression to Phase 2a and 2b

Funding scope: Consortia are welcome; however, applicants should note that BEIS will not fund development of consortia or team building. See Annex 3 for further details on eligible and ineligible costs.

The next sections provide high level details of Phases 2a and 2b, more detail will be made available to successful participants during Phase 1, such as locations for unoccupied demonstration trials.

2.2 Phase 2a Prototype Development 1.0 (April 2019 – March 2020)

Phase 2a will focus on the physical development of the first prototype as detailed in the Phase 1 solution designs which will be tested for functionality and safety.

Phase 2a outputs: Outputs proposed will include a report, which will provide evidence of successful completion of Phase 2a milestones (Section 7) and suitability to move to Phase 2b. A presentation may be requested by BEIS as part of knowledge dissemination. This will not be assessed and will not form part of the bid for future phases.

Phase 2a outputs of each project will also include:

- Appliance test report – covering functional and safety test results and any other test the manufacturer considers necessary to demonstrate the readiness of the appliance.
- Five fully boxed examples of the appliance prototype including all paperwork and CE Gas Appliance Regulation (GAR) type test report and demonstration of the prototype being safely installed, operated and maintained.
- Details of plans for further product development to obtain full certification, meeting emissions and full aesthetic requirements within the next phase.

BEIS will assess progress, including evidence from the prototype safety testing, to inform decisions whether to proceed with Phase 2b funding for the project or not as part of contract review. There may be opportunity to update plans for Phase 2b, but it is envisaged that the price will be fixed as part of the Competition evaluation of proposals to move from Phase 1 to Phase 2.

Phase 2a does not require evidence that emissions and full aesthetic requirements have been met. However, this will be a requirement within Phase 2b.

Phase 2a outputs are required no later than 31 March 2020. Progression to Phase 2b earlier than April 2020 may be allowed if Phase 2a outputs are successfully delivered earlier in the timeframe.

Further details regarding the completion of the report for Phase 2a will be made available during Phase 1 to participants. Reports will be reviewed to confirm compliance and phase 2a deliverables.

It is envisaged that all projects within Phase 2a will progress to Phase 2b provided they fully deliver. Projects that fail to deliver Phase 2a outputs fully will not progress further.

2.3 Phase 2b Prototype 2.0 (April 2020 – March 2021)

Projects within Phase 2b will be funded to further develop the prototype appliance to be community trial ready and certified for use in an occupied home. This development work should be continued in parallel with the testing of prototype 1.0 (from Phase 2a) within Hy4Heat Work Package 8[6].

Other activities are likely to also include:

- Knowledge dissemination
- Stakeholder engagement and communications

Final outputs are likely to include:

1. A final project report detailing design and development of the prototype 2.0.
2. Results, outputs and / or specifications of prototypes developed including prototype 1.0 demonstration trial results, prototype 2.0 test results and certificates to demonstrate compliance with the safety and performance standards[7].
3. Recommendations for further dissemination of knowledge and learning from the project.
4. A business plan for scaling up the manufacture of appliances and training of installers in preparation for a potential future community trial and subsequent sales. The business plan should also consider potential further product developments to facilitate a long term roll out programme for hydrogen transition as well as cost to the consumer. Developments should include a full explanation about how the product would deliver a ‘dual fuel’, ‘adaptable’ or ‘hydrogen ready’ capabilities, including the likely cost, implications on efficiency and time to convert.

[6] Work package 8 will consist of an unoccupied demonstration trial to validate the domestic hydrogen appliances developed in terms of product concept, functionality and safety.

[7] Evidence that emissions and full aesthetic requirements have been met is required for prototype 2.0.

2.4 Summary of Key Dates

The anticipated timetable for the Competition and this tender exercise is as follows. BEIS reserves the right to vary this timetable. Any variations will be circulated by email to all organisations who have registered an interest in tendering.

Phase 1 – Solution Design	
Briefing and industry engagement event	15 June 2018
Competition opens	30 August 2018
Briefing webinar	w/c 3 September 2018
Deadline for questions relating to the tender	14 September 2018
Responses to questions published	21 September 2018
Deadline for Phase 1 applications	**Friday 5 October 2018, 12 Noon**
Notification of Phase 1 results	9 November 2018
Standstill period	10 – 19 November 2018
Phase 1 Start / Finish	26 November 2018 – 15 February 2019
Phase 2a – Prototype Development 1.0	
Phase 2a application deadline (Phase 1 report)	15 February 2019
Phase 2a presentations (if required)	w/c 18 February 2019
Notification of Phase 2a results	15 March 2019
Standstill period	16 – 25 March 2019
Phase 2a Start / Finish	1 April 2019 – 31 March 2020
Phase 2b – Prototype 2.0	
Phase 2b Start / Finish	April 2020 – March 2021

3. Competition Process

BEIS is seeking proposals to deliver a portfolio of certified domestic hydrogen appliances (boilers, fires and cookers) for use in the home, in order to provide critical evidence of end use application, safety, in-use emissions and consumer acceptability.

Contracts will be awarded on a competitive basis to the highest quality proposals that address the challenges set out in this guidance.

The Competition will proceed as follows:

- Competition documents released 30 August 2018;
- Briefing webinar w/c 3 September 2018 to be shared via email;
- Interested companies submit applications that are assessed against defined criteria;
- Phase 1 contracts are awarded to the highest-ranking proposals; however, BEIS reserves the right to take a portfolio approach and may choose to allocate the budget to lower scoring projects to develop a wider range of appliance types;
- Assessment of Phase 1 outputs to decide which projects will progress to Phase 2a;
- Phase 2a projects are awarded to undertake prototype development;
- Phase 2a outputs are reviewed to ensure completion and confirm project progression to Phase 2b;
- Phase 2b projects commence to further develop the prototype and full certification through unoccupied demonstration trials;
- Successful companies can further develop and exploit products or services, offer it to other customers and take it to market (complying with intellectual property requirements – see Section 10.5).

The three phases are described further below:

Phase	Dates
1 – Solution Design	26 November 2018 – 15 February 2019
2a – Prototype Development v1.0	1 April 2019 – 31 March 2020
2b – Prototype v2.0 – full certification	1 April 2020 – 31 March 2021

4. Application Process

Conflict of Interest

BEIS's terms and conditions of contract for the Competition 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, subcontractor (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 consortia or organisation designs a working arrangement such that the findings cannot be influenced (or perceived to be influenced) by the organisation which is the owner of 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 that an impartial approach to the project is maintained.

The process by which this is managed in the procurement process is as follows:

1. **During the bidding process, organisations may contact BEIS, via the builtenvironmentinnovation@beis.gov.uk email address to discuss whether or not their proposed arrangement is likely to yield a conflict of interest.** Any responses given to individual organisations or consortia will be issued by email (in a form which does not reveal the questioner's identity). Any organisation thinking of submitting a bid, should share their contact details with the staff member responsible for this procurement, to ensure they receive an update when any responses to questions are published.
2. **Contractors are asked to sign and return Declaration 3 (page 67) 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.
3. **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 proposal and declaration, there remains a conflict of interest which may affect the impartiality of the research.

Failure to declare or avoid 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.

BEIS has appointed Arup+ as the programme management contractor (PMC), who is responsible for delivering work packages 1 and 9 as part of their contract. Arup+ will also be managing the delivery of Work Packages 2 – 8 and, as part of the conditions for the PMC role, have agreed not to bid for the remaining work packages. These work packages will be delivered by other suppliers.

Evaluation of Responses

The tender process will be conducted to ensure that bids are evaluated fairly and transparently, in accordance with agreed assessment criteria. Further details of the assessment criteria are provided in Section 8.

Terms and conditions applying to this Invitation to Tender (ITT)

BEIS Terms and Conditions of Contract for Services for Domestic Hydrogen Appliance Development Innovation Competition (Hy4Heat - Work Package 4) (TRN: 1575/07/2018) are published alongside this ITT.

Instructions to Contractors

BEIS reserves the right to amend the enclosed tender documents at any time prior to the deadline for receipt of tenders. Any such amendment will be numbered, dated and issued by 26 September 2018. Where amendments are significant, BEIS may at its discretion extend the deadline for receipt of tenders.

BEIS 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 that a tender is considered to be fundamentally unacceptable on a key issue, regardless of its other merits, that tender may be rejected.

By issuing this invitation the Department is not bound in any way and does not have to accept the highest scoring or any tender and reserves the right to accept a portion of any tender unless the tenderer expressly stipulates otherwise in their tender.

Applicants should endeavour to answer all of the questions on the application in full. Incomplete applications and any containing incorrect or false information are very likely to be rejected although BEIS may, at its discretion, request clarification or additional data before making a final decision. Applicants are strongly advised to structure their tender submissions to cover each of the evaluation criteria.

All answers should be contained within the application form. Any appendices that support the answers in the application form must be appended to the end of the form. The application form must list all appendices and supporting documents.

Any applications or supporting documentation received after the application deadline will not be considered.

After reviewing and evaluating the written proposals, BEIS may decide to seek clarifications from suppliers.

Registering interest for submitting an application

Tenderers should register their interest in submitting a tender for this project at the following email address:

- builtenvironmentinnovation@beis.gov.uk

The email must include the following subject line:

- ‘RoI: Domestic Hydrogen Appliance Development Innovation Competition’

All notifications of updates to the Invitation to Tender (ITT) process or answers to questions raised by potential bidders will be issued by email, so it is important that you have registered your interest to receive them.

Submitting an application

The application form can be found at:

- Annex 5 – Application Form

Completed application forms should be submitted electronically in pdf format and emailed to the following email address:

- builtenvironmentinnovation@beis.gov.uk

with the following subject line:

- 'TENDER: Domestic Hydrogen Appliance Development Innovation Competition'

The maximum size email you can send is 10 MB. If your application is larger than 10MB please break the submission down into smaller sizes and ensure the subject line of each additional email takes the following format:

- 'TENDER: Domestic Hydrogen Appliance Development Innovation Competition – (name of lead applicant) – email x of y'

Checklist of documents to be submitted

For each project – a completed application must be submitted:

- Annex 5 (a) – Summary Information
- Annex 5 (b) items 1, 2 and 3 - Proposal Details (maximum 15 A4 pages for each appliance type, Arial font minimum size 12pt with single spacing and minimum 2.5cm margins)
- Annex 5 (b) item 4 – Pricing Schedule *(separate document)*
- Declaration 1: Statement of Non-collusion
- Declaration 2: Form of Tender
- Declaration 3: Conflict of Interest
- Declaration 4: Questions for Tenderers
- Declaration 5: Code of Practice for Research
- Declaration 6: GDPR Assurance Questionnaire
- Declaration 7: Safe Use of Hydrogen

5. Eligibility Criteria

BEIS expects to deliver the proposed Competition as a pre-commercial procurement which 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 pre-commercial R&D activities only. Projects requesting funding for commercialisation activities are not eligible.

This Competition is ***open to all organisations*** that can demonstrate a route to market for their solution based on natural gas appliance sales.

The sharing of risks and benefits is an important aspect to the pre-commercial procurement approach. Projects receive financial support and retain any intellectual property generated, with certain rights of use retained by BEIS as set out in Annex 4 Terms & Conditions.

Project outputs are expected to be shared publicly (See 'Further Information' in Section 10). Key functional performance data (e.g. efficiency and emissions) will be published at least in the Phase 2b final report.

Applicants should clearly state where cost savings are being provided compared to exclusive development contracts[8]

Proposals must:

1. Be at a pre-commercial stage of development[9]
2. Address the phase 1 scope (see Sections 6 and 7)
3. Describe all phases of the project (see 'Competition Process', Section 3 and 'Activities and Timescales, Section 2)
4. Clearly indicate the cost savings, compared to exclusive development contracts, provided to BEIS in line with pre-commercial procurement requirements (see Financial Information, Section 10.2)
5. Be led by a single organisation acting as prime contractor with evidence of strong collaboration across consortia (if a consortium bid is proposed).

[8] Exclusive development means that the public purchaser reserves all the results and benefits of the development (including Intellectual Property Rights or IPRs) exclusively for its own use.

[9] Pre-commercial covers activities such as solution exploration and design, prototyping, up to the original development of a limited volume of first products or services in the form of a test series. It does not include commercial development activities such as quantity production.

6. Phase 1 Scope

BEIS is seeking applications from contractors to deliver one or more of the types of appliance listed in the table in Annex 1. The technical specifications for each appliance type are detailed in Annex 2. The appliance types listed and their specifications are based on market research conducted by the Hy4Heat team to establish which products are most reflective of appliances currently in a typical home. This provides a guide for which hydrogen products might be most useful in any future potential 'like for like' community trial.

Applications for projects to develop individual appliances should propose a reference natural gas appliance with sufficient sales history to demonstrate its suitability as a 'like for like' replacement for a significant section of the market. However, innovative domestic hydrogen appliances may not be based on a reference product and so evidence of existing market may not be available. Instead, applicants will need to explain why they believe that there is a potential market for their proposed appliance.

We anticipate that between two and five projects per appliance type will be selected to produce a feasibility study (Phase 1) and that two to three projects per appliance type will be selected to deliver Phases 2a and 2b.

BEIS reserves the right to take a portfolio approach when awarding funding to projects in order to ensure that the Competition supports a range of appliance types across the three categories (boilers, cookers and gas fires). Within these categories, BEIS may therefore choose to allocate the budget to lower scoring projects to develop a wider range of appliance types. For a specific appliance type, if tenders received are only for 'hydrogen only' appliances with no acceptable tenders received for 'dual fuel', 'hydrogen ready' or 'adaptable' appliances, BEIS further reserves the right to only award part or none of the funding available for that appliance type.

Multiple applications

Within the same appliance type (see the table of recommended scope of appliances Annex 1), manufacturers may submit more than one application provided that they are based on reference appliances with fundamental differences in design i.e. these shall be with regards to such aspects as design of 'heat cell' (in the boiler industry) or 'heat exchanger' (in the gas fire industry). Differences that are solely aesthetic are not considered to be fundamental. Applicants wishing to bid for the development of more than one appliance type must complete an application form for each appliance.

7. Deliverables

Contract delivery will be measured against predefined milestones. These will be specific for each phase and are detailed below. At the end of each phase, the deliverables provided will be assessed and based on this assessment, projects will be selected to progress to the next phase[10].

It should be noted that BEIS contracts require that project outputs are shared publicly. See 'Further Information' in Section 10.

Phase 1

Manufacturers will be expected to deliver a feasibility report that describes the necessary product development steps and required outputs to achieve Phase 2a (first prototype (1.0)) and Phase 2b (community ready prototype (2.0)). BEIS will supply guidance for report writing prior to projects commencing but, as a minimum, reports should include:

- Identification and assessment of the reference appliance regarding its suitability for development to a hydrogen appliance. This should include:
    - Evidence of significant ongoing market demand for the chosen natural gas appliance. For innovative domestic hydrogen appliances, this should be a justification of a potential market;
    - An explanation for why this appliance is particularly suited for development into a replacement hydrogen appliance from an engineering and cost perspective.
- A description of the approach to develop the 'like for like' hydrogen appliance that acknowledges the risks involved and demonstrates how these will be avoided or mitigated to create a hydrogen appliance that is:
    - Safe;
    - Functional, in that it delivers a similar level of performance to the natural gas reference appliance;
    - Aesthetic in keeping with market expectations;
    - Compliant with the relevant standards and efficiency and emissions regulations.
- A coherent explanation of the hydrogen combustion and heat exchanger technology (where relevant) that is planned, including diagrams of key components (e.g. burner, heat exchanger). Consideration should be given to all key challenges detailed in Section 2.
- Where projects are for 'hydrogen ready', 'dual fuel' or adaptable' appliances, a detailed description of functionality and key components should be provided, including estimates of conversion times and component costs.

[10] It is envisaged that all projects within Phase 2a will progress to Phase 2b, only on failure to deliver Phase 2a outputs will a project not progress further.

- A schedule for the development work which refers to the milestone schedule for Phases 2a and 2b in the table below. This should include a Gantt chart and detail inhouse development activities and externalities e.g. testing, facility use.
- Description of roles specific to how to deliver work alongside existing commitments and quality assurance procedures
- Key risks (technical, safety and end-user related) and dependencies of the project, including mitigation plans.
- Details of the type of information you propose to publish outside your organisation, the format you expect this to take and the expected timeframe
- A detailed breakdown of costs for the development work.

The Phase 1 report will be used to assess which projects will go forward to Phases 2a and 2b. As such, reference should be made to the relevant product functional specification as detailed in Annex 2. The report should contain sufficient information to enable assessment. We reserve the right to request any further details beyond those provided to aid us in our assessment.

Participants will also need to deliver fully accessible copies of any other relevant documentation or outputs used in delivery of Phase 1, with appropriate explanations of the analysis undertaken and raw data used.

Deliverables for all appliances:

No.	Milestone	Evidence / Deliverable Required
1	Identification of design parameters for conversion to hydrogen (or development of an innovative domestic hydrogen appliance), especially burner and burner control unit	Feasibility report to demonstrate that the development of a hydrogen appliance is viable. The report should describe the necessary product development steps to create the first prototype (1.0) and the community trial ready prototype (2.0). This will include details of the 'reference product' (where relevant) as tabled in the tender evaluation criteria and a list of the components to be changed e.g. gas/air mixture control, level of premix (see Section 8, Technical Approach).

Phase 2a

Progression to Phase 2a will be dependent on successful qualification from Phase 1. Assessment will be made against your response to the deliverables detailed in Phase 1. Access to manufacturing facilities to evaluate the achievement of appliance development milestones in phase 2a and 2b will be required.

Deliverables for all appliances in Phase 2a will consist of:

No.	Milestone	Evidence / Deliverable Required
2a	All components identified, including colourant method as required	A bill of materials showing all the key components and prototype designs for each component. The proposed colourant method (where relevant) and associated component designs should be included as required.
2b	All components developed and tested for functionality and safety	First design review report including a final bill of materials showing all the key components with designs and/or details of sub-contract suppliers for each component. Where necessary the report should demonstrate that each component has passed functionality and safety testing and component level safety certificates should be included. The report should identify any predicted challenges for assembling these components into a functioning and safe appliance and what further work is planned to overcome these.
3	All component assemblies (e.g. burner/control assembly or heat exchanger) developed and tested for functionality and safety	Second design review report for all component assemblies including test results demonstrating how the safety and performance challenges listed in the functional specs have been met. Where some performance challenges have yet to be achieved, the report should recommend what further work needs to be done.
4	Completion of appliance prototype 1.0 design and production of the first unit	Design, production and laboratory demonstration of the first unit ready for functional and safety testing. The whole product shall demonstrate adequate qualitative performance as might be expected by the householder e.g. speed of response, turn-down and basic aesthetic acceptability.
5	Appliance prototype 1.0 developed and tested for functionality and safety	Appliance test report that shows that the appliance has passed functionality and safety tests and includes recommendations of content for inclusion in instruction manuals, installation instructions and training courses. Tests should include as appropriate: smooth ignition; cross lighting; pilots; control valves; delayed ignition; heat exchanger performance; plus any other tests the manufacturer considers necessary to demonstrate the readiness of their appliance to meet the functional and safety requirements of the specification. **Evidence that emissions and full aesthetic requirements have been met is not required for prototype 1.0.**

6	Production of five fully boxed examples of appliance prototype 1.0 including all product documentation, CE GAR type test report and demonstration of the prototype being safely installed, operated and maintained.	Delivery to the demonstration trial site of five appliance prototype 1.0, complete with a full set of manufacturer's instructions and CE GAR type test certificate valid for the demonstration trial. The appliance should be accompanied by trained support staff qualified to install, operate and maintain the prototype safely and who can show evidence of this qualification. Support staff will be required for the full duration of the unoccupied demonstration trial.

Phase 2b

Deliverables for all appliances will consist of:

No.	Milestone	Evidence / Deliverable Required
7a	Completion of appliance prototype 2.0 design and presentation of one fully boxed example of appliance including all paperwork and CE GAR type test report	A community trial-ready prototype 2.0 is developed and certified for use in an occupied home. Evidence should include prototype 1.0 demonstration trial results, prototype 2.0 test reports, and certificates to demonstrate compliance with the safety and performance standards listed in the functional specifications. **Evidence that emissions and full aesthetic requirements have been met is required for prototype 2.0.**
7b	Final retention for training, guarantee issues and business cases etc.	Final report to provide information on the manufacturer's business plan for scaling up the manufacture of appliances and training of installers in readiness for a community trial and subsequent sales. The business plan should also consider potential further product developments to facilitate a long term roll out programme for hydrogen transition as well as cost to the consumer. Developments should include a full explanation about how the product would deliver a 'dual fuel', 'adaptable' or 'hydrogen ready' capabilities, including the likely cost, implications on efficiency and time to convert.

8. Evaluation Criteria

Although the contract is divided into phases, the response to tender should demonstrate your ability to cover the entire development and delivery contract, e.g. Phases 1, 2a and 2b**.** The approach you detail will primarily be for the completion of Phase 1. However, you should be mindful that sufficient detail is included to show your technical capabilities to complete the full development of the proposed appliance(s).

NOTE: Separate evaluation criteria will be provided in Phase 1 which will be used to assess the outputs from Phase 1 projects with regards to their suitability for progression to Phases 2a and 2b.

The tender response should show that the concept hydrogen appliance is achievable in theory by describing the reference natural gas appliance and planned design approach to adapt it to burning hydrogen. For new appliances, tenderers should describe the engineering principles that underpin the concept and how they will be applied in practice.

Each application will be assessed by three assessors, including Hy4Heat team representation. The cost criterion will be marked by BEIS staff only. Proposals will be assessed against each of the criteria in the table below. A total of five points is available against each sub-criterion and the weighting to be applied to each sub-criterion is given in brackets.

If your response is successful, payments will be made upon delivery against milestones in each phase as detailed in Section 9.1.

Proposals must:

1. Be at a pre-commercial stage of development[11]
2. Address the Phase 1 scope (see Sections 6 and 7)
3. Describe all phases of the project (see ‘Competition Process’, Section 3 and ‘Activities and Timescales, Section 2)
4. Clearly indicate the cost savings, compared to exclusive development contracts, provided to BEIS in line with pre-commercial procurement requirements (see Financial Information, Section 10.2)
5. Be led by a single organisation acting as prime contractor with evidence of strong collaboration across consortia (if a consortium bid is proposed)

[11] Pre-commercial covers activities such as solution exploration and design, prototyping, up to the original development of a limited volume of first products or services in the form of a test series. It does not include commercial development activities such as quantity production.

1. Skills and Expertise	Total Score 20

a. Evidence that the team has relevant skills and expertise to undertake the project, including demonstrating capability of working with hydrogen and/or town gas *(weighting x 2);*

b. Details of project team including organisational structure. If your bid is a consortium, this should clearly state the consortium lead and details of each consortium member and their role *(weighting x 1);*

c. Evidence of appropriate facilities (either existing or planned) that are required to undertake the project *(weighting x 1).*

2. Technical Approach	Total score 35

a. Provide a clear description of the proposed appliance. Describe the approach and methodologies that will be applied to address the challenges defined in the ITT and any others which may be considered relevant *(weighting x 2);*

b. Demonstrate how your proposal provides further value by developing 'dual fuel', 'hydrogen ready' or 'adaptable' variants to simplify the switch-over process or transition to hydrogen *(weighting x 2 (marks only available to 'dual fuel', 'hydrogen ready' or 'adaptable' proposals))*;

c. Describe the reference appliance and how this meets the requirements set out in the ITT including the following *(weighting x 2);*

- Photo/picture of base line reference appliance
- Technical specification
- Installation instructions
- User instructions

d. Include evidence that you understand the risks associated with hydrogen use and, in comparison to natural gas. Include reference to risks outlined in Section 10.1 *(weighting x 1).*

3. Management of delivery / Project Plan	Total score 20

a. Detailed description of work and associated timelines to complete phase 1 (include a Gantt chart). Indicative high level timelines must be included for Phase 2a and 2b *(weighting x 1);*

b. Description of management plans to demonstrate how the project will be delivered alongside existing commitments. Include detail of your quality assurance procedures *(weighting x 1);*

c. Key risks relating to the delivery and dependencies of the project, including mitigation plans. Risks should be presented in the table provided in the application form and may include technical, user-related and safety aspects (weighting x 2).

4. Cost	Total score 25

a. Bid cost for Phase 1 *(weighting 5).*

Price will be marked proportionately to the lowest bid. The lowest bid will receive maximum marks for the price elements and then all other bids will be marked proportionately to that bid, see example below

If 25 marks are available and the cheapest bid is £18,000, then:

Supplier	Price	Marks
1 (lowest bid)	£18,000	25
2	£21,000	18/21 * 25 = 21.4
3	£27,500	18/27.5 * 25 = 16.4

Suppliers bidding for more than one project (appliance type) should provide details of any discount that they wish to offer on their costs for Phase 1 if they are awarded more than one project/appliance type to take account of any duplicated work in their multiple proposals. Any discount will not form part of the assessment of the cost but will be applied to the signed contracts.

An indication of cost should be provided for Phase 2a and Phase 2b however these will not be assessed for application to enter Phase 1. Final costs for Phases 2a and 2b will be requested as part of the Phase 1 output report and will form part of the assessment to enter Phase 2a.

Applicants should clearly state where cost savings, compared to exclusive development contracts, are being provided compared to exclusive development contracts.

Scoring Method

Each question will be scored from one to five. The following illustrates the meaning of each score:

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

Phase 1 contracts will be awarded to the highest-ranking proposals, which achieve a minimum pass mark of 60%, in order of ranking (based on the total score), however, the number of Phase 1 projects funded depends on the range of solutions proposed and the quality of the proposals and BEIS may allocate less than the total budget depending on the quality of the applications.

BEIS reserves the right to take a portfolio approach when awarding funding to projects in order to ensure that the Competition supports a range of appliance types across the three categories (boilers, cookers and gas fires). Within these categories, BEIS may therefore choose to allocate the budget to lower scoring projects to develop wider range of appliance types. For a specific appliance type, if tenders received are only for 'hydrogen only' appliances with no acceptable tenders received for 'dual fuel', 'hydrogen ready' or 'adaptable' appliances, BEIS further reserves the right to only award part or none of the funding available for that appliance type.

Selection for Phase 2a will be based on the outputs from Phase 1, and progression to Phase 2b will be dependent on successful completion of Phase 2a.

9. Support Available

The total value of the Competition is up to **£9.0m** (excluding VAT), although BEIS may allocate less than the total budget depending on the quality of the applications.

Phase 1 – Solution design for a domestic hydrogen appliance. A maximum of £960k will be available in total for Phase 1 solution designs, with a maximum value of £30k per project. BEIS would like to encourage innovation and will be looking for a portfolio of appliance types and diversity of suppliers.

Phase 2a – Development of a first prototype (1.0) to be provided for unoccupied demonstration trials. A maximum of £6.0m will be available in total for Phase 2a in accordance with the breakdown of target available funds per project shown in the table below.

Phase 2b – Further prototype development (2.0) and full certification. A maximum of £2.0m will be available in total for Phase 2b projects in accordance with the breakdown of target available funds per project shown in the table below.

Appliance category	Appliance type (one per project)	Target funds for Phase 2a & 2b (£)	% of funds in Phase 2a	% of funds in Phase 2b
Boiler	Combination boiler	720,000	75%	25%
	Regular/system boiler	720,000	75%	25%
Cooker	Stand-alone hob	170,000	75%	25%
	Stand-alone oven with grill	270,000	75%	25%
	Integrated freestanding cooker	370,000	75%	25%
Fire	Standard fire	370,000	75%	25%
	Mid-range fire	370,000	75%	25%
Innovative domestic hydrogen appliance		370,000	75%	25%

Funding under this Competition will only be **available until March 2021**. All payments need to be completed by this date.

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 proposals 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 proposals and applicants accept the risk that they may not be awarded a contract.*

9.1 Milestone payments

Funding payments will be made as outlined in the table below and in line with the deliverables outlined in Section 7.

Phase	Milestone No.	Milestone	Payment
1	1	Design parameters for conversion to hydrogen, especially burner and burner control unit	£30k max. payment on delivery of phase 1 output
2a	2a	All components identified, including colourant method as required	5%
	2b	All components developed and tested for functionality and safety	10%
	3	All component assemblies (e.g. burner/control assembly or heat exchanger) developed and tested for functionality and safety	15%
	4	Completion of appliance prototype 1.0 design and production of the first unit	15%
	5	Appliance prototype 1.0 developed and tested for functionality and safety	15%
	6	Production of five fully boxed examples of appliance prototype 1.0 including all paperwork and CE GAR type test report and demonstration of the prototype being safely installed, operated and maintained.	15%
2b	7a	Completion of appliance prototype 2.0 design and presentation of one fully boxed example of appliance including all paperwork and CE GAR type test report	20%
	7b	Final retention for training, guarantee issues and business cases etc.	5%

10. Further Information

10.1 Safe use of Hydrogen

Hydrogen offers a different set of risks to natural gas (NG) and liquid petroleum gas (LPG). Similarly to NG and LPG, these surround its flammability. Hydrogen is non-toxic and offers no risk of carbon monoxide (CO) poisoning. As part of this tender document manufacturers are required to declare that their R&D staff are safe and competent in the handling and combustion of hydrogen and as a minimum have read and understood the public literature (including for example product standards for hydrogen fuel cells) on the use and combustion of hydrogen. The knowledge so gained (which could be supplemented by training and or working with appropriate consultants) will then be applied. Specific examples of this might be related to ATEX zoning, the increased risk from delayed ignition, and the use of compressed hydrogen gas in a development laboratory context.

Bidders must sign and return Declaration 7 – Safe Use of Hydrogen (Annex 5).

10.2 Financial Information

Applicants are requested to provide a fixed price quotation for Phase 1 deliverables described in Section 7. The total fixed price will be the financial criterion against which bids will be assessed.

Financial information should also include estimated costs for Phases 2a and 2b of the project, detailing items such as labour, material and capital equipment costs, travel and expenses. A detailed cost breakdown is required to enable assessment of value for money. Final costs and a detailed breakdown for Phases 2a and 2b will be required in the Phase 1 output forming part of the bid for these Phases. **Financial information should clearly indicate the cost savings / discount applied compared to an exclusive development contract[12].**

In submitting full tenders, applicants confirm in writing that the price offered will be held for a minimum of 13 weeks from the date of submission. Any payment conditions applicable to the prime contractor must also be replicated with sub-contractors.

10.3 Publication of Results

Pre-commercial procurement 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, industry and other stakeholders to further understanding and progress technology development and deployment.

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

- Identity of the participant and its partners;

[12] Exclusive development means that the public purchaser reserves all the results and benefits of the development (including Intellectual Property Rights or IPRs) exclusively for its own use.

- Project summary information including aims and expected outcomes of the project and technology area;
- Total award value.

Following completion of the funded projects, BEIS may wish to 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, key achievements and recommendations. BEIS may also revisit projects at a later date and publish research and/or evaluation reports for the scheme as a whole.

BEIS however recognise the need to maintain confidentiality of commercially sensitive information. BEIS will consult applicants regarding the nature of information to be published, in order to protect commercially sensitive information.

10.4 Reporting, evaluation & knowledge sharing requirements

There will be a number of requirements on contractors during the course of the project. These are described in more detail in Section 2, but for clarity, these will at a minimum include:

Reporting: to track project progress and ensure payments are made according to a schedule of milestones to be agreed with selected projects. This reporting will be in confidence to BEIS 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. Any public reporting by BEIS on the progress of the Hy4Heat programme will be anonymised and circulated for comment to the programme participants prior to publication.

Research and evaluation of the scheme: Successful applicants will be expected to participate in research and evaluation activities of their project during and after final contract payments, to assess the impact of the project including value for money. For example, during the project, successful applicants will be expected to grant access to their facilities so BEIS's agents may verify the progress being claimed prior to recommending that a milestone payment be made.

Knowledge sharing: to improve understanding of this technology and share lessons learned there will be an obligation on successful applicants to undertake knowledge sharing activities. We will expect applicants to share useful data (including performance data collected during field trials) and experience, for example through relevant industry forums. If it becomes apparent that a participant is having difficultly solving a problem that another participant has already solved, both parties will be encouraged to share their respective experiences to maximise the number of certified appliances that are delivered by the end of the Hy4Heat programme.

10.5 Intellectual Property

Suppliers will retain the intellectual property generated from the project and will be expected to identify and protect patentable knowledge within three years of its creation. Costs associated with securing intellectual property arising from or associated with this project are not eligible for reimbursement and cannot be included within the contract price.

BEIS requires a UK wide, irrevocable, royalty-free, non-exclusive licence, together with the right to grant sub-licences, to use or publish information, data, results, outcomes or conclusions which are created in performing the project, for its internal non-commercial purposes.

The detailed arrangements for intellectual property rights and exploitation of IPR are set out in the Terms and Conditions for this Competition.

10.6 Ownership of Demonstration Devices

Chosen suppliers will retain responsibility and ownership for the technologies and related equipment developed and used during the delivery of the contracts.

10.7 Decommissioning Costs

Chosen suppliers will have responsibility for decommissioning demonstration equipment when the project has been completed. When bidding, suppliers need to include any decommissioning costs, at fair market value, in the total cost of their bid.

10.8 Quality Assurance

This project must comply with the BEIS Code of Practice for Research (Annex 6) and bidders must set out their approach to quality assurance in their response to this ITT.

Tenderers should include a quality assurance plan that they will apply to the project.

To demonstrate relevant experience in producing high quality reporting, the tenderer must:

- Specify who will be responsible for quality assurance. This must be undertaken before information is issued to Hy4Heat for review prior to submission to BEIS.
- Specify the specific responsibilities of the contractor's project manager / director.

Sign-off for the quality assurance must be done by someone of sufficient seniority within the contractor organisation to be able take responsibility for the work done. Acceptance of the work by BEIS will take this into consideration. BEIS reserves the right to refuse to sign off outputs which do not meet the required standard specified in this invitation to tender.

The successful bidder or prime contractor in a consortium, will be responsible for any work they or their sub-contractors within the consortium supply and should therefore provide assurance that all work in the contract is undertaken in accordance with the Code of Practice.

BEIS reserves the right to request an audit of projects against the BEIS Code of Practice for Research and the commitments made in the tender documents and subsequent contract. Your response could be automatically rejected if the project will not be performed under quality assurance measures that fully meet the Code's requirements.

Other useful sources of guidance and advice that will help bids and the resulting work be of the highest quality include:

- The Government Social Research (GSR) Code, in particular those that relate to GSR Products: http://www.civilservice.gov.uk/networks/gsr/gsr-code
- The Green Book: appraisal and evaluation in central government. https://www.gov.uk/government/publications/the-green-book-appraisal-and-evaluation-in-central-governent

- Quality in Qualitative Evaluation: A Framework for assessing research evidence provides a Framework for appraising the quality of qualitative evaluations.
- Rapid Evidence Assessment (REA): http://www.civilservice.gov.uk/networks/gsr/resources-and-guidance/rapid-evidence-assessment/what-is. This toolkit will help researchers to identify whether a Rapid Evidence Assessment is best for their needs, and help with the process of planning and carrying out a review

Where relevant, all bids should refer to these pieces of guidance and advice and how they will be used.

The Contractor will be expected to produce high quality reports that meet the following criteria:

General:

- They answer the research questions clearly, in plain English
- They are clearly structured so that information presented in each section of each report is clear
- Connections between sections are clear
- Executive summaries are no more than two sides and set out the findings clearly and their relevance to BEIS policies
- All sections have clear introductions and conclusions (including findings being written concisely upfront)

Use of good quality English:

- They are thoroughly peer reviewed for writing quality
- No jargon is used and all terms are defined and referenced clearly
- All acronyms are written out in full the first time that they are mentioned in each section of each report
- No grammar and phrasing errors are present
- No typos / typographical errors are present
- They contain concise and non-wordy sentences and paragraphs
- They are concise reports that are not too long and do not have vast annexes

Visualisations:

- All visualisations are labelled
- All axes are labelled, including with appropriate units
- Clear and appropriate use of visualisations (large enough size, data can be read clearly without reference to the raw data, and there are not too many visualisations presented at once)
- All visualisations are clearly explained and discussed
- A range of different types of visualisations are used to provide more interesting and innovative ways of presenting the results

Data quality:

- Any limitations in the research approach need to be clearly stated and justified
- Further research should be stated to build upon the limitations that cannot be addressed in the research
- Where the findings are stronger and more robust and where they are not needs to be stated clearly
- They must use appropriate and consistent units
- All numerical units should include the range of uncertainty / error margin

10.9 Ethics

All applicants will need to identify and propose arrangements for initial scrutiny and on-going monitoring of ethical issues. The appropriate handling of ethical issues will be taken into consideration within the evaluation of applicants' proposals.

We expect contractors to adhere to the following GSR Principles:

1. Sound application and conduct of social research methods and appropriate dissemination and utilisation of findings
2. Participation based on valid consent
3. Enabling participation
4. Avoidance of personal harm
5. Non-disclosure of identity and personal information

10.10 Consortium Bids / Conflicts of Interest

In the case of a consortium tender, only one submission covering all of the partners is required but consortia are advised to make clear the proposed role that each partner will play in performing the contract as per the requirements of the technical specification. We expect the bidder to indicate who in the consortium will be the lead contact for this project, and the organisation and governance associated with the consortia.

Tenderers must provide details as to how they will manage any sub-contractors engaged to deliver this tender and what percentage of the tendered activity (in terms of monetary value) will be sub-contracted.

If a consortium is not proposing to form a corporate entity, full details of alternative proposed arrangements should be provided in Annex 5. However, please note that BEIS reserves the right to require a successful consortium to form a single legal entity.

BEIS recognises that arrangements in relation to consortia may (within limits) be subject to future change. Potential providers should therefore respond in the light of the arrangements as currently envisaged. Potential providers are reminded that any future proposed change in relation to consortia must be notified to BEIS so that it can make a further assessment by applying the selection criteria to the new information provided.

Annex 1: Recommended scope of appliances

The appliance types listed and their specifications are based on market research conducted by the Hy4Heat team to establish which products are most reflective of appliances currently in a typical home. This provides a guide for which future hydrogen products might be most useful in any future potential 'like for like' community trial.

This scope of appliances is open to tenders covering 'hydrogen only', 'hydrogen ready', 'dual fuel' and 'adaptable' appliances.

Appliance	Scope
Combi Boiler	• Suitable for a small house or apartment/flat, where no hot-water cylinder is present • Capable of providing heating and hot water on demand • Within a total heat output range of 12-32kW
Regular/System Boiler	• Suitable for a larger house where a hot-water cylinder is present • Capable of providing heating and hot water (via storage) on demand • With a total heat output range of 12-32kW
Standalone Hob	• A multiple burner appliance, with each burner producing a variable range of heat output
Standalone Oven with grill	• An oven unit with variable range of heat outputs/temperatures, incorporating hydrogen-fuelled grill technology (also with a range of heat outputs)

Integrated freestanding cooker	• A single, integrated appliance, comprising all three hydrogen fuelled technologies:
	  • A hob - a multiple burner appliance, with each burner producing a variable range of heat outputs
	  • A grill with variable range of heat outputs
	  • An oven with variable range of heat outputs/temperatures
	• Each technology would have distinct controls and functionality

Standard Gas Fire	• Development of an inset convector hydrogen fire • Open fronted with a conventional flue • Incorporate a standard appliance which can be installed into a 16"x22" opening incorporating a control burner with manual controls. The control burner assembly must be removable • Flame picture should be stable, visible, quiet and appealing • Back boilers are excluded from scope
Mid-range Gas Fire	• Development of an inset glass fronted hydrogen fire with a balanced flue • Incorporate a standard appliance which can be installed into a 16"x22" opening incorporating a control burner with manual controls. The control burner assembly must be removable • Flame picture should be stable, visible, quiet and appealing • Back boilers are excluded from scope
Innovative domestic hydrogen appliance	• Appliances in this category should stimulate the desirability of hydrogen in the home. • Examples could include: o A state of the art hydrogen gas fire o Incorporation of modern technologies (e.g. micro fuel cells with power outputs of <200W or hydrogen fuel cell powered combined heating and power unit) • Efficiency and NOx levels should comply with the intentions of the Eco-design directive • Appliances must operate with Grade A, Type 1 hydrogen • Appliance design should ensure installation convenience, user acceptability and servicing requirements are included • Appliances must meet the demand requirements of a domestic home, therefore appliances that dump heat will not be permitted • Back boilers are excluded from scope • Purely decorative products are excluded from scope

Annex 2: Functional Product Specifications

Information for All Appliances

It is expected that any product developed under the Hy4Heat programme has comparable performance to the reference natural gas appliance. Users should be provided with the same heat output and functionality. The environmental impact in terms of point of use and life cycle emissions from the new appliance should not be higher than that of the current natural gas product.

Within the Hy4Heat programme a small unoccupied demonstration trial will take place. The appliances procured under this Work Package will be used for this trial.

Gas Quality

In accord with ISO 14687, a hydrogen gas specification of Grade A, Type 1 should be assumed. This comprises >98%v/v hydrogen and is designated for use in internal combustion engines for transportation and residential/commercial appliances, excluding PEM fuel cell stationary appliances (Figure 1).

Odorant

Leak detection is a fundamental safety requisite under the Health and Safety Gas Safety (Management) Regulations 1996[13]. In natural gas, this is achieved using the addition of an odorant consisting of t-butyl mercaptan (TBM) and dimethyl sulphide (Odorant NB), at a concentration of 6 mg/m^3 gas.

The same odorant will be assumed for use with hydrogen in the unoccupied demonstration trial.

Supply Pressure

The hydrogen supply pressure to the property Emergency Control Valve (ECV) will be comparable to the current supply of natural gas in the low-pressure network, at 0.07 to 0.025 bar. The same meter regulators will be used as for natural gas and internal carcass pressure is expected to be nominally 20mbar i.e. similar to natural gas.

Certification

Delivered appliances will need to meet all relevant legal requirements for the UK. It is expected that the same certification procedure as would be carried out for a natural gas product will be completed for the hydrogen appliance.

For gas appliances, relevant legislation includes:

- Gas Appliances Regulation (GAR)[14].
- The relevant Ecodesign regulations

[13] UK Government. HEALTH AND SAFETY Gas Safety (Management) Regulations 1996, SCHEDULE 3 CONTENT AND OTHER CHARACTERISTICS OF GAS PART I REQUIREMENTS UNDER NORMAL CONDITIONS

[14] Regulation (EU) 2016/426 of the European Parliament and of the Council of 9 March 2016 on appliances burning gaseous fuels and repealing Directive 2009/142/EC. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32016R0426 (13/04/18)

- WRAS (Water Supply (Water Fittings) Regulations or Scottish Byelaws[15])

Safety

All developed appliances must be safe and fit for purpose for use with hydrogen as a fuel gas.

Delayed Ignition

A leak, or a release of unignited gas within an appliance carries a risk of fire and potential explosion. Accidents of this nature are rare. However, hydrogen has a higher flame speed than natural gas, therefore increasing the risks associated with such an event. Delayed ignition within the combustion chamber should be considered within the appropriate standards. This is a particular risk for large glass fronted balanced flued fires and care must be taken to minimise the combustion volume of such appliances. Traditional pressure relief flaps tend to be less functional in the case of hydrogen especially in the transitions from deflagration to detonation which will be rapid in the case of hydrogen.

Manufacturers are expected to demonstrate understanding of the result of hydrogen accumulation within the appliance casing. It would be expected that the product casing would fail, however tests should be carried out so designers can understand the mechanics of the accident, subsequent damage to the appliance and environment within which it was sited and possible mitigation options. These might include a gas detector within the case. These tests should be carried out in a safe location with the necessary risk assessments and health and safety procedures in place.

Flame Detection

Hydrogen contains no carbon compounds and very few impurities, therefore means of flame detection are different to those used for natural gas. It is expected that appropriate flame detection devices are included in all appliances supplied within the Hy4Heat programme. Methods of detection may include (not exhaustive):

- Colourant
- UV
- Thermal
- Infrared

Advice to installation technicians

Appliances within the unoccupied demonstration trial and any possible future occupied trials will be installed by ‘Gas Safe’ registered personnel. Such staff usually receive their core training with natural gas. There is an expectation that engineers will have undergone specific hydrogen training and assessment prior to such installations. It is likely that these hydrogen specific assessments will follow a similar process to LPG, where additional conversion modules are available.

[15] Water Industry, England and Wales. The Water Supply (Water Fittings) Regulations 1999, Statutory Instruments No.1148. Available at: http://www.legislation.gov.uk/uksi/1999/1148/pdfs/uksi_19991148_en.pdf (16/04/2018).

Manufacturers will be expected to co-operate with hydrogen specific training and provide bespoke advice on their products. They are also expected to ensure that their installations are safe and that their own engineers are appropriately trained on working with hydrogen gas.

Installation and operational documentation

A full set of installation and operational documentation as required under the GAR will be required and are expected to be closely based upon the reference natural gas equivalent appliance. Documents include:

- Instructions for installation intended for the installer
- Instructions for use and servicing, intended for the user
- Appropriate warning notices, which shall also appear on the packaging

In addition, any documentation and labelling requirements as specified by the eco-design regulations should also be adhered to.

The full set of documentation for the equivalent natural gas product will be used as a reference point.

Figure 1: ISO 14687 Gas Quality

Dimensions in micromoles per mole unless otherwise stated

Constituents (assay)	Type I			Type II	Type III
	Grade A	Grade B	Grade C	Grade C	
Hydrogen fuel index [g] (minimum mole fraction, %)	98,0	99,90	99,995	99,995	99,995
Para-hydrogen (minimum mole fraction, %)	NS	NS	NS	95,0	95,0
Impurities (maximum content)					
Total gases			50	50	
Water (cm^3/m^3)	NC [a]	NC	b	b	
Total hydrocarbon	100	NC	b	b	
Oxygen	a	100	c	c	
Argon	a		c	c	
Nitrogen	a	400	b	b	
Helium			39	39	
CO_2			d	d	
CO	1		d	d	
Mercury		0,004			
Sulfur	2,0	10			
Permanent particulates	f	e	e	e	
Density					e

NOTE 1 NS: Not specified

NOTE 2 NC: Not to be condensed

[a] Combined water, oxygen, nitrogen and argon: maximum mole fraction of 1,9 %.

[b] Combined nitrogen, water and hydrocarbon: max. 9 µmol/mol.

[c] Combined oxygen and argon: max. 1 µmol/mol.

[d] Total CO_2 and CO: max. 1 µmol/mol.

[e] To be agreed between supplier and customer.

[f] The hydrogen shall not contain dust, sand, dirt, gums, oils, or other substances in an amount sufficient to damage the fuelling station equipment or the vehicle (engine) being fuelled.

[g] The hydrogen fuel index is determined by subtracting the "total non-hydrogen gases" in this Table, expressed in mole percent, from 100 mole percent.

Functional Product Specifications - Boiler Specific

It is anticipated that for this programme condensing boilers will be produced.

The boilers procured for this programme will need to reflect the current market, therefore extremes of output ranges are to be avoided. Manufacturers are strongly encouraged to supply a hydrogen version of an existing natural gas product. The reference model should be rated between 12 – 32kW including DHW production.

The boilers procured for this programme should fit within spaces typically available in dwellings. Dimensions of a selection of available natural gas boilers from several manufacturers have been collated and are shown in Table 1.

Boiler replacement should be as straightforward as possible. Connections of typical modern compact wall hung boilers are bottom located water, gas and electrical connections and top mounted air supply/flue. Use of common back-plates to help simplify boiler switching would be a useful concept.

Table 1 Product Dimensions

	Combination Boiler	Regular/System Boiler
Average Dimensions (H x W x D) mm	722 x 415 x 325	684 x 402 x 313
Minimum Dimensions (H x W x D) mm	600 x 390 x 248	600 x 340 x 270
Maximum Dimensions (H x W x D) mm	845 x 453 x 474	780 x 450 x 360

Certification

The delivered product must be demonstrated to comply with the essential requirements of the GAR by undertaking type testing and on-going certification by a suitably approved Notified Body. Manufacturers are expected to determine the appropriate standards and testing procedures, working with their Notified Body as necessary. Hy4Heat's Work Package 3 is currently looking to develop information to assist this process.

It is thought likely that most compliance documentation will be based upon BS EN 15502-1:2012 plus A1:2015. Additional consideration of hydrogen safety from BS EN 62282-3-100:2012, and BS EN 62282-3-400 may be applicable.

It is required that GAR certificates issued during the development of appliances under this work package (development of domestic hydrogen appliances) are (as a minimum) of sufficient duration to cover the duration of the unoccupied demonstration trial. It is appreciated these may be location limited.

Declaration against the requirements of the relevant eco-design regulations should be accompanied by the appropriate product fiche as detailed in the regulation.

WRAS approval as appropriate would be expected by the provision of a WRAS approval certificate for potable water.

Efficiency

Measured efficiency should meet the values specified within the relevant EN standard, for example EN 15502. It is expected that manufacturers will aim to achieve appliance efficiency (Net or LHV basis) as close to that attained for the reference natural gas product under full and part load test conditions.

All new gas appliances entering the market are expected to comply with the Energy Related Products (ERP) directive (2009/125/EC)[16]. This states that products that use energy meet the requirements of the relevant Ecodesign regulation.

For boilers the requirements for seasonal space heating efficiency are (EU 813/2013)[17]:

- Fuel boiler space heaters with rated heat output ≤ 70 kW and fuel boiler combination heaters with rated heat output ≤ 70 kW,

The seasonal space heating energy efficiency shall not fall below 86% (Gross or HHV basis)

- Fuel boiler space heaters with rated heat output > 70kW and ≤ 400 kW and fuel boiler combination heaters with rated heat output > 70kW and ≤ 400 kW:

The useful efficiency at 100% of the rated heat output shall not fall below 86%, and the useful efficiency at 30% of the rated heat output shall not fall below 94% (Gross or HHV basis)

Manufacturers should aim for the developed hydrogen boilers to meet these requirements. This value will be published.

[16] Directive 2009/125/EC of the European Parliament and of the Council of 21 October 2009, establishing a framework for the setting of eco-design requirements for energy-related products. Available: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32009L0125&from=EN (19/04/18).

[17] Commission Regulation (EU) No 813/2013 of 2 August 2013 implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to eco-design requirements for space heaters and combination heaters. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32013R0813&from=EN (19/04/18).

Domestic Hot Water

Water heating efficiency is likely to be determined using the EN 13203 suite of standards. Manufacturers should aim to achieve appliance efficiency as close to that attained for the reference natural gas product.

The eco-design efficiency requirements are determined by load profile as follows. Water heat up time must be no greater than two minutes. Manufacturers should aim for the developed hydrogen boilers to meet these requirements.

Table 2: Ecodesign water heating efficiency requirements[18]

Declared load profile	3XS	XXS	XS	S	M	L	XL	XXL	3XL	4XL
Water heating energy efficiency	32%	32%	32%	32%	36%	37%	38%	60%	64%	64%

If manufacturers also wish to list their products on the Product Characteristics Database (PCDB)[19] they are obliged to provide evidence of conformity with the efficiency for an 'M' DHW load profile; consisting of 23 draw offs totalling 5.845kWh per day.

Although not mandatory to list a product on the PCDB, product data held is used to form the basis of SAP (Standard Assessment Procedure) and SBEM (Simplified Building Energy Model) assessments, therefore should be a consideration for future product roll out. 'M' DHW profile data will be required (third party validated). This value will be published.

Emissions

NOx Emissions

NOx emissions shall be measured using the method described in the relevant product standards. Manufacturers should aim to achieve the NOx limit of 56mg/kWh (GCV) as specified in the eco-design regulations. The NOx emission performance as measured above will be published.

Flue Considerations

Flue requirements for combustion appliances are covered under Approved Document J[20] of the Building Regulations. All combustion appliances should incorporate or be connected to, a flue which discharges the products of combustion to outside air.

[18] Commission Regulation (EU) No 813/2013 of 2 August 2013 implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to eco-design requirements for space heaters and combination heaters. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32013R0813&from=EN (19/04/18).

[19] Product Characteristics Database (PCDB). Available at: https://www.ncm-pcdb.org.uk/sap/searchpod.jsp?id=17 (19/04/2018)

[20] Approved Document J, Combustion appliances and fuel storage systems. The Building Regulations 2010, HM Government. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/468872/ADJ_LOCKED.pdf

For hydrogen appliances, condensate is an important consideration as approximately 40% more water is produced (at stoichiometric combustion) per MJ of heat input than for natural gas. Manufacturers must consider ways to mitigate the risks associated with condensation such as corrosion, damp and mould development. Under Document J, chimneys and flues are required to provide satisfactory control of water condensation, the following guidance is given. *For condensing appliances, flue materials must be impervious to condensates and resistant to corrosion (as per BS EN 1443:2003). Provisions must be made for drainage, thus avoiding ledges and crevices.*

Under the remit of Gas Safe, manufacturers should provide guidance on the safe installation of a flue associated with the newly developed hydrogen appliance.

Functional Product Specifications - Cooker Specific

Cookers procured for this programme will need to reflect the current market. Manufacturers are therefore encouraged to develop hydrogen products that fall within a range of products already developed for natural gas. Particular consideration should be made to typical kitchen unit dimensions as shown in Table 3. Cooker replacement should be as straight forward as possible.

Table 3: Typical Kitchen Unit Dimensions

Unit	Height (mm)	Width (mm)	Depth (mm)
Base Unit	890, 900	300, 400, 500, 600, 700, 800, 1000, 1200	500, 600
Wall Unit	600, 740, 760, 900, 990		300
Tall Unit	1975, 2066, 2166, 2266	500, 600	600

It is appreciated that many cooker manufacturers effectively install a limited range of freestanding hob burners into a wide variety of cooker shells or hob tops. Hy4Heat would be interested in proposals where a wider range of hob and oven sizes could be offered upon conversion from natural gas to hydrogen hobs.

Colourant

Cooker suppliers are required to include within their design a method to make the flame visible. Manufacturers should give careful consideration as to the longevity of such colourant and the ability of householders to refresh the colorant without the need to ‘work’ on the appliance as defined by the GAS(I&U)R 1998.

Manufacturers may suggest colourants but unless exceedingly low levels of colourant are envisaged (a few parts per billion) then only alkali metal salts are suggested. The colour as seen by the naked eye should be of similar intensity as that emitted by natural gas. It is suggested that as part of any maintenance the Gas Safe fitter would confirm operation of the colorant system.

Certification

The delivered product must be demonstrated to comply with the essential requirements of the GAR by undertaking type testing and on-going certification by a suitably approved Notified Body. Manufacturers are expected to determine the appropriate standards and testing procedures, working with their Notified Body as necessary. Hy4Heat's Work Package 3 is currently looking to develop information to assist this process.

It is expected that much of the test work will be based on the suite of standards under EN 30 and EN 203; but it is stressed these are only examples. Additional consideration of hydrogen safety may be based upon BS EN 62282-3-100:2012, and BS EN 62282-3-400.

It is required that certificates issued during the development of appliances under this work package (Development of domestic hydrogen appliances) are (as a minimum) of sufficient duration to cover the duration of the unoccupied demonstration trial. It is appreciated these may be location limited.

Declaration against the requirements of the relevant eco-design regulations should be accompanied by the appropriate product fiche as detailed in the regulation.

WRAS approval as appropriate would be expected by the provision of a WRAS approval certificate for potable water.

Manufacturers are also expected to determine the 'bake quality' of the hydrogen appliance and ensure comparable standards to those achieved using a natural gas appliance. At stoichiometric conditions 40% more water vapour is produced when burning hydrogen compared to natural gas. Therefore, ovens with open flames will be 'wetter' than the same oven using natural gas. This could have a significant impact on roasting and baking and must be a consideration.

Efficiency

New gas cookers entering the market, are expected to comply with the limits specified in Ecodesign regulation EU No 66/2014[21] as requested under the Energy Related Products (ErP) directive (2009/125/EC)[22]. For domestic ovens the following limits are set (Table 4).

Table 4: Ecodesign requirements for domestic oven cavities

	EEI of oven cavity
From 1 year after regulation comes into force	<146
From 2 years after regulation comes into force	<121
From 5 years after regulation into force	<96

The energy efficiency (EE) limits for domestic gas hobs are shown in Table 5. The efficiency of the hob is calculated as the average energy efficiency of the different gas burners of the hob.

Table 5: Ecodesign requirements for domestic hobs

	EE of gas-fired hob (%)
From 1 year after regulation comes into force	>53
From 2 years after regulation comes into force	>54
From 5 years after regulation comes into force	>55

[21] Commission Regulation (EU) No 66/2014 of 14 January 2014 implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to eco-design requirements for domestic ovens, hobs and range hoods.

[22] Directive 2009/125/EC of the European Parliament and of the Council of 21 October 2009, establishing a framework for the setting of eco-design requirements for energy-related products. Available: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32009L0125&from=EN (19/04/18).

Products developed under this work package are expected to be supplied at least five years from the date of the Ecodesign regulations entering into force. Therefore, manufacturers should aim to meet the efficiency limits in force at that time. Efficiency values will be published. As is currently the case for natural gas, there are no NOx emission requirements for gas cookers. This will not be changed for cookers developed under the Hy4Heat programme.

Functional Product Specifications - Fire Specific

The standard and mid-range fires procured for this programme will need to reflect the current market. Manufacturers are therefore encouraged to develop hydrogen appliances that fall within a range of products already developed for natural gas. It is likely this will be in the form of an open or closed fronted convector or balanced flued appliance which can be installed into a 16”x22” fireplace opening. Hydrogen burns with a near invisible flame, therefore to produce a flame similar to that of a methane flame, it is likely that a colourant will need to be added at the appliance level.

The characteristics of hydrogen when burning are significantly different to that of methane. Therefore, the burner currently used with natural gas fires will need significant modification to create a stable and appealing flame picture. Manufacturers are encouraged to consider the burners developed under this programme as offering a route to the provision of a more diverse looking range of appliances.

A state of the art hydrogen gas fire provides an opportunity for manufacturers to develop an innovative solution without the restriction of size or reproducing a solid fuel flame picture. An example may be a miniature air blown fuel cell.

In all instances, fire replacement should be as straight forward as possible and at a cost similar to current models on the market.

Colourant

Fire suppliers are required to include within their design a method to make the flames visible. Manufacturers should give careful consideration as to the longevity of such colourant and/or the ability of householders to refresh the colorant if required without the need to ‘work’ on the appliance as defined by the GAS(I&U)R 1998.

Manufacturers may suggest colourants but unless exceedingly low levels of colourant are envisaged (a few parts per billion) then only alkali metal salts are suggested.

Certification

The delivered product must be demonstrated to comply with the essential requirements of the GAR by undertaking type testing and on-going certification by a suitably approved Notified Body. Manufacturers are expected to determine the appropriate standards and testing procedures, working with their Notified Body as necessary. Hy4Heat's Work Package 3 is currently looking to develop information to assist this process.

It is thought likely that most compliance documentation will be based upon BS 7977. Additional consideration of hydrogen safety from BS EN 62282-3-100:2012, and BS EN 62282-3-400 may be applicable.

It is required that certificates issued during the development of appliances under this work package (Development of domestic hydrogen appliances) are (as a minimum) of sufficient duration to cover the duration of the unoccupied demonstration trail. It is appreciated these may also be location limited.

Declaration against the requirements of the relevant eco-design regulations should be accompanied by the appropriate product fiche as detailed in the regulation.

Efficiency

Measured efficiency should meet the values specified within the relevant product standard, for example BS 7977. It is expected that manufacturers will aim to achieve appliance efficiency (Net or LHV basis) as close to that attained for the reference natural gas product.

All new gas appliances entering the market are expected to comply with the Energy Related Products (ErP) directive (2009/125/EC)[23]. This states that products that use energy meet the requirements of the relevant Ecodesign regulation.

For fires the requirements for efficiency are (EU 2015/1188[24]):

- Seasonal space heating energy efficiency of open fronted local space heaters using gaseous or liquid fuel shall not be less than 42%.
- Seasonal space heating energy efficiency of closed fronted local space heaters using gaseous or liquid fuel shall not be less than 72%.

It is expected that manufacturers aim to meet the eco-design parameters applicable to the particular type of appliance developed.

Emissions

NOx Emissions

NOx emissions shall be measured using the method described in the relevant product standards. Manufacturers should aim to achieve the NOx limit of 130 mg/kWh (GCV) as specified in the eco-design regulations for open fronted and closed fronted local space heaters using gaseous fuels.

The NOx emission performance as measured above will be published.

Flue Considerations

Flue requirements for combustion appliances are covered under Approved Document J[25] of the Building Regulations. All combustion appliances should incorporate or be connected to, a flue which discharges the products of combustion to outside air. The exception to this are flue less appliances.

For hydrogen appliances, condensate is an important consideration as approximately 40% more water is produced (at stoichiometric combustion) per MJ of heat input than for natural gas. Manufacturers must consider ways to mitigate the risks associated with condensation such as corrosion, damp and mould development.

As for natural gas, appliance manufacturers must offer precise criteria as to the suitability of any flue for hydrogen.

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[23] Directive 2009/125/EC of the European Parliament and of the Council of 21 October 2009, establishing a framework for the setting of eco-design requirements for energy-related products. Available: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32009L0125&from=EN (19/04/18).

[24] Commission Regulation (EU) 2015/1188 of 28 April 2015 implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to eco-design requirements for local space heaters. Available at: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32013R0813&from=EN (19/04/18).

[25] Approved Document J, Combustion appliances and fuel storage systems. The Building Regulations 2010, HM Government. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/468872/ADJ_LOCKED.pdf

Annex 3: Eligible and Ineligible Costs

Eligible Costs

Directly incurred costs:

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

- Labour costs for all those contributing to the project broken down by individual
- Material costs (including consumables specific to the project)
- Capital equipment costs (cost or depreciation as appropriate)
- Decommissioning costs
- Sub-contract costs
- Travel and subsistence

Indirect costs:

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

- General office and basic laboratory consumables
- Library services / learning resources
- Administrative / secretarial
- Finance, personnel, public relations and departmental services
- Central and distributed computing
- Cost of capital employed
- Overheads

Ineligible Costs

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

- Commercialisation activities
- Protection of IPR
- For activities of a political or exclusively religious nature;
- In respect of costs reimbursed or to be reimbursed by funding from other public authorities or from the private sector;
- In connection with the receipt of contributions in kind (a contribution in goods or services as opposed to money);
- To cover interest payments (including service charge payments for finance leases);
- For the giving of gifts to individuals;

- For entertaining (entertaining for this purpose means anything that would be a taxable benefit to the person being entertained, according to UK tax regulations);
- To pay statutory fines, criminal fines or penalties; or
- In respect of VAT that you are able to claim from HM Revenue and Customs.

Annex 4: Terms and Conditions

See separate document.

Annex 5: Application Form

Department of Business, Energy and Industrial Strategy

Domestic Hydrogen Appliance Development Innovation SBRI Competition (Hy4Heat - Work Package 4)

TRN: 1575/07/2018

Application Form

Closing Date: Friday 5 October 2018, 12 Noon

Lead applicant:

Project name:

Appliance type:

Date:

Contact for enquiries

Department of Business, Energy and Industrial Strategy (BEIS)

Email: builtenvironmentinnovation@beis.gov.uk

Possible disclosure of information provided in response to this Competition

The Freedom of Information Act 2000 (“FOIA”) and the Environmental Information Regulations 2004 (“EIR”) apply to the Department. You should be aware of the Department’s obligations and responsibilities under FOIA or EIR to disclose, on written request, recorded information held by the Department.

Information provided in connection with this procurement exercise, or with any contract that may be awarded as a result of this exercise, may therefore have to be disclosed by the Department in response to such a request, unless the Department decides that one of the statutory exemptions under the FOIA or the exceptions in the EIR applies.

If you wish to designate information supplied as part of this response as confidential, of if you believe that its disclosure would be prejudicial to any person’s commercial interests, you must provide clear and specific detail as to the precise information involved and explain (in broad terms) what harm may result from disclosure if a request is received, and the time period applicable to that sensitivity. Such designation alone may not prevent disclosure if in the Department’s reasonable opinion publication is required by applicable legislation or Government policy or where disclosure is required by the Information Commissioner or the First-tier Tribunal (Information Rights).

Additionally, the Government’s transparency agenda requires that tender documents (including ITTs such as this) are published on a designated, publicly searchable web site. The same applies to other tender documents issued by the Department (including the original advertisement and the pre-qualification questionnaire (if used)), and any contract entered into by the Department with its preferred supplier once the procurement is complete.

By submitting a tender you agree that your participation in this procurement may be made public. The answers you give in this response will not be published on the transparency web site (but may fall to be disclosed under FOIA or EIR (see above)).

Where tender documents issued by the Department or contracts with its suppliers fall to be disclosed the Department will redact them as it thinks necessary, having regard (inter alia) to the exemptions/exceptions in the FOIA or EIR.

Non-Collusion

No tender will be considered for acceptance if the contractor has indulged or attempted to indulge in any corrupt practice or canvassed the tender with an officer of the Department. Declaration 1 contains a "Statement of non-collusion"; any breach of the undertakings covered under items 1 - 3 inclusive will invalidate your tender.

If a contractor has indulged or attempted to indulge in such practices and the tender is accepted, then grounds shall exist for the termination of the contract and the claiming damages from the successful contractors.

You must not:

- Tell anyone else what your tender price is or will be, before the time limit for delivery of tenders.
- Try to obtain any information about anyone else's tender or proposed tender before the time limit for delivery of tenders.

- Make any arrangements with another organisation about whether or not they should tender, or about their or your tender price.

Offering an inducement of any kind in relation to obtaining this or any other contract with the Department will disqualify your tender from being considered and may constitute a criminal offence.

Application Guidance

Applicants are urged to read all sections of this ITT carefully before completing this form and are asked to ensure that they provide sufficient information to demonstrate compliance with the Eligibility Criteria and the Evaluation Criteria.

Applicants are encouraged to write self-contained responses, using the guidance provided to limit the size of the application. Applicants may annex additional material if it is relevant to the evaluation criteria and materially strengthens the application. Applicants are requested to maintain the structure of the application form.

Applications should detail plans across all phases of the Competition.

This application has the following sections:

A. Application Form: Summary Information

B. Application Form: Proposal Details

C. Declarations

A. Application Form: Summary Information

Summary Information	
Appliance Type	
Project Category *(delete as appropriate)*	a) Boiler b) Cooker c) Gas Fire d) Innovative domestic hydrogen appliance
Project Sub-Category *(delete as appropriate)*	a) Hydrogen only b) Dual Fuel c) Hydrogen ready d) Adaptable
Project Summary	Please provide a brief summary of your proposed project, clearly demonstrating that the proposal is in scope, and the key outputs of the project will be achieved.
List of Annexes	
Contract Duration	
Proposed Start Date	
Lead applicant details	
Registered name	
Registered address	
Company registration No.	
VAT registration No.	
Country	
Region	
No. of employees	
Main activity	
Business sector	
Organisation type	
Website	
Lead contact details	
Name	
Position	
Organisation	
Correspondence address	
Telephone	
Email	

B. Application Form: Proposal Details

Please note that items B1, B2 and B3 must be a maximum of 15 A4 pages, Arial font minimum size 12pt with single spacing and minimum 2.5cm margins.

B1. Skills and Expertise

Total score 20
a. Provide evidence that the team has relevant skills and expertise to undertake the project, including demonstrating capability of working with hydrogen and/or town gas. CVs of key personnel may be included as an appendix but will not be assessed *(weighting x 2);* b. Provide details of project team including an organisational structure and the responsibilities of each role. If your bid is a consortium, this should clearly state the consortium lead and details of each consortium member and their role. Evidence of commitment should be included if available *(weighting x 1);* c. Description of appropriate facilities (either existing or planned) that are required to undertake the project and confirmation that access is available *(weighting x 1).*

B2. Technical Approach

Total score 35

a. Provide a clear description of the proposed appliance. Describe the approach and methodologies that will be applied to address the challenges defined in the ITT and any others which may be considered relevant *(weighting x 2);*

b. Demonstrate how your proposal provides further value by developing 'dual fuel', 'hydrogen ready' or 'adaptable' variants to simplify the switch-over process or transition to hydrogen *(weighting x 2 (marks only available to 'dual fuel', 'hydrogen ready' or 'adaptable' proposals))*;

c. Describe the reference appliance and how this meets the requirements set out in the ITT including the following *(weighting x 2):*

- Photo/picture of base line reference appliance
- Technical specification
- Installation instructions
- User instructions;

d. Include evidence that you understand the risks associated with hydrogen use and, in comparison to natural gas *(weighting x 1).*

NB – only text written within the page limit will be assessed and marked. Documents may be referenced and detail included in an appendix to provide supporting evidence to an answer. Please note that the appendix documents themselves will not be assessed. Those documents may include:

- *Standard documents for reference appliance technical specification (Q.2b)*
- *Standard documents for reference appliance installation instructions (Q.2b)*
- *Letters of support or Memorandum of Understanding (MOU) (Q.2d)*

Appendix documents are excluded from the page limit*.*

B3. Management of Delivery / Project Plan

Total score 20

a. Provide a detailed description of work proposed and the associated timelines to complete phase 1 (include a Gantt chart). Indicative high level timelines must be included for Phase 2a and 2b *(weighting x 1);*

b. Description of management plans to demonstrate how this work will be delivered alongside existing commitments. Include detail of your quality assurance procedures *(weighting x 1);*

c. Identify the key risks relating to the delivery and dependencies of the project, including mitigation plans. Risks should be presented in the table provided in the application form and may include technical, user-related and safety aspects *(weighting x 2).*

Risks:

This table can be presented outside this box section and in landscape orientation if required.

Ref	Risk description	Likelihood (H/M/L)	Impact (H/M/L)	Mitigation

B4. Cost (see separate document for application)

Total score 25	Page limit n/a (i.e. not included in 15-page total)

a. Bid cost for Phase 1 *(weighting 5).*

Price will be marked proportionately to the lowest bid. The lowest bid will receive maximum marks for the price elements and then all other bids will be marked proportionately to that bid.

Applicants submitting bids for more than one project (appliance type) must indicate what discount they are prepared to offer on their costs for Phase 1 if they are awarded more than one project to take account of any duplicated work in their multiple proposals. Any discount will not form part of the assessment of the cost but will be applied to the signed contracts.

An indication of cost should be provided for Phase 2a and Phase 2b however these will not be assessed for application to enter Phase 1. Final costs for Phases 2a and 2b will be requested as part of the Phase 1 output report and will form part of the assessment to enter Phase 2a.

Applicants should clearly state where cost savings are being provided compared to exclusive development contracts.

For Pricing Schedule, see separate document.

Scoring Method

Each question will be scored from one to five. The following illustrates the meaning of each score:

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

Section C: Declarations

Declaration 1: Statement of non-collusion

To: The Department of Business Energy and Industrial Strategy

1. We recognise that the essence of competitive tendering is that the Department will receive a bona fide competitive tender from all persons tendering. We therefore certify that this is a bona fide tender and that we have not fixed or adjusted the amount of the tender or our rates and prices included therein by or in accordance with any agreement or arrangement with any other person.

2. We also certify that we have not done and undertake not to do at any time before the hour and date specified for the return of this tender any of the following acts:

   (a) communicate to any person other than the Department the amount or approximate amount of our proposed tender, except where the disclosure, in confidence, of the approximate amount is necessary to obtain any insurance premium quotation required for the preparation of the tender;

   (b) enter into any agreement or arrangement with any other person that he shall refrain for submitting a tender or as to the amount included in the tender;

   (c) offer or pay or give or agree to pay or give any sum of money, inducement or valuable consideration directly or indirectly to any person doing or having done or causing or having caused to be done, in relation to any other actual or proposed tender for the contract any act, omission or thing of the kind described above.

3. In this certificate, the word “person” shall include any person, body or association, corporate or unincorporated; and “any agreement or arrangement” includes any such information, formal or informal, whether legally binding or not.

……
Signature (duly authorised on behalf of the tenderer)

……
Print name

……
On behalf of (organisation name)

……
Date

Declaration 2: Form of Tender

To: The Department of Business, Energy and Industrial Strategy

1. Having considered the invitation to tender and all accompanying documents
2. (including without limitation, the terms and conditions of contract and the Specification) we confirm that we are fully satisfied as to our experience and ability to deliver the goods/services in all respects in accordance with the requirements of this invitation to tender.
3. We hereby tender and undertake to provide and complete all the services required to be performed in accordance with the terms and conditions of contract and the Specification for the amount set out in the Pricing Schedule.
4. We agree that any insertion by us of any conditions qualifying this tender or any unauthorised alteration to any of the terms and conditions of contract made by us may result in the rejection of this tender. We agree that this tender shall remain open to be accepted by the Department for 8 weeks from the date below.
5. We understand that if we are a subsidiary (within the meaning of section 1159 of (and schedule 6 to) the Companies Act 2006) if requested by the Department we may be required to secure a Deed of Guarantee in favour of the Department from our holding company or ultimate holding company, as determined by the Department in their discretion.
6. We understand that the Department is not bound to accept the lowest or any tender it may receive.
7. We certify that this is a bona fide tender.

…….....
Signature (duly authorised on behalf of the tenderer)

…….....
Print name

…….....
On behalf of (organisation name)

…….....
Date .

Declaration 3: Conflict of Interest

I have nothing to declare with respect to any current or potential interest or conflict in relation to this research (or any potential providers who may be subcontracted to deliver this work, their advisers or other related parties). By conflict of interest, I mean, anything which could be reasonably perceived to affect the impartiality of this research, or to indicate a professional or personal interest in the outcomes from this research.

Signed ……..

Name ……..

Position ……..

OR

I wish to declare the following with respect to personal or professional interests related to relevant organisations*;

- X
- X

Where a potential conflict of interest has been declared for an individual or organisation within a consortium, please clearly outline the role which this individual or organisation will play in the proposed project and how any conflict of interest has or will be mitigated.

- X
- X

Signed ……..

Name ……..

Position …….

Please complete this form and return this with your application form - Nil returns **are** required.

*****These may include (but are not restricted to);

- A professional or personal interest in the outcome of this research
- For evaluation projects, a close working, governance, or commercial involvement in the project under evaluation
- Current or past employment with relevant organisations

- Payment (cash or other) received or likely to be received from relevant organisations for goods or services provided (Including consulting or advisory fees)
- Gifts or entertainment received from relevant organisation
- Shareholdings (excluding those within unit trusts, pension funds etc.) in relevant organisations
- Close personal relationship or friendships with individuals employed by or otherwise closely associated with relevant organisations

All of the above apply both to the individual signing this form and their close family / friends / partners etc.

If your situation changes during the project in terms of interests or conflicts, you must notify BEIS straight away.

A DECLARATION OF INTEREST WILL NOT NECESSARILY MEAN THE INDIVIDUAL OR ORGANISATION CANNOT WORK ON THE PROJECT; BUT IT IS VITAL THAT ANY INTEREST OR CONFLICT IS DECLARED SO IT CAN BE CONSIDERED OPENLY.

Declaration 4: Questions for tenderers

Potential Supplier Information and Exclusion Grounds: Part 1 and Part 2.

The standard Selection Questionnaire is a self-declaration, made by you (the potential supplier), that you do not meet any of the grounds for exclusion[26]. If there are grounds for exclusion, there is an opportunity to explain the background and any measures you have taken to rectify the situation (we call this self-cleaning).

A completed declaration of Part 1 and Part 2 provides a formal statement that the organisation making the declaration has not breached any of the exclusions grounds. Consequently we require all the organisations that you will rely on to meet the selection criteria to provide a completed Part 1 and Part 2. For example these could be parent companies, affiliates, associates, or essential sub-contractors, if they are relied upon to meet the selection criteria. This means that where you are joining in a group of organisations, including joint ventures and partnerships, each organisation in that group must complete one of these self-declarations. Sub-contractors that you rely on to meet the selection criteria must also complete a self-declaration (although sub-contractors that are not relied upon do not need to complete the self-declaration).

When completed, this form is to be sent back to the contact point given in the procurement documents along with the selection information requested in the procurement documentation.

Alternatively you can submit the completed Exclusion Grounds of the EU ESPD (Part III) as a downloaded XML file to the buyer contact point along with the selection information requested in the procurement documentation.

Supplier Selection Questions: Part 3

The procurement document will provide instructions on the selection questions you need to respond to and how to submit those responses. If you are bidding on behalf of a group (consortium) or you intend to use sub-contractors, you should complete all of the selection questions on behalf of the consortium and/or any sub-contractors.

If the relevant documentary evidence referred to in the Selection Questionnaire is not provided upon request and without delay we reserve the right to amend the contract award decision and award to the next compliant bidder.

Consequences of misrepresentation

If you seriously misrepresent any factual information in filling in the Selection Questionnaire, and so induce an authority to enter into a contract, there may be significant consequences. You may be excluded from the procurement procedure, and from bidding for other contracts for three years. If a contract has been entered into you may be sued for damages and the contract may be rescinded. If fraud, or fraudulent intent, can be proved, you or your responsible officers may be prosecuted and convicted of the offence of fraud by false representation, and you must be excluded from further procurements for five years.

[26] For the list of exclusion please see https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/551130/List_of_Mandatory_and_Discretionary_Exclusions.pdf

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Notes for completion

1. The “authority” means the contracting authority, or anyone acting on behalf of the contracting authority, that is seeking to invite suitable candidates to participate in this procurement process.
2. “You” / “Your” refers to the potential supplier completing this standard Selection Questionnaire i.e. the legal entity responsible for the information provided. The term “potential supplier” is intended to cover any economic operator as defined by the Public Contracts Regulations 2015 (referred to as the “regulations”) and could be a registered company; the lead contact for a group of economic operators; charitable organisation; Voluntary Community and Social Enterprise (VCSE); Special Purpose Vehicle; or other form of entity.
3. Please ensure that all questions are completed in full, and in the format requested. If the question does not apply to you, please state ‘N/A’. Should you need to provide additional information in response to the questions, please submit a clearly identified annex.
4. The authority recognises that arrangements set out in section 1.2 of the standard Selection Questionnaire, in relation to a group of economic operators (for example, a consortium) and/or use of sub-contractors, may be subject to change and will, therefore, not be finalised until a later date. The lead contact should notify the authority immediately of any change in the proposed arrangements and ensure a completed Part 1 and Part 2 is submitted for any new organisation relied on to meet the selection criteria. The authority will make a revised assessment of the submission based on the updated information.
5. For Part 1 and Part 2 every organisation that is being relied on to meet the selection must complete and submit the self-declaration.
6. All sub-contractors are required to complete Part 1 and Part 2[27]
7. For answers to Part 3 - If you are bidding on behalf of a group, for example, a consortium, or you intend to use sub-contractors, you should complete all of the questions on behalf of the consortium and/ or any sub-contractors, providing one composite response and declaration.

The authority confirms that it will keep confidential and will not disclose to any third parties any information obtained from a named customer contact, other than to the Cabinet Office and/or contracting authorities defined by the regulations, or pursuant to an order of the court or demand made by any competent authority or body where the authority is under a legal or regulatory obligation to make such a disclosure.

[27] See PCR 2015 regulations 71 (8)-(9)

Part 1: Potential supplier Information

Please answer the following questions in full. Note that every organisation that is being relied on to meet the selection must complete and submit the Part 1 and Part 2 self-declaration.

Section 1	Potential supplier information	
Question No.	**Question**	**Response**
1.1(a)	Full name of the potential supplier submitting the information	
1.1(b) – (i)	Registered office address (if applicable)	
1.1(b) – (ii)	Registered website address (if applicable)	
1.1(c)	Trading status a) public limited company b) limited company c) limited liability partnership d) other partnership e) sole trader f) third sector g) other (please specify your trading status)	
1.1(d)	Date of registration in country of origin	
1.1(e)	Company registration number (if applicable)	
1.1(f)	Charity registration number (if applicable)	
1.1(g)	Head office DUNS number (if applicable)	
1.1(h)	Registered VAT number	
1.1(i) - (i)	If applicable, is your organisation registered with the appropriate professional or trade register(s) in the member state where it is established?	Yes ☐ No ☐ N/A ☐
1.1(i) - (ii)	If you responded yes to 1.1(i) - (i), please provide the relevant details, including the registration number(s).	
1.1(j) - (i)	Is it a legal requirement in the state where you are established for you to possess a particular authorisation, or be a member of a particular organisation in order to provide the services specified in this procurement?	Yes ☐ No ☐
1.1(j) - (ii)	If you responded yes to 1.1(j) - (i), please provide additional details of what is required and confirmation that you have complied with this.	

1.1(k)	Trading name(s) that will be used if successful in this procurement	
1.1(l)	Relevant classifications (state whether you fall within one of these, and if so which one) • Voluntary Community Social Enterprise (VCSE) • Sheltered Workshop • Public service mutual	
1.1(m)	Are you a Small, Medium or Micro Enterprise (SME)[28]?	Yes ☐ No ☐
1.1(n)	Details of Persons of Significant Control (PSC), where appropriate:[29] - Name; - Date of birth; - Nationality; - Country, state or part of the UK where the PSC usually lives; - Service address; - The date he or she became a PSC in relation to the company (for existing companies the 6 April 2016 should be used); - Which conditions for being a PSC are met; - Over 25% up to (and including) 50%, - More than 50% and less than 75%, - 75% or more. [30] (Please enter N/A if not applicable)	
1.1(o)	Details of immediate parent company: - Full name of the immediate parent company - Registered office address (if applicable) - Registration number (if applicable) - Head office DUNS number (if applicable) - Head office VAT number (if applicable) (Please enter N/A if not applicable)	

[28] See EU definition of SME: http://ec.europa.eu/enterprise/policies/sme/facts-figures-analysis/sme-definition/

[29] UK companies, Societates European (SEs) and limited liability partnerships (LLPs) will be required to identify and record the people who own or control their company. Companies, SEs and LLPs will need to keep a PSC register, and must file the PSC information with the central public register at Companies House. See PSC guidance.

[30] Central Government contracting authorities should use this information to have the PSC information for the preferred supplier checked before award.

1.1(p)	Details of ultimate parent company: - Full name of the ultimate parent company - Registered office address (if applicable) - Registration number (if applicable) - Head office DUNS number (if applicable) - Head office VAT number (if applicable) (Please enter N/A if not applicable)	

Please note: A criminal record check for relevant convictions may be undertaken for the preferred suppliers and the persons of significant in control of them.

Please provide the following information about your approach to this procurement:

Section 1	Bidding model	
Question No.	**Question**	**Response**
1.2(a) - (i)	Are you bidding as the lead contact for a group of economic operators?	Yes ☐ No ☐ If yes, please provide details listed in questions 1.2(a) (ii), (a) (iii) and to 1.2(b) (i), (b) (ii), 1.3, Section 2 and 3. If no, and you are a supporting bidder please provide the name of your group at 1.2(a) (ii) for reference purposes, and complete 1.3, Section 2 and 3.
1.2(a) - (ii)	Name of group of economic operators (if applicable)	
1.2(a) - (iii)	Proposed legal structure if the group of economic operators intends to form a named single legal entity prior to signing a contract, if awarded. If you do not propose to form a single legal entity, please explain the legal structure.	
1.2(b) - (i)	Are you or, if applicable, the group of economic operators proposing to use sub-contractors?	Yes ☐ No ☐

1.2(b) - (ii)	If you responded yes to 1.2(b)-(i) please provide additional details for each sub-contractor in the following table: we may ask them to complete this form as well.

Name					
Registered address					
Trading status					
Company registration number					
Head Office DUNS number (if applicable)					
Registered VAT number					
Type of organisation					
SME (Yes/No)					
The role each sub-contractor will take in providing the works and /or supplies e.g. key deliverables					
The approximate % of contractual obligations assigned to each sub-contractor					

Contact details and declaration

I declare that to the best of my knowledge the answers submitted and information contained in this document are correct and accurate.

I declare that, upon request and without delay I will provide the certificates or documentary evidence referred to in this document.

I understand that the information will be used in the selection process to assess my organisation's suitability to be invited to participate further in this procurement.

I understand that the authority may reject this submission in its entirety if there is a failure to answer all the relevant questions fully, or if false/misleading information or content is provided in any section.

I am aware of the consequences of serious misrepresentation.

Section 1	Contact details and declaration	
Question No.	**Question**	**Response**
1.3(a)	Contact name	
1.3(b)	Name of organisation	
1.3(c)	Role in organisation	
1.3(d)	Phone number	
1.3(e)	E-mail address	
1.3(f)	Postal address	
1.3(g)	Signature (electronic is acceptable)	
1.3(h)	Date	

Part 2: Exclusion Grounds

Please answer the following questions in full. Note that every organisation that is being relied on to meet the selection must complete and submit the Part 1 and Part 2 self-declaration.

Section 2	Grounds for mandatory exclusion	
Question No.	**Question**	**Response**
2.1(a)	**Regulations 57(1) and (2)** The detailed grounds for mandatory exclusion of an organisation are set out on this web page, which should be referred to before completing these questions. These are also included under Annex 7. Please indicate if, within the past five years you, your organisation or any other person who has powers of representation, decision or control in the organisation been convicted anywhere in the world of any of the offences within the summary below and listed on the webpage.	
	Participation in a criminal organisation.	Yes ☐ No ☐ If Yes please provide details at 2.1(b)
	Corruption.	Yes ☐ No ☐ If Yes please provide details at 2.1(b)
	Fraud.	Yes ☐ No ☐ If Yes please provide details at 2.1(b)
	Terrorist offences or offences linked to terrorist activities	Yes ☐ No ☐ If Yes please provide details at 2.1(b)
	Money laundering or terrorist financing	Yes ☐ No ☐ If Yes please provide details at 2.1(b)
	Child labour and other forms of trafficking in human beings	Yes ☐ No ☐ If Yes please provide details at 2.1(b)

2.1(b)	If you have answered yes to question 2.1(a), please provide further details. Date of conviction, specify which of the grounds listed the conviction was for, and the reasons for conviction, Identity of who has been convicted If the relevant documentation is available electronically please provide the web address, issuing authority, precise reference of the documents.	
2.2	If you have answered Yes to any of the points above have measures been taken to demonstrate the reliability of the organisation despite the existence of a relevant ground for exclusion? (Self Cleaning)	Yes ☐ No ☐
2.3(a)	**Regulation 57(3)** Has it been established, for your organisation by a judicial or administrative decision having final and binding effect in accordance with the legal provisions of any part of the United Kingdom or the legal provisions of the country in which the organisation is established (if outside the UK), that the organisation is in breach of obligations related to the payment of tax or social security contributions?	Yes ☐ No ☐
2.3(b)	If you have answered yes to question 2.3(a), please provide further details. Please also confirm you have paid, or have entered into a binding arrangement with a view to paying, the outstanding sum including where applicable any accrued interest and/or fines.	

Please Note: The authority reserves the right to use its discretion to exclude a potential supplier where it can demonstrate by any appropriate means that the potential supplier is in breach of its obligations relating to the non-payment of taxes or social security contributions.

Section 3	Grounds for discretionary exclusion	
Question No.	**Question**	**Response**
3.1	**Regulation 57 (8)** The detailed grounds for discretionary exclusion of an organisation are set out on this web page, which should be referred to before completing these questions. These are also included under Annex 7. Please indicate if, within the past three years, anywhere in the world any of the following situations have applied to you, your organisation or any other person who has powers of representation, decision or control in the organisation.	
3.1(a)	Breach of environmental obligations?	Yes ☐ No ☐ If yes please provide details at 3.2
3.1 (b)	Breach of social obligations?	Yes ☐ No ☐ If yes please provide details at 3.2
3.1 (c)	Breach of labour law obligations?	Yes ☐ No ☐ If yes please provide details at 3.2
3.1(d)	Bankrupt or is the subject of insolvency or winding-up proceedings, where the organisation's assets are being administered by a liquidator or by the court, where it is in an arrangement with creditors, where its business activities are suspended or it is in any analogous situation arising from a similar procedure under the laws and regulations of any State?	Yes ☐ No ☐ If yes please provide details at 3.2
3.1(e)	Guilty of grave professional misconduct?	Yes ☐ No ☐ If yes please provide details at 3.2
3.1(f)	Entered into agreements with other economic operators aimed at distorting competition?	Yes ☐ No ☐ If yes please provide details at 3.2
3.1(g)	Aware of any conflict of interest within the meaning of regulation 24 due to the participation in the procurement procedure?	Yes ☐ No ☐ If yes please provide details at 3.2

3.1(h)	Been involved in the preparation of the procurement procedure?	Yes ☐ No ☐ If yes please provide details at 3.2
3.1(i)	Shown significant or persistent deficiencies in the performance of a substantive requirement under a prior public contract, a prior contract with a contracting entity, or a prior concession contract, which led to early termination of that prior contract, damages or other comparable sanctions?	Yes ☐ No ☐ If yes please provide details at 3.2
3.1(j)	Please answer the following statements	
3.1(j) - (i)	The organisation is guilty of serious misrepresentation in supplying the information required for the verification of the absence of grounds for exclusion or the fulfilment of the selection criteria.	Yes ☐ No ☐ If Yes please provide details at 3.2
3.1(j) - (ii)	The organisation has withheld such information.	Yes ☐ No ☐ If Yes please provide details at 3.2
3.1(j) –(iii)	The organisation is not able to submit supporting documents required under regulation 59 of the Public Contracts Regulations 2015.	Yes ☐ No ☐ If Yes please provide details at 3.2
3.1(j)-(iv)	The organisation has influenced the decision-making process of the contracting authority to obtain confidential information that may confer upon the organisation undue advantages in the procurement procedure, or has negligently provided misleading information that may have a material influence on decisions concerning exclusion, selection or award.	Yes ☐ No ☐ If Yes please provide details at 3.2
3.2	If you have answered Yes to any of the above, explain what measures been taken to demonstrate the reliability of the organisation despite the existence of a relevant ground for exclusion? (Self Cleaning)	

Part 3: Selection Questions[31]

Section 4	Economic and Financial Standing	
Question No.	**Question**	**Response**
4.1	Are you able to provide a copy of your audited accounts for the last two years, if requested? If no, can you provide **one** of the following: answer with Y/N in the relevant box.	Yes ☐ No ☐
	(a) A statement of the turnover, Profit and Loss Account/Income Statement, Balance Sheet/Statement of Financial Position and Statement of Cash Flow for the most recent year of trading for this organisation.	Yes ☐ No ☐
	(b) A statement of the cash flow forecast for the current year and a bank letter outlining the current cash and credit position.	Yes ☐ No ☐
	(c) Alternative means of demonstrating financial status if any of the above are not available (e.g. forecast of turnover for the current year and a statement of funding provided by the owners and/or the bank, charity accruals accounts or an alternative means of demonstrating financial status).	Yes ☐ No ☐
4.2	Where we have specified a minimum level of economic and financial standing and/ or a minimum financial threshold within the evaluation criteria for this procurement, please self-certify by answering 'Yes' or 'No' that you meet the requirements set out.	Yes ☐ No ☐

[31] See Action Note 8/16 Updated Standard Selection Questionnaire

Section 5	**If you have indicated in the Selection Questionnaire question 1.2 that you are part of a wider group, please provide further details below:**	
Name of organisation		
Relationship to the Supplier completing these questions		
5.1	Are you able to provide parent company accounts if requested to at a later stage?	Yes ☐ No ☐
5.2	If yes, would the parent company be willing to provide a guarantee if necessary?	Yes ☐ No ☐
5.3	If no, would you be able to obtain a guarantee elsewhere (e.g. from a bank)?	Yes ☐ No ☐

Section 6	Technical and Professional Ability
6.1	**Relevant experience and contract examples** Please provide details of up to three contracts, in any combination from either the public or private sector; voluntary, charity or social enterprise (VCSE) that are relevant to our requirement. VCSEs may include samples of grant-funded work. Contracts for supplies or services should have been performed during the past three years. Works contracts may be from the past five years. The named contact provided should be able to provide written evidence to confirm the accuracy of the information provided below. Consortia bids should provide relevant examples of where the consortium has delivered similar requirements. If this is not possible (e.g. the consortium is newly formed or a Special Purpose Vehicle is to be created for this contract) then three separate examples should be provided between the principal member(s) of the proposed consortium or Special Purpose Vehicle (three examples are not required from each member). Where the Supplier is a Special Purpose Vehicle, or a managing agent not intending to be the main provider of the supplies or services, the information requested should be provided in respect of the main intended provider(s) or sub-contractor(s) who will deliver the contract. If you cannot provide examples, see question 6.3

	Contract 1	Contract 2	Contract 3
Name of customer organisation			
Point of contact in the organisation			
Position in the organisation			
E-mail address			
Description of contract			
Contract Start date			
Contract completion date			
Estimated contract value			

6.2	Where you intend to sub-contract a proportion of the contract, please demonstrate how you have previously maintained healthy supply chains with your sub-contractor(s) Evidence should include, but is not limited to, details of your supply chain management tracking systems to ensure performance of the contract and including prompt payment or membership of the UK Prompt Payment Code (or equivalent schemes in other countries)
6.3	If you cannot provide at least one example for questions 6.1, in no more than 500 words please provide an explanation for this e.g. your organisation is a new start-up or you have provided services in the past but not under a contract.

Section 7	Modern Slavery Act 2015: Requirements under Modern Slavery Act 2015[32]	
7.1	Are you a relevant commercial organisation as defined by section 54 ("Transparency in supply chains etc.") of the Modern Slavery Act 2015 ("the Act")?	Yes ☐ N/A ☐
7.2	If you have answered yes to question 1 are you compliant with the annual reporting requirements contained within Section 54 of the Act 2015?	Yes ☐ Please provide the relevant the url: No ☐ Please provide an explanation

[32] Procurement Policy Note 9/16 Modern Slavery Act 2015

8. Additional Questions

Suppliers who self-certify that they meet the requirements to these additional questions will be required to provide evidence of this if they are successful at contract award stage.

Section 8	Additional Questions	
8.1	**Suppliers' Past Performance[33] - (please refer to supplier selection guidance - this question should only be included by central government contracting authorities)**	
a.	Can you supply a list of your relevant principal contracts for goods and/or services provided in the last three years?	Yes ☐ No ☐
b.	On request can you provide a certificate from those customers on the list?	Yes ☐ No ☐
c.	If you cannot obtain a certificate from a customer can you explain the reasons why?	Yes ☐ No ☐
d.	If the certificate states that goods and/or services supplied were not satisfactory are you able to supply information which shows why this will not recur in this contract if you are awarded it?	Yes ☐ No ☐
e.	Can you supply the information in questions a. to d. above for any sub-contractors [or consortium members] who you are relying upon to perform this contract?	Yes ☐ No ☐

[33] Procurement Policy Note 04/15 Taking Account of Suppliers' Past Performance

Declaration 5: The Code of Practice for Research[34]

I confirm that I am aware of the requirements of the Department's Code of Practice for Research[35] and, in the proposed project, I will use my best efforts to ensure that the procedures used conform to those requirements under the following headings[36]:

- ❑ Responsibilities
- ❑ Competence
- ❑ Project planning
- ❑ Quality Control
- ❑ Handling of samples and materials
- ❑ Facilities and equipment
- ❑ Documentation of procedures and methods
- ❑ Research/work records

I understand that the Department has the right to inspect our procedures and practices against the requirements of the Code of Practice, and that I may be asked to provide documentary evidence of our working practices or provide access and assistance to auditors appointed by the Department.

(There is some flexibility in the application of the Code of Practice to specific research projects. Contractors are encouraged to discuss with the Department any aspects that cause them concern, in order to reach agreement on the interpretation of each requirement.)

Signed …….....

Name …….....

Position ……

Date …….....

[34] Please note that this declaration applies to individuals, single organisations and consortia.

[35] The Code of Practice is attached to this ITT as Annex 6.

[36] Please delete as appropriate.

Declaration 6: The General Data Protection Regulation Assurance Questionnaire for Contractors

Declaration 6 -
GDPR Assurance Que

(See separate document)

Declaration 7: Safe Use of Hydrogen

By responding to this call the tenderer must provide assurance that its staff are competent to work with hydrogen in the declaration below and evidence must be provided to support the declaration.

I declare that the staff that will be working on this project (who are already qualified and extensively experienced in the use of natural gas) have given appropriate consideration to the safety considerations of hydrogen and will put in place procedures to ensure these are followed to provide a safe working environment to complete the tendered work.

Signed ……..

Name ……..

Position ……

Date ……..

Annex 6: Code of Practice for Research

CODE OF PRACTICE FOR RESEARCH

Issued by the Department for Business, Energy and Industrial Strategy

The Department has developed this Code of Practice from the Joint Code of Practice issued by BBSRC; the Department for Environment, Food and Rural Affairs (Defra); the Food Standards Agency; and the Natural Environment Research Council (NERC) which lays out a framework for the proper conduct of research. It sets out the key aspects of the research process and the importance of making judgements on the appropriate precautions needed in every research activity.

The Code applies to all research funded by the Department. It is intended to apply to all types of research, but the overriding principle is fitness of purpose and that all research must be conducted diligently by competent researchers and therefore the individual provisions must be interpreted with that in mind.

PRINCIPLES BEHIND THE CODE OF PRACTICE

Contractors and consortia funded by the Department are expected to be committed to the quality of the research process in addition to quality of the evidence outputs

The Code of Practice has been created in order to assist contractors to conduct research of the highest quality and to encourage good conduct in research and help prevent misconduct.

Set out over 8 responsibilities the Code of Practice provides general principles and standards for good practice in research.

Most contractors will already have in place many of the measures set out in the

Code and its adoption should not require great effort.

COMPLIANCE WITH THE CODE OF PRACTICE

All organisations contracting to the Department (including those sub-contracting as part of a consortium) will be expected to commit to upholding these responsibilities and will be expected to indicate acceptance of the Code when submitting proposals to the Department.

Contractors are encouraged to discuss with the Department any clauses in the Code that they consider inappropriate or unnecessary in the context of the proposed research project. The Code, and records of the discussions if held, will become part of the Terms and Conditions under which the research is funded.

Additionally, The Department may conduct (or request from the Contractor as appropriate) a formal risk assessment on the project to identify where additional controls may be needed.

MONITORING OF COMPLIANCE WITH THE CODE OF PRACTICE

Monitoring of compliance with the Code is necessary to ensure:

- Policies and managed processes exist to support compliance with the Code
- That these are being applied in practice.

In the short term, the Department can require contractors to conduct planned internal audits although the Department reserves the right to obtain evidence that a funded project is carried out to the required standard. The Department may also conduct an audit of a Contractor's research system if deemed necessary.

In the longer term it is expected that most research organisations will assure the quality of their research processes by means of a formal system that is audited by an impartial and competent third party against an appropriate internationally recognised standard that is fit for purpose.

A recommended checklist for researchers can be found on the UK Research Integrity Office (UKRIO) website at http://www.ukrio.org/what-we-do/code-of-practice-for-research

SPECIFIC REQUIREMENTS IN THE CODE OF PRACTICE

1. Responsibilities

All organisations contracting to the Department (including those sub-contracting as part of a consortium will be responsible for the overall quality of research they conducted. Managers, group leaders and supervisors have a responsibility to ensure a climate of good practice in the research teams, including a commitment to the development of scientific and technical skills.

The Principal Investigator or Project Leader is responsible for all the work conducted in the project including that of any subcontractors. All staff and students must have defined responsibilities in relation to the project and be aware of these responsibilities.

2. Competence

All personnel associated with the project must be competent to perform the technical, scientific and support tasks required of them. Personnel undergoing training must be supervised at a level such that the quality of the results is not compromised by the inexperience of the researcher.

3. Project planning

An appropriate level of risk assessment must be conducted to demonstrate awareness of the key factors that will influence the success of the project and the ability to meet its objectives. There must be a written project plan showing that these factors (including research design, statistical methods and others) have been addressed. Projects must be ethical and project plans must be agreed in collaboration with the Department, taking account of the requirements of ethical committees[37] or the terms of project licences, if relevant.

Significant amendments to the plan or milestones must be recorded and approved by the Department if applicable.

4. Quality Control

The organisation must have planned processes in place to assure the quality of the research undertaken by its staff Projects must be subjected to formal reviews of an appropriate frequency. Final and interim outputs must always be accompanied by a statement of what quality control has been undertaken.

[37] Please note ethical approval does not remove the responsibility of the individual for ethical behaviour.

The authorisation of outputs and publications shall be as agreed by the Department, and subject to senior approval in the Department, where appropriate. Errors identified after publication must be notified to the Department and agreed corrective action initiated.

5. Handling of samples and materials

All samples and other experimental materials must be labelled (clearly, accurately, uniquely and durably), and retained for a period to be agreed by the Department. The storage and handling of the samples, materials and data must be as specified in the project plan (or proposal) and must be appropriate to their nature. If the storage conditions are critical, they must be monitored and recorded.

6. Documentation of procedures and methods

All the procedures and methods used in a research project must be documented, at least in the personal records of the researcher. This includes analytical and statistical procedures and the generation of a clear audit trial linking secondary processed information to primary data.

There must be a procedure for validation of research methods as fit for purpose, and modifications must be trackable through each stage of development of the method.

7. Research/work records

All records must be of sufficient quality to present a complete picture of the work performed, enabling it to be repeated if necessary.

The project leader is accountable for the validity of the wok and responsible for ensuring that regular reviews of the records of each researcher are conducted[38].

The location of all project records, including critical data, must be recorded. They must be retained in a form that ensures their integrity and security, and prevents unauthorised modification, for a period to be agreed by the Department.

A recommended checklist for researchers can be found on the UK Research Integrity Office (UKRIO) website at http://www.ukrio.org/what-we-do/code-of-practice-for-research

[38] Please note that this also applies to projects being undertaken by consortia.

Annex 7: Exclusion Grounds

Mandatory Exclusion Grounds

Public Contract Regulations 2015 R57(1), (2) and (3)

Public Contract Directives 2014/24/EU Article 57(1)

Participation in a criminal organisation
Participation offence as defined by section 45 of the Serious Crime Act 2015
Conspiracy within the meaning of

- section 1 or 1A of the Criminal Law Act 1977 or
- article 9 or 9A of the Criminal Attempts and Conspiracy (Northern Ireland) Order 1983

where that conspiracy relates to participation in a criminal organisation as defined in Article 2 of Council Framework Decision 2008/841/JHA on the fight against organised crime;

Corruption
Corruption within the meaning of section 1(2) of the Public Bodies Corrupt Practices Act 1889 or section 1 of the Prevention of Corruption Act 1906;
The common law offence of bribery;
Bribery within the meaning of sections 1, 2 or 6 of the Bribery Act 2010, or section 113 of the Representation of the People Act 1983;

Fraud
Any of the following offences, where the offence relates to fraud affecting the European Communities' financial interests as defined by Article 1 of the convention on the protection of the financial interests of the European Communities:

- the common law offence of cheating the Revenue;
- the common law offence of conspiracy to defraud;
- fraud or theft within the meaning of the Theft Act 1968, the Theft Act (Northern Ireland) 1969, the Theft Act 1978 or the Theft (Northern Ireland) Order 1978;
- fraudulent trading within the meaning of section 458 of the Companies Act 1985, article 451 of the Companies (Northern Ireland) Order 1986 or section 993 of the Companies Act 2006;
- fraudulent evasion within the meaning of section 170 of the Customs and Excise Management Act 1979 or section 72 of the Value Added Tax Act 1994;
- an offence in connection with taxation in the European Union within the meaning of section 71 of the Criminal Justice Act 1993;
- destroying, defacing or concealing of documents or procuring the execution of a valuable security within the meaning of section 20 of the Theft Act 1968 or section 19 of the Theft Act (Northern Ireland) 1969;
- fraud within the meaning of section 2, 3 or 4 of the Fraud Act 2006;
- the possession of articles for use in frauds within the meaning of section 6 of the Fraud Act 2006, or the making, adapting, supplying or offering to supply articles for use in frauds within the meaning of section 7 of that Act;

Terrorist offences or offences linked to terrorist activities

Any offence:

- listed in section 41 of the Counter Terrorism Act 2008;
- listed in schedule 2 to that Act where the court has determined that there is a terrorist connection;
- under sections 44 to 46 of the Serious Crime Act 2007 which relates to an offence covered by the previous two points;

Money laundering or terrorist financing

Money laundering within the meaning of sections 340(11) and 415 of the Proceeds of Crime Act 2002

An offence in connection with the proceeds of criminal conduct within the meaning of section 93A, 93B or 93C of the Criminal Justice Act 1988 or article 45, 46 or 47 of the Proceeds of Crime (Northern Ireland) Order 1996

Child labour and other forms of trafficking human beings

An offence under section 4 of the Asylum and Immigration (Treatment of Claimants etc.) Act 2004;

An offence under section 59A of the Sexual Offences Act 2003

An offence under section 71 of the Coroners and Justice Act 2009;

An offence in connection with the proceeds of drug trafficking within the meaning of section 49, 50 or 51 of the Drug Trafficking Act 1994

An offence under section 2 or section 4 of the Modern Slavery Act 2015

Non-payment of tax and social security contributions

Breach of obligations relating to the payment of taxes or social security contributions that has been established by a judicial or administrative decision.

Where any tax returns submitted on or after 1 October 2012 have been found to be incorrect as a result of:

- HMRC successfully challenging the potential supplier under the General Anti – Abuse Rule (GAAR) or the “Halifax” abuse principle; or
- a tax authority in a jurisdiction in which the potential supplier is established successfully challenging it under any tax rules or legislation that have an effect equivalent or similar to the GAAR or “Halifax” abuse principle;
- a failure to notify, or failure of an avoidance scheme which the supplier is or was involved in, under the Disclosure of Tax Avoidance Scheme rules (DOTAS) or any equivalent or similar regime in a jurisdiction in which the supplier is established

Other offences

Any other offence within the meaning of Article 57(1) of the Directive as defined by the law of any jurisdiction outside England, Wales and Northern Ireland

Any other offence within the meaning of Article 57(1) of the Directive created after 26th February 2015 in England, Wales or Northern Ireland

Discretionary exclusions

Obligations in the field of environment, social and labour law.
Where an organisation has violated applicable obligations in the fields of environmental, social and labour law established by EU law, national law, collective agreements or by the international environmental, social and labour law provisions listed in Annex X to the Directive (see copy below) as amended from time to time; including the following:-

- Where the organisation or any of its Directors or Executive Officers has been in receipt of enforcement/remedial orders in relation to the Health and Safety Executive (or equivalent body) in the last 3 years.
- In the last three years, where the organisation has had a complaint upheld following an investigation by the Equality and Human Rights Commission or its predecessors (or a comparable body in any jurisdiction other than the UK), on grounds of alleged unlawful discrimination.
- In the last three years, where any finding of unlawful discrimination has been made against the organisation by an Employment Tribunal, an Employment Appeal Tribunal or any other court (or incomparable proceedings in any jurisdiction other than the UK).
- Where the organisation has been in breach of section 15 of the Immigration, Asylum, and Nationality Act 2006;
- Where the organisation has a conviction under section 21 of the Immigration, Asylum, and Nationality Act 2006;
- Where the organisation has been in breach of the National Minimum Wage Act 1998.

Bankruptcy, insolvency
Bankrupt or is the subject of insolvency or winding-up proceedings, where the organisation's assets are being administered by a liquidator or by the court, where it is in an arrangement with creditors, where its business activities are suspended or it is in any analogous situation arising from a similar procedure under the laws and regulations of any State;

Grave professional misconduct
Guilty of grave professional misconduct

Distortion of competition
Entered into agreements with other economic operators aimed at distorting competition

Conflict of interest
Aware of any conflict of interest within the meaning of regulation 24 due to the participation in the procurement procedure

Been involved in the preparation of the procurement procedure.

Prior performance issues
Shown significant or persistent deficiencies in the performance of a substantive requirement under a prior public contract, a prior contract with a contracting entity, or a prior concession contract, which led to early termination of that prior contract, damages or other comparable sanctions.

Misrepresentation and undue influence
The organisation has influenced the decision-making process of the contracting authority to obtain confidential information that may confer upon the organisation undue advantages in the procurement procedure, or to negligently provided misleading information that may have a material influence on decisions concerning exclusion, selection or award.

Additional exclusion grounds

Breach of obligations relating to the payment of taxes or social security contributions.

ANNEX X Extract from Public Procurement Directive 2014/24/EU

LIST OF INTERNATIONAL SOCIAL AND ENVIRONMENTAL CONVENTIONS REFERRED TO IN ARTICLE 18(2) —

- ILO Convention 87 on Freedom of Association and the Protection of the Right to Organise;
- ILO Convention 98 on the Right to Organise and Collective Bargaining;
- ILO Convention 29 on Forced Labour;
- ILO Convention 105 on the Abolition of Forced Labour;
- ILO Convention 138 on Minimum Age;
- ILO Convention 111 on Discrimination (Employment and Occupation);
- ILO Convention 100 on Equal Remuneration;
- ILO Convention 182 on Worst Forms of Child Labour;
- Vienna Convention for the protection of the Ozone Layer and its Montreal Protocol on substances that deplete the Ozone Layer;
- Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (Basel Convention);
- Stockholm Convention on Persistent Organic Pollutants (Stockholm POPs Convention)
- Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade (UNEP/FAO) (The PIC Convention) Rotterdam, 10 September 1998, and its 3 regional Protocols.

Consequences of misrepresentation
A serious misrepresentation which induces a contracting authority to enter into a contract may have the following consequences for the signatory that made the misrepresentation:-

- The potential supplier may be excluded from bidding for contracts for three years, under regulation 57(8)(h)(i) of the PCR 2015;
- The contracting authority may sue the supplier for damages and may rescind the contract under the Misrepresentation Act 1967.
- If fraud, or fraudulent intent, can be proved, the potential supplier or the responsible officers of the potential supplier may be prosecuted and convicted of the offence of fraud by false representation under s.2 of the Fraud Act 2006, which can carry a sentence of up to 10 years or a fine (or both).
- If there is a conviction, then the company must be excluded from procurement for five years under reg. 57(1) of the PCR (subject to self-cleaning).

Annex 8: Glossary

Adaptable – Refers to the replacement of a minimum number of key components within existing natural gas appliances to allow them to run on hydrogen.

Appliance category – Boilers, cookers, fires and innovative domestic hydrogen appliance.

Appliance type – Sub-division of appliance category. Boilers: standard/regular and combination boiler; Cookers: Hob, oven with grill and integrated free-standing cooker; Fires: open fronted with conventional flue, glass fronted with balanced flue and state of the art executive appliance.

Dual Fuel – Refers to the ability to interchange between gas types without the need to change over components. Definition from BEIS commissioned report 'Appraisal of Domestic Hydrogen Appliances', Frazer-Nash Consultancy, February 2018.

Evaluation criteria – Measures by which the tenders will be assessed and scored.

Exclusive development – The public purchaser reserves all the results and benefits of the development (including Intellectual Property Rights or IPRs) exclusively for its own use.

Hy4Heat – The BEIS Hydrogen for Heat programme to a programme to demonstrate and de-risk the use of hydrogen for heating in GB homes and businesses.

Hydrogen only – Refers to appliances that are designed to run only on hydrogen.

Hydrogen ready – Refers to appliances that are optimally designed to run on hydrogen but initially configured to run on natural gas. These appliances then may require a minimum number of components to be changed at the point of switchover but will have been specifically developed to facilitate this process. Definition adapted from BEIS commissioned report 'Appraisal of Domestic Hydrogen Appliances', Frazer-Nash Consultancy, February 2018.

Like for Like – Defined as having a reference appliance that uses natural gas as a fuel.

Milestones – Significant points during the delivery of the projects by which progress of the appointed suppliers will be assessed and interim payments made.

PCP – Pre-commercial procurement. Research and development competition.

Phase 1 – Solution design.

Phase 2a – Development of a first prototype appliance for demonstration trials.

Phase 2b – Further prototype development to achieve full certification.

Pre-Commercial – Pre-commercial covers activities such as solution exploration and design, prototyping, up to the original development of a limited by volume of first products or services in the form of a test series. It does not include commercial development activities such as quantity production.

Project – The development of one hydrogen appliance type.

SBRI – Small Business Research Initiative.

Volume Manufacturing – Refers to the scaling up of hydrogen-fueled appliance manufacture beyond prototype levels, for future purposes such as use in occupied trials or eventual conversion.