

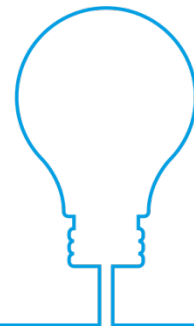


Department for
Business, Energy
& Industrial Strategy

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

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

Phase 2a Guidance Document



29 April 2019

Department for Business, Energy & Industrial Strategy

Date: 26 April 2019

As part of the Hy4Heat Programme, the Department for Business, Energy & Industrial Strategy (“BEIS”) has appointed your organisation as one of the contractors to develop and provide certified domestic gas appliances that can be run on hydrogen.

The following document (which should be read in conjunction with the original Invitation to Tender) provides guidance on the milestone verification process together with the evidence required to determine whether the Phase 2a development milestones have been met.

Phase 2b milestones have also been included for completeness, but specific guidance on the evidence required for Phase 2b development milestones will be published separately.

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

- Milestone verification approach and criteria

All notifications of updates/clarifications to the milestone verification process, evidence required, or contract management procedure will be issued by email.

Contact with the Hy4Heat programme should be to the following email address:

- hy4heat@arup.com

Your email must include the following subject line:

- ‘Hy4Heat WP4: Domestic Hydrogen Appliance Development (Phase 2)’

Yours sincerely,

Steve Loades

BEIS Programme Manager – Hy4Heat

Email: steve.loades@beis.gov.uk

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1. Introduction

This Phase 2a guidance document sets out the process and assessment criteria for verifying that the Phase 2a milestones of the Domestic Hydrogen Appliance Development Innovation Competition (Hy4Heat - Work Package 4) have been completed to the satisfaction of BEIS prior to payment of the related invoices.

This document is provided further to the Invitation to Tender (ITT) for the SBRI Domestic Hydrogen Appliance Development Innovation Competition and should be considered alongside the ITT.

Phase 2a covers the development of a first prototype (1.0) appliance to be provided for use in demonstration trials.

2. Phase 2a milestone verification

The table below provides the verification method and evidence required for a contractor to demonstrate that they have met each of the milestones in Phase 2a.

Visits will be carried out by members of the Hy4Heat team at appropriate manufacturers locations. For manufacturers with multiple projects, the Hy4Heat team will look to maximise the value the visits across the projects as appropriate.

Any reference to the GAR or Ecodesign regulations should be interpreted as either the current European regulation or the UK equivalent at the time. Unless otherwise stated requirements apply to all types of appliance.

Regarding appliance test and compliance, reference should be made to BS PAS4444 as soon as draft versions become available.

It is fully appreciated that in a rapidly developing sector such as this, manufacturers may adopt different solutions to the matters raised within PAS4444, but it is expected that at each Milestone a short document highlighting both points of agreement and disagreement will be tabled and may be used as basis to provide feedback to the writers of PAS4444.

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Milestone No.	Milestone Description	Verification Method	Verification evidence required	Payment (% of total contract value)
2a	All components identified	Document review	<ul style="list-style-type: none"> • First design review report to include: <ul style="list-style-type: none"> • Confirmation that proposed appliance design is as detailed in the Phase 1 report. • Where design aspects have been changed, the following information is required: <ul style="list-style-type: none"> ○ Detail of changes made ○ Diagram of the proposed appliance ○ Exploded diagram of the proposed appliance showing assemblies and how they fit together ○ Exploded diagrams of all assemblies showing component parts and how they fit together. • Bill of Materials (BoM) with descriptions of component function, reference part numbers and sub-contract suppliers (where relevant) provided for each. Each component listed should be described fully. Note gas carrying components must meet the essential requirements of the GAR. • Description and design drawings of colourant method if applicable. A proposed methodology to test the longevity of colourant should be included. 	5%
2b	All components developed and tested for	Visit to confirm that each component	<ul style="list-style-type: none"> • Provision of short summary document, prior to site visit to form basis of onsite verification, detailing the following: <ul style="list-style-type: none"> • Any changes to the design provided at milestone 2a during this development stage. 	10%

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Milestone No.	Milestone Description	Verification Method	Verification evidence required	Payment (% of total contract value)
	functionality and safety	works as specified	<ul style="list-style-type: none"> • Any issues that will impact the delivery of the project, e.g. staff absence or component failure. Where issues have been identified, plans should be included to address these. • Records that show proposed components have passed functionality and safety testing. • Progress visit to review the following: <ul style="list-style-type: none"> • Summary report and progress to date • Test equipment and methods including: <ul style="list-style-type: none"> ○ For gas carrying components, pressure tightness to 50 mbar ○ Where possible, burner performance is within limits; the flame is stable and lights easily. ○ FFD and/or other safety devices operate effectively. ○ If applicable, temperature of components and user-touchable parts are acceptable. ○ For fires, the fuel bed assembly should be demonstrated including colourant method. ○ For cookers the colourant method should be demonstrated. ○ For fires and cookers, the method to assess longevity of colourant should be demonstrated. • View selection of performance tests in progress. 	

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Milestone No.	Milestone Description	Verification Method	Verification evidence required	Payment (% of total contract value)
3	All component assemblies developed and tested for functionality and safety	Visit to confirm that each assembly works as specified	<ul style="list-style-type: none"> • Provision of short summary document, prior to site visit to form basis of onsite verification, detailing the following: Any changes to the design provided at milestone 2b during this development stage. • Any issues that will impact the delivery of the project, e.g. staff absence or component failure. Where issues have been identified, plans should be included to address these. • Records that show each assembly has passed functionality and safety testing. • Progress visit to review the following: <ul style="list-style-type: none"> • Summary report and progress to date • Test equipment and methods including: <ul style="list-style-type: none"> ○ For gas carrying components, pressure tightness to 50 mbar ○ If applicable, unignited gas does not accumulate within the appliance ○ Where possible, burner assembly performance is within limits, e.g. the flame is stable, ignition is reliable and cross lighting is effective. ○ FFD and/or other safety devices operate reliably and effectively. ○ If applicable, temperature of components and user-touchable parts are acceptable. ○ For fires, assembly should be demonstrated within a working flue system showing flame picture and fuel bed arrangement. 	15%

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Milestone No.	Milestone Description	Verification Method	Verification evidence required	Payment (% of total contract value)
			<ul style="list-style-type: none"> ○ For fires and cookers, results of colourant longevity testing to date should be available, including assessment of any impact on the condition of the fuel bed, flame strip or other associated components ○ For fuel cells, hydrogen clean-up assemblies will need to demonstrate that they can produce hydrogen of a quality suitable for the proposed cells. ● View selection of performance tests in progress. 	
4	Completion of appliance prototype 1.0 design and production of the first unit	Document review	<ul style="list-style-type: none"> ● Final prototype design review report, to include: <ul style="list-style-type: none"> ● Final appliance design drawings ● Final BoM with part numbers and sub-contract suppliers (where relevant) provided for each. Note; gas carrying components must meet the essential requirements of the GAR and evidence of suitability for use with hydrogen should be provided. ● Description as to how the appliance meets the requirements of the functional specification and how the challenges have been addressed. To include detail of qualitative performance reviews, e.g. safety, functionality, usability, aesthetic appeal. <ul style="list-style-type: none"> ○ For cookers, evidence of cooking performance will be required. Further detail regarding this assessment will be provided by Hy4Heat. This will be based on tests such as those detailed in EN 12815 (solid fuel), BS 5386 (Gas, withdrawn) and EN 60350 (electric appliances). ● Where there are outstanding performance and functional challenges, the report should detail further work to address these. ● Photographs of prototype product including packaging and labelling ● Risk assessment for reasonable or foreseeable use 	15%

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Milestone No.	Milestone Description	Verification Method	Verification evidence required	Payment (% of total contract value)
5	Appliance prototype 1.0 developed and tested for functionality, safety and rational use of energy	Visit to confirm that appliance works as specified	<ul style="list-style-type: none"> • Progress visit to review the following: <ul style="list-style-type: none"> • Final prototype design review report (as delivered at milestone 4) and progress to date • Records that show the prototype appliance has passed functionality and safety testing. • Observe performance tests that demonstrate the following, (as a minimum, tests should show an appliance that can be safely lit, operate for an extended period (at least 30minutes), carry out its intended task, operate under automatic control (where relevant), and be safely shut down): <ul style="list-style-type: none"> ○ The completed prototype appliance performs as detailed in the final prototype design report. ○ For gas carrying components, pressure tightness to 50 mbar ○ Unignited gas does not accumulate within the appliance (risk of delayed ignition) ○ Burner control assembly performance is within limits, e.g. the flame is stable, ignition is reliable and cross lighting is effective and flame detection device is appropriate. ○ FFD and other safety devices operate reliably and effectively. ○ Temperature of components and user-touchable parts when assembled are acceptable and meet requirements of relevant standards and regulations. ○ Functionality and performance are acceptable to users, e.g. ease of use, speed of response, convenience. ○ All naked flames are visible ○ In addition, for fires; the flame picture is satisfactory and maintained. 	15%

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Milestone No.	Milestone Description	Verification Method	Verification evidence required	Payment (% of total contract value)
			<ul style="list-style-type: none"> ○ In addition, for fires and cookers; the flame colourant method is acceptable and maintained. ○ For cookers, evidence of cooking performance will be required. Further detail regarding this assessment will be provided by Hy4Heat. This will be based on tests such as those detailed in EN 12815 (solid fuel), BS 5386 (Gas, withdrawn) and EN 60350 (electric appliances). 	
6	Production of five fully boxed examples of appliance prototype 1.0 and demonstration of the prototype being safely installed, operated and maintained.	Deliverable review and site visit	<ul style="list-style-type: none"> ● Provision of five fully boxed examples of appliance prototype 1.0 to site to be specified by Hy4Heat. To include user, installation and maintenance instructions. ● Evidence of compliance with essential requirements of GAR for each appliance, valid for the demonstration trial. ● Declaration that support staff will be available for the duration of the unoccupied demonstration trial. ● Site visit to assess that: <ul style="list-style-type: none"> ● The appliance has been installed in accordance with the manufacturer's instructions by a qualified person having undertaken a recognised and relevant qualification to provide competence in the relevant technology and registered with GasSafe. ● The appliance operates in accordance with its specification and any current certification ● The appliance operates as per the manufacturer's user instructions ● The appliance has been commissioned at the time of installation and handover. 	15%

3. Phase 2b milestone verification

Further detailed guidance for the completion of Phase 2b will be provided prior to commencement, however, the following offers indicative requirements.

Milestone No.	Milestone Description	Verification Method	Verification evidence required	Payment (% of total contract value)
7a	Completion of appliance prototype 2.0 design and presentation of one fully boxed example of appliance	Visit to confirm that all the appliances work as specified and a review of the paperwork	<ul style="list-style-type: none"> • Provision of one boxed example of appliance prototype 2.0. To include user, installation and maintenance instructions as per the requirements of the GAR. • Short post production information package to include: <ul style="list-style-type: none"> • Detail of the outcome/findings of the demonstration trials and any subsequent changes made to the design of the appliance in light of this work. • Evidence that the developed appliance meets the requirements of the Functional Specification as detailed in the Invitation to Tender. Including efficiency and emissions • Evidence of compliance with the essential requirements of the GAR for each appliance. • Evidence of compliance with the requirements of the relevant Ecodesign regulations. 	20%
7b	Final retention for training, guarantee	Document review	<ul style="list-style-type: none"> • Provision of final report including: <ul style="list-style-type: none"> • Business plan for scaling up manufacture 	5%

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Milestone No.	Milestone Description	Verification Method	Verification evidence required	Payment (% of total contract value)
	issues and business cases etc.		<ul style="list-style-type: none"> • Training plan for installers in readiness for a possible community trial and subsequent sales. • Potential further product developments • Potential costs to consumer with regard a hydrogen transition • Where a dual fuel, hydrogen ready or adaptable appliance has not been produced, detail should be included as to how further product development could provide these capabilities, including likely cost, implications on performance and time to convert. 	

4. Competition timetable

Phase 2a – Prototype Development 1.0	
Phase 2a Start / Finish	May 2019 – March 2020
Phase 2b – Prototype 2.0	
Phase 2b Start / Finish	April 2020 – March 2021

Contractors will be expected to meet the milestones listed in section 2 by the deadlines specified in their Phase 1 reports unless otherwise agreed at the Phase 2 kick-off meeting.

It should be noted that progression to Phase 2b earlier than April 2020 will be allowed if Phase 2a outputs are successfully delivered earlier in the timeframe.