Notes on Completion: Please refer to the appropriate NIA Governance Document to assist in the completion of this form. The full completed submission should not exceed 6 pages in total.

NIA Project Registration and PEA Document

Date of Submission

Apr 2023

Project Reference Number

NIA2_SGN0037

Project Registration

Project Title

Hydrogen Appliance Supply Chain - Technical Specification & Development Strategy

Project Reference Number

NIA2_SGN0037

Project Licensee(s)

SGN

Project Start

March 2023

Project Duration

1 year and 1 month

Nominated Project Contact(s)

Houra Mozaffar

Project Budget

£25,000.00

Summary

To support the networks progressing the trials, this project aims to produce a 'Technical Specification' for hydrogen appliances and a 'Development Strategy' for domestic Fires and Cookers providing clear options for these appliances in time for the H100 Fife Neighbourhood trial. This work will also contribute to one of the crucial deliverables set out by BEIS as part of the Hydrogen Village Trial (HVT) Collaborative Appliance Supply Chain project.

- The 'Technical Specification' will set a benchmark for each type of appliance to ensure that the required appliances are safe, robust, reliable, easy to use, aesthetically acceptable, fully UKCA certified and of suitable quality whilst being as cost effective as is reasonably possible.
- The 'Development Strategy' will identify the resources required by manufacturers and set out a process by which manufacturers can develop appliances to meet the Technical Specification in a timely and cost-effective manner.

Third Party Collaborators

Arup

Enertek International Ltd

Nominated Contact Email Address(es)

sgn.innovation@sgn.co.uk

Problem Being Solved

The government heat policy decision in 2026 will be informed by feedback mainly from the H100 Neighbourhood trial and to some extent by the HVT which will be at its early stages by then. Feedback from the Trials will largely be from the householders involved in the Trial, and their feedback will largely be based on their experience of using their new hydrogen appliances. The householders will

generally not be aware of the technology and challenges of producing and distributing the hydrogen, but they will witness any changes in the performance of appliances within their home. Therefore, it is evident that we cannot perform and fully evaluate the trials without appliances. Furthermore, the appliances must be of viable quality and equivalent (where possible) to the natural gas appliances which they replace. This in itself is a challenge because natural gas appliances have been developed progressively over many decades whereas hydrogen appliances have had very little development effort over the last three or four years only.

Due to recent changes in the availability of domestic Fires and Cookers for the H100 Fife Neighbourhood project and the HVT, the necessity to produce a Development Strategy and Technical Specification for these appliances and provide clear purchasing options in time for the trials has become evident.

As the operator of the H100 Fife Neighbourhood trial, SGN is leading on the development strategy for domestic Fires and Cookers which is an immediate need with limited timelines for this trial. To develop an accurate and reliable strategy for domestic Fires and Cookers, SGN have identified the need to contract specialist bodies such as Enertek who have a strong track record and experience in hydrogen appliance development through their involvement in the Hy4Heat program and therefore are understood to have the required expertise to undertake this work efficiently and quickly. While Enertek can evaluate manufacturers statements from a professional engineering point of view and make an objective assessment of likely readiness of the appliances and development costs and time, they can also offer various amounts of support to OEMs from simple guidance on appliance development through to full development services.

Method(s)

The project aims to deliver the following:

Milestone Work Pack 1) Creation of a 'Technical Specification' for each type of appliance (domestic fires, cooker, boilers, meters and ancillary components) to ensure that the required appliances are safe, robust, reliable, easy to use, aesthetically acceptable, fully UKCA certified and of suitable quality whilst being as cost effective as is reasonably possible.

Milestone Work Pack 2) Creation of a 'Development Strategy' for domestic fires and cookers (which the availability is uncertain for the H100 and HVT trial) which will identify the resources required by manufacturers and set out and suggest a process by which manufacturers can develop appliances to meet the Technical Specification in a timely and cost-effective manner.

Milestone Work Pack 3) Strategy for procurement of fires and cookers with identified manufacturers in work pack 2. Collectively, the two strategies will be designed to attract manufacturers considering participation in the trials and to provide support and guidance for those already committed to doing so.

Scope

Work Pack 1 - Creation of a 'Technical Specification' for each type of appliance (domestic fires and cookers, boilers, meters and ancillary components)

• To propose and recommend to SGN technical requirements for hydrogen domestic fires, cooker, boilers, meters and ancillary components (e.g. valves and fittings used within the domestic piping system) in terms of:

- Certification, quality, safety, reliability, ease of use, robustness and aesthetics

- Specifications incorporating function, safety operation and reliability, will be aligned with natural gas models, supplemented by specific requirements for use with hydrogen and the Service Provider in concluding such recommendations and guidelines, conduct an appraisal of relevant and appropriate regulation and legislation governing such appliances as are the subject under this Agreement

- The deliverable will be a 'Technical Specification' document for each type of product required in a format suitable for publication or distribution to the industry

Work Pack 2 - Creation of a 'Development Strategy' for fires and cookers

• To identify and liaise with hydrogen cooker and fire manufacturers to understand their resource requirements, and recommend a method and timeline for a suitable development of products that can be used in the H100 Fife Neighbourhood trial and used in the HVT following on from that

• The deliverable would be a number of bespoke and confidential 'development strategies' shared with each manufacturer

and SGN

Work Pack 3 - Strategy for procurement of fires and cookers

- To liaise with the manufacturers and use the strategies as identified and defined in work pack 2 to achieve manufacturer involvement in the H100 Fife neighbourhood trial and establish a clear procurement strategy for the purchasing of the developed appliances

Objective(s)

To progress the H100 Fife Neighbourhood and Hydrogen Village trials, availability of hydrogen appliances is crucial. Due to the immediate requirement for the H100 Fife Neighbourhood Trial, SGN are leading on finding a solution to the newly emerged risk of not having any Hydrogen Cookers and suitable Fires ready for these trials. Hence this project involves contracting and receiving required assistance from professional bodies such as Enertek who played an important role in the Hy4Heat H2 appliance development.

Consequently, this work will offer detail on “technical specification” requirements for the development of hydrogen fires and cookers that are ready and certified for use in Hydrogen trials and prepare a “Development Strategy” for these appliances which is expected to help resolve the issue with gap appliances identified in both Hydrogen Trials.

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

Success of the H100 Neighbourhood trial and the HVT, which is highly dependent on the outcome of this project, can directly impact the government heat policy decision in 2026 and hence the roll- out of hydrogen as a form of energy for heating to current NG consumers and even those currently not connected to the gas grid. All hydrogen appliances will be installed and used regularly within consumer properties, hence consumers will be directly impacted the quality and availability of these items. Therefore, hydrogen appliances must be of viable quality and equivalent (where possible) to the natural gas appliances which they replace and this project is looking into providing this opportunity. The availability of suitable hydrogen appliances will define the success of these trials which can result in the replacing NG with a green and potentially cheaper source of energy for all consumers including vulnerable customers.

Success Criteria

Delivery of a final report to fulfil requirements and generate various solutions and options for the development of Cookers and Fires including timelines and costs for the development of these appliances up to a level which can be used within the trial areas. The project should produce a ‘Technical Specification’ and ‘Development Strategy’ for hydrogen appliances (specifically domestic fires and cookers) for SGN’s H100 project (and subsequent contribution towards the Hydrogen Village Trial).

Project Partners and External Funding

While this project is led by SGN and is mainly funded through SGN and NIA, it is a collaborative work between all GDNs. All partners will share their relevant information to fill the gaps and assist with the effective delivery of the work.

Potential for New Learning

Currently there are no hydrogen cooker and fires available in the market for immediate installation in consumer properties for the changeover of NG to Hydrogen which is an essential requirements for the success of the H100 Neighbourhood and the HVT. This project will help understand the technical specifications requirements to set a benchmark for each type of appliance to ensure that the required appliances are safe, robust, reliable, easy to use, aesthetically acceptable, fully UKCA certified and of suitable quality whilst being as cost effective as is reasonably possible. Furthermore, through the development strategy is will identify the resources required by manufacturers and set out a process by which manufacturers can develop appliances to meet the Technical Specification in a timely and cost-effective manner.

Consequently, it can initiate a number of R&D project with the aim of building the required components or finding a suitable alternative to any unavailable appliances and ancillary products.

Scale of Project

The H100 Neighbourhood Trial covers approximately 300 domestic properties. Appliance requirements are therefore limited to domestic boilers, cookers, and fires. On the other hand the HVT will cover around 1000-2000 properties of which a large proportion will require domestic cookers and fires.

This project will reach out any identified cooker or fire manufacturer who have shown interest in producing these appliances and supporting these trials. Based on responses from these manufacturers a development strategy will be delivered to help making a justified decision on availability and purchasing of these appliances for the trials.

Technology Readiness at Start

TRL5 Pilot Scale

Technology Readiness at End

TRL8 Active Commissioning

Geographical Area

The project aims to fulfil the whole of GB.

Revenue Allowed for the RIIO Settlement

Not applicable

Indicative Total NIA Project Expenditure

Recoverable through NIA (Innovation): £29,993

SGN Internal Net Cash Flow: £4,993

Project Eligibility Assessment Part 1

There are slightly differing requirements for RIIO-1 and RIIO-2 NIA projects. This is noted in each case, with the requirement numbers listed for both where they differ (shown as RIIO-2 / RIIO-1).

Requirement 1

Facilitate the energy system transition and/or benefit consumers in vulnerable situations (Please complete sections 3.1.1 and 3.1.2 for RIIO-2 projects only)

Please answer **at least one** of the following:

How the Project has the potential to facilitate the energy system transition:

Readiness and quality of the supply chain for domestic hydrogen appliances (cookers, fires, boilers, etc.) will play an important role in supporting the networks progressing H100 Neighbourhood and Hydrogen Village Trials and can significantly influence evaluating the success of these trials. Feedback from these trials will directly inform the government heat policy in 2026 which will be a determining factor in the UK government decision for the potential role out of hydrogen and decarbonising the gas network over the entire GB.

How the Project has potential to benefit consumer in vulnerable situations:

With current net zero targets and the rising NG prices, the success of hydrogen trials could benefit vulnerable consumers by replacing NG with a green and potentially cheaper source of energy and even provide an opportunity for those currently not connected to the gas grid to join the network and benefit from this clean energy source.

Requirement 2 / 2b

Has the potential to deliver net benefits to consumers

Project must have the potential to deliver a Solution that delivers a net benefit to consumers of the Gas Transporter and/or Electricity Transmission or Electricity Distribution licensee, as the context requires. This could include delivering a Solution at a lower cost than the most efficient Method currently in use on the GB Gas Transportation System, the Gas Transporter's and/or Electricity Transmission or Electricity Distribution licensee's network, or wider benefits, such as social or environmental.

Please provide an estimate of the saving if the Problem is solved (RIIO-1 projects only)

Not applicable

Please provide a calculation of the expected benefits the Solution

To achieve the net zero targets set by the UK and Scottish governments by 2050 and 2045 respectively, there are many different routes that are currently being investigated. However, due to timescale slippage, the H100 Trial may form the main basis upon which the govern-ment base their 2026 decision on the roll out of hydrogen as the replacement to NG, because the Village Trials will still be in their early stages. Hence finding a solution for domestic hydrogen cookers and fires for this trial is a vital requirements to form the evidence of converting the existing GB gas networks to 100% hydrogen. This conversion has the potential to save millions of pounds with minimal gas customer disruption versus alternative decarbonisation solutions.

Please provide an estimate of how replicable the Method is across GB

If the H100 Neighbourhood and HVT are proved to be a success for rolling out 100% H2 as the replacement for NG across 300 and 2000 properties respectively, it can be replicated in the Town trial which is expected to cover 10,000 properties. Following the success of the town trial, roll-out of 100% H2 can be replicated across GB.

Please provide an outline of the costs of rolling out the Method across GB.

The cost for rolling out hydrogen appliances across GB is not part of this project. This project aims to find a solution for the current issue with the lack of hydrogen cookers and fired for the trials. Conclusions from this work will help the success of the H100 and HVT

trial areas and helps facilitate the transition at this level. However, any appliance developed for the trials can then be used or upgraded for the roll out of H2 across GB.

Requirement 3 / 1

Involve Research, Development or Demonstration

A RIIO-1 NIA Project must have the potential to have a Direct Impact on a Network Licensee's network or the operations of the System Operator and involve the Research, Development, or Demonstration of at least one of the following (please tick which applies):

☐ A specific piece of new (i.e. unproven in GB, or where a method has been trialled outside GB the Network Licensee must justify repeating it as part of a project) equipment (including control and communications system software).

☐ A specific novel arrangement or application of existing licensee equipment (including control and/or communications systems and/or software)

☐ A specific novel operational practice directly related to the operation of the Network Licensees system

☐ A specific novel commercial arrangement

RIIO-2 Projects

☐ A specific piece of new equipment (including monitoring, control and communications systems and software)

☑ A specific piece of new technology (including analysis and modelling systems or software), in relation to which the Method is unproven

☐ A new methodology (including the identification of specific new procedures or techniques used to identify, select, process, and analyse information)

☐ A specific novel arrangement or application of existing gas transportation, electricity transmission or electricity distribution equipment, technology or methodology

☐ A specific novel operational practice directly related to the operation of the GB Gas Transportation System, electricity transmission or electricity distribution

☑ A specific novel commercial arrangement

Specific Requirements 4 / 2a

Please explain how the learning that will be generated could be used by the relevant Network Licensees

While SGN is leading this project for resolving the domestic fires and cookers issue for H100, findings of this project will directly feed into requirements of the Hydrogen Village Trial lead by other GDNs. Hence this is a collaborative work between all GDNs with different GDNs showing their support and sharing findings. In addition to knowledge sharing in working groups meetings with representatives from all GDNs, findings from the project will be available to all relevant stakeholders through the ENA Smarter Networks Portal at https://smarter.energynetworks.org/.

Or, please describe what specific challenge identified in the Network Licensee's innovation strategy that is being addressed by the project (RIIO-1 only)

n/a

Is the default IPR position being applied?

☐ Yes

Please demonstrate how the learning from the project can be successfully disseminated to Network Licensees and other interested parties.

All the information and knowledge gained will be shared with other GDNs either through working group meetings or other means of communication. Also, the information will be available to all relevant stakeholders to review through the ENA Smarter Networks Portal at https://smarter.energynetworks.org/.

Please describe how many potential constraints or costs caused, or resulting from the imposed IPR arrangements.<

Due to the immediate requirement for the H100 Fife Neighbourhood Trial, SGN are leading on finding a solution to the newly emerged risk of not having any Hydrogen Cookers and suitable Fires ready for this trial. A solution for H100 fires and cookers will also be the

first step for resolving the similar issue in the Hydrogen Village trial. £29,993 of the budget is recoverable through NIA but the remaining £4,993 is the SGN net cash flow for this project.

Please justify why the proposed IPR arrangements provide value for money for customers.

There are a number of collaborative projects that are contributing to different hydrogen trials. The understanding between the GDNs running these projects is that the lead GDN is responsible for the funding of that project. The ENA is monitoring the spend across all of these projects so that the overall costs is distributed fairly across the GDNs and at the same time benefits all parties. Through this model all GDNs can benefit from each other's findings and help one another in the development and success of different trials which will in turn determine the future of using Hydrogen and hence the future of all gas networks.

Project Eligibility Assessment Part 2

Not lead to unnecessary duplication

A Project must not lead to unnecessary duplication of any other Project, including but not limited to IFI, LCNF, NIA, NIC or SIF projects already registered, being carried out or completed.

Please demonstrate below that no unnecessary duplication will occur as a result of the Project.

While domestic fires and cookers are a requirement for all hydrogen trials, due to the immediate need for the H100 Fife Neighbourhood Trial, SGN are leading on finding a solution to the newly emerged risk of not having any Hydrogen Cookers and suitable Fires ready for the H100 Fife Neighbourhood and Hydrogen Village trials. Findings of this work will be shared with other GDNs which can be used as the first step for finding a solution for the wider range of appliance required for the Village trial. Details of the project has been discussed with the other networks with clear charts showing where each party stands to ensure there is no duplication of work. The findings from the project will be shared with all key stakeholders.

If applicable, justify why you are undertaking a Project similar to those being carried out by any other Network Licensees.

While other GDNs are also looking at finding a solution for the current problem of not having fires and cookers for the hydrogen trials, H100 Neighbourhood has an immediate requirement compared to the HVT. At the same time the required appliances dont need to meet the range and choice required for the HVT. It has been discussed between GDNs that H100 should look into finding a solution for the limited number and choice of cookers and fires and other GDNs can then look at finding a solution for providing the range required. This model will ensure that no work is duplicated and if anything is repeated it will not be identical as timelines of H100 and HVT trials which is a critical factor in the proposed solution are different.

Additional Governance And Document Upload

Please identify why the project is innovative and has not been tried before

Gas distribution networks have yet no clear overview on the requirements from the end users in a future with hydrogen and how this demand can be met. This work will be an investigation to assess the technical specifications required for new hydrogen appliances and a development strategy to ensure readiness of the supply chain for domestic cookers and fires that the networks will need for H100, HVT, and Town trial.

Relevant Foreground IPR

Not applicable

Data Access Details

All the information and knowledge gained will be shared with other GDNs. Also, the information will be available to all relevant stakeholders to review through the ENA Smarter Networks Portal at https://smarter.energynetworks.org/.

However, if the project gathers any commercially sensitive information from any of the OEMs that information cannot be shared publicly and can only be released to parties who have signed NDAs with relevant OEMs.

Please identify why the Network Licensees will not fund the project as apart of it's business and usual activities

This work is deemed an essential part of the 100% hydrogen trials process which is a key step towards conversion of the existing gas network to 100% hydrogen which is yet not a business-as-usual activity for SGN or any other GDN

Please identify why the project can only be undertaken with the support of the NIA, including reference to the specific risks(e.g. commercial, technical, operational or regulatory) associated with the project

The NIA framework is a robust, open framework which can support the work and ensure the results which play an essential part on the roll-out of Hydrogen, are fully circulated to all licenses. The conversion of the GB gas network to 100% hydrogen is a key step on the road to net zero.

This project has been approved by a senior member of staff

☑ Yes