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

Nov 2024

Project Reference Number

NIA2_SGN0067

Project Registration

Project Title

H100 Design of Purging Trailer for Emergency Operations

Project Reference Number

NIA2_SGN0067

Project Licensee(s)

SGN

Project Start

October 2024

Project Duration

0 years and 4 months

Nominated Project Contact(s)

Joseph Abazeri

Project Budget

£32,380.00

Summary

The project aims to facilitate energy system transition through the development and demonstration (develop new learning, design and fabricate) a prototype nitrogen purging trailer (rig) and trainable work instructions allowing for indirect purging operations for use with 100% hydrogen, specifically for the H100 Fife Hydrogen Gas Distribution Network. Current Industry standards recommend indirect purging of gas systems for a range of situations to avoid the potential for a temporary flammable atmosphere to develop within pipework. Whilst there are ongoing projects to provide further evidence for direct purging in a 100% Hydrogen Network, there is no guarantee that key stakeholders will sign off direct purging evidence for our H100 Distribution operations. As a result of this SGN needs to ensure H100 Distribution Network system readiness with a deployable solution for indirect purging before the go-live date.

Third Party Collaborators

BTS Engineering

Nominated Contact Email Address(es)

sgn.innovation@sgn.co.uk

Problem Being Solved

The H100 Fife Distribution network is constructed with newly laid PE mains, featuring sectorisation valves at the start and end of each street and additional key valves at strategic locations. In the event of a Public-reported event (PRE) or loss of containment on the H100 network, the SGN response team will close the sectorisation valves and purge the affected section of the network before and after conducting replacement or repair works.

Current Industry practice utilises indirect purging of Hydrogen gas mains for a range of situations to avoid the potential for a temporarily flammable atmosphere to develop within pipework. However, performing indirect purging for Emergency operations on the H100 Network is bound by some operational risks including delays from sourcing and transportation of Nitrogen gas to site, safely

maintaining and reducing high pressures in the gas cylinders, limited road accessibilities to certain parts of the network among others. Therefore, it is essential to obtain assistance from BTS Engineering to design and fabricate a purging trailer (rig) for safe indirect purging operations on the H100 Fife Hydrogen Gas Distribution Network.

Method(s)

The project will use a combination of technical methods to design and fabricate a purging trailer. These include:

1)Technical Design and Engineering: This will involve a detailed technical design phase where engineers will assess the requirements for the trailer, including capacity, pressure ratings, material selection, and safety features. Existing trailer modifications will be made based on this design. The design will adhere to British Standards for gas distribution networks, ensuring compliance with safety and operational guidelines.

2) Fabrication and Assembly: Once the design is approved, the fabrication of the trailer will commence. This will include the integration of equipment such as gas cylinders, valves, pressure regulators, and any digital control systems required in an existing trailer for efficient and safe nitrogen distribution.

3)Testing and Commissioning: Before being put into operation, the trailer will undergo rigorous testing to ensure that it meets all technical standards, including pressure tests, leak tests, and operational tests under load.

4)Technical Documentation Development: A detailed product manual will be created, outlining all operational steps, safety procedures, emergency protocols, and maintenance schedules. This document will be created by the engineering and operations team, ensuring clarity and adherence to health and safety guidelines.

Scope

The project scope of works include:

1) Design and build a fit for purpose Nitrogen trailer to meet current industry standards and regulations utilising existing trailer.

2) Produce a product manual on how to safely operate the trailer.

3) Supply Nitrogen Gas required for operations.

4) Routine maintenance and servicing up to two years.

5) Knowledge dissemination.

Objective(s)

The project aims to facilitate energy system transition through the development and demonstration (develop new learning, design and fabricate) a prototype nitrogen purging trailer (rig) and trainable work instructions allowing for indirect purging operations for use with 100% hydrogen, specifically for the H100 Fife Hydrogen Gas Distribution Network. However, it could be adopted by the rest of the GDNs for future rollout of Hydrogen Projects.

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

Positive impact on customers in vulnerable situations as our response time will be a lot shorter which will mean vulnerable customers will be off of gas for a shorter period during an incident.

Success Criteria

The outcomes of the project will be considered successful if they can:

1) Design and fabricate a fit for purpose prototype Nitrogen purging trailer.

2) Produce a product manual on how to safely operate and maintain the trailer.

Project Partners and External Funding

BTS Engineering will be the supplier for this project.

The project is fully funded via NIA.

Potential for New Learning

This project seeks to facilitate energy system transition through the development and demonstration (develop new learning, design and fabricate) a prototype nitrogen purging trailer (rig) and trainable work instructions allowing for indirect purging operations for use with 100% hydrogen, specifically for the H100 Fife Hydrogen Gas Distribution Network.

Scale of Project

This project is important for effectively and safely managing interference damage and (de)commissioning activities on the H100 Fife Neighbourhood Distribution Network. Its results will be used to update the SGN and Industry Distribution and Emergency Bridging Documents for network operations and training. Additionally, this project will provide further evidence to help inform policy decisions regarding the adoption of hydrogen across the GB gas networks.

Technology Readiness at Start

TRL7 Inactive Commissioning

Technology Readiness at End

TRL8 Active Commissioning

Geographical Area

The project will be delivered at the BTS Engineering site in Edinburgh. The outputs of this project will be a representative of the H100 Fife Neighbourhood project and the wider GB Network.

Revenue Allowed for the RIIO Settlement

Not applicable

Indicative Total NIA Project Expenditure

SGN External - £24,291

SGN Internal - £8,089

Total - £32,380

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:

The outputs of this project will provide the capability of safe management of interference Damage and effective performance of purging operations in 100% Hydrogen Gas Network. The outcomes of the project will help to identify opportunities for updating SGN and Industry Distribution operations and allow the Gas networks to develop a low carbon gas network of the future.

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

Not Applicable

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

Not Applicable (this is a research project)

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

The outcome of this project is relevant to GB Gas network operating on 100% Hydrogen Gas.

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

Not Applicable

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

The project aims to facilitate energy system transition through the development and demonstration (develop new learning, design and fabricate) a prototype nitrogen purging trailer (rig) and trainable work instructions allowing for indirect purging operations for use with 100% hydrogen, specifically for the H100 Fife Hydrogen Gas Distribution Network. The insights gain will be applicable to the wider GB Gas Network and future transition of the Network to 100% Hydrogen. 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)

Not Applicable

Is the default IPR position being applied?

☑ Yes

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.

This project is unique to the H100 Fife Neighbourhood project and aims to provide further evidence to support SGN operations on the H100 distribution network during emergencies and any future trials or wider rollout of hydrogen.

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

Not Applicable

Additional Governance And Document Upload

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

This project holds immense importance for the safety of the H100 Fife Neighbourhood Distribution Network operations. The H100 Fife Neighbourhood trials represent a highly innovative program that is unmatched in scale and replication worldwide.

Relevant Foreground IPR

Not Applicable

Data Access Details

Information relating to the project will be published on the ENA Smarter Networks Portal at https://smarter.energynetworks.org/

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

activities

The methodology undertaken in this project is deemed beneficial for the network conversion to 100% hydrogen. This is not yet a business-as-usual activity for the GDNs.

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 conversion of the GB gas network to 100% hydrogen is essential to pave the road towards net zero. A reliable supply and the assurance of safe operations for workers and the public are crucial to supporting the hydrogen transition's viability. The NIA framework can support works that ensure results that play an essential part in the roll-out of hydrogen.

This project has been approved by a senior member of staff

☑ Yes