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

NIA_NGT0232

Project Registration

Project Title

GERG HYdrogen Service Tightness Criteria

Project Reference Number

NIA_NGT0232

Project Licensee(s)

National Gas Transmission PLC

Project Start

November 2024

Project Duration

1 year and 5 months

Nominated Project Contact(s)

Alistair Carvell, box.GT.Innovation@nationalgas.com

Project Budget

£75,000.00

Summary

This project, “Determination of in-service Tightness Criteria” focuses on establishing stringent criteria to qualify components and installations on the gas transmission network. As part of the project, flange gaskets, valves and fittings are to be tested and evaluated to develop understanding of in-service tightness requirements, ensuring the reliability and safety of critical components in hydrogen applications.

Nominated Contact Email Address(es)

Box.GT.Innovation@nationalgrid.com

Problem Being Solved

As hydrogen is introduced into the gas transmission network, ensuring the tightness and integrity of critical components such as flange gaskets, valves and fittings becomes crucial. This project addresses the need for standardised tightness criteria to qualify components and installations within gas transmission networks in the context of hydrogen.

Method(s)

Pressure Range

• Group1 (low pressure): From 21 mbar to 16 bar

• Group2 (high pressure): From 16 bar to 150 bar

Temperature

• Min: -20°C

• Max: + 80°C -(option): +60 °C in case of failure @ +80°C or if +80°C is not relevant for the tested equipment.

Media

• 100% CH4 for reference

• 20 (+ X for safety margin)% H2+ 80 (-X for safety margin)% CH4 with X =2 (proposal to be discussed) => may be optional for selected equipment

• 100% H2

• Option: 2%H2+98%CH4 => for selected equipment

Work Package 1: Flange gasket testing

WP1.1: Short term performances based on EN13555 room temperature sealing test

WP1.2. Long term performances

Work Package 2: Valve & pressure regulator testing

Work Package 3: Fittings testing

Measurement Quality Statement

The measurement approach used to meet Data Quality objectives will be through the identification of high calibre project partners who are experts in their given field. The methodology used in this project will be subject to our supplier's own ISO 9001 certified quality assurance regime and the source of data, measurement process and equipment as well as data processing will be clearly documented and verifiable. The measurements, designs and economic assessments will also be clearly documented in the relevant deliverables and final project report and made available for review.

Data Quality Statement (DQS)

The project will be delivered under the NIA framework in line with the agreed Energy Networks Innovation Process document and NGT internal policies. Data produced as part of this project will be subject to quality assurance to ensure that the information produced with each deliverable is accurate to the best of our knowledge and sources of information are appropriately documented. All deliverables and project outputs will be stored on our internal SharePoint platform ensuring backup and version management. Relevant project documentation and reports will also be made available on the ENA Smarter Networks Portal and dissemination material will be shared with the relevant stakeholders.

Scope

Flange gaskets, valves and fittings are to be tested and evaluated to develop understanding of in-service tightness requirements, ensuring the reliability and safety of critical components in hydrogen applications. The project aims to define tightness criteria/tightness classes for these components.

By partnering on this project, it provides a net benefit to National Gas and consumers by reducing the cost required to complete the project. Without collaborating on this, the project would need to be funded in total instead of splitting costs between the partners involved.

Objective(s)

· Review of reference documents regarding qualification of selected component types tightness performances and identification of gaps

· Definition of a work program for remaining gaps (test protocols, components to tested, planning, etc.)

· Testing of selected components + result analysis + report

· Define tightness criteria/tightness classes

· Define associated test protocols (based on existing ones as much as possible)

· Qualify the sealing performances under service conditions of several component types

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

An assessment of distributional impacts (technical, financial and wellbeing related) for this project has been carried out using a bespoke assessment tool, which assesses the project as having a positive, negative or neutral effect on consumers in vulnerable situations. To help inform the assessment, this tool considers the categories of consumers identified in the Priority Services Register. This project has been assessed as having a neutral impact on customers in vulnerable situations. This is because it is a transmission project.

Success Criteria

· Test results are clear and accurate with a clear conclusion that can be utilised to understand next steps if necessary.

· Completed work package reports outlining the methodology, findings and recommendations for in-service tightness criteria for the tested components.

· Proposal towards standardisation

· Provide clear understanding of tightness criteria and required updates to procedures

Project Partners and External Funding

Confirmed Partners

Nedgia (funding)

Storengy (funding)

Cetim (funding and delivery)

DNV (delivery – information)

Kiwa (delivery – tests)

DBI (delivery – tests)

Possible Partners

Gas Network Ireland

DNG Danish Gas Technology Centre

Engie

GASUNIE

GRDF

Shell

Total budget estimate: 800,000 Euros

NG contribution: £74,664

Potential for New Learning

The project will provide clear understanding of tightness criteria for tested components with up to 100% hydrogen and the required updates to policies/procedures. Learning will be disseminated through updates to policies/procedures.

Scale of Project

This is a standard test program scale for a project such as this. It is a 2-year programme to allow an in-depth study across multiple asset types to ensure we gain a full understanding of the tightness criteria and includes an international approach to in-service tightness criteria.

Technology Readiness at Start

TRL1 Basic Principles

Technology Readiness at End

TRL2 Invention and Research

Geographical Area

International. Main base of study is France with possible testing houses (DNV, KIWA, DBI, Cetim) across the UK, US and France.

Revenue Allowed for the RIIO Settlement

N/A to this project

Indicative Total NIA Project Expenditure

External Cost: £59,730.75

Internal Cost: £14,933

Total Cost: £74,664

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 determination of in-service tightness criteria enhances the reliability and safety of critical components within the gas transmission and distribution systems which is crucial to the safe integration of hydrogen into the networks, as part of the energy system transition. The project aims to identify and address potential failure points in hydrogen application and the findings can contribute to the development and standardisation of industry standards and best practices for in-service tightness criteria, fostering a more resilient and safer energy system.

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

N/A

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)

N/A

Please provide a calculation of the expected benefits the Solution

Category
Description
Scoring
Maturity
TRL 0-1

Opportunity
>50% or multiple assets

Deployment costs
£0

Innovation cost
£74,664

Financial Saving
0

Safety
5%

Environment

1.0 tonnes of CO2

Compliance
Support compliance

Skills & Competencies
No change

Future proof
Supports business strategy

Project Score: 25

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

The method is replicable with components/installations outside the scope of this project and through policy/procedure updates, knowledge can be shared.

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

N/A

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 assets tested as part of this project are components utilised on other gas transmission and distribution networks and the findings can be used by the networks to make informed decisions for their specific network configurations through the use of the updated policies and procedures that will follow due to the output of this project.

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.

Due to exemption, we will be sharing the outcomes of the project through updates to policies/procedures.

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

N/A

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

N/A

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.

Findings will be shared through procedure/policy updates and knowledge shared to prevent duplication.

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

N/A

Additional Governance And Document Upload

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

There is no current set criteria for hydrogen and the differences between hydrogen and methane need to be understood. This is a new test developed for this reason and testing will be carried out for blends of Hydrogen and methane as well as 100% hydrogen. Such testing of the selected components has not been carried out before.

Relevant Foreground IPR

No foreground IPR is being shared on this. Due to Ofgem funding rules, knowledge and learning is shared.

Data Access Details

Details on how network or consumption data arising in the course of an NIA funded project can be requested by interested parties, and the terms on which such data will be made available by National Gas can be found in our publicly available “Data sharing policy relating to NIA projects” at www.nationalgas.com/gasinnovation. National Gas data access is managed IAW provisions under 2.15-2.18 for the current NIA Governance Document.

National Gas already publishes much of the data arising from our NIA projects at www.smarternetworks.org. You may wish to check this website before making an application under this policy, in case the data which you are seeking has already been published.

Data Quality Statement (DQS):

The project will be delivered under the NIA framework in line with the agreed Energy Networks Innovation Process document NGT internal policies. Data produced as part of this project will be subject to quality assurance to ensure that the information produced with each deliverable is accurate to the best of our knowledge and sources of information are appropriately documented. All deliverables and project outputs will be stored on our internal SharePoint platform ensuring backup and version management. Relevant project documentation and reports will also be made available on the ENA Smarter Networks Portal and dissemination material will be shared with the relevant stakeholders.

Measurement Quality Statement (MQS):

The methodology used in this project will be subject to our supplier's own ISO 9001 certified quality assurance regime and the source of data, measurement process and equipment as well as data processing will be clearly documented and verifiable. The measurements, designs and economic assessments will also be clearly documented in the relevant deliverables and final project report and made available for review.

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

Hydrogen related work is not currently funded by business-as-usual activities, therefore innovation funding must be used for this project.

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

Hydrogen projects cannot be funded as part of BAU activities. NIA also enables sharing of the results and methodology.

This project has been approved by a senior member of staff

☑ Yes