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

Jan 2019

Project Reference Number

NIA_NGN_235

Project Registration

Project Title

Alternative Gas pinpointing phase 2

Project Reference Number

NIA_NGN_235

Project Licensee(s)

Northern Gas Networks

Project Start

February 2019

Project Duration

0 years and 9 months

Nominated Project Contact(s)

Adam Madgett

Project Budget

£132,000.00

Summary

he current technique used by Gas Distribution Networks for detecting the location of external gas escapes from buried assets is ‘Barholing’. The basic principle is to penetrate a small diameter hole into a footpath or carriageway, enabling gas samples to be taken from within the pavement structure. This is achieved using a pile driven pin, which has a barrel handle. Operatives carry out a number of penetrations in the general vicinity of the gas escape before subsequent gas samples are taken at subsurface level in order to pinpoint the source.

The current tooling has not been reviewed or updated for the past 40 years and it has been identified that a new method is required. It is hoped that this will contribute to:

• Reduce risk of injury to our engineers.
• Reduce risk to members of the public.
• Reduce time to pinpoint escaping gas.
• Reduce noise from barholing.
• Reduce risk of damaging third party equipment.
• Reduce weight of equipment.

Third Party Collaborators

Energy Innovation Centre

Frazer-Nash Consultancy

Nominated Contact Email Address(es)

innovation@northerngas.co.uk

Problem Being Solved

The current technique used by Gas Distribution Networks for detecting the location of external gas escapes from buried assets is 'Barholing'. The basic principle is to penetrate a small diameter hole into a footpath or carriageway, enabling gas samples to be taken from within the pavement structure. This is achieved using a pile driven pin, which has a barrel handle. Operatives carry out a number of penetrations in the general vicinity of the gas escape before subsequent gas samples are taken at subsurface level in order to pinpoint the source.

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Method(s)

Concerns were originally raised by the Northern Gas Networks regarding the existing 'Barholing' device due to:
- Risk of injury to the operator due to large force propagation through the shoulders during impact;
- Safety risk to the public due to risk of spike rebounding;

During the Option Study it was established that both the Dead Blow Barholer and the Drop Hammer method could offer a number of advantages over the existing device. The final design will combine these solutions and will have a number of unique features.

The final solution will be a combination of these two concepts. It is estimated that each final production unit will be slightly more expensive than the existing solution, however the added safety benefits could provide value for money.
For a full report of Phase 1 of the project, including a description of each of the concepts and a basic cost analysis, please refer to the Alternative Gas Pinpointing phase 1 (NIA_NGN_219)

Scope

This project is phase two of a three phase project:
During Phase 1 of the project (NIA_NGN_219), the Frazer-Nash Consultancy design team conducted a Requirements Capture of the current Barholing technique. This provided an agreed set of requirements which fed into an Option Study which considered new methods of Barholing. Each of the concepts were appraised using Pugh analysis and stakeholder input. A final solution which combined the features of the Dead Blow Barholer and Drop Hammer concepts was decided upon.

The next stage of the design development process is to enter Phase 2, the Concept Design phase. This will be split into two parts containing:

Phase 2a – Product Definition

- Product Specification Document

- Field Testing of existing Barholer

- High Level Concept Design

- Develop Commercialisation and Engagement Strategy

Interim Review Meeting
Phase 2b – Concept Design

- Design Analysis

• Prototype Design

• Prototype Manufacture & Testing

• Design Justification Report

• Commercial Partner Engagement

After success in Phase 1 of the project, it is suggested that Phase 2 is once again conducted in collaboration between the design team and end users. This blend of experience and expertise will help develop the prototype against the agreed requirements.

Out of scope for this project

After completion of Phase 2, it is hoped the project would be in a position to enter Phase 3; the Detailed Design phase. The main output of this phase would be a final detailed design allowing for a production unit to be manufactured and fully field tested. This will be developed using a combination of analysis and learning from prototype testing. This work package is likely to consist of the following:

Phase 3
• Detailed Design Development
• Safety Review
• Structural Evaluation
• Human Factors and Vibration Analysis
• Manufacture Drawings
• Further Develop Relationship with Commercialisation Partner (as defined by the outcome of the commercialisation strategy developed during Phase 2)

Objective(s)

The main objectives of Phase 2 of the project is to produce a prototype for testing and to initiate discussions with a commercial partner for final variant production. In order to complete this, there are a number of other related objectives which must be completed:

• Capture the requirements that the solution must meet. This will be achieved using the Product Specification Document. This document will be reviewed by key stakeholders to ensure that the performance criteria of the solution are agreed upon.

• Develop a commercialisation strategy and approach potential commercial partners.

• Understand the benefits of the new solution. This will be achieved using ‘before and after’ scenarios during field testing. Through collaboration with our specialist Noise & Vibrations team, we will be able to quantitatively capture the forces transferred to operators whilst through input from our Human Factors team, we will qualitatively understand the implications of the new solution for an FCO.

• Justify the prototype design. This will be achieved using the Design Justification Report. All key design decisions will be captured and justified using a combination of analysis and testing.

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

Success Criteria

a) Project success can be evaluated against two key documents. The Product Specification will illustrate that the design space has been captured and requirements have been agreed upon with key stakeholders. The Design Justification Report will record the key design decisions and provide justification against the agreed requirements. It will contain a clear and structured approach to the problem and be linked to the Product Specification so that it is clear which requirements have been met and which areas require further development in Phase 3.

b) The performance of the innovation will be evaluated against the prototype. It must be suitable for generating test data to allow comparison against the current Barholer.

Project Partners and External Funding

Frazer-Nash Consultancy

EIC

Potential for New Learning

There is potential for new learning as a result of the field testing that will be conducted during the project. It is hoped that the research will provide a greater understanding of the forces an FCO is exposed to using the current equipment and a better understanding of the surfaces a Barholing device is required to penetrate.

Scale of Project

The focus of the project is research and feasibility. The output of which has the potential to update the way that FCO's undertake bar holing to enable gas escape investigation.

Technology Readiness at Start

TRL3 Proof of Concept

Technology Readiness at End

TRL5 Pilot Scale

Geographical Area

The design work will take place at Frazer Nash with field trials taking place across NGN's network.

Revenue Allowed for the RIIO Settlement

N/A

Indicative Total NIA Project Expenditure

Total project costs £132,200

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:

n/a

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)

Through the development of an improved barholing device it is envisaged that the project will deliver benefits as outlined below:
• Financial Reduction in compensation claims
• Reduction in LTI's
• Reduced noise impact
• More efficient bar holing techniques resulting in a positive impact locating leaks.
This is a very low TRL research and development project and as such it is too early in the process to quantify these. An understanding of the cost benefit will identified throughout the project.

Please provide a calculation of the expected benefits the Solution

N/A

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

N/A

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

All GDN's undertake barholing when investigating gas escapes. The learning generated from this project will be applicable to all networks.

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

Safety and emergency – this project has the potential to reduce injuries to colleagues and increase efficiency when identifying gas escapes.

☑ Has the Potential to Develop Learning That Can be Applied by all Relevant Network Licensees

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.

A search of the smarter networks portal has not identified any similar projects in this area. The project has also been shared through the Gas Innovation Governance Group for awareness.

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

The current bar holing solution has been fit for purpose and is able to carry out the task at hand as required. However, the current tooling was designed circa 40 years ago and is very labor intensive. NGN believe that now new technology and materials have advanced we should explore what is possible to increase safety and efficiency for our workforce.

Relevant Foreground IPR

n/a

Data Access Details

n/a

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

Due to the very low TRL of this product there is too much risk associated with developing a new tool for bar holing activities.

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

Due to the uncertainty surrounding the project outcome, the project is considered a commercial risk that is beyond the appetite of the business.

This project has been approved by a senior member of staff

☑ Yes