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

Mar 2014

Project Reference Number

NIA_SGN0017

Project Registration

Project Title

Portable 'Gas In Ducts' Sample System

Project Reference Number

NIA_SGN0017

Project Licensee(s)

SGN

Project Start

August 2013

Project Duration

2 years and 2 months

Nominated Project Contact(s)

Ryan Smith, Innovation Delivery Manager

Project Budget

£118,640.00

Summary

The scope of this project is to bring to the industry a new and improved piece of equipment that improves and extends the design of the previous gas in ducts detection device designed by Crowcon for the use of pinpointing the source of a gas escape, avoiding the current method of excavating and breaking out sections of the duct to detect the leak source.

The outcomes of these improvements will include:

- Reduction in the number of excavations required to pin point a gas escape, and as a result the amount of excavated material sent to landfill
- Reduce the length of time for interruptions, thus improving the productivity and efficiency across our networks
- Reduced risks to operatives having to excavate around third party plant
- Utilisation of existing maintenance covers to launch the detection equipment.

Nominated Contact Email Address(es)

sgn.innovation@sgn.co.uk

Problem Being Solved

The safety of our assets and those of third parties are of paramount importance. The use of plastic ducts to protect cabling situated alongside our gas mains is the preferred method for electrical contractors. However, on occasions, due to small leakages in our network and areas of exposure in the duct work, gas 'tracks' into ducts due to the open space inside it being the path of least resistance. Gas leakage into ducts poses potential hazards to our operatives and other parties; individuals could become exposed to large sources of gas trapped in concealed areas, and potentially enter neighbouring properties via service ducts.

The current method of detecting the source of gas in the ducts is to lift the duct maintenance covers to vent the gas, this breaks the

path of the gas and the direction of the source of the leak can be determined. Once the section of duct with the source of the leak is identified, the only option is to use the process of elimination and dig on the line of the duct dividing the area up in to sections. This is a costly and time consuming method, and has the potential to cause high levels of disruption to the general public. Therefore a solution that allows gas to be detected from a distance with minimal physical disruption to the ducts is deemed advantageous to our industry and customers.

Method(s)

This project is concerned with exploring a solution to detect gas in ducts. The project will develop a new portable 'gas in ducts' sample system, based on an existing device designed by Crowcon, to pinpoint the source of a gas escape. The new system will be able to accurately measure low volumes of methane remotely across long distances in harsh environments including mud and water filled ducts. It will therefore reduce the number of excavations required to locate the source of a gas leak. The solution will be mobile, compact in size, lightweight for manual handling purposes and require minimal maintenance.

The methodology is outlined below:

1. Crowcon to research, develop, and produce working drawings of the new design.
2. If suitable, SGN to provide written approval to Crowcon to proceed with manufacture of one 2nd generation 'gas in line' sample system for observation and testing.
3. Drawings and test results to be submit to SGN for assessment pre production.
4. If the sample product is suitable, SGN to provide written approval to Crowcon to proceed with the manufacture of a further nine 2nd generation 'gas in line' sample systems for field trial.
5. Training for the use of the new equipment provided by Crowcon to 30 SGN employees covering the use of the new equipment across all three of SGN's networks in South, South East and Scotland.
6. SGN to field trial new systems across three depot locations, one in each of SGN's regional networks and record results for analysis. Onsite support to be provided by Crowcon if requested by SGN.
7. Once results have been analysed SGN to make a decision on the success of the new product and record and share findings with the other GDNs.

Scope

The scope of this project is to bring to the industry a new and improved piece of equipment that improves and extends the design of the previous gas in ducts detection device designed by Crowcon for the use of pinpointing the source of a gas escape, avoiding the current method of excavating and breaking out sections of the duct to detect the leak source.

The outcomes of these improvements will include:

- Reduction in the number of excavations required to pin point a gas escape, and as a result the amount of excavated material sent to landfill
- Reduce the length of time for interruptions, thus improving the productivity and efficiency across our networks.
- Reduced risks to operatives having to excavate around third party plant
- Utilisation of existing maintenance covers to launch the detection equipment

The reason for the change is as follows:

As part of the project lab tests were carried out on the equipment as part of the initial testing process. These tests identified an issue with the filtration system built into the unit. In particular the unit was limited in the amount of water it could withstand before causing damage. The design of the filtration system has, therefore, been altered to take into account the additional volume requirement for water and dust removal. This has led to a requirement to extend the project duration..

The project problems, objectives, success criteria and cost arrangements, previously outlined in the Project Registration document, remain unchanged.

This change to allow completion of the field trial testing is beneficial as it will ensure full assessment of whether the equipment is fit for purpose and there is no change to the project costs or expected benefits.

Objective(s)

The key objectives of this project are to design, develop and evaluate a single-line sample system, for safe area use only, enclosed in an ABS enclosure that has carry handles and inbuilt wheels to aid transportation.

To achieve this the key objectives are to:

- Develop, test and review design drawings of the new equipment

- Produce and review at least one ‘gas in line’ sample system
- Train SGN employees in use of the sample system
- Evaluate the performance of the sample system through field trials
- Produce a technical report detailing the outcomes of the project

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

Success Criteria

In order to determine whether this project has been successful or not it will be reviewed at key milestones set throughout the project listed above, this will ensure value for money is received by the customer, with the avoidance of unnecessary expenditure. Key outcomes of the project will be:

- The development of a piece of equipment which detects the entry point of gas in to ducts remotely
- Field trial data clarifying the effectiveness of the equipment
- A reduction in the time taken to detect the leak source
- Minimisation of the disruption caused to the general public whilst detecting gas in ducts
- Production of a technical report detailing the project outcomes

Project Partners and External Funding

n/a

Potential for New Learning

n/a

Scale of Project

The scale of the project reflects the fact it is based on development of an existing product to meet GDN requirements for this application of the technology, reducing the amount of time and cost spent at the development stage.

Technology Readiness at Start

TRL4 Bench Scale Research

Technology Readiness at End

TRL8 Active Commissioning

Geographical Area

This project will be trialed in three depot locations, one in each of SGN’s regional networks; Scotland, South and South East. The purpose of the trials being carried out in a number of depots is to ensure that the equipment is used extensively in varying environments to ensure the integrity of the findings.

Revenue Allowed for the RIIO Settlement

SGN’s RIIO-GD1 allowance for Repair activities is £209.6m. While no direct savings are expected during project implementation, it is likely that some of this expenditure could be saved by the introducing the Portable ‘Gas In Ducts’ Sample System. The potential savings will depend on the success of the new techniques in the key target areas listed above in the project scope section.

Indicative Total NIA Project Expenditure

The expected total project cost is £118,640, 90% of which is allowable NIA expenditure (£106,776).

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)

The anticipated savings of this initiative will not be known until completion of the field trial wherein both the technical and commercial benefits will be clarified. SGN's RIIO Allowance for Repair activities, which this device will aid, is £209.6m. Gas in ducts is found at 80% of gas leak sites reported to SGN, many of which would benefit from the use of the equipment being developed in the following areas:

- A reduction in the amount of time taken to detect the source of the leak, and therefore man hours to complete repair
- Allowing the operative using the equipment to detect the leak source remotely, reducing the impact on the general public
- Reducing the quantity of excavations required to detect the leak, and the amount of waste sent to landfill
- Minimising the disruption to the third party ducting, and associated repairs when reinstating

Please provide a calculation of the expected benefits the Solution

On average across SGN we deal with approximately 44,750 escapes per year. It is estimated that 80% of these escapes involved gas in ducts meaning there would be approximately 35,800 escapes where the new sampling system technology could be utilised.

At present, the estimated average cost to repair one mains gas escape is £1,500. It is envisaged that this new technology can generate savings of approximately 3% due to the reduction in time taken to locate the gas leak and the amount of excavation required.

Therefore; £1500-£1455 = £45 (Benefit Estimation for Development) per gas escape.

This would result in an estimated total saving of approximately £1,611,450 per annum, if used on all escapes involving gas in ducts.

The cost savings will fluctuate per job depending on the type of duct containing the gas, its length, its location and the amount of blockages within it.. The field trial findings from this project will enable us to refine this estimate and provide a more accurate analysis of the system's potential to deliver net financial benefits.

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

Based on the quantity of sites SGN will be able to use this technology, and extrapolating a 4:2:1:1 split with reference to the size of each network, it is assumed that National Grid have in the region of 140,000 escapes per year involving gas in ducts, and Wales & West and Northern Gas would have approximately 18,000 per year each. This gives an estimated total of 247,600 sites across Great

Britain (GB) where this technology could be applied each year.

It must be noted that these figures are based on averages and estimates rather than real network data and the nature of escapes and sites will vary, which could affect the potential to apply the method and the benefits of applying it. The main focus of this project is to test the technology and understand the potential benefits.

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

Until the product is developed fully, it is difficult to determine an accurate price for the roll out of the equipment. Further development through this project will enable assessment of the cost of the equipment and costs associated with its deployment.

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 learning from this project will benefit network licensees as it will provide them with a clear evaluation of current techniques for gas detection against the new 'gas in duct' system. If successful the learning from the project (new system development and evaluation of trial results) will allow network licenses to make informed decisions on the introduction of this equipment into their operational activities. Where introduced, the learning will enable them to begin accurately measuring low volumes of methane remotely across long distances in harsh environments including mud and water filled ducts with minimal interference of the third party plant contained inside.

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

☑ 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.

n/a

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

n/a

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

n/a

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

n/a

This project has been approved by a senior member of staff

☑ Yes