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

Dec 2013

Project Reference Number

NIA_NGN_049

Project Registration

Project Title

Technologies and strategies to reduce gas leakage expenditure profile

Project Reference Number

NIA_NGN_049

Project Licensee(s)

Northern Gas Networks

Project Start

January 2014

Project Duration

1 year and 7 months

Nominated Project Contact(s)

Marc Wigham 07785345074

Project Budget

£177,704.00

Summary

Networks want to adopt best practices from overseas or other sectors that prove viable within the UK gas network, they also understand the impact methane has on carbon emissions and wish to reduce this as much as economically possible. This research, unique in the gas industry is to undertake a close technical review of the water industries approach to leakage strategies to learn and share best practices. This project will seek to identify the benefits from the transfer of approaches and techniques used in the water industry and to identify potential improvements in the efficiency and effectiveness of gas industry leakage management. It will also Identify routes to leakage reduction during the early part of RIIO GD1 to maximise the duration for implementation and net benefits to customers. It may also provide longer term strategic planning that will impact on RIIO GD2.

Third Party Collaborators

Water Research Centre plc

Nominated Contact Email Address(es)

innovation@northerngas.co.uk

Problem Being Solved

Methane (CH4) is the prime constitute of Natural Gas and is a much more potent Greenhouse Gas (CHG) than carbon dioxide (CO2). Leakage from the natural gas grid is approximately 0.06% of transported gas but can have a disproportionate impact on the environment. Location of very small leakages, economic cessation of these leaks and removing the need to expose buried pipework is a challenge to the gas sector to reduce its carbon footprint.Pro-active planned leakage detection, pipe repair and renovation along with localized effective pressure management has not been fully developed into business as usual. New strategies and technologies may now exist which may now make revisiting our existing approach a viable option to optimise leakage reduction, both on a technical and theoretical level.

Method(s)

By undertaking a research program into the effects these strategies had on water reduction and there transferability from one sector to another, Networks will be able to reassess their current approach and develop new technologies that have a significant impact on gas leakage. The approach taken will be to:

- Conduct best practice and cost benchmarking to identify and recommend leakage/ pressure management practice and leakage detection technologies that could be transferred from the water to gas industry.
- As part of a suite of investigative tools respond to PREs, trial selected leakage detection technology and deployment techniques to identify if any are appropriate for gas industry application.

Scope

Networks want to adopt best practices from overseas or other sectors that prove viable within the UK gas network, they also understand the impact methane has on carbon emissions and wish to reduce this as much as economically possible. This research, unique in the gas industry is to undertake a close technical review of the water industries approach to leakage strategies to learn and share best practices.

This project will seek to identify the benefits from the transfer of approaches and techniques used in the water industry and to identify potential improvements in the efficiency and effectiveness of gas industry leakage management.

It will also Identify routes to leakage reduction during the early part of RIIO GD1 to maximise the duration for implementation and net benefits to customers. It may also provide longer term strategic planning that will impact on RIIO GD2.

Objective(s)

This project will deliver a report which will include:

· A comprehensive summary of leakage/pressure management practice/equipment and costs within the UK water industry.

· A detailed review of changes to gas sector analysis/operation process, based upon transfer from the UK water industry, which could provide improvements in leakage management efficiency and effectiveness.

· Recommendations on utilisation of leakage detection technology and deployment techniques to identify the most cost-effective intervention technique for leaking gas mains.

· Recommendations on the use or development of leak/water ingress detection technology that could be transferred from the water to gas industry.

· An implementation strategy with respect to leakage/pressure management within the gas industry.

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

Success Criteria

Following this research the networks should be able to:

· Identify changes to current gas industry leakage/pressure management equipment, practice and policy that could improve efficiency and effectiveness. This will include Regulatory conditions and operational factors affecting implementation, based on water industry techniques.

· Understand the utilisation of leakage detection/deployment technology to identify the most cost-effective intervention technique for leaking gas mains.

· Identify cost savings that could result from any of the above changes.

· Utilise existing water ingress detection technology into existing water ingress removal strategies

Leakage detection/deployment and water ingress technology that show promise and may be worth developing further, the networks will be in a position to plan the development of these technologies

Project Partners and External Funding

n/a

Potential for New Learning

n/a

Scale of Project

A full project work schedule to be provided by Wrc, however, four Project Steering Committee meetings are proposed with five key tasks to be undertaken:

Task 1: Comprehensive review of participating gas distribution network companies leakage/pressure management practice, policy and costs

Task 2: Collate water industry best practice with respect to leakage/ pressure management

Task 3: Identification of water industry leakage/pressure management best practice that could be transferred to the gas industry

Task 4: Review leakage detection/deployment technology that could be utilised in the gas industry

Task 5: Trialling leakage detection/deployment technology that could be utilised in the gas industry

Task 6: Develop implementation strategy for gas industry leakage/ pressure management best practice

Technology Readiness at Start

TRL3 Proof of Concept

Technology Readiness at End

TRL5 Pilot Scale

Geographical Area

Investigations, data research and meetings with key staff will need to take place across all GDN's. Any field trials will be undertaken at the discretion of the steering committee and will be undertaken at the most suitable locations, within any of the networks.

Revenue Allowed for the RIIO Settlement

None

Indicative Total NIA Project Expenditure

NGN External Costs - £66,706 NGN Internal Costs -£22,146 W&W External Costs - £66,706 W&W Internal Costs -£22,146 Total project cost - £177,704

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)

This is a research project at stage 1 to 4 amendments will be made here should the project move to stage 5 or 6

Please provide a calculation of the expected benefits the Solution

This is a research project at stage 1 to 4 amendments will be made here should the project move to stage 5 or 6

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

An implementation strategy will be develop as part of the report incorporating appropriate water industry leakage/pressure management practices and detection/ deployment technology within the gas industry. Implementation will either be conducted on a collaborative basis or by individual networks depending on the solutions identified and GDN's business requirements.

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

Those GDN's contributing to the research and will form part of the steering committee, all networks will receive the learning and knowledge from this research. Trials will be limited to contributing networks.

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

WRc will review the findings from initial research to understand the changes to gas company leakage/pressure management practice that could improve efficiency and effectiveness. This will incorporate Regulatory conditions and operational factors affecting implementation based on water industry techniques.

There is numerous leakage detection and deployment techniques currently used, or in development, in the water and gas industry for detection technology, for example leak noise correlators, acoustic sensors, pressure transient detection, robotics, etc. A review will be undertaken on the available techniques and recommend which could potentially transfer and which should be trialled.

The learning generated from these elements of the research could be adapted and adopted to reduce methane emissions from the gas network

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

Since 2005, GDN's have reduced leakage by more than 10%, approximately 1.2m tonnes of carbon equivalent (tCO2e). We have achieved this through a programme of pipeline replacement, reducing system operating pressures, treatment of pipeline joints and seals, the capture of gas vented during street works and managing gas escapes within the agreed standards of service.

Networks wish to optimise the use of operational expenditure track repairs, poor pressures, water ingress and mechanical failures to assist planning decisions when undertaking network optimisation planning. Leakage is a key element of these strategies and plays a key role in decision making, any adoption of strategies from others sectors will enhance these decisions for the benefit of UK customers.

Develop data models which collect leakage and repairs data along with operational cost data so that it is used to inform the Asset Strategy. All networks have stated the need to optimise these decisions to reduce overall cast and improve efficiencies.

Any outcomes will take the work that Network Planning has done to date forward, based on sound empirical research.

☑ 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