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 2014

Project Reference Number

NIA_NGN_100

Project Registration

Project Title

Service Water Extraction

Project Reference Number

NIA_NGN_100

Project Licensee(s)

Northern Gas Networks

Project Start

December 2014

Project Duration

1 year and 7 months

Nominated Project Contact(s)

John Pickering

Project Budget

£98,168.00

Summary

The project will include the following stages:

Feasibility Study: Will also look into the individual system components, including a review of all other globally available technology to enhance the key aims of the methodology. The key areas are:

Network Entry, no gas entry methodology

Use on 17.5 to 32mm PE pipes, ¾" to 1½" metallic service pipes and ServiFlex lined service pipes

Operating Network Pressure System initially limited to below 74mm

Test volumes of extracted water

Trial optimum distances from remote location.

Recycling and reinjection of gas back into network

3D Prototype Stage

- Alpha prototype production of designs.
- Design review

Bench Test Prototype Stage

- Suction head & spring development
- Push-rod development

- Vacuum pump development
- Cable-reel and carry-case development
- Beta prototype production of design
- Laboratory testing
- Design review

Field Trials Prototype Stage

- Required further development from beta testing and design review
- Gamma prototype production of designs.
- Laboratory testing
- Site selection and field trials

Third Party Collaborators

Synthotech Limited

Nominated Contact Email Address(es)

innovation@northerngas.co.uk

Problem Being Solved

Water entering the gas network creates significant network management issues primarily around the location of entry points, removal from the network and methods of removing its cause. Gas enters the aging cast iron low pressure system from a variety of sources as the pressure of the water exceeds the pressure inside the gas network.

Detecting water ingress into pipes is extremely difficult, as it prevents gas escaping, our normal detection techniques cannot pinpoint the exact entry point. Water within the system creates blockages as it either fills the main system or enters smaller services this disrupts supplies to customers either individual services or multiple consumers.

The current method of extracting water from services involves a two man team using an Alan Taylor unit to pump the water from the service. This is a lengthy process resulting in customer being without gas until all water has been removed there is also no way of checking that all water has been successfully removed.

Method(s)

NGN has developed a concept which allows extraction of water from a service pipe by a single engineer and without the need for intrinsically safe equipment. NGN have now engaged with Synthotech to develop this in to a fully functioning product to safely extract water remotely from service pipes.

This technical project involves developing this system so that it can that it can easily be operated by a single user on a live, low pressure (below 75mbar) network with the aim of locating the point of the blockage or restriction, removing the water and then locating the point of entry in a no gas operation in conjunction with ServiceCam. Water can also be removed with no vision in a single operation.

It is envisaged that the service water extraction system will comprise of a suction head embedded at the front of the system, and an

umbilical push rod method. The suction device is designed to extract the water through the umbilical push rod system.

Rather than utilising the pipeline pressure to extract the water and flare the gas, the project will focus on all environmental aspects and use a novel differential pressure system to separate the water from the gas, and recycle the gas back into the network, preventing any greenhouse gas emissions.

Scope

The project will include the following stages:

Feasibility Study: Will also look into the individual system components, including a review of all other globally available technology to enhance the key aims of the methodology. The key areas are:

Network Entry, no gas entry methodology

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Objective(s)

The objectives of this project are to:

- Develop appropriate technology that will easily, simply and quickly remove water from a remote location reducing customer disruption.

- Entry to service pipe via ECV entry point under no gas operation.
- A single operation to remove water from up to 20mtrs from entry point on pressures up to 75mbar
- Develop a methodology of recycling gas back into the network and separating water from gas
- Produce documents, reports, presentations and seminars to share the learning from this project

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Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

Success Criteria

Through-out the project there will be monthly updates from Synthotech to update NGN on the progress of the project. There will be key deliverables reviews at key points with accountable parties clearly identified. The project seeks to deliver:

- A sufficient flow rate of water extraction for a manual system.
- Speed, manpower and customer disruption reductions as compared to current methods
- Ease of use and a target maximum training of 4 hours for competent use of the equipment
- Sufficiently robust hardware
- One Person operation
- Does not require connection external power supply e.g. 110v/240v

Project Partners and External Funding

n/a

Potential for New Learning

n/a

Scale of Project

NGN believe that learning can be obtained using a small scale project focusing on developing the prototype into a working system into a fully developing work model. We intend to focus on the system developed by NGN initially.

Water entry into the low pressure system creates the most impact on customers and pressures at the higher tiers often restrict water entry. By focusing on the low pressure systems the water can be removed where it causes the most issues – downstream from the mains, where the water has ‘tracked’ from the mains into the service pipes.

Technology Readiness at Start

TRL3 Proof of Concept

Technology Readiness at End

TRL8 Active Commissioning

Geographical Area

The development and trials will take place within the NGN network

Revenue Allowed for the RIIO Settlement

NA

Indicative Total NIA Project Expenditure

External Funding - £73,700

Internal Funding – £24,468

Total Project Cost - £98,168

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 focus of this project is to minimise the length of time the customer is without gas. We receive on average 600 reports of blocked services due to water ingress a year. In all cases the customer is visited by a rapid response engineer within the first how who would then need to call a team for extracting water from services, once complete the would need to call out another RRE to carry out a P&R. meaning on average customer is without gas 7 hours. By using a pumping device to extract the water this can be done as a one man operation and has the potential to reduce time off gas by 60%

Please provide a calculation of the expected benefits the Solution

Estimated labour costs per job = £198.20 Potential labour costs per job = £40.70

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

It is envisaged that this will be rolled out across the whole NGN network, we received around 566 blockages in 2013/14 costing a total of £112,181.20. If this project is successful we could save around £89,145 per year.

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

If rolled out across GB could save customer £713,160

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 network licensees encounter water within the low pressure system, and services in particular, and will be able to use the learning generated from this project to better manage water ingress.

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