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NIA Project Registration and PEA Document

Date of Submission

Feb 2019

Project Reference Number

NIA_NGN_238

Project Registration

Project Title

Project Zero

Project Reference Number

NIA_NGN_238

Project Licensee(s)

Northern Gas Networks

Project Start

February 2019

Project Duration

1 year and 6 months

Nominated Project Contact(s)

Thomas McPherson

Project Budget

£251,800.00

Summary

Project Zero aims to develop a number of encapsulation technology prototypes to enable zero interruption to customers gas supplies during a number of network operations.

Third Party Collaborators

Synthotech Limited

Nominated Contact Email Address(es)

innovation@northerngas.co.uk

Problem Being Solved

Currently all Gas Networks undertake a variety of operations that involve isolation of a customer's supply. This can have a number of negative impacts on customers and stakeholders. Without a gas supply a customer can be left without heat, a means to cook food and use hot water.

Method(s)

This project takes learning from a previous NIA project; Live ECV Exchange (NIA_NGN_226), which proved it was feasible to undertake an exchange of an ECV under live gas conditions with no impact to the customer's gas supply. Due to the success of this project NGN would like to explore further the use of encapsulation technology to undertake 'live gas' maintenance tasks on the network.

Scope

This project covers the development for a range of solutions which can be used on our low pressure network, without interrupting the gas supply and minimising excavations.

The development focuses on four core areas, which all relate to the development of a safe enclosure(s) that allows a variety of tasks to

be carried out under live conditions.

This project will also seek to determine if there are other activities that could be undertaken in a temporary but controlled environment using an enclosure that can be developed to allow the exchange of network components.

It will aim to cover the following areas:

- Development of a Low pressure 40mBar MAOP encapsulation prototypes (Stretch Target 60mBar)
 - Including a 2 x safety factor lab testing of the prototypes, to 80/120mBar.
- Pre-loosening of the ECV / joint connections prior to kit installation
- Training of NGN operatives at Synthotech Ltd on all equipment gathering of information or tools used on the trials
- Development of solution that can be undertaken in under one hour or no longer than current method(s)
- Development for four core concepts to allow a variety of new techniques to be applied

Objective(s)

The project will aim to development a replacement method in the four key areas outlined below.

- 1.Live Exchange of ECV's (TRL4 – 7)
- 2.Use of ServiceCam to be used on steel services (TRL5-7) (No ECV).
- 3.Live Service Isolation Valve exchange or insertion on to a service (TRL4-7)
 - o Fitment of isolation valve to Metallic Pipe work (TRL4-7)
 - o Isolation approach for PE pipework diameter (TRL4-7)
- 4.Live Pivot Tee exchange (TRL4-7) for emergency situations

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

Success Criteria

- Concept Design – design of an enclosure to allow interaction with pipework under live conditions
- Detailed Design – Production of detailed engineering drawings and detailed documentation to enable manufacture. Define the solution economics in design and decide between higher costs multiple use vs lower cost single use approach.
- Manufacture and Assembly
- Testing & Trials - Laboratory testing and trial of the developed solution(s) to verify performance and validate benefits case.
- Live Service Isolation Valve Exchange - To incorporate the required features in to the enclosure to allow the installation of a SV safely without needing to interrupt the gas supply to the consumer. Concept demonstrators for PE and Metallic pipes.
- Live ServiceCam - To incorporate required ports of evolution of the enclosure developed in previous criteria to allow the use of a ServiceCam on metallic pipes, this is to be achieved with no ECV attached to maximise the entry point bore, allowing skids to be fitted to aid negotiation of short radius bends and threads.
- Live Pivot Tee Isolation - To develop an enclosure to allow for a quick and easy method of creating a 'dead' service via the tee on to the main (metallic) by removing the plug of a top tee and inserting a stopper under live conditions. Allowing for safe repair, replacement or transfer of services (metallic).

Project Partners and External Funding

Northern Gas Networks
Synthotech

Potential for New Learning

The potential of conducting operations on the network without interrupting gas supply to customers.

The success of the encapsulation technology could have further benefit to additional operations is the developments in this project are proven.

Scale of Project

The scale of the project will consist of the following:

- 3 off (TRL7) prototype kits for extended trial to assess product risks for Live Exchange of ECV
- 2 off (TRL7) Metallic ServiceCam Solution with no interruption (TRL7)
- 2 off (TRL7) Solution for Service Isolation Valve installation or exchange onto a metallic service for PE and Metallic Services (TRL7)
- 1 off (TRL7) Solution for “Pivot Tee” exchange and control
- Practicability study of components that could be exchanged under live gas conditions
- Technical Report & closure report

Technology Readiness at Start

TRL4 Bench Scale Research

Technology Readiness at End

TRL7 Inactive Commissioning

Geographical Area

The project will be developed at Synthotech’s premises and be trialed in NGN’s network.

Revenue Allowed for the RIIO Settlement

N/A

Indicative Total NIA Project Expenditure

External Costs: £188,850

Internal Costs: £62,950

Total Project Costs: £251,800

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)

As a mix of colleague resources time and loss of supply cost (Forecasting in utilization rates of the end product) The benefits of which have been calculated below:

- Live Exchange of ECV's - Potential yearly savings £6,669.
- Live use of ServiceCam - Potential yearly savings £13,416
- Live Service Isolation Valve – Potential yearly savings £9,900
- Live Pivot Tee exchange – to be explored as part of the project.

There is also additional benefit in the utilization of the end product in the REPEX pre enabling work which could be a yearly saving of £243,600

Additionally the end product could affect two of the Guaranteed Standards that NGN must meet, GS1 (Supply Restoration) and potentially GS13 (planned supply interruptions.). These standards prevent loss of supply and in turn prevent a purge and relight (supply restoration).

Please provide a calculation of the expected benefits the Solution

Current method of exchanging an ECV

Labour impact = £29

Loss of supply =£13

Total cost £42.

Proposed method would nullify loss of supply, equating in a total cost of just the labour at £29.

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

Every network undertakes the four operations within this projects scope. All learning from each of the work packages will be adaptable to all other GDN's. The end product of the work packages can also be trialed on all other networks as will be applicable to their current operations.

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

At this stage costs cannot yet be defined, this may be possible to provide a calculation if the technical development is successful as we move towards a future commercial assessment.

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 networks currently undertake similar traditional operations as standard everyday job(s). This solution can be transferable to all other Gas 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)

The Innovation challenges this project meets are Safety & Emergency works, Reliability & Maintenance & security (of supply). The ability to undertake operations without interruption of gas supply has a massive benefit to the customer as well as preventing additional work load for operational delivery.

- 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 thorough technology search has been undertaken.

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 are no methods or technology currently utilized to enable 'live' operational working conditions for these existing practices.

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

The tasks in this project all start at a low TRL and there is a degree of risk through the development phase to deliver a solution which will meet the project objectives. Due to this uncertainty it is not a project that the business can fund itself.

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

Commercially, the existing process is well established and allows networks to operate efficiently. The move to 'interruption free' working is commercially uncertain and therefore makes this appropriate to fund via the NIA mechanism.

This project has been approved by a senior member of staff

Yes