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

Jun 2017

Project Reference Number

NIA_NGN_198

Project Registration

Project Title

Clean to Green

Project Reference Number

NIA_NGN_198

Project Licensee(s)

Northern Gas Networks

Project Start

June 2017

Project Duration

1 year and 1 month

Nominated Project Contact(s)

Mark Johnson

Project Budget

£111,888.00

Summary

- Develop technology to use in a gas holder prior to dewatering to provide the business with upfront data to accurately cost a project and make business decisions. Data required is:
    - o Volume of gas holder construction
    - o Volume and constituent of waste material
- Develop technology to decontaminate a gas holder without putting men in the tank or working for heights

Third Party Collaborators

Willacy Oil Services

Nominated Contact Email Address(es)

innovation@northerngas.co.uk

Problem Being Solved

NGN have a requirement to demolish all remaining gas holders by the end of 2025.

During each holder demolition there are various unknown factors that can affect the cost and duration, these are outlined below.

When decontaminating Gas holders the biggest factor that will determine the methodology we use, the project duration, and therefore the cost is the volume of waste contaminant. It is vital that we know how much of this contaminant is in the tank and where it is located in order to effectively plan the cleaning process. As there are very limited entry positions in the roof the only way to measure the contaminant is to use a dip tape or stick to physically feel the sludge. However, there are large areas of the tank which are not

accessible and the perception of what is or isn't contaminant results in very inaccurate data.

NGN plan to develop existing technology currently not used in the UK gas industry to address the following uncertainties when carrying out gas holder demolition.

- Unable to quantify and sample the waste material in a gas holder at the outset of a project leaving the business at risk once the project commences and is past the point of no return
- Unable to successfully clean and decontaminate a gas holder without putting men in a confined space or working at height

Once the volume and location of the sludge has been established we can then look at the most practical and efficient methods of removal. The aim of any sludge removal system is to minimize man entry and improve efficiency. NGN intend to trial a developed range of nozzle recirculation or washing systems as well as several different hydraulically driven units that are either manned or remotely operated.

The hope for this project is for NGN to move away from using operational staff to enter Gas Holders to carry out the cleaning process and to have the equipment to accurately identify the levels of contaminant within each holder.

Method(s)

The true benefit of successful development will be to clean the gas holding tanks without the need for manual effort / man entry. The development of a successful / practical solution will negate the need for man entry into the tanks via erected scaffolding staircases.

The gas holding tanks for this trial have been previously decommissioned and purged via gas to nitrogen and nitrogen to air. Ventilation / Access hatches will be cutting into the roof crowns and access stairs will be constructed to allow access to the internal tank floor.

Robotic camera / suction cleaning equipment will be lowered into the tank to perform the measuring, cleaning and removal of water, oil and sludge which this then put through on site mobile treatment systems and the residual material removed from site for recycling of waste disposal depending on the constituents of the waste product.

The innovative / development will focus on the benefits / limitations of the 'trawler' equipment, testing flow / pumping rates related to the suction capabilities as well as the kits ability to maneuvers around the tank construction and characteristics / obstructions of the tank design.

It is anticipated that these areas will need "hands on" expertise to fine tune the necessary development to achieve success hence the need for man entry during the development phases of the cleaning.

Scope

- Develop technology to use in a gas holder prior to dewatering to provide the business with upfront data to accurately cost a project and make business decisions. Data required is:
  - Volume of gas holder construction
  - Volume and constituent of waste material
- Develop technology to decontaminate a gas holder without putting men in the tank or working for heights

Objective(s)

- Provide an accurate and practical way of quantifying the waste material to be removed from gas storage tanks.
- To obtain a detailed measure of the constituents contained within the waste material prior to demolition so that the best route for recycling or disposal can be identified in advance which will allow for accurate cost analysis of disposal.
- To develop a cleaning system which removes the need to send men into holding tanks to undertake manual cleaning and remove hazards associated with confined space working.

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

Success Criteria

- Successful quantification level of sludge within a gas holder prior to starting the demolition project
- Ability to determine the sludge constituent within a gas holder prior to starting the demolition project
- Ability to decontaminate a gas holder eliminating man entry and working from height
- Ability to undertake a decontamination programme similar that that of the mothballing programme

Project Partners and External Funding

n/a

Potential for New Learning

n/a

Scale of Project

This project will take place at NGN holders; 3 x below ground holders at Redheugh and 1 x above ground holder at Jarrow. It is anticipated that if the new technology is successful then it can be replicated for all remaining holder demolitions.

Technology Readiness at Start

TRL6 Large Scale

Technology Readiness at End

TRL8 Active Commissioning

Geographical Area

The trial and development will take place in NGN's network.

Revenue Allowed for the RIIO Settlement

£500k per holder however this includes full demolition of the gas holders.

Indicative Total NIA Project Expenditure

Max Recoverable internal costs: £21,083

External Costs; £90,805

Total Project costs; £111,888

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 project has the potential to create substantial savings with NGN's holder demolition program, circa £3.3m. Note this is based on numerous unknowns such as waste quantities and constituents. Savings based on projects undertaken in 2016/17.

Please provide a calculation of the expected benefits the Solution

An extensive CBA has been carried out against the current method of holder demolition vs the proposed method in this document. We estimate that this could reduce the decontamination process by 4 weeks.

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

If this project is proved to be successful the method used could be replicated by all network licensees to improve efficiencies and safety measures when carrying out their remaining gas holder demolitions.

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

As above.

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

If successful this method could be utilized by all other Network Licensees, to carry out the holder demolition program.

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

This project addresses two areas of our innovation strategy.

- Enviroment & Health and Safety - The new technique will allow for improved health and safety measures when carrying out holder demolitions.
- Assest - It will also allow for improved effciencies when we carry out our holder demoltions.

☑ 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