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 2016

Project Reference Number

NIA_NGN_184

Project Registration

Project Title

Remote circumferential pipe cleaning tool

Project Reference Number

NIA_NGN_184

Project Licensee(s)

Northern Gas Networks

Project Start

December 2016

Project Duration

1 year and 4 months

Nominated Project Contact(s)

Scott Kitchingman

Project Budget

£27,067.00

Summary

ALH Systems for a number of years have been leaders in long handled tooling (LHT) for the repair of joints and have developed further tooling for a range of other applications such as camera and mainspray launch. It is anticipated that the pipe cleaner will be incorporated on to the current LHT making it easily adapted for use in the field using existing fleets of equipment and therefore limiting cost impact on implementation. The cleaning tool will incorporate a mechanism to allow it to clean the underside of main from either side of the main and therefore manual handling issues will be minimised.

Trelawny Tools are a sister company to ALH Systems within the Indutrade Group and have been a manufacturer of surface preparation equipment for over 60 years. Trelawny has been offering a range of equipment for the preparation of steel surfaces to industry and with this experience will adapt an ‘off the shelf’ product for the purpose required. Under its designated trade mark Vibro-Lo™, Trelawny tools are designed to keep vibration levels to a minimum and this will be implemented in to the integrated final product. Adding to the ‘Tool & Vacuum System’ (TVS) as an alternative to blast cleaning, for the containment of dust & debris, it is anticipated that minimal additional PPE will be required.

Third Party Collaborators

ALH Systems Ltd

Trewlawny SPT Ltd

Trewlawny SPT Ltd

Energy Innovation Centre

Nominated Contact Email Address(es)

innovation@northerngas.co.uk

Problem Being Solved

In the UK there are approximately 275,000 km of various sized gas mains with approximately 115,000 km constructed from cast iron or ductile iron dating back up to 100 years in age. Connected to these gas mains are many more thousands of service pipes connecting private, business and commercial customers to the mains gas network. These metallic pipes can leak due to, amongst other reasons, fractures due to weather conditions/movement or failure at joints which may be caused by the drying of yarn within the joint used as filler for a lead seal. This follows the switchover from 'wet' Towns gas compared to the 'dry' natural gas used today.

GDN's currently undertake excavations in the public highway to perform maintenance and repair on these buried pipe assets. Traditionally excavation to expose these buried assets often negatively impact customers or the environment by; creating traffic disruption; reduced property access; sending material to land fill; high, sustained noise levels; etc. Since approximately 2008 'core and vac' technology has been used that allows a circular 'core' to be cut and removed from the surface courses of the carriageway exposing the base and bed layers. This relatively less dense material can then be broken up using air powered picks and the spoil removed using a 'vacuum' ('vac') excavator, exposing the buried gas main. Inspection or repair of the pipe can then be achieved using long handled tooling, allowing the operator to work from the surface without entering the excavation. Following work on the gas pipe the spoil is reused to 'back fill' the excavation, compacted to standard and the original 'core' sealed back in place – reducing spoil to landfill and decreasing risk to the public from changes in road surface grip. Disruption to road users is significantly reduced where this technique can be deployed.

Currently operations to repair leaking joints require only a small area of the pipe crown to be cleaned, allowing the drilling of the pipe joint and the injection of joint sealant. The GDN is looking to further increase its capability of work using long handled tooling via 'core' and 'vac'. Operations in the future, including fitting access and repair fittings will require the pipe to be fully cleaned around its circumference, removing surface debris and taking the pipe back to a visibly mechanically clean surface. Currently should the underside of the pipes surface require cleaning a hammer and chisel or a manual scrapping type tool mounted on a hand pulled belt is used, this is drawn under the pipe surface. Surface preparation using this technique is inconsistent and can lead to poor surfaces for mechanical fittings to seal against.

There is an opportunity to reduce customer/traffic disruption and costs associated with these activities and the GDN's are keen to see a variety of potential alternatives or solutions to the problem.

Method(s)

The innovation will be deployed as part of the tooling for the 'core and vac' teams within NGN and NGG.

It will be used following 'core and vac' exposes the pipe, prior to a further operation being undertaken on the pipe such as a repair clamp.

The innovation may then be adopted for all operative teams within the networks.

Scope

ALH Systems for a number of years have been leaders in long handled tooling (LHT) for the repair of joints and have developed further tooling for a range of other applications such as camera and mainspray launch. It is anticipated that the pipe cleaner will be incorporated on to the current LHT making it easily adapted for use in the field using existing fleets of equipment and therefore limiting cost impact on implementation. The cleaning tool will incorporate a mechanism to allow it to clean the underside of main from either side of the main and therefore manual handling issues will be minimised.

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The project has been delayed significantly due to staffing issues with the external supplier, a key member of the design team has been absent for some time. The supplier has recruited new personnel and the absent staff member has now returned back to work. It is hoped that we can make up some time on these delays.

Objective(s)

Stage 1 - Design and Development, Prototype manufacture and Internal Testing: Finalising the design concepts and developing

detailed manufacturing drawings. Once design has been signed off a unit will be manufactured in house to allow our field engineers to test the system under controlled conditions. (12 Weeks)

Stage 1a - (if required) - Modifications: Modify design to eliminate issues found during prototype and testing phases. Remanufacture required new parts and retest, iterate until solution is acceptable. (4 Weeks if required)

Stage 2 - Field Trials: With the GDN trial the equipment on 3 sites to ensure their acceptance of the equipment (8 weeks)

Stage 3 – Approval and Network acceptance (2 weeks).

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

Success Criteria

Successful completion of the project will have delivered the development and field testing of a new mechanical method of cleaning metallic mains utilising long handled tooling to a degree whereby appropriate repair clamps can be attached to the host main.

The product would be at a point where it could be commercially available and ready for implementation within the network.

Successful implementation of the product will ensure that the GDN will be able to apply a safe, mechanical operation to clean a host main to enable the operative to apply a repair clamp through core and vac / small ex working.

Project Partners and External Funding

n/a

Potential for New Learning

n/a

Scale of Project

Working with Trelawny to adapt the existing product to incorporate in to ALH LHT and engineer the mechanism to articulate around the host main. This will include production of technical drawings including basic installation guidance in addition to prototyping of mechanism and incorporation of air drive motor on to tooling.

Three locations will be identified to trial the prototype cleaning tool live on the network and both parties will gather information relating to the outcome. Following feedback from the field operatives, any agreed modifications or amendments to the fitting, work procedure or implementation can be reviewed and agreed mutually.

The prototype and field trial detail will be reviewed as part of the G23 approvals process.

Technology Readiness at Start

TRL4 Bench Scale Research

Technology Readiness at End

TRL8 Active Commissioning

Geographical Area

Northern Gas Networks area.

Revenue Allowed for the RIIO Settlement

None

Indicative Total NIA Project Expenditure

NGN External expenditure - £ 6767

NGGD External Expenditure- £ 13,533

NGN Internal expenditure - £ 2256

NGGD Internal Expenditure - £ 4511

Total NGN & NGGD expenditure - £ 27,067

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)

In addition to the qualative operational, safety and customer impact benefits of this Project, the development of this tooling has the potential to deliver substantial financial benefits.

The benefits of deploying this in terms of cost savings is £86,700

Please provide a calculation of the expected benefits the Solution

The cost of reinstatement of the road surface is reduced by around 80%. The cost of reinstatement for a gas main repair via conventional excavation is more expensive per repair as opposed to a core excavation. Within NGN, of the fractured mains identified per annum, approximately half of these mains are suitable for core and vac operations.

Reinstatement cost through existing technique = £102,000

Reinstatement cost through new technique = £15,300

Reinstatement saving per annum = £86,700

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

The operations carried out specifically relating to fractured mains are relevant to all network licensees. The learning and implementation could be therefore adopted by all GDN's

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

£87,6000 x 8 GDN's = £700,800

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 all Network Licensees. If the Project leads to successful development of solution to this problem relating to remote cleaning, other Network Licensees will be able to use the learning generated to embed this new solution in their businesses, This will enable cost reductions and improvements to customer satisfaction by reducing the disruption experienced.

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 is aligned primarily to the Asset and Network Management area of the innovation strategy. The development of technology that can open up wider opportunities for the deployment of keyhole technology in field operations

☑ 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