

NIA Project Registration and PEA Document

Date of Submission

Jan 2014

Project Reference

NIA_NGGD0013

Project Registration

Project Title

CISBOT 18" Cast Iron Demonstration

Project Reference

NIA_NGGD0013

Project Licensee(s)

National Grid Gas Distribution

Project Start

September 2013

Project Duration

0 years and 8 months

Nominated Project Contact(s)

Paul Slater – Project Delivery Manager and Andrew Newton – Innovation Portfolio Manager

Project Budget

£758,100.00

Summary

The scope of this project includes:

- Demonstration of the capability of the CISBOT technology in operating within 18"CI LP main in North London
- It is envisaged that the demonstration will take place on a 200m section of live gas main
- Anaerobic sealant will be internally applied to each joint
- A camera survey will be undertaken within the main to determine its suitability for the CISBOT robot
- An FIM survey will be undertaken pre and post joint sealing
- FIM results will be used as evidence of capability within the final report
- The Final Report will be shared directly with SGN to compliment SGN lead studies

- Appropriate site competencies, responsibilities, permits, notices will be in place
- Appropriate contracts and relationships will in place.

Nominated Contact Email Address(es)

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Problem Being Solved

Under RIIO the 3 tier approach allows a greater focus on risk and larger diameter 'at risk' iron pipes above the risk action threshold will only be subject to decommissioning if either condition or risk assessment or engineering judgement indicates this is justified. There is greater flexibility to allow the Gas Distribution Network (GDN) operators to exploit innovative solutions, where these are suitable and sufficient. It also ensures efficiency, environmental and reliability benefits associated with the programme are accounted for.

Tier 2 pipes scoring above a risk-action threshold, set by the GDN operator, will be selected to receive appropriate attention over the period of the approved PSR regulation 13A programme. Appropriate attention means that Tier 2 pipes scoring above the risk-action threshold will either be decommissioned or, where a suitable and sufficient technique exists, assessed for continued use if found to be in good condition or remediated to allow for lifetime extension. GDNs are investigating various techniques to assess the condition of Cast Iron (CI) pipes including but not limited to coupon removal for localised metallurgy, DVST internal pipe inspections (inner/outer wall corrosion, hairline cracks and induced strain) localised NDT (ultrasonic and magnetic flux for corrosion and pitting) and basic internal camera inspections.

In addition there are a number of techniques to remediate and/or reduce pipe risk including 'permanent' joint repairs (CISBOT) and semi structural linings.

The overall objective for this initiative is to develop the capability to insert a robotic tool into a Tier 2/3 CI main to effect a permanent refurbishment of the asset.

Method(s)

This project will allow the demonstration of the CISBOT robot to internally inject anaerobic lead yarn joint sealant into an 18" Cast Iron Low Pressure 200m section of live gas main.

Scope

The scope of this project includes:

- Demonstration of the capability of the CISBOT technology in operating within 18"CI LP main in North London.
- It is envisaged that the demonstration will take place on a 200m section of live gas main
- Anaerobic sealant will be internally applied to each joint.
- A camera survey will be undertaken within the main to determine its suitability for the CISBOT robot
- An FIM survey will be undertaken pre and post joint sealing.
- FIM results will be used as evidence of capability within the final report.
- The Final Report will be shared directly with SGN to compliment SGN lead studies.
- Appropriate site competencies, responsibilities, permits, notices will be in place.
- Appropriate contracts and relationships will in place.

Objective(s)

The objective is to demonstrate the existing US developed CISBOT robotic technology and technique in the UK in order to test its practicality, effectiveness, current and future potential benefits as an initial step in support of the above Problem Statement.

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

Success Criteria

Successful insertion, operation and retrieval of the CISBOT robot in the chosen 18" CI LP gas main to inform an understanding of how this technique could be developed towards the overall objective.

Project Partners and External Funding

n/a

Potential for New Learning

n/a

Scale of Project

The scale of this project is limited to a small scale trial on a 200M section of 18" CI LP main.

Technology Readiness at Start

TRL5 Pilot Scale

Technology Readiness at End

TRL6 Large Scale

Geographical Area

The trial will take place in Camden in the North London Network

Revenue Allowed for the RIIO Settlement

Total Repex in allowance = £3.2bn.

Allowances as per Ofgem RIIO-GD1 Final Proposals and all figures are in 2009/10 prices.

Indicative Total NIA Project Expenditure

£758,100 total NIA project expenditure (indicative)

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)

Please see following example – actual benefits are dependent on applicability across Tier 2/3 mains.

Please provide a calculation of the expected benefits the Solution

Example

1000km section of 18" CI pipe requiring remediation/replacement

Potential business benefit following roll-out in the above example is £0.85m/km

The calculation uses the Base Cost – Method Cost = Benefit, method with definitions as per Gas Network Innovation Allowance Governance Document.

Base Cost (solution delivered at the most cost effective method currently available)

(T3 allowance under RIIO = £1570/m) x 1000m = £1.57m

Method Cost (Estimate of delivery once solution has been proven successful)

As detailed below = **£0.72m**

Sitework = £100k

Joint Repair = £468k

Asset Integrity determination = **£156k**

Assume additional 33% additional to joint repair technique for capability to assess and record pipe wall structural integrity. Capability to be assessed and combined with current CISBOT capability in future stages. At this point it is acknowledged that this element is difficult to substantiate however even if it were at the same cost level as the joint repair element there would still a compelling case to continue. (ie method cost would rise to £1.04m.

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

Of the GDNs population of some 72000 KM of Tier 1/2/3 pipes the following lengths of mains have been 'allowed' under Ofgem's final proposal, 26500KM of Tier 1, 294KM of Tier 2a above the risk action threshold, and 1363KM of Tier 2b and Tier 3 non mandatory condition.

It is unclear at this time to what extent CISBOT would be able to contribute toward these totals but their scale offers significant opportunity across all GDN's.

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

Dependent on future development of the CISBOT tool and commercial considerations with regard to such things as economies of scale with regard numbers of Networks and volume of applicable pipeline.

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

n/a

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

Not applicable

- 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