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 2013

Project Reference Number

NIA_NGGD0014

Project Registration

Project Title

Cast Iron Fitness For Purpose (CIFFP)

Project Reference Number

NIA_NGGD0014

Project Licensee(s)

Cadent

Project Start

December 2013

Project Duration

1 year and 0 months

Nominated Project Contact(s)

Andrew Newton – National Grid Innovation Portfolio Manager

Project Budget

£138,809.00

Summary

The scope of this project includes:

- Review of cast iron fitness for purpose (FFP) assessment methods
- Review MRPS risk screening inputs
- Assess historical cast iron pipe failure data
- Review the remediation techniques under consideration by the participants
- Review of cast iron inspection techniques
- Statistical reliability of local inspection data
- Source data on typical pipe loading conditions
- Consideration regarding potential algorithms to be used in the FFP assessment
- Consideration regarding the balance of weighting that should be given to the FFP calculations versus the historical performance data for the asset

- Outline decision support methodology

Nominated Contact Email Address(es)

Innovation@cadentgas.com

Problem Being Solved

The Gas Distribution Networks (GDNs) are investigating various techniques to assess the condition of Cast Iron (CI) pipes including, but not limited to, coupon removal for localised metallurgy, 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.

However none of the projects makes any quantitative assessment based on the individual outputs to define with any degree of accuracy the remaining life of the complete pipe section or current factor of safety with measured defects.

Method(s)

To undertake an in depth review and assessment of technologies and methodologies that provide intelligence on the fitness for purpose of CI pipe including:

- Review of CI inspection techniques (intrusive and NDT), both under trial/development and those that are commercially available
- Review of CI residual life and strength assessment methods
- Review of GDN CI failure data
- To consider the statistical reliability of inspection data

Scope

The scope of this project includes:

· Review of cast iron fitness for purpose (FFP) assessment methods

· Review MRPS risk screening inputs

· Assess historical cast iron pipe failure data

· Review the remediation techniques under consideration by the participants

· Review of cast iron inspection techniques

· Statistical reliability of local inspection data

· Source data on typical pipe loading conditions

· Consideration regarding potential algorithms to be used in the FFP assessment

· Consideration regarding the balance of weighting that should be given to the FFP calculations versus the historical performance data for the asset

· Outline decision support methodology

Objective(s)

To develop a methodology that satisfies obligations under the Pipeline Safety Regulations to enable Tier 2/3 pipes to be safely maintained for continued use, or be categorised in such a way to prioritise for remediation or decommissioning. In this context remediation could involve internal repair of pipe and/or joints, or semi structural linings, or fully structural linings if the pipe required decommissioning.

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

Success Criteria

Success of the project would be:

- Evidence of national and global work on CI test assessments. Contact with suitable broad range of stakeholders and review of scientific papers
- Substantive and reliable data has been sourced on CI failure data. Learning adds value in addition to pipe risk score and that the output feeds into the pass/fail criteria methodology
- Commercially available and cost effective CI inspection techniques have been identified. A suitable range of techniques that enables pipes of greater or lesser risk score or other risk factors can be assessed. Ideally 3 or 4 techniques are or could be developed to be applied to pipes of differing initial levels of risk score
- Technically acceptable, cost effective and practical decision support methodologies have been identified. That GDNs reach consensus on approach and external stakeholders sign on (HSE).

Project Partners and External Funding

n/a

Potential for New Learning

n/a

Scale of Project

For stage 1 the areas covered are:

- Any precedence that has been set for determining FFP of cast iron pipes in the gas and water industries and how this has been validated
- How FFP is defined in relation to the available remediation options
- What inspection data is needed to make Tier 2 and 3 FFP / remediation decisions
- What inspection / condition assessment options are available and whether these can provide the data required for FFP assessment
- How data used in the Mains Risk Prioritisation Scheme (MRPS) risk screening process (e.g. background breakage) can be used in the FFP assessment.
- The weighting that should be given to FFP calculations versus knowledge of the historical performance of the assets.
- How to demonstrate that the FFP methodology developed is based on best practice and sound engineering principles

Technology Readiness at Start

TRL2 Invention and Research

Technology Readiness at End

TRL3 Proof of Concept

Geographical Area

UK mainland

Revenue Allowed for the RIIO Settlement

No Revenue Allowed for in the RIIO Settlement

Indicative Total NIA Project Expenditure

NGG

£76,741 Total NIA Project Expenditure

NGN

£17,485 Total NIA Project Expenditure

SGN

£31,469 Total NIA Project Expenditure

WWU

£13,113.75 Total NIA Project Expenditure

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 project outputs will be centered around reliability and safety by proving the condition of larger diameter (tier 2 and 3) iron mains; this will allows for all further interventions on these assets to be informed and conducted at the most cost efficient point in the assets life cycle and in the most cost efficient manner; potentially providing justification for extending an assets life.

Please provide a calculation of the expected benefits the Solution

Stage 1 is categorized as TRL 3 and it not possible to provide a calculation of the expected financial benefits.

In broad terms the work is an enabler for other projects in flight under NIA and other non NIA initiatives.

These other projects and initiatives seek to develop tools and techniques to gather intelligence on the pipe condition either localized, remote, inferred and for both intrusive and non intrusive applications. This other work will have financial benefits associated with the projects based on the claimed or assumed outputs of the specific technology.

To claim additional specific cost savings as a result of this CI FFP project could lead to a duplication of benefits as these are being stated for the other NIA projects. However the benefits of this CI FFP project will be re-assessed as each stage progresses.

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

This method and the tool developed could be applied across the whole of GB, it is principally focused on tier 2, 3 iron mains however it is expected that further learning could be applied to tier 1 iron mains.

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

The knowledge generated as part of this project will be disseminated to the other networks as a matter of course. The costs incurred would be a product of any decision support tool (yet to be determined).

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 generated will be in the form of a report(s) The results of this learning will be made available to all network licensees and the tool will be available for all networks to implement.

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

Alternative methodologies and approaches for the asset life extension for larger diameter Tier 2/3 pipes.

☑ 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