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

May 2014

Project Reference Number

NIA_NGGT0055

Project Registration

Project Title

Above Ground Installation Integrity Decision Support Tool

Project Reference Number

NIA_NGGT0055

Project Licensee(s)

National Gas Transmission PLC

Project Start

May 2014

Project Duration

1 year and 9 months

Nominated Project Contact(s)

Tony Stonehewer

Project Budget

£125,000.00

Summary

The project scope is designed to develop a risk based model for prioritisation of high pressure gas above ground installation integrity management and maintenance activities. Taking into account the threats posed by different damage mechanisms such as corrosion, vibration, over pressure, low temperature, fatigue assessments on individual installations, this type of prioritisation system is a new concept and will better enable the prioritisation of resources to the highest risk installations.

This work will determine how National Grid can best make decisions for prioritising maintenance and inspection for high pressure gas installations to maintain their availability for use by customers whilst meeting our safety obligations.

The project will use information from around the world including Europe, US and Asia from research bodies such as EPRG and PRCI to define the appropriate risk profile and consider the various options for above ground installation inspection and management. The work will consider the location, the failure mechanism likelihoods for installation assets and the prevention and mitigation measures in place for individual assets and the entire installation.

National Grid's expenditure on the inspection and maintenance of its National Transmission System above ground assets is in the region of £4M per annum. The tool will be able to rank installations against each other for their propensity for failure and will help National Grid make informed choices for investing funds in maintenance and/or inspection activities for higher risk installations and ensure that we can continue to meet our customer and safety obligations in the most efficient way.

The project will therefore deliver both a specific piece of new equipment and also a novel operational practice

Third Party Collaborators

Pipeline Integrity Engineers Ltd

Nominated Contact Email Address(es)

Box.GT.Innovation@nationalgrid.com

Problem Being Solved

National Grid operates hundreds of above ground installations across its network in a variety of locations; rural and suburban, and constructed to different standards depending upon when the installation was constructed.

Whilst the installations are exposed to similar threats such as over pressure, corrosion, vibration fatigue, the extent of the threat is dependent upon a number of factors such as operating pressure, construction standard, and location. The current inspection and maintenance regime is generally to use a standard approach for each installation and does not take into consideration specific threats and level of risk for each installation. IGEM/TD/1 requires an integrity assessment to be carried out every 4 years unless an authoritative review is carried out to extend the period.

The project looks to undertake a study to develop a model which would take into account the threats posed by the different damage mechanisms for an individual installation and rank the installation so that the high risk sections can be readily identified and the inspection, maintenance and mitigation actions can be applied appropriately. Where possible, this information should be able to be used to extend the integrity assessment period for low risk installations.

Method(s)

Phase 1 **Scoping**

Phase 2 **Model Development:**

a) Development of interactive aspects of the model

b) Independent expert review of risk scoring logic

c) Development of a strategy to compare risk ranking model against quantified risk assessment

d) Verification of risk scoring logic using case studies and refine based on (b)

Phase 1 took longer than anticipated due to initial resource constraints. These have now been resolved and the project team is making good progress and work will complete by January 2016.

Scope

The project scope is designed to develop a risk based model for prioritisation of high pressure gas above ground installation integrity management and maintenance activities. Taking into account the threats posed by different damage mechanisms such as corrosion, vibration, over pressure, low temperature, fatigue assessments on individual installations, this type of prioritisation system is a new concept and will better enable the prioritisation of resources to the highest risk installations.

This work will determine how National Grid can best make decisions for prioritising maintenance and inspection for high pressure gas installations to maintain their availability for use by customers whilst meeting our safety obligations.

The project will use information from around the world including Europe, US and Asia from research bodies such as EPRG and PRCI to define the appropriate risk profile and consider the various options for above ground installation inspection and management. The work will consider the location, the failure mechanism likelihoods for installation assets and the prevention and mitigation measures in place for individual assets and the entire installation.

National Grid’s expenditure on the inspection and maintenance of its National Transmission System above ground assets is in the region of £4M per annum. The tool will be able to rank installations against each other for their propensity for failure and will help National Grid make informed choices for investing funds in maintenance and/or inspection activities for higher risk installations and ensure that we can continue to meet our customer and safety obligations in the most efficient way.

The project will therefore deliver both a specific piece of new equipment and also a novel operational practice

Objective(s)

To develop a decision support tool for above ground installations, which would be fully validated and used to prioritise resources to the

highest risk installations.

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

Success Criteria

Delivery of the model, report and supporting guidance on how to use the model to make informed decisions.

Project Partners and External Funding

n/a

Potential for New Learning

n/a

Scale of Project

The project will determine a risk ranking approach for above ground installation which can be used on the high pressure gas pipeline network. The estimated operating cost of maintaining AGIs is £4M per annum.

If successful, this approach will take the form of an interactive model, that will be validated against current information and practices prior to roll out.

Dissemination of the principles of the risk ranking model will take place through appropriate industry groups and publications.

Technology Readiness at Start

TRL3 Proof of Concept

Technology Readiness at End

TRL8 Active Commissioning

Geographical Area

This is a desktop project which will deliver a tool for use across the National Transmission System.

Revenue Allowed for the RIIO Settlement

None

Indicative Total NIA Project Expenditure

£125,000

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 output will assist in minimising outage for customers and improve reliability whilst reducing overall cost for inspection and maintenance of above ground installations. If the problem is solved it is anticipated that the potential annual savings of £150 K operating costs would be achieved and the outages and capacity constraints would be reduced.

Please provide a calculation of the expected benefits the Solution

It is expected that the Integrity Decision Support Tool would reduce expenditure on the inspection and maintenance of its National Transmission System above ground assets by £150,000 (4%) per year. Of the £4m spent of maintaining AGIs annually, a significant proportion is spent on regular 4 yearly IGEM/TD/1 integrity assessments. This tool potentially extends the assessment period for IGEM/TD/1 integrity assessments.

There are approximately 500 sites each requiring 4 year Affirmation review as per TD/1, therefore 125 sites per year need to be surveyed. Using a conservative estimate, the average cost per survey is in the region of £7,500, therefore total annual cost of £937,500. The tool should defer approximately 20 sites, saving 15% per year, £150,000.

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

The tool would be a support tool appropriate for all above ground installations on NTS. The principle could also be adopted by other gas network operators.

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

The project does not require any hardware to be purchased and the software is license free. There would be approximately £10,000 required for training courses for the relevant National Grid staff.

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 risk ranking approach is a novel methodology for managing maintenance and mitigation of high risk above ground installations. Once proven the principle, could be adopted by other gas network operators although the model algorithms developed as part of this project will be specific to the National Transmission System assets and policy.

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

Key challenge is to be able to prioritise resources against the ~500 above ground assets to ensure the safety of the assets is maintained and customers are not affected by unplanned outages, this project falls under the Safety and Customer themes and is also linked to the Optimising Asset Management under the reliability theme.

☑ 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