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

Jan 2014

Project Reference Number

NIA_NGGT0016

Project Registration

Project Title

Pipeline Risk Ranking Phase II

Project Reference Number

NIA_NGGT0016

Project Licensee(s)

National Gas Transmission PLC

Project Start

September 2013

Project Duration

0 years and 7 months

Nominated Project Contact(s)

Danielle Willett

Project Budget

£75,000.00

Summary

The project scope is designed to develop a risk based model for prioritisation of high pressure gas pipeline management and maintenance activities. Taking into account the threats posed by different damage mechanisms such as corrosion, third party interference, and ground movement on individual pipeline sections, this type of prioritisation system is a new concept and will better enable the prioritisation of resources to the highest risk pipelines. This work will determine how National Grid can best make decisions for prioritising maintenance and inspection for high pressure gas pipelines to maintain their availability for use by customers whilst meeting our safety obligations.

The proposal is to draw on the PIPESAFE model, which can assess risk at a single location, from the most likely failure mechanism at that location, and to extend this to develop a model which would prioritise maintenance activities across the full length of a pipeline section. 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 pipeline inspection and management. The work will consider the location of the pipelines, the failure mechanism likelihoods for sections of pipeline and the prevention and mitigation measures in place for pipeline sections.

National Grid's expenditure on inline inspection, excavations, linewalking, CIPS, third party monitoring/ raising awareness is many £m per annum . Being able to rank pipelines against each other for their propensity for failure will help National Grid makes informed choices for investing funds in maintenance and/or inspection activities for higher risk pipeline sections 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 high pressure pipelines across a wide variety of locations from rural and suburban. Whilst the pipelines are all exposed to similar threats, including third party damage, ground movement, fatigue and corrosion, the extent of the threat varies dependant upon the pipeline location and construction standards in place at the time of build. The current approach is generally to use standard procedures for all
pipelines which do not take into account specific risks for individual pipeline sections (with the exception of inline inspection).

The project looks to undertake a study to develop a model that takes into account the threats posed by different damage mechanisms on individual pipeline sections and ranks the relative risks of failure so that high risk sections can be identified and inspection, maintenance and mitigation actions applied appropriately.

Method(s)

The Model Development consists of:

1. Development of interactive aspects of the model
2. Independent expert review of risk scoring logic
3. Development of a strategy to compare risk ranking model against quantified risk assessment
4. Verification of risk scoring logic using case studies and refine based on (b)

Scope

The project scope is designed to develop a risk based model for prioritisation of high pressure gas pipeline management and maintenance activities. Taking into account the threats posed by different damage mechanisms such as corrosion, third party interference, and ground movement on individual pipeline sections, this type of prioritisation system is a new concept and will better enable the prioritisation of resources to the highest risk pipelines. This work will determine how National Grid can best make decisions for prioritising maintenance and inspection for high pressure gas pipelines to maintain their availability for use by customers whilst meeting our safety obligations.

The proposal is to draw on the PIPESAFE model, which can assess risk at a single location, from the most likely failure mechanism at that location, and to extend this to develop a model which would prioritise maintenance activities across the full length of a pipeline section.

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 pipeline inspection and management. The work will consider the location of the pipelines, the failure mechanism likelihoods for sections of pipeline and the prevention and mitigation measures in place for pipeline sections.

National Grid’s expenditure on inline inspection, excavations, linewalking, CIPS, third party monitoring/ raising awareness is many £m per annum . Being able to rank pipelines against each other for their propensity for failure will help National Grid makes informed choices for investing funds in maintenance and/or inspection activities for higher risk pipeline sections 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)

The desired result will be a fully validate pipeline risk ranking model.

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

Success Criteria

Delivery and implementation of the model with guidance documents

Project Partners and External Funding

n/a

Potential for New Learning

n/a

Scale of Project

The model will be validated for use across the NTS. It is necessary that all possible variables – e.g. pipeline location, date of construction etc are incorporated.

Technology Readiness at Start

TRL4 Bench Scale Research

Technology Readiness at End

TRL8 Active Commissioning

Geographical Area

This is a desk based 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

NIA expenditure - £75k.

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)

Estimated as £134k per annum.

Please provide a calculation of the expected benefits the Solution

National Grid spends in the region of £400,000k on TD/1 pipeline inspection surveys, assessing pipelines every four years. Following authoritative review, if a one-in-six year approach were adopted based on the Pipeline Risk Ranking Model; the annual expenditure would fall to an estimated £266,666k. Therefore expected financial benefits in the region of £134k/annum. This methodology could be of benefit to other pipeline operations which would allow for an even
greater savings per annum.

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

The proposed Method would produce a model that could be utilised across the National Transmission pipeline network.

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

The scope of this project includes majority provision for roll-out of the model via training and engagement with internal departments. A minimum of 0.1 FTE may be required to roll-out additional training within the first year for a one time cost of £7k.

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 pipelines. Once proven the principle, could be adopted by other pipeline 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)

This project primarily falls within the Third Party Interference under the Safety theme but is also linked to 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