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 2016

Project Reference Number

NIA_NGGT0088

Project Registration

Project Title

Nitrogen Sleeve Epoxy End-Seal Repair Solution

Project Reference Number

NIA_NGGT0088

Project Licensee(s)

National Gas Transmission PLC

Project Start

January 2016

Project Duration

3 years and 1 month

Nominated Project Contact(s)

Robert Stockley box.GT.innovation@nationalgrid.com

Project Budget

£680,000.00

Summary

The pipeline and sleeve are likely to be eccentric, and there can be a variety of end-seal arrangements types and shapes, which cannot be known in advance until a sleeve is excavated. The Syntho Glass XT product is a versatile product, which requires very little prior preparation or design prior to the works being undertaken. Following excavation, a composite repair could potentially be undertaken within a couple of days. There is also the potential to train NG staff to undertake the repairs in the future, which will reduce the cost of application, without the need for expert intervention.

Third Party Collaborators

DNV

Metalyte

Nominated Contact Email Address(es)

Box.GT.Innovation@nationalgrid.com

Problem Being Solved

National Grid UKT has approximately 500 leaking Nitrogen Sleeves on the Transmission pipeline system. Approximately 100 sleeves have an epoxy end-seal, and a number of end-seals are known to be leaking. There is a need to find a solution to enable NG to repair the end-seals to render them compliant with our Policies and Procedures.

The seals were installed over a between 1960 and 1984, and the precise nature of any leak or defect cannot be known until a sleeve is excavated and inspected. Therefore a flexible repair solution is required so that a more rapid cost effective repair can be made.

Method(s)

Composite wrap products, such as Syntho Glass XT produced by Metalyte, has been identified that could, by their flexible nature, be used to wrap the leaking end-seal to any pipeline or fitting geometry, potentially making it a more efficient solution for this type of repair. The wrap could be reinforced with a combination of carbon fibre and other fabrics, so that the strength can be designed to suit the particular application.

This project will research and test the suitability and integrity of composite wraps. A number of composite wrap products and configurations will be destructively tested in scenarios that try to reproduce real repair scenarios, to examine the strength, and the pressure sealing capability. The intention is to undertake tests on a dummy end-seal arrangement at the PMC Ambergate facilities to fully evaluate the effectiveness of the proposed sealing techniques.

The results will be used to design a number of live trial installations on the network that are required due to the variation in age, condition and design of the nitrogen sleeves. The results of the live trials will be reviewed and if the method is successful the necessary NG policy and composite wrap repair specifications will be created/modified and implemented as policy. If successful, a training package for NG staff to use the technique will also be developed to ensure an effective implementation within the business.

Scope

The pipeline and sleeve are likely to be eccentric, and there can be a variety of end-seal arrangements types and shapes, which cannot be known in advance until a sleeve is excavated. The Syntho Glass XT product is a versatile product, which requires very little prior preparation or design prior to the works being undertaken. Following excavation, a composite repair could potentially be undertaken within a couple of days. There is also the potential to train NG staff to undertake the repairs in the future, which will reduce the cost of application, without the need for expert intervention.

Objective(s)

The objective of this project is to find a simple and cost effective solution, to facilitate the repair of leaking nitrogen epoxy end-seals. This type of repair should need minimal modification to the sleeve end-seal to effectively repair the nitrogen leaks.

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

Success Criteria

The project will identify, test, live trial, verify and develop an approved method of using composite wraps to repair nitrogen sleeve end seals.

Project Partners and External Funding

n/a

Potential for New Learning

n/a

Scale of Project

Desk based analysis and trial in a typical working environment.

Technology Readiness at Start

TRL5 Pilot Scale

Technology Readiness at End

TRL8 Active Commissioning

Geographical Area

Desk based work at NG and project partners.

Destructive testing at Ambergate.

Live trials at various UK wide locations.

Revenue Allowed for the RIIO Settlement

None **(to be confirmed RIIO Delivery)**

Indicative Total NIA Project Expenditure

Indicative NIA Expenditure : £680k

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 cost of repairing an end seal by current methods is approximately between £403k (modified end repair) and £470k (gel filled repair) both taking 6 weeks.

Information provided by a composite wrap supplier suggests that to undertake the repair of a 900mm pipeline with a 1050mm sleeve will cost £294k per end to repair, taking 4 weeks.

The overall cost saving in this example could be of the order of £106k, with a possible time saving of 2 weeks per project. The potential time saving may be greater once the technique is further developed as a result of the proposed programme.

Please provide a calculation of the expected benefits the Solution

It is anticipated that there will be an immediate need to repair about 60 nitrogen sleeves ends across the gas transmission network.

Two conventional nitrogen sleeve techniques are currently employed:

1. The cost to excavate up to 60 sleeves and to modify the end-seals to accept a new epoxy end-seal is approximately £24.2m.

2. The cost to excavate up to 60 sleeves and to modify the end-seals by the gel filled technique is of the order of £28.2m

Employing the composite type (Metalyte) repair to the end-seal nitrogen sleeves the total anticipated costs will be £17.7m for the repair of 60 sleeves.

On this basis, the financial benefits are considered to be in the region of £10.5m to £6.5m depending on primary repair method considered.

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

Providing this product proves to be satisfactory in repairing the leaking end-seals it will be replicable across 100% of epoxy, and other end-seal type leaking nitrogen sleeves.

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

All sleeves are site specific, and the main cost will be for the excavations to expose the end-seals for repair so the generic costs will be attributable to the particular site.

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 composite wrap product that has been identified is versatile, and could in future be used for a variety of pipeline and valve repairs across gas transmission and distribution networks.

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 leaking Epoxy End-Seal Nitrogen Sleeve issue has been known for a number of years, and although other repair techniques have been investigated, and trialed they have proved ineffective and costly to implement.

☑ 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