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

Feb 2015

Project Reference Number

NIA_NGGT0069

Project Registration

Project Title

Pipeline Installation Techniques

Project Reference Number

NIA_NGGT0069

Project Licensee(s)

National Gas Transmission PLC

Project Start

March 2015

Project Duration

0 years and 5 months

Nominated Project Contact(s)

Paul Lee

Project Budget

£25,000.00

Summary

As explained above, National Grid Gas (NGG) design, construct and operate large diameter pipelines transporting natural gas. High pressure gas transmission pipelines are typically buried to a nominal depth of 1.2m. as required by pipeline design codes (IGE/TD/1, PD 8010). For such a depth, pipelines are installed using the well-established and proven 'open-cut' installation technique. This technique typically involves performing a surface excavation (surface stripping) and removing the soil to the depth and width as required, preparing the trench, installing the pipe and then backfilling the trench with soil in accordance with TD/1 and then reinstatement of the top soil. Each stage of the pipeline installation process requires careful and detailed design and safety considerations and National Grid have procedures and specifications to ensure a high quality installation is performed.

In locations where there is a requirement for a deeper burial depth to negotiate a constraint (such as a road/rail/river crossing, unstable ground, building proximity), trenchless techniques such as auger

boring, thrusting, pipe jacking and Horizontal Directional Drilling (HDD) are typically employed. These have successfully been performed by specialist drilling companies. In certain industries, the success of these installations has prompted the use of these techniques to replace the traditional open-cut installation technique as the impact on personnel and environment is greatly reduced.

The project seeks to investigate how existing and new pipeline installation technology is expected to evolve over the next 3, 5 and 10 year timescales and hence how the benefits seen in other industries can translate for NTS pipelines. The feasibility of using alternative technologies to those being deployed currently for pipelines in the National Grid Transmission Network will be extremely important in choosing the most appropriate technology for each installation.

Third Party Collaborators

Andrew Francis Associates Limited (AAFA)

Nominated Contact Email Address(es)

Box.GT.Innovation@nationalgrid.com

Problem Being Solved

High pressure gas transmission pipelines are typically buried to a nominal depth of 1.2m. as required by pipeline design codes. In locations where there is a requirement for a deeper burial depth to negotiate a constraint (such as a road/rail/river crossing, unstable ground, building proximity), trenchless techniques such as auger boring, thrusting, pipe jacking and Horizontal Directional Drilling (HDD) are typically employed. This project is to undertake a study to investigate the potential for advancement of existing and emerging technologies for pipeline installation in the National Transmission Network (NTS). NGGT are seeking to understand how new and existing technologies may evolve into the future, and how quickly these may be expected to develop.

Method(s)

Identify all pipeline installation techniques being used worldwide in the gas industry and other pipeline industries, and provide a detailed review of :

- advantages/disadvantages
- any limitations in terms of design and construction
- impacts on the environment
- indication of the cost of application
- the range of applicability to gas pipelines
- implications of differing ground conditions
- working in proximity to special interest locations
- analysis based on diameter vs length
- a view on likely timescales for significant technology development/advancement

Scope

As explained above, National Grid Gas (NGG) design, construct and operate large diameter pipelines transporting natural gas. High pressure gas transmission pipelines are typically buried to a nominal depth of 1.2m. as required by pipeline design codes (IGE/TD/1, PD 8010). For such a depth, pipelines are installed using the well-established and proven ‘open-cut’ installation technique. This technique typically involves performing a surface excavation (surface stripping) and removing the soil to the depth and width as required, preparing the trench, installing the pipe and then backfilling the trench with soil in accordance with TD/1 and then reinstatement of the top soil. Each stage of the pipeline installation process requires careful and detailed design and safety considerations and National Grid have procedures and specifications to ensure a high quality installation is performed.

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The project seeks to investigate how existing and new pipeline installation technology is expected to evolve over the next 3, 5 and 10 year timescales and hence how the benefits seen in other industries can translate for NTS pipelines. The feasibility of using alternative technologies to those being deployed currently for pipelines in the National Grid Transmission Network will be extremely important in choosing the most appropriate technology for each installation.

Objective(s)

To review current and emerging pipeline installation techniques, to understand the potential scope for advancement in these

technologies into the future.

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

Success Criteria

To deliver a report that will enable NGGT to gain an unbiased view of the limitations or development of existing pipeline installation techniques, and how any new techniques are expected to develop into the future.

Project Partners and External Funding

n/a

Potential for New Learning

n/a

Scale of Project

The project is a study that will investigate how new and existing technologies worldwide may evolve into the future. This will include consideration for a number of contributing factors applicable to high pressure pipelines, and provide a view on how quickly these may be expected to develop.

Technology Readiness at Start

TRL4 Bench Scale Research

Technology Readiness at End

TRL4 Bench Scale Research

Geographical Area

The project is a desk based study taking place at the supplier's offices in the UK.

Revenue Allowed for the RIIO Settlement

None

Indicative Total NIA Project Expenditure

£25k

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)

National Grid is looking to understand the potential (including any limitations) of existing and new technology. The objective is that where the application of any new technology identified it can be applied to future investment decisions, and this will bring financial benefit to customers and allow more efficient project delivery.

Please provide a calculation of the expected benefits the Solution

N/A - research project

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

The research will consider existing and new technologies and construction methods suitable for the pipeline network that makes up the National Transmission System.

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

Unknown at this stage, and dependent on the conclusions from this industry research.

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

Learning will be disseminated primarily through the ENA portal, National Grid website and the annual NIA conference .

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 is aligned to 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