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

Aug 2016

Project Reference Number

NIA_NGGT0098

Project Registration

Project Title

Composite Pipe Supports Phase 2

Project Reference Number

NIA_NGGT0098

Project Licensee(s)

National Gas Transmission PLC

Project Start

August 2016

Project Duration

1 year and 8 months

Nominated Project Contact(s)

Simon Cowling, Gemma Parkes Wally,
box.GT.innovation@nationalgrid.com

Project Budget

£177,510.00

Summary

The proposed project will review of the existing styles of pipe supports in use across the UK Gas National Transmission System (NTS) and determine concepts for trial to remove the existing manual handling issues and allow for inspection without the need to damage/break out the associated concrete plinths. The subsequent design would also eliminate the inherent corrosion risk with existing metallic pipe support materials and design.

Preceding Projects

NIA_NGGT0011 - Composite Pipe Supports

Third Party Collaborators

Premtech Ltd

Nominated Contact Email Address(es)

Box.GT.Innovation@nationalgrid.com

Problem Being Solved

Despite the need for numerous pipe supports across the National Transmission System (NTS) network, there is little commonality in design and installation method, excepting in material of construction which is usually metal.

The need to investigate alternative approaches for pipe supports, in terms of materials and design, has already been undertaken. The key drivers for this programme was:

- To alleviate existing manhandling issues.

Manhandling issues are a concern because the requirement for manoeuvring the supports in close proximity to the pipe which can be problematical for personnel and also in terms of the risk of pipe damage.

- To reduce problems due to corrosion of metal to metal contact areas.
- To facilitate inspection of the outer pipe surface (and pipe cradle surface) between the outer pipe surface and the support cradle. The inspection of the interface between the pipe and the support cradle and, at present, in the case of larger supports, this can only be achieved by removing the concrete plinth which sits beneath the support
- To reduce pipework and support maintenance costs.

While the initial programme provided an extensive review of alternative pipe support design and materials it was unable to progress to deliver a fully engineered and tested alternative design. Alternative pipe support solutions have considerable potential to improve pipeline asset maintenance and this programme will progress the most suitable pipe support solution to the detailed design stage and accordingly produce relevant documentation to implement the safe use of the supports. The programme will also produce all the relevant specifications and installation guidelines that would meet existing requirements of National Grid and allow the new pipe support designs to be expediently implemented within the business.

Method(s)

The programme will be will be undertaken in four stages.

1. Review of the state of the art.

This stage will conduct a full review of the work conducted to date on composite pipe supports.

2. Analysis

A full and detailed design will be conducted, inclusive of any necessary finite element modelling, for all typical pipe support sizes (300mm, 450mm, 600mm, 750mm, 1050mm, 1220mm) configurations.

The analysis will also confirm:

- Any material property anisotropy on design loadings.
- The stress/strain loading relationship at all pipe support sizes.
- The suitable mechanical testing regime to evaluate the chosen support designs.
- Allowable stress concentrations around bolts and flanges.
- Material properties under cyclic thermal and mechanical loading conditions.
- Feasibility of incorporating monitoring sensors (load, temperature, pH) within the support to allow for in service performance monitoring.

3. Testing

A testing programme will be undertaken to perform representative crushing tests should be performed by applying horizontal loads to representative samples in a test rig. The intention will be to test with both vertical and horizontal applied loads to better reflect expected in service conditions of the support.

4. Design Specifications

A design and procurement specification will be developed that will allow the procurement and design of suitable GRP supports for use on the NTS. The specification will also set out the acceptability limits for in service use.

To facilitate the use of GRP supports on the NTS standard drawings and models will be developed for each of the standard GRP/polymeric supports.

For each support design, the standard T/PM/G/19 model appraisal will be developed.

CC1 July 2017: Initial crush testing carried out has raised some issues over the design of the testing method. As a result, an additional crush testing stage will be added to the project timeline following a redesign of the testing method. The addition of a second test, which is expected to take place in August 2017, has led to a change control request of 7 months. The new timelines will enable the supplier to redesign the testing approach to ensure it is representative of on-site conditions and the data generated will be input into the FEA models.

Scope

The proposed project will review of the existing styles of pipe supports in use across the UK Gas National Transmission System (NTS) and determine concepts for trial to remove the existing manual handling issues and allow for inspection without the need to damage/break out the associated concrete plinths. The subsequent design would also eliminate the inherent corrosion risk with existing metallic pipe support materials and design.

Objective(s)

The project objective is to develop a suitable alternative design of pipe support for use on the NTS.

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

Success Criteria

The project will provide the necessary designs and experimental data to support the use of alternative pipe supports across the NTS.

Project Partners and External Funding

n/a

Potential for New Learning

n/a

Scale of Project

The project will be conducted in an office environment with some laboratory scale tests.

Technology Readiness at Start

TRL6 Large Scale

Technology Readiness at End

TRL8 Active Commissioning

Geographical Area

The project output will be suitable for use across the NTS asset base.

Revenue Allowed for the RIIO Settlement

None

Indicative Total NIA Project Expenditure

£177,510

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)

It is estimated that up to £400,000 in reduced maintenance costs associated with pipe supports by removing the need to revisit sites or break out and replace the concrete plinths can be achieved across the NTS.

Please provide a calculation of the expected benefits the Solution

The proposed saving per pipe support between the conventional metal and composite support is

25%.

The Base cost/support : £5,000

The Method cost/support: £4,000

Total savings over RIIO T1 period by adopting composite supports for new build/modifications: £250,000.

Total savings over RIIO T1 period resulting from reduced maintenance and plinth replacement: £150,000.

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

The project is looking to identify solutions suitable for the full range of pipe support sizes on NTS sites.

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

The cost to manufacture a single composite pipe support unit is estimated at £4,000. A minimum of two to three units required for each installation.

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

Pipe supports are part of the NTS asset base but learning may be of use to gas distribution networks with similar assets.

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 fits within 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