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NIA Project Registration and PEA Document

Date of Submission

Feb 2018

Project Reference Number

NIA_SGN0116

Project Registration

Project Title

Under Pressure Drilling Equipment for PE Construction Valves

Project Reference Number

NIA_SGN0116

Project Licensee(s)

SGN

Project Start

February 2018

Project Duration

3 years and 1 month

Nominated Project Contact(s)

Alex Stewart, Innovation Project Manager

Project Budget

£280,700.00

Summary

SGN NIA project to design and develop under pressure drilling equipment.

Nominated Contact Email Address(es)

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Problem Being Solved

Currently within the UK gas networks, the use of full bore PE Ball Valves is restricted to small diameter (typically 32mm and 63mm) for services to smaller dwellings such as houses and commercial properties. Above 63mm the use of metallic valves is widespread across all networks. This means that there is a risk of corrosion on these valves, which require corrosion protection, anodes, wrapping etc. Adopting the use of PE valves for all of SGN's distribution activities provides an opportunity to reduce expenditure associated with preventing and repairing corroded assets.

As part of the 30/30 replacement program there is a large focus to replace all metallic components, especially on Tier 1 mains for above 63mm. SGN have researched the use of a Polyethylene (PE) valve for a range of uses, typically, but not exclusive to, Network Construction and mains replacement sites, and identified a need for the drilling of these valves.

Current Gas Industry Standards (GIS/V6: Part 2) allow for the use of PE Bodied Valves of up to 180mm on the GB Network.

To enable the GDN's to achieve the desired target of a fully PE network, current methods would require cut out of the host mains to tie in 'Tee – Pieces' and fuse on the ball valve off that fitting. This is both time consuming, adds additional joints on the network and the expense of excavation and backfill materials along with the environmental effects created by the additional works.

Work was previously carried out on PE valves within the NIA project "NIA_SGN0068 – PE Bodied Valves". Testing was carried out which highlighted an issue with the drilling process as the extended drilling spindles required to drill the PE valves resulted in the drillings being off centre due to the drilling head "travelling" from the centre bore and causing the drill head to damage the internal bore of the valve.

The decision was made to close out the NIA project "NIA_SGN0068 – PE Bodied Valves" to allow the development of an appropriate drilling machine to be made.

Method(s)

The project consists of:

- Design and development of a prototype product ready for trial.
- Manufacture prototype and create testing setup.
- Complete SGN/PM/G/23 for Under Pressure Drilling Equipment for PE Construction Valves.
- Submission of reports on trials, outcome validation and delivery of approved and agreed training/ implementation plan.

Scope

This project aims to continue the work carried out in the NIA project “NIA_SGN0068 – PE Bodied Valves”. This will involve design and development of an under pressure drilling equipment to resolve the off centre drilling issues which can cause the drill head to damage the internal bore of the valve.

This project therefore aims to develop a drilling solution that will result in extending the use of PE bodied valves up to and beyond 180mm for all distribution activities, providing an opportunity to reduce expenditure on corrosion protection for metallic valves. It was necessary to extend the project timescale. This was primarily due to discussion with valve manufacturers and the availability of the various valve sizes to allow the offsite testing to be undertaken

This change is beneficial as it allows the completion of the offsite testing and also assures the availability of fittings for the final field trials which are scheduled to take place in 2020 and allow completion of the objectives as planned with no changes to the expected benefits.

Objective(s)

This project will include:

- Complete concept design and development of a prototype product.
- Develop technical drawing and meet with operations
- Production of Prototypes, Internal Testing and Draft Specifications
- Manufacture prototype and complete testing setup.
- Field trails.
- Produce specification for under pressure drilling
- Generate and complete SGN/PM/G/23 for final equipment.
- Report documenting findings.

This will focus on both line valves and construction valves greater than 63mm.

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

Success Criteria

The following success criteria for the project are:

- Complete concept design and development of a prototype product.
- Produce draft Industry specification.
- Production of 3D (scaled) printed model to fully assess the equipment prior to production of prototype equipment.
- Manufacture prototype and complete testing setup.
- Generate and complete SGN/PM/G/23 for final equipment.
- Produce all necessary documentation and complete full project report.
- Production of final training, Industry standard and Work Instructions approved by SGN

Project Partners and External Funding

ALH Systems Ltd

Potential for New Learning

The Project is expected to develop the following new learning for Network Licensees:

- Provide all GDNs with an understanding of the under pressure drilling equipment and construction valves.
- Awareness of a method and product for under pressure drilling equipment for PE construction valves.
- Whether the final concept design and methodology has the potential to be adapted to suit other types of applications.

Scale of Project

The project involves carrying out internal testing of the manufactured prototype followed by Live field trials.

Technology Readiness at Start

TRL3 Proof of Concept

Technology Readiness at End

TRL5 Pilot Scale

Geographical Area

The live trial aspects of this project will be carried out on live sites on SGN's Scotland, South and South East Networks.

Revenue Allowed for the RIIO Settlement

As PE valves can be utilised on a number of different operational activities it is not possible to identify this.

Indicative Total NIA Project Expenditure

The total project expenditure is £280,700, 90% (£252,630) of which will be recovered via the NIA funding mechanism in line with the funding conditions.

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 estimated savings that could be achieved through the development of under pressure drilling equipment would be to remove metallic valves for above 63mm, which would help the GDN's achieve the 30/30 replacement program. This will also create savings by reducing the need for corrosion protection such as coatings and wrapping.

Please provide a calculation of the expected benefits the Solution

SGN replace approximately 800-1,000km of mains per year. On average a construction valve is installed about every 100m, equating to 8,000 valves installed per year (based on a conservative value of 800km). Each valve has two metallic flanged connections which are £35 each.

By removing the metallic flange connections for PE Bodied Valves equates to a cost of £560,000 saving per annum (8,000 valves x £70). This figure doesn't include any potential savings to be made by the reduction in corrosion control and repair costs.

If it is assumed that PE valves can be utilised in all of SGN's operational activities, up to 250mm, after successful completion of this project, and the material costs of both PE valves and metallic valves are comparable, then the potential annual saving is £560,000 (plus the cost savings in repair and 'maintained asset' protection).

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

The potential outcomes of this project are applicable across GDN's. All the network licensees will be able to utilise under pressure drilling equipment for PE construction valves throughout all operational activities.

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

Unknown at present due to the low TRL starting position.

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

This project applies to all Network Licensees as PE Valves are used across the Gas Network. This is an ongoing issue that needs to be addressed.

All Network Licensees will be able to use the learning from this project as the outputs will be presented in a clearly defined report that will be available to them on request, this will allow the network licensees to make informed choices as to whether to invest in this technology.

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

N/A

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.

A review has been made of all other Network Licensees and no other similar projects have been carried out.

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