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NIA Project Registration and PEA Document

Date of Submission

Mar 2014

Project Reference

NIA_SGN0015

Project Registration

Project Title

Pneumatic PE Pushing Machine

Project Reference

NIA_SGN0015

Project Licensee(s)

SGN

Project Start

August 2013

Project Duration

1 year and 8 months

Nominated Project Contact(s)

Ryan Smith, Innovation Delivery Manager

Project Budget

£110,199.00

Summary

The scope of this project is to improve and extend the design of the PE Pipe Insertion Machine to enable PE pipe to be inserted back to the original meter position, to reduce the number of services re-laid to meter boxes and to reduce the number of services requiring copper outlet pipe re-runs.

Nominated Contact Email Address(es)

sgn.innovation@sgn.co.uk

Problem Being Solved

SGN have been allowed a total of £1,804.1m for its mains replacement programme (Repex) operations throughout the GD1 price control. Traditional service replacement has involved open cutting i.e. excavation to cut off the old metallic service at the mains and trench a new route for the new Polyethylene (PE) service pipe, to a new meter position. Copper pipe is then used to reconnect the supply to the existing system, which is associated with high costs and disruption to the customer.

Where applicable operatives will instead replace the service by manually inserting PE pipe into the existing steel, reducing the time taken and costs associated with a full relay of the service using the traditional open cut replacement method. However, pushing by hand is limited by an operative's own strength and generally provides only enough force to insert around one easy bend. This is not sufficient to replace services back to original meter position and over the years this method has resulted in both back and upper arm

injuries. In the 1980's a piece of equipment was initially developed to aid service insertion with PE. The equipment was used in small quantities a number of years ago, but due to limitations with the design it was never developed further to cover a broader range of service sizes reducing its use in the field.

In order to avoid the high cost associated with traditional service replacement and the strain on operatives, the aim of this project is to provide a solution that will allow almost every service to be inserted and replaced back to the original meter position.

Method(s)

This project is concerned with exploring the potential for technical alternatives to service replacement techniques currently used within the gas industry. Throughout GD1 there will be greater focus towards service insertion and this project will seek to develop a solution that allows licensees to maximize their opportunities to replace services back to the original meter position and eliminate the costs associated with moving the gas meter, excavation in the customer's garden and reducing the disruption to our customers.

In order to do this SGN will work with Pipetech Pipeline Technology Limited to develop the old style of Pushing Machines incorporating a new design and range of pipe sizes, with field trials carried out to compare the method against traditional methods of service replacement in terms of safety, environment, productivity and cost.

To ensure the technique can be utilised as often as possible, SGN have identified the need for service pipe insertion for the following pipe sizes:

- 20mm PE will be inserted in 1" Steel pipe
- 25mm PE in 1 ¼" Steel pipe
- 32mm PE in 1 ½" Steel pipe
- 40mm in 2" Steel Pipe

Consideration will be given to minimising the noise and Joule Thompson cooling effect of venting the compressed air used to provide the force required to insert the service pipe, and the use of the machine in a confined space inside a customers house under the stairs where a large amount of existing gas meters are found to be located.

Scope

The scope of this project is to improve and extend the design of the PE Pipe Insertion Machine to enable PE pipe to be inserted back to the original meter position, to reduce the number of services re-laid to meter boxes and to reduce the number of services requiring copper outlet pipe re-runs.

Objective(s)

The objectives of this project are to:

- Produce a machine that will impart enough force to insert PE around 3 easy bends without damaging the PE and with no safety risk to the user.
- Remove the risk to the operative relaying the service of any physical injury or strain.
- Request Pipetech manufacture two working models for testing in purpose built test rigs.
- Have the service pipe used for the tests independently assessed to ensure the new service insertion techniques does not have any detrimental effects on the pipe once inserted
- SGN to evaluate suitability of method against traditional techniques of service replacement and issue approval for the production of a prototype of each unit covering all of the service diameters in question.
- SGN to carry out field trials to comprehensively review the new equipment and provide a technical report for the other Licensees to disseminate the outcomes of the field trial.

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

Success Criteria

The success criteria for this project are to trial and test the method against the traditional methods currently used to compare its performance in terms of:

- safety
- environmental impacts
- efficiency

- productivity
- cost

Project Partners and External Funding

n/a

Potential for New Learning

n/a

Scale of Project

In order to ensure that learning associated with this project is maximised and that the future application of this technology is well understood, it is necessary to trial the following size categories across a number of sites:

1. 20mm PE will be inserted in 1" steel pipe
2. 25mm PE in 1 ¼",
3. 32mm PE in 1 ½"
4. 40mm in 2" Steel Pipe.

A variety of site locations will be selected across Scotland, South and South East England in order to ensure a sufficient range of scenarios are covered.

Technology Readiness at Start

TRL5 Pilot Scale

Technology Readiness at End

TRL8 Active Commissioning

Geographical Area

This project will be trialed in three depot locations, one in each of SGN's regional networks; Scotland, South and South East England. As mentioned above, the purpose of the trials being carried out in a number of depots is to ensure that the new technology is used extensively in varying environments to ensure the integrity of the findings.

Revenue Allowed for the RIIO Settlement

The approximate RIIO-GD1 Allowance for Repex operation throughout SGN is £1,804.1m. While no savings on this are allowed for during project implementation, it is expected that if successful this project could provide Network Licensees with an opportunity to make cost savings on service replacement.

Indicative Total NIA Project Expenditure

The total project expenditure is £110,199 , 90% of which is allowable NIA expenditure (£99,107).

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 approximate RIIO-GD1 Allowance for Repex operations throughout SGN is £1,804.1m. SGN's service relay estimate for 2013 alone is 54,602 relays at an average cost of £726.50 each. It is expected that if successful this project could provide Network Licensees with an opportunity to make cost savings on Replacement allowances, and therefore provide net financial benefits to customers, as a result of the improvements made to the existing methods used to relay domestic services. The estimated saving on each service where the new technology is utilised is 5%.

Please provide a calculation of the expected benefits the Solution

The total cost of labour and materials to perform the traditional technique in 2011/12 was estimated to be £726.50.

The new process is anticipated to allow our Repex and repair teams to become more productive, eliminate the need for the meter box and avoid any potential disputes with the customer in regards to their meter box position. Hence we have made a conservative estimate of cost for equivalent service replacement using this method as approximately £690.17.

Therefore; $£726.50 - £690.17 = £36.33$ (Benefit Estimation for Development) per service relay.

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

Based on SGN figures, the total number of services forecasted to be relayed in 2013 is 54,602. Based on a 4:2:1:1 split with reference to the size of the networks, it could be assumed that National Grid may have approximately 218,408 similar services and Wales & West Utilities and Northern Gas Networks have around 27,301 each. Therefore, the estimated total number of services this technology could be applied to on a per annum basis throughout GB is around 327,612.

While this estimate provides an indication of potential applicability, it is important to note it is necessarily based on a number of unqualified assumptions and therefore subject to a large sensitivity margin.

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

Excluding the cost of purchasing the equipment, it is anticipated that the cost of disseminating the development outcomes and findings from the project and training costs incurred before the product can be used would be approximately £10,000 for SGN. Using the 4:2:1:1 split with reference to the size of the networks, it could be assumed that National Grid's training costs would be approximately £40,000, and Wales & West Utilities and Northern Gas Networks would be £5,000 each. Therefore, the estimated total cost of training

before the equipment can be used operationally would be £40,000.

This estimate is based on the following assumptions: three training courses for 12 people are provided for each Network Licensee from the manufacturer in three separate locations across their network with an allowance for travel included, and approximate costs for one practical demonstration of the equipment by SGN for representatives from each Network.

It is anticipated that thereafter each Licensee would have their internal training departments carry out further training once the initial training program from the product manufacturer to a selective proportion of their workforce has been carried.

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

n/a

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.

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