

NIA Project Registration and PEA Document

Date of Submission

Jan 2014

Project Reference

NIA_WWU_002

Project Registration

Project Title

e Pipe – Trial internal lining assessment and development of small diameter pipelines.

Project Reference

NIA_WWU_002

Project Licensee(s)

National Grid Gas Distribution

Project Start

March 2013

Project Duration

1 year and 7 months

Nominated Project Contact(s)

Martyn Pallant (Innovation Manager)

Project Budget

£522,419.00

Summary

The scope of this Project is to further develop the ePIPE system (currently used within the water distribution industry) adapting it for use in the gas distribution industry, allowing internal risers inside high rise buildings to be coated internally so extending the operational life of the asset. The Project will ascertain what resin developments are needed, what equipment designs need to be altered and what procedural processes need to be implemented. The development of the ePIPE product will be an iterative process based upon the results of trial work. The Project will:

- Assess the technology in a mock/test environment and development of a specification
- Develop and test the suitability of new resin formulations
- Validate and develop a suitable industry standard.

Nominated Contact Email Address(es)

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Problem Being Solved

There are a number of high rise buildings across the country with internal gas risers. These risers, usually constructed of steel or copper, are coming to the end of their expected operational life, and to replace these using existing construction methods will be

expensive and time consuming. An alternative method to replace these systems is required. In WWU alone as an example has an estimated 14,000 low rise and 346 high riser systems.

Method(s)

The proposed solution would consist of developing a resin that can be blown into the internal pipe cavity. The resin is a specially designed thermo-set resin that can be blown along the inside surface of a pipe using compressed air, similar to the way in which paint can be blown across a piece of paper until there is an even coating. The resin will line past bends, tee's and changes in diameter meaning that complex pipe configurations can be lined from convenient access points at existing fittings.

Scope

The scope of this Project is to further develop the ePIPE system (currently used within the water distribution industry) adapting it for use in the gas distribution industry, allowing internal risers inside high rise buildings to be coated internally so extending the operational life of the asset. The Project will ascertain what resin developments are needed, what equipment designs need to be altered and what procedural processes need to be implemented. The development of the ePIPE product will be an iterative process based upon the results of trial work. The Project will:

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Objective(s)

The objective is to develop an internal resin and application system that could provide an elegant and cost effective solution. This would substantially decrease the replacement cost of a gas riser system.

The objectives of the Project are to:

- Substantially improve the cost of the replacement of a gas riser.
- Significantly increase the operational life of the asset.
- Reduce the gas leakage on the system (small leaks only)
- To avoid major construction work minimising transport and customer disruption.
- Significantly reduce time on site
- Establish training requirement and equipment needs

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

Success Criteria

The success criteria of the Project are:

- Efficiency - How does the process perform in terms of duration, safety or customer impact
- Effectiveness - Has the lining provided complete and even coverage, including threaded joints
- Practicability - What enablers are required in terms of customer cooperation, network isolation, other impacts?
- Recommendations for suitability for refurbishment or replacement criteria by comparing to existing standards and identifying additional standards or amendments that may be required.
- Training needs – achieve acceptable training needs

Through-out the Project there will be monthly reports from Pipe Restoration Services, to update all Project steering group members on the progress of the Project. There will be face to face meetings every 6-8 weeks and key deliverables reviews at key points with accountable parties clearly identified. Each stage will have its own deliverables and targets which the Project will measure itself and report on monthly as it progresses. When issues are identified recovery plans will be adopted to ensure minimal impact on time scales, and avoid additional costs.

Project Partners and External Funding

n/a

Potential for New Learning

n/a

Scale of Project

The Project has been split into four distinct stages:

Stage One -Technology Readiness Level Assessment. The purpose of stage one is to access the existing ePIPE product and to establish its suitability for use on gas risers.

Stage Two –Specification and Product Development. This stage will produce an achievable and acceptable specification for a final product that satisfies policy requirements for all GDN’s and develops a thermo-set resin to meet that specification.

Stage Three - Testing of Developed Product. This stage will involve the GB based testing of final product in accordance with draft code of practice on a 3 storey riser, not a live customer environment. Additionally, further laboratory testing will be done to address issues such as life expectancy and chemical resilience.

Stage Four - Consultation on Regulation and Approval. This stage will involve the development and agreement of a recognised “Code of Practice” or “Standard”.

Having a collaborative Project allows all Networks to give their input to what is a national industry issue. The Project though collaborative, could not be scaled down as the main costs are associated with the research and development of the technology.

The Project will consist of 2 mock risers constructed in GLND test site in Spadeadam, Cumbria. In order to develop a Technology assessment and prove the concept, the product will develop further with a number of field trials, (location and number to be confirmed). Once complete full Operational testing of the product in live gas situations for all Networks, until final Policy approval.

Technology Readiness at Start

TRL3 Proof of Concept

Technology Readiness at End

TRL8 Active Commissioning

Geographical Area

Initial trials in Spadeadam, Cumbria (GLND test centre) until the Networks are satisfied with the information then rolled out with on-site trials (location tbc) followed by UK site trials at a suitable representative location.

Revenue Allowed for the RIIO Settlement

During RIIO-GD1 it is estimated that SGN, NGN ,WWU & NGG will need to replace 5% / annum of their High rise building services stock attend 135,000 gas escapes per annum that are attributed to Gas mains, spending approximately £135m on repairs. As this Project is starting at a low TRL, it is not yet possible to determine whether revenue savings are likely during RIIO-GD1.

However it is assumed that if progressed successfully through to development and field trial in future stages this type of solution will have potential to provide Network Licensees with an excellent outperformance opportunity with regards to identifying gas leaks and repairing them quicker. Expected savings against specific areas would be quantified in these later stages of development.

Indicative Total NIA Project Expenditure

WWU

£22,145 IFI Project expenditure
£36,163 NIA Project expenditure
£58,308 total Project expenditure

NGG

£48,430 IFI Project expenditure
£228,469 NIA Project expenditure
£276,899 total Project expenditure

SGN

£52,107 IFI Project expenditure
£75,532 NIA Project expenditure

£127,639 total Project expenditure

NGN

£11,073 IFI Project expenditure

£48,500 NIA Project expenditure

£59,573 total Project expenditure

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)

There will be a significant savings by using this system against traditional methods. Initial forecasts indicate that they could be 50% of current costs.

Please provide a calculation of the expected benefits the Solution

Using Wales and West as an example, there are an estimated 14,000 low rise and 346 high riser systems. Of those approximately 442 are repaired or replaced over a five year period at a cost of £2.5m, an intervention rate of 0.6%/annum. Using e Pipe will make it possible and affordable to increase the intervention level and will mean complete systems are sealed rather than the points of repair (sustainable solution). It is estimated that using the e Pipe system will prolong the existing pipeline, by up to 20years at 25% costs of existing methods.

Using the above assumptions;

- 442 repairs or replacements over a 5 year period therefore 88 per annum
- 98% of the 88 will be low rise ($442 \times 98\% = 86$) and 2% of the 88 will be high rise ($442 \times 2\% = 2$)
- The average cost of each repair/replacement on low rise is £5,572
- The average cost of each repair/replacement on high rise is £9,050

Low Rise calculation

Base Cost to replace Low rise building with 3 laterals = $£5,572 \times 86 = £479,000$ per annum
Method cost to replace Low rise building with 3 laterals = $£4,179 \times 86 = £359,000$ per annum
Savings £120,000 per annum

High Rise calculation

Base Cost to replace 1 High rise building with 6 laterals = $£9,050 \times 2 = £18,000$
Method cost to replace 1 High rise building with 6 laterals = $£2,262 \times 2 = £5,250$
Savings £132,750 per annum
Total Potential savings per annum using e pipe system £132,750 in WWU

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

The design of internal risers is essentially the same, in material, construction and operation across all networks owing to the historical working policies within the industry. The Project will develop a method that can be replicated at all risers in GB.

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

Each Network will either;

- Contract the work out to existing contract service providers or
- Train in house staff to implement the new system.

As a lower cost technique compared to current practice the work load will be included within existing replacement levels as per RIIO agreed service levels.

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