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

Jan 2014

Project Reference Number

NIA_NGGD0012

Project Registration

Project Title

Alternative Jointing Techniques for Small Diameter PE Pipe

Project Reference Number

NIA_NGGD0012

Project Licensee(s)

Cadent

Project Start

September 2013

Project Duration

0 years and 5 months

Nominated Project Contact(s)

Tom Neal – Project Manager and Darren White – Innovation Portfolio Manager

Project Budget

£112,710.00

Summary

Since the mid 1980's the primary method of jointing small diameter PE pipe in the Gas industry has been by use of electrofusion sockets. This technique requires careful surface preparation, together with the associated electrofusion equipment and adherence to procedures, in order to affect a high integrity joint. National Grid Gas (NGG) is looking to investigate whether cost reduction and productivity improvements could be achieved by introducing alternatives to electrofusion fittings.

Nominated Contact Email Address(es)

Innovation@cadentgas.com

Problem Being Solved

Since the mid 1980's the primary method of jointing small diameter PE pipe in the Gas industry has been by use of electrofusion sockets. This technique requires careful surface preparation, together with the associated electrofusion equipment and adherence to procedures, in order to affect a high integrity joint. National Grid Gas (NGG) is looking to investigate whether cost reduction and productivity improvements could be achieved by introducing alternatives to electrofusion fittings.

Method(s)

Following some feasibility/capability analysis work undertaken under IFI during 2012/13, this project will see a number of these fittings subjected to laboratory assembly tests, leaktightness tests and pull-out tests. It will also include a gap analysis to compare the requirements of Standards that selected fittings conform to, with the requirements of UK Gas Industry Standards. A cost benefit analysis will look at the total installed costs for conventional mains to meter installations using electrofusion fittings compared with those employing mechanical fittings.

Scope

The primary objectives of this stage are to:

1. Conduct a gap analysis to compare the requirements of Standards that selected fittings conform to, with therequirements of established UK Gas Industry Standards.
2. Demonstrate, under laboratory conditions, the assembly of all mains-to-meter mechanical fittings from 4 different manufacturers and compare against a conventional electrofusion mains-to-meter assembly.
3. Undertake laboratory tests of selected fittings for both leaktightness and pull-out resistance.
4. Undertake a cost benefit analysis and undertake field observations.

Objective(s)

Identify feasible efficient alternative jointing techniques for small diameter PE pipe that could be utilised for domestic services and risers

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

Success Criteria

The processes and outputs from tasks presented in this proposal will be documented in a final technical report and accompanying cost benefit model in Microsoft Excel format. Also included will be a digital video file showing the construction of laboratory test assemblies.

The success criteria of the Project are:

- Efficiency - How does the process perform in terms of cost, and customer impact
- Effectiveness – Can the solution be deemed safe over the life of the asset
- Practicability – Is it practical and easy to adopt and what are the training requirements

Project Partners and External Funding

n/a

Potential for New Learning

n/a

Scale of Project

The Project has been split into 3 distinct task areas for stage 2.

1. Task 1 – RAG Status and Standards Gap Analysis The RAG analysis will look at materials commonly used, or with potential for use, in fitting manufacture (fitting body, seals, grip rings, etc). A RAG Status for each of the identified materials will be presented with comments. RAG Status will be used as a tool to confirm the selection of fittings for evaluation. The 4 Manufacturers fittings selected for this project have already received approval to various standards in the countries that they are currently sold into.

2. Task 2 – Fitting Laboratory Assessment and Testing This task will demonstrate, under laboratory conditions, the assembly of a simulated mains-to-meter / riser connection. The test setup will, as closely as possible, mimic the installation procedure specified in NGG Procedures The test setup will incorporate a tapping tee, coupler, equal tee, end cap and transition fitting (meter box adaptor) and emergency control valve. The mechanical fittings from the 4 different manufacturers will be compared against a conventional mains-to-meter assembly using electrofusion fittings.
3. Task 3 – Cost Benefit Analysis Costing models for a mains to meter and riser model Site visits will be included to carry out time and motion studies.

Technology Readiness at Start

TRL3 Proof of Concept

Technology Readiness at End

TRL4 Bench Scale Research

Geographical Area

Within the NGG Gas Distribution footprint

Revenue Allowed for the RIIO Settlement

During RIIO-GD1 it is estimated that NGG will need to replace 5% / annum of their High rise building services stock. In addition NGG and its Contractors undertake in the order of 200,000 new services each year as a result of replacement, following escape and new.

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.

Indicative Total NIA Project Expenditure

£112,710 Total NIA 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

There are a number of potential business benefits to be realised through providing an alternative to conventional electrofusion couplers as a jointing technique for small diameter PE pipe:

Increased Network Integrity by overcoming problems and limitations conventionally associated with pipe scraping and preparation for reliable jointing of coiled pipe.

Potential cost savings through improved productivity and a reduction to total installed cost, where alternative jointing techniques can be used. By for example:

- Reduced assembly and installation time
- Reduced excavation sizes.
- Combining the new fittings with keyhole technologies

Quantification of financial benefits are the aims of stage 2, however some estimate of the potential has been made based on:

Annually some 200,000 domestic services are installed each year. These are either new to new, as part of mains replacement, and replacement following escape.

Some discussion with the Manufactures has indicated the time saved per job using the new fittings compared to electrofusion is 12 minutes.

Assuming the time is saved per individual team member and not the team and the typical hourly rate is £40, then the cost saving over a year is £40*(12/60 hrs)*200,000 services = £1.6M

The additional cost of the fittings needs to factored in and this is likely to be £2-3 per service making the net annual benefit nearer

£1M.

The additional savings using keyhole have not formed part of this basic analysis but over time as and when the keyhole technique was deployed more widely in the GDSP further potential savings would result.

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

The method is very replicable for all domestic services and riser.

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

As an overall 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

Sharing of the project outcomes will be disseminated to all Network Licenses in accordance with the NIA principles

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

Efficient and Safe Work Delivery and Removal.
The need to progress the development of improved mains replacement technology and techniques, to minimise risk to be more efficient, safe and less disruption to the public

☑ 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