

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

Dec 2016

### Project Reference Number

NIA\_WWU\_043

## Project Registration

### Project Title

Alternative PE joint preparation

### Project Reference Number

NIA\_WWU\_043

### Project Licensee(s)

Wales & West Utilities

### Project Start

January 2017

### Project Duration

0 years and 4 months

### Nominated Project Contact(s)

WWU - Thomas James. NGN – Richard Hynes-Cooper

### Project Budget

£27,600.00

## Summary

The work scope is based around delivering a number of initial and basic prototypes in a relatively short space of time; it is believed that there will not be a 'silver-bullet' approach or technology to address the challenge, but that the solution will be built up from a number of different innovative options.

The Work Programme is detailed below:

#### 0. Planning (Weeks 1 – 3) January

At the start of the work a 3 week period will be required in order to plan and make the necessary logistical arrangements for the project and workshops, including the recruitment of the workshop team from the GDNs. This will include site observation of work to understand conditions and physical restrictions on site, with a minimum of 6 teams undertaking electro-fusion jointing.

#### 1. Understand (Week 4) February

The work would kick off with confirming the challenge and understanding the technical area through a 1 day workshop ideally with contributions from field operators and manufacturers. This will highlight the issues involved and allow for a landscape of the process to be achieved. Steer will also seek to mock up test tooling in the Research and Development workshop, replicating the problem. A review of current practices, legalisation, and preparation options will also be carried out during this task.

#### 2. Create (Week 5) February

A further stakeholder day will be then spent sketching out potential solutions and ranking these as appropriate. The aim is to produce a significant number of possible options to be explored in the next work package ("Prototype").

#### 3. Prototype (Week 6) February/March

Steer will then take these concepts and trial (as appropriate) the solution, ideally building realistic – but basic - prototyping through its fast prototyping experience.

#### 4. Validate (Week 7) March

A further session of the stakeholders will then be held, and the results of these prototypes will then be tested on the field operatives and manufacturers. This will allow the validation of the ideas with the real target 'customers'.

#### 5. Report (Week 8) March

A report of the work carried out will be issued following Week 7.

### Nominated Contact Email Address(es)

innovation@wwutilities.co.uk

### Problem Being Solved

The Gas Distribution Networks (GDN's) utilise electro-fusion of Polyethylene (PE) pipe and associated fittings, as the main component of the distribution network. The current methodology for the surface preparation of PE pipes for electro-fusion involves the scraping of any surface contamination or impurities with a hand scraper not originally intended for this purpose.

The electro-fusion process is used to join the majority of pipe for the replacement of existing iron distribution mains as part of the on-going 30/30 replacement program and to expand and alter the existing PE distribution network.

It is therefore imperative that the electro-fusion joints used to connect the PE pipe are constructed to the required standards to ensure a safe operating distribution network. Due to the conditions on site in which electro-fusion jointing is undertaken and the procedure required for preparation of the PE pipe ends there is the potential for unsuccessful or inconstant quality of jointing.

There is evidence following investigations undertaken when electro-fusion joints have failed that the root causes are:

- Hand scrapers, which are not desirable for consistency e.g. over or under scraping
- Dirt retained in the pipe – significantly reducing the strength of the joint
- Ovality of the pipe to be electro-fused

### Method(s)

With input from both the manufacturers and the field operatives to understand the issues involved, the project will seek to create, and prototype a number of solutions. These solutions will then be taken for a validation workshop where they are reviewed and their advantages and challenges examined. A report will be produced by the project partner Steer Energy Solutions Ltd detailing the conclusions of the project.

### Scope

The work scope is based around delivering a number of initial and basic prototypes in a relatively short space of time; it is believed that there will not be a 'silver-bullet' approach or technology to address the challenge, but that the solution will be built up from a number of different innovative options.

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## Objective(s)

A report will be produced by the project partner Steer Energy Solutions Ltd detailing the conclusions of the project, along with basic prototypes.

## Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

## Success Criteria

Success of the project will be a full assessment of the issues around PE pipe preparation for jointing, assessment of existing solutions for pipe preparation and the potential identification of new/improved methodologies and/or techniques for PE pipe preparation for jointing. This will be documented in a report to be produced by Steer Energy Solutions Ltd at the completion of the project.

## Project Partners and External Funding

n/a

## Potential for New Learning

n/a

## Scale of Project

The project will involve representation from the 2 participating GDN's and identify potential solutions to improve PE pipe preparation for jointing.

## Technology Readiness at Start

TRL3 Proof of Concept

## Technology Readiness at End

TRL4 Bench Scale Research

## Geographical Area

Review of solutions within the UK area. Project is predominately workshop based, locations of these to be confirmed on a workshop by workshop basis.

## Revenue Allowed for the RIIO Settlement

N/A

## Indicative Total NIA Project Expenditure

Wales And West Utilities Costs

External Costs - £10,350

Internal Costs - £3,450

NGN Costs

External Costs - £10,350

Internal Costs - £3,450

## 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)

By improving the preparation of the PE pipe before electrofusion takes place, there should be less failures, therefore reducing the cost associated with the wastage produced and time undertaken to cut-out and electro-fuse the joint again when it is identified during the electro-fusion jointing process. The joints can also fail following installation, which will result in replacement of the leaking joint.

#### Please provide a calculation of the expected benefits the Solution

##### Estimated cost savings for PRE's resulting from PE jointing failure

Average cost per service repair required for 32mm diameter service and below at £750 (~£300 for team and £450 for materials – reinstatement, etc.)

Average number of service repairs required over 5 year period 2012-2016 =  $209/5 = 42$

Total cost of repairs =  $42 \times £750 = £31,500$  saving per annum

##### Estimated cost due to failure of fusion process

Average cost of 32mm diameter and below electro-fusion fitting £0.50

Estimate that approx. 100 fittings are cut-out following failed electro-fusion for everyone that results in a PRE this would be  $42 \times 100 = 4200$  fittings  $\times £0.50 = £2,100$  saving per annum

##### Estimated total cost saving

Estimated cost savings for PRE's resulting from PE jointing failure = £31,500 saving per annum

Estimated cost due to failure of fusion process = £2,100 saving per annum

Total = £33,600 saving per annum

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

The methods generated could be replicated by all other of the other gas distribution networks. The findings of the report will enable GDN's to understand the value and benefits of the prototypes trialed.

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

The cost of rollout would include the purchase of any equipment that would be developed, along with any necessary training

### **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 trialed 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**

The information collected through the project will be directly applicable to other gas distribution networks in terms of preparing a PE joint for electrofusion. The process of electrofusion is consistent across the GDN's and as such the findings will be directly applicable to the other gas networks.

#### **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