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## NIA Project Registration and PEA Document

### Date of Submission

Mar 2018

### Project Reference Number

NIA\_SGN0118

## Project Registration

### Project Title

High Volume Gas Escapes (Stage 1)

### Project Reference Number

NIA\_SGN0118

### Project Licensee(s)

SGN

### Project Start

March 2018

### Project Duration

0 years and 11 months

### Nominated Project Contact(s)

Hector Salgado, Innovation Project Manager

### Project Budget

£156,600.00

## Summary

The aim of this project is to produce a range of options across several technology readiness levels (TRL) which will form the 'toolbox' of the project's name, in order to allow SGN to select a particular tool dependent on the type of leak encountered.

### Nominated Contact Email Address(es)

sgn.innovation@sgn.co.uk

## Problem Being Solved

SGN currently deals with high volume gas escapes through applying one of a range of temporary solutions, which avoids contact with the pipe or intervention on the leak by Gas Operatives, as capturing the gas in a confined area (e.g. in the pit) increases the risk from explosions. Such gas escapes also have the potential to provide significant disruption in supply to customers. In effect, there are 3 issues that need responding to:

1. Loss of gas.
2. Ensuring continuation of supply to customer.
3. Removing risk of explosion/injury to the public and operatives.

The eventual aim of this project is to produce a range of options across several technology readiness levels (TRL) which will form the 'toolbox' of the project's name, in order to allow SGN to select a particular tool dependent on the type of leak encountered. These options will be devised by undertaking a wide technology review with a firm basis in the operational environment and demands that must be faced. The project includes a validation exercise which will allow for fast-tracking of selected options that are near-field ready.

SGN currently respond to between 1,000 and 1,500 leaks per year (not including interference damage) from PE pipes. Based on

similar information from the other networks, the total UK figure is likely to be around 6,000. Current procedures for the repair of PE gas piping systems (pipes and fittings) only allow cut out and replacement as a permanent repair for a leaking or damaged section.

The ability to apply a permanent repair technique may offer reductions in the time and costs to help undertake repairs to damaged PE piping, as well as providing significant safety benefits for operatives.

The use of permanent live application repair techniques could offer significant cost savings over the current process of an intermediate temporary repair followed by a planned cut-out and replacement (savings of between 35% and 55% may be realised using alternative, first time, permanent repair techniques).

## Method(s)

This project aims to provide a solution which can quickly and effectively repair a leaking pipe at the leak's source. This project will therefore seek to identify and develop a number of prototyped options for responding to high volume gas escapes from low pressure pipelines.

The work outlined in this proposal is focused on Low Pressure Pipes (up to 2 bar), but will ideally also be appropriate for Medium Pressure Pipes (up to 7 bar). This encompasses both metallic and PE pipes, and diameters of 63mm to 1200mm / 48".

The work has been divided into 2 primary sections:

- **Idea Generation:** ideas will come from improvement or adaptation of current practice, transferring ideas from other industries, and through blue-sky thinking. It is believed that ideas from the offshore sector, along with marine, nuclear and water, may provide a useful starting place for this work. The work will generate solutions for (i) making safe the work space (ii) controlling the amount of gas lost (iii) minimizing the amount of gas lost, (iv) safely stopping gas loss. It will however place an emphasis on technologies and methods for safely stopping gas loss.
- **Idea Validation:** Feasibility Assessments – both technical and commercial – will be carried out on the long-list of ideas that are developed. This work will lead to recommendations for further work, and will provide the opportunity to 'road test' or 'validate' a select number of concepts.

## Scope

This stage of the project is focused primarily on concept development. The stage will examine solutions for making the workspace safer, controlling and minimising the amount of lost gas, as well as safely stopping gas loss. The scope of this work will incorporate five phases:

- Conceptual grouping
- Concept generation
- Concept longlisting
- Prototype and validation

## Objective(s)

The specific objectives for this project are:

- Confirm the challenges of the solution.
- Develop a screening process to choose the most appropriate techniques to move forward.
- Provide a full view of the solution 'landscape' (idea generation).
- Outline a long list of solutions (initial screening).
- Carry out an Engineering Screening Process to determine the initial feasibility of the long list.
- Recommend a short list of solutions to be taken forward with appropriate costings.
- Carry out a validation exercise, looking at getting rough prototypes into the field and understanding their benefits and challenges.

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

n/a

## Success Criteria

The success criteria for the project is as follows:

- Initial feasibility assessment of potential repair systems.
- Prototype generation and laboratory testing of conceptual designs.

- Validation exercise to physically test key concepts.
- Submission of final project report outlining recommendations for Stage 2, involving completion and approval of SGN/PM/G/23 and field trial plan.

### **Project Partners and External Funding**

n/a

### **Potential for New Learning**

n/a

### **Scale of Project**

At this stage of the project, the work completed will be a desktop exercise. If the project progresses to field trials, these will take place at a selection of sites across SGN's network. The visits will allow SGN to assess the benefits of this innovative project and deliver learning as outlined above.

### **Technology Readiness at Start**

TRL2 Invention and Research

### **Technology Readiness at End**

TRL3 Proof of Concept

### **Geographical Area**

This project will be undertaken off-site by Steer Energy Solutions at their premises.

### **Revenue Allowed for the RIIO Settlement**

During RIIO-GD1 it is estimated that SGN will spend approximately £255.7m and £209.6m on emergency and planned repairs respectively on all metallic mains. As this project is the development phase of the overall project to raise the TRL level, the full potential savings that could be achieved under RIIO-GD1 will be determined upon completion of this stage.

### **Indicative Total NIA Project Expenditure**

The total project expenditure will be £156,600 90% of which is allowable NIA expenditure (£140,940)

## 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)

As this project solely focuses on the feasibility study of the technology it is difficult to quantify the potential financial benefits at this stage.

It is envisaged that deployment of this technology would lead to financial benefits in the following areas:

- Avoided/Reduced Public Reported Escapes and associated costs; including excavation and reinstatement.
- Risk reduction and risk management demonstration.
- Leakage reduction within the national leakage model.
- Have the potential to extend asset life and provide an alternative to full direct replacement.

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

N/A - This is a research project.

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

High volume gas escapes are often time-consuming and costly to fix. Repairing the pipe is usually deemed unsafe, meaning that the pipe surrounding the leak must be replaced. The method proposed in this project aims to allow for safe repair of the leak, thus removing the need for replacement work and using fewer operatives, taking less time and with a lower expense.

At this stage of the project, SGN and its partner aim to explore the various options for solving this problem; the results of which will be detailed in a Final Report, which will be made available to the other Network Licensees.

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

There are no costs associated with sharing the conclusion and recommendations of this study with the other Network Licensees, which will be the first step towards roll out across GB. The very early technology readiness level means that it is not possible to estimate the costs of deployment at this stage.

### 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

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 on the Smarter Networks portal, allowing the network licensees to make informed choices as to whether to invest in this technology.

This will then allow Network Licensees to analyse internally where they foresee the benefits and whether they outweigh the costs and disadvantages of current methods of addressing localised corrosion on metallic mains.

### 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