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NIA Project Registration and PEA Document

Date of Submission

May 2020

Project Reference Number

NIA_SGN0141

Project Registration

Project Title

Stent Bag 2

Project Reference Number

NIA_SGN0141

Project Licensee(s)

SGN

Project Start

June 2020

Project Duration

1 year and 11 months

Nominated Project Contact(s)

Alex Stewart, Innovation Project Manager

Project Budget

£942,431.00

Summary

Damage or failure of a pipeline or a gas main can lead to a significant escape of gas, a loss of supply and incur a significant financial cost with considerable environmental damage and inconvenience to both gas customers and members of the public.

This project is a continuation of the NIA project Stent Bag (NIA_SGN0031) which focused on metallic pipe 4" and 6", where this project Stent Bag 2 will be designed for use on PE gas pipe (90mm to 355mm diameter at pressure up to 4bar) and metallic gas pipe (up to 12" diameter at pressure up to 2bar).

The project aims to develop a method to ensure our Operatives and others affected can safely and remotely deal with the main failure whilst maintaining the gas supply to customers.

Nominated Contact Email Address(es)

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Problem Being Solved

Damage or failure of a pipeline or a gas main can lead to a significant escape of gas, a loss of supply and incur a significant financial cost with considerable environmental damage and inconvenience to both gas customers and members of the public. Depending on the extent of the failure, the first choice option for dealing with third party damage is to try to maintain the gas supply to customers and minimize the risk to both our Operatives and anyone else in the vicinity

The current method for achieving this is to temporarily repair/control the leaking pipe with a repair clamp and/or sandbags and then construct a bypass around the damage, subsequently cutting out or permanently repairing the damaged section. The caveat to this method is that it on most occasions this must be carried out within a critical time window before too much gas escapes through the damaged pipe and a loss of supply occurs. If the supply is lost in this way, air can be drawn into the gas system which can create potentially explosive atmospheres within the network. Therefore, often the only available method for safely dealing with network

damage is to stop the supply to the affected area until the damage has been remediated. This can be done either by total isolation or by flowstopping and bypassing the affected area. Both are costly and time consuming.

This project is a continuation of the NIA project Stent Bag (NIA_SGN0031) which focused on metallic pipe 4" and 6", where this project Stent Bag 2 will be designed for use on PE gas pipe (90mm to 355mm diameter at pressure up to 4bar) and metallic gas pipe (up to 12" diameter at pressure up to 2bar).

Method(s)

The project aims to develop a method to ensure our Operatives and others affected can safely and remotely deal with the main failure whilst maintaining the gas supply to customers.

Scope

The scope of this project is to design, develop and test an innovative stent bag system that can remotely stop the escape of gas whilst maintain gas supplies during high volume gas escapes and reduce the potential loss of supply to customers on PE gas pipe (90mm to 355mm diameter at pressure up to 4bar) and metallic gas pipe (up to 12" diameter at pressure up to 2bar). The project will:

- Design concepts for the 4 project streams – 8" metallic, 10-12" metallic, 90mm-180mm PE and 250mm – 355mm PE
- Design and complete offsite testing of all four concept prototypes to ensure their performance and fitness for purpose
- Design and build final prototypes for all four streams which will be tested in live environments
- Produce a final project report detailing all the project outputs and providing conclusions and recommendations as to the fitness for use of the equipment.

Objective(s)

The aim of this project is to design and field trial prototype pieces of equipment that will facilitate the repair of a damaged gas main whilst maintaining the supply of gas with focus on PE gas pipe (90mm to 355mm diameter at pressure up to 4bar) and metallic gas pipe (up to 12" diameter at pressure up to 2bar). The objectives of the project are:

- Produce concept designs to be evaluated
- Produce a report recommending which concepts are viable, highlighting and potential gap actions to move forward
- Produce initial prototypes and Testing equipment.
- Produce test programme to be evaluated and agreed to provide suitable evidence of equipment performance and usability
- Produce a report detailing the suitability of the 4 prototypes
- Produce the final field trial prototype and evaluate the equipment in a live environment
- Produce a final detailed report providing conclusions and recommendations for the equipment developed during the project.

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

Success Criteria

The following success criteria for the project include the completion of:

- Concept design are suitable for use on the Network
- Offsite testing of initial prototypes prove their fitness for purpose as a temporary repair method on the live gas Network.
- Live field trials of prototypes prove their fitness for purpose as a temporary repair method on the live gas Network.
- Final detailed project report delivered with conclusions and recommendations as to the fitness for purpose, performance and usability of the equipment.

Project Partners and External Funding

Sarco Stopper

Potential for New Learning

This project looks to continue to the learning from stage 1 NIA project Stent Bag (NIA_SGN0031) which focused on metallic pipe 4" & 6", by developing a method of responding to gas escapes on PE gas pipe (90mm to 355mm diameter at pressure up to 4bar) and metallic gas pipe (up to 12" diameter at pressure up to 2bar).

Scale of Project

The project involves carrying out designing a prototype and testing on a field trial on a site. This will focus on PE gas pipe (90mm to 355mm diameter at pressure up to 4bar) and metallic gas pipe (up to 12" diameter at pressure up to 2bar).

Technology Readiness at Start

TRL2 Invention and Research

Technology Readiness at End

TRL7 Inactive Commissioning

Geographical Area

The project will be carried out at both Sarco Stopper and SGN office and offsite locations in both Scotland and Southern Networks

Revenue Allowed for the RIIO Settlement

If the project is successful, the developed solution has the potential to improve the response to high volume gas escape incident by improving the safety of the operation, removing personnel from risk areas, securing downstream supplies and improving performance.

Indicative Total NIA Project Expenditure

The total project expenditure is £ 942,431, 90% (£ 848,187.9) of which will be recovered via the NIA funding mechanism in line with the funding conditions.

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)

It is expected that if successful this project could provide Network Licensees with an opportunity to use the Stent Bag system in major incidents would have the following financial benefits:

- Improvements in the loss of downstream pressures.
- Reduction in disruption to customers, reducing failure to supply payments and also customers' costs due to loss of business during supply loss.
- A reduction in the amount of time taken to resolve the incident, reducing failure to supply payments and man hours required to resolve incident.
- Minimising the disruption to current operational activities and limiting the need for displacement of resources.
- Minimise the amount of gas to atmosphere.
- Improvement of practices to safeguard operatives undertaking repairs.

Please provide a calculation of the expected benefits the Solution

In the past five years SGN have had 48 incidents that have resulted in fires and explosions and a total of 187 high volume gas escapes. These incidents result in a loss of downstream supplies to customers. The period of loss is variable, but has an effect not only on our customers but also on our planned work as; inevitably, additional resources are required to make the situation safe before re-establishing the supplies.

Utilising the stent bag will require less resources being deployed as the system will secure supply downstream resulting in substantial cost savings and decreased disruption to our customers and stakeholders.

The costs analysis indicates a total saving of £328,880 per annum.

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

All 4 gas networks are exposed to various stakeholders and environments that can damage our assets. Through 3rd party accidents or from issues on our network may result in high volume gas escapes. These gas escapes are uncommon over our network with an average of approximately 42 incidents per year on average in SGN networks. These incidents do, however, pose a severe risk to individuals and infrastructure in their vicinity, due to the volume of gas released and the manpower required. They also have the

potential to significantly disrupt supply to customers resulting in interruptions to supplies for extended periods.

On the basis of the 4:2:1:1 it is estimated that Stent could be used on 168 incidents in GB. The stent bag solution offers a safe and more efficient alternative that maintains security of supply to our customers downstream. The Stent equipment allows operatives to remotely isolate the section of main to be worked on in a safe environment; out with the hazardous area of the escape itself.

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

Until the product is developed fully, it is difficult to determine an accurate price for the roll out of the equipment. Further development through this project will enable assessment of the cost of the equipment and costs associated with its deployment.

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

After the trials have been carried out SGN will be able to share the findings from the evaluation of the Method and highlight any advantages of utilising this technology as opposed to the current working practice for network pressure support in the event of mains damage. The learning from this project will benefit Network Licensees as it will provide them with a clear evaluation of current techniques for dealing with loss of supply during incidents against the new Stent Bag system.

If successful, the learning from the project (new system development and evaluation of trial results) will allow Network Licenses to make informed decisions on the introduction of this equipment into their operational activities. Where introduced, the learning will enable them to begin accurately measuring the reduction in the volume of gas released to atmosphere as well as determining the potential improved impact it has on customers.

The outputs will be presented in a clearly defined report that will be available to the Gas Networks on request, this will allow the GDN's to make informed choices as to whether to invest in this technology.

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

Within the innovation strategy key 'Innovation Themes', this project primarily addresses 'Safety and Emergency'.

- 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.

A review has been made of all other Network Licensees and no other similar projects have been carried out.

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

It has been identified that the available options for carrying out repair on PE and metallic pipe has limited options and a new proven technique would be beneficial to all the Networks now and in the future.

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

The high-level conceptual design this initial work will determine the scale and applicability of any further research and development required. This uncertainty prevents this from being funded as a business as usual activity.

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

A review of all other Network Licensees Innovation Funding Incentive Annual Reports and NIA portfolios has been performed and no similar projects have been identified.

This project has been approved by a senior member of staff

Yes