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

Aug 2015

Project Reference Number

NIA_SGN0070

Project Registration

Project Title

Magnetic Filtration in Medium to Low Pressure Networks

Project Reference Number

NIA_SGN0070

Project Licensee(s)

SGN

Project Start

August 2015

Project Duration

1 year and 7 months

Nominated Project Contact(s)

Nancy Thomson, Innovation Project Manager

Project Budget

£80,433.00

Summary

The Scope of this project is to investigate the latest developments in Magnetic Filtration Technology for use on SGN's plant. This would allow the potential for utilising more cost effective methods of gas filtration on the network pressure regulating stations, with the potential to remove the restriction on Low Pressure networks, returning the systems to their full operating parameters.

Nominated Contact Email Address(es)

sgn.innovation@sgn.co.uk

Problem Being Solved

SGN have a number of medium to low pressure systems which suffer from issues with mains dust. These issues result in the network running at a reduced performance level.

The occurrence of mains dust in the inlet filter at peak demands can reduce the output of the regulator. To ensure the network is maintained at the correct pressure, additional site visits are required to exchange filter elements. This is a costly process for the Gas Distribution Networks (GDNs) and puts restraints on the outputs of the pressure regulators and their performance. On a number of occasions, dust has passed through to the low pressure network and into customer's appliances, which has resulted in compensation claims being filed against GDNs. Currently, medium pressure mains in these areas are restricted to operate at a velocity of 20m/s to reduce the disturbance of mains dust. Operating at these reduced velocity can restrict the capacity of these assets.

Profile control systems are predominately installed on medium to low pressure networks with the objective of optimising the network and minimising leakage. This has been achieved on a number of networks but further improvements are possible. The profile operating system allows for automatic adjustment of the source pressures to maintain the low point at its optimum pressure. This alters the pressure and flow as demand increases. The large volumes of mains dust that can gather in the main filters currently prevent the profile system from reducing its average low pressure network on high demand loads, requiring frequent filter changes to ensure the network system meets its low point requirements.

Method(s)

The aim of this project is to more efficiently and effectively manage the removal of mains dust that occurs in the network equipment by providing an alternative method for collection. This has the potential to increase the efficiency of the system and reduce the need for multiple site visits.

Three magnetic filter elements will be installed into existing filter elements on the Bournemouth and Poole networks. The new prototype devices will be the most common types of filter elements presently used on these networks.

- The new Method will result in fewer site visits, resulting in a saving in man hours required for maintaining the existing filtering system
- Installing of the new filter elements will increase the regulator capacity, and improve the performance of the site.
- The innovation could replace standard filter elements, which have a limited life span when subjected to large volumes of mains dust.
- By improving the performance of the existing filter units would potentially give a further reduction in SGN's Low Pressure networks, and improve our overall system.
- If successful this could be adopted into SGN'S restricted networks and could open up opportunities to further develop a range of filter elements that may be of benefit in other applications.

Scope

The Scope of this project is to investigate the latest developments in Magnetic Filtration Technology for use on SGN's plant. This would allow the potential for utilising more cost effective methods of gas filtration on the network pressure regulating stations, with the potential to remove the restriction on Low Pressure networks, returning the systems to their full operating parameters.

Objective(s)

The objectives of the project are to:

- Prove that Magnetic filtration technologies can be adopted into SGN's activities.
- Show the potential to return the network capacity on restricted networks increasing the efficiency of maintaining these systems and improve the life of the asset.
- Consolidation and updating of existing SGN specifications for the use of magnetic filtration in the network.
- Reduce the number of standard filter elements required to maintain system pressures.
- Create a new SGN Policy approval of the new specification to allow their use within the network, to provide a safe and efficient cost effective solution, and the likely reduction in filter element waste disposal could both improve efficiencies and productivity.
- Return the asset to its original performance, the site capacity restriction could be removed, thus improving the average system pressures.

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

Success Criteria

The success criteria for this project are to trial and test the new magnetic filtering system and methods in our existing filter elements. The project will be determined to be a success if the following is achieved:

- Compatibility assessment of magnetic filtration technology and products with particular consideration to durability, practicality of application and price on all SGN assets.
- Risk assessment and gap analysis of relevant industry and SGN standards and specifications.
- Completed review of current specifications including assessment of current practice suitability in relation to new technology.
- Draft a new specification incorporating applicable new technology.
- Completed technical report on results, findings and comparisons between new and existing elements.
- Carry out off site mechanical appraisals and on site field trials.
- Compare the existing performance of the regulator against the newly installed system.
- Create comparison of the number of site visits required compared to traditional methods.
- Provide technical reports against existing and new filter systems and their successes rate.
- Produce a Maintenance Work instruction that reflects the applications and methods, in SGN's SMF format, equipment and the applications techniques required.
- Share the learning of this project with the other Network Licensees.

Project Partners and External Funding

n/a

Potential for New Learning

n/a

Scale of Project

The project will involve three SGN regulator sites, covering a selection of affected systems. This gives the opportunity to field trial this technology in multiple areas and therefore give confidence that it is fit for purpose across the network.

- The field trial will take place on the Poole and Bournemouth low pressure network and will be on the minimum number of sites.
- The project will focus on the affected network to maximise the outcome and impacts of this project.

Technology Readiness at Start

TRL4 Bench Scale Research

Technology Readiness at End

TRL8 Active Commissioning

Geographical Area

All off site trials will be carried out by Cairndon using their existing designs and developments on previous applications that have been tested and are in operational use in Europe. The live field trials will be undertaken on three existing regulator locations in SGN's Southern network, specifically in the Poole and Bournemouth areas.

The testing will only be required in SGN's network as the filtration systems are common across all DN's.

Revenue Allowed for the RIIO Settlement

The cost of this maintenance activity, for the remainder of RIIO-GD1 is currently estimated at £59,790 per annum for SGN. This is the cost to maintain the filter elements and ensure the assets are performing correctly.

Indicative Total NIA Project Expenditure

2015/16

Totex (Opex) of £60,331

Uplifted Costs of £80,433

Recoverable Costs Through NIA of £72,390

Net Cash flow of £12,059

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 this project could provide Network Licensees with an opportunity to make cost savings on the reduction in filter maintenance inspections under high load conditions. Therefore, a net financial benefit to customers, as a result of the improvements made to the existing method of maintaining the integrity of the network equipment.

Please provide a calculation of the expected benefits the Solution

The current maintenance activity for these six sites is estimated to cost SGN£59,789 per annum.

There are nine SGN networks that currently have restricted flow rates including Bournemouth and Poole, based on the present operating cost of this system. The likely cost for maintaining the affected networks is in the region of £206,800per annum.

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

Present cost.

Bournemouth and Poole network has some 45 regulators in operation 6 of these suffer from severe mains dust problems, there are a further 12 sites that also have large arising of mains dust. The cost of maintaining these 6 sites at present is £59,789.00 a year

- 2 site visit per day at peak loads.
- 6 sites over a 12 week period = £3,780.00 per week.
- Cost cleaning filters 4 per week £60.00 x 12 weeks = £720.00
- 12 week load period £3,780.00 x 12 weeks = £45,360.00
- Replacement filter elements £ 593.00 x 12 weeks = £ 7116.00
- Non Routine Operations a year to maintain defective inlet valves = £ 6,593.00
- Total ongoing yearly cost £59,789.00

Predicted cost savings based on six sites.

- 1 visits per 6 sites over a 12 week period. £3,780.00 - £3,240.00 = saving £540.00

- Reduced cost of cleaning filters 2 occasions over a 12 week period. £720.00 -£ 660.00 = saving £60.00
- No filter element costs = saving £ 7,116.00
- No Non Routine Operations = saving £ 6,593.00
- Present yearly cost £59,789.00 - £14,969.00 = £ 44,720.00. Year on year saving.

This project has been designed to develop potential solutions to the high volumes of mains dust that can occur on high flow periods. Therefore, it can be assumed that this project shall provide Network Licensees with the opportunity to transfer the benefits of the Magnetic Filtration Technologies and techniques and apply them into their businesses.

It can also be assumed that each network may have a high mains dust problem on old network systems making the assumption that each will have at least six sites that have similar arising of dust as SGN. Based on a 4:2:1:1, the potential saving could be as follows:

National Grid - 12 sites = £89,440 saving

Northern Gas Networks – 6 sites = £44,720 saving

Wales & West Utilities - 6 sites = £44,720 saving

SGN Networks - 6 sites = £44,720 saving

Overall the total saving across GB per annum could be in the region of £223,600 year on year.

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

Excluding the cost of purchasing the equipment, it is anticipated that the cost of disseminating the development outcomes and findings from the project and training costs incurred before the product can be used would be approximately £8,500 for SGN. Based on a 4:2:1:1 the estimated total cost of training before the equipment can be used operationally throughout GB would be £34,000.

This estimate is based on the following assumptions: Four training courses for 12 people are provided for each Network Licensee from the Manufacturer to provide in four separate locations across their network with an allowance for travel included, and approximate costs for one practical demonstration of the equipment by SGN for representatives from each Network.

It is anticipated that there after each Licensee would have their internal training departments carry out further training once the initial training program from the product manufacturer to a selective proportion of their workforce has been carried.

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

The new filtration systems could have the potential to remove flow restrictions on networks that have high volumes of mains dust occurrences.

The learning from this project will benefit Network Licensees as it will provide them with a clear evaluation of the new potential gas filtration products. If successful the learning from the project will allow Network Licensees to make informed decisions on adoption the new technologies

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

Large occurrences of mains dust that arise in network filter equipment have the potential to reduce the capacity of the site and restrict its performance. By providing an alternative method for extracting large volumes of mains dust, this has the potential to increase the efficiency of the system and reduce the need for multiple site visits required to keep the site operating. Better outputs for the site could be achieved as flow restriction would be removed allowing a more efficient operating system.

☑ 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