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

May 2017

Project Reference Number

NIA_NGGD0098

Project Registration

Project Title

Serviboost Phase 2

Project Reference Number

NIA_NGGD0098

Project Licensee(s)

Cadent

Project Start

May 2017

Project Duration

2 years and 3 months

Nominated Project Contact(s)

Mark Edwards – Project Sponsor – National Grid Adam Hassall – Project Manager - National Grid Wez Little – Project Supplier – Synthotech Ltd

Project Budget

£847,313.00

Summary

The following are included in the Scope for Phase 2;

(1) Development of TRL8 Serviboost Solution

a. Development of Serviboost Solution to meet performance criteria on pressure uplift (5mbar) and battery life (1 week and 3 Months)

b. Manufacture of Serviboost units

c. Validation Trials

d. Prototype Tooling for Serviboost

(2) Determine impact on Standards and operating procedures

a. Review and Gap Analysis

b. Support generation of G23

c. Technical reporting during the trials

d. Compliance and Data Folders

(3) Operative training for safe Installation of Serviboost

a. Training needs analysis

b. Work Procedures

Nominated Contact Email Address(es)

Innovation@cadentgas.com

Problem Being Solved

Gas Distribution Network Operations (GDNO's) have a license obligation to maintain pressures to the ECV of a property.

Design minimum pressure for low pressure systems shall be no lower than:

-19mbar for systems designed pre January 1996

-20.75 mbar for systems designed post December 1995

Low gas pressures are evident when the gas supply to a customer's property fails to meet the minimum pressure required to keep their appliances functioning correctly. There are numerous causes for low pressure and the impact of low pressures often results in a customer's gas supply being interrupted until a resolution has been identified and resolved.

It is important to minimize the length of an interruption to our customers by identifying a solution that can be installed promptly with minimal disruption and allow work to resolve the root cause of the poor pressure to be resolved as a planned event rather than unplanned.

National Grid estimate that in the last financial year, 4,875 recorded instances of poor pressure where caused by service construction; this is the size of opportunity to fit a Serviboost unit to provide planning and scheduling time to re-configure the service.

In order to address the poor pressure problem, detailed above, Synthotech have approached the required work in two distinct phases. The first stage was completed under NIA-NGG0057 commenced in October 2015 and was completed in December 2017. It successfully proved that a concept device could be developed to TRL4 that could provide a solution to overcoming pressure losses of up to 5 mbar on services without creating a negative effect on the mains pressure.

Method(s)

Phase 2 of the project is to develop the current prototype Serviboost pressure compensating unit from TRL4 to TRL8. This phase is to be conducted in three specific stages that will prove the viability of the solution in laboratory, simulated and real environments.

Phase 2 will address the remaining technical and operational challenges;

(1) Develop Phase 1 TRL4 prototype to a pre-commercialised TRL8

(2) Compliance

(3) Power duration

4) Pressure Uplift - ≥5 mbarg

(5) Unit Size, Fitment and Cost

(6) Cost Benefit associated to reduction in unplanned interruptions and flexibility of operational work force

This will development with provide NGGDL with alternative innovative solution in addressing low gas pressures in domestic service pipes, focusing on shorter interruption periods for our customers without the need to alter the network design infrastructure or elevating gas operating pressures. This solution is not intended to be a resolution to the root cause of the pressure loss, but will allow the work to be scheduled at more convenient and planned times for all parties affected, keeping the impact to the customer to an absolute minimum.

To address the above six challenges, the following work packages will be undertaken by Synthotech with operation support from

NGGDL.

- Serviboost development - Mechanical (Housing / Body and Fan blade)
- Serviboost Intelligence development – Electronic (Motor, Control, operating limits and Sensing)
- Efficiency and Power Mgt – 1 week and 3 month duty cycles
- Fitment and Engineering Challenges
- Trials and Verification
- Standards and Compliance
- Commercialisation flight plan
- Data capture and optimisation

It is not proposed to investigate during Phase 2 if the unit could be fitted as a long term solution ≤12 months or a permanent solution

Scope

The following are included in the Scope for Phase 2;

(1) Development of TRL8 Serviboost Solution

a. Development of Serviboost Solution to meet performance criteria on pressure uplift (5mbar) and battery life (1 week and 3 Months)

b. Manufacture of Serviboost units

c. Validation Trials

d. Prototype Tooling for Serviboost

(2) Determine impact on Standards and operating procedures

a. Review and Gap Analysis

b. Support generation of G23

c. Technical reporting during the trials

d. Compliance and Data Folders

(3) Operative training for safe Installation of Serviboost

a. Training needs analysis

b. Work Procedures

Objective(s)

The objective of Phase 2 are as follow are as follows;

- Design and Development of a TRL8 working prototype (pre-commercialised)
- Manufacture of fully functioning Serviboost units to permit field trials to be undertaken
- Determine Installation challenges
- Undertake trials – Laboratory, Simulated and ‘Live’ Trials
- Development of data folders to provide a flight plan for commercialisation
- Data collection – Performance, Efficiency, Function of the Installed Serviboost Unit

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

Success Criteria

The project is deemed successful if, the products and end to end processes are developed that;

- Meets the requirements of the project objectives
- Achieves technology readiness level as detailed in the project scope

Project Partners and External Funding

The project is fully funded by the NIA mechanism
External - £648,781
Internal - £133,610
Contingency - £64,922
Total - £847,313

Potential for New Learning

This project will result in new learning that can be applied by all Network Licensees regarding the possibilities of the Servi-Boost device. This new learning will be in the form of an output report which can be shared with all Network Licensees and other interested parties

Scale of Project

The project will be conducted under controlled conditions (G23) and as a result there will be a limited number of trials. This approach is designed to prove the technology is validity of reaching TRL8.

Technology Readiness at Start

TRL4 Bench Scale Research

Technology Readiness at End

TRL8 Active Commissioning

Geographical Area

The technology will be trialed across the NGGDL network, once developed the technology will have the potential to be used across the UK gas industry.

Revenue Allowed for the RIIO Settlement

No Revenue Allowed for in the RIIO Settlement.

Indicative Total NIA Project Expenditure

£847,313 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)

Estimated NGGD annual saving= £698,750

Please provide a calculation of the expected benefits the Solution

NGGD assumptions;

- Applicable task types per year- 5250 (poor pressure data 2015/2016)
- Unit cost £300
- Saving per installation- £215 (based on reduction in unplanned interruptions and increase in operational efficiency)

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

This Method could be applied by all Network Licensees if successful, it could be utilised wherever low pressures exist in isolated situations of poor pressure as a result of historic service construction.

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

Roll out cost will consist of equipment hire or purchase, training cost and the costs associated to change of documentation and policies.

It is expected that the cost of the unit will offer a ROI within the first 10 uses based on current analysis associated to the cost of the current methodology of dealing with unexpected low pressure incidents.

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

Learning generated will be in the form of an output report and demonstration, which will articulate the success of the project. This output report can be freely shared for use by all relevant Network Licensees.

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.

This project has not been carried out by any other UK Gas Transmission or Gas Distribution group. Synthotech own all foreground IP prior to the commencement of Phase 1 and have sought to patent the technology.

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