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

Feb 2015

Project Reference Number

NIA_NGN_111

Project Registration

Project Title

T-Shale Part Two (Summer Flow Modelling)

Project Reference Number

NIA_NGN_111

Project Licensee(s)

Northern Gas Networks

Project Start

January 2015

Project Duration

3 years and 1 month

Nominated Project Contact(s)

Dan Sadler (Head of Head of Energy Futures) & Chris Barron

Project Budget

£98,450.00

Summary

The project scope has been broken into four sections:

1. Prove the accuracy and suitability of ultrasonic flow meters

An important component of this project will be to demonstrate the accuracy and suitability of ultrasonic flow metering foe low flow conditions. This will be achieved by requiring suppliers to demonstrate and prove the accuracy of their product against existing fiscal metering apparatus, and on a test rig under laboratory conditions.

2. Install flow meters and collect demand data for the low flow summer conditions 2015/2016

Network analysis has identified a number of suitable locations across the network, which will provide a representative cross section of community archetype which can be extrapolated across the gas distribution networks. Flow meters will be installed at these locations during the low flow demand periods of summer 2015 and 2016 to log and record actual low demand flows, to be used in recalibrating the network modelling software

3. Recalibrate the network flow modelling software

The data gained from the actual summer flows will be fed into the model. At present the model assumes low demand flows of 0.5% - 1.5% of peak demand. The actual flow data will allow the theoretical assumptions in the software modelling for low demand flows to be recalibrated to represent the actual flow data.

4. Validate the developed network follow modelling software against actual flow data summer 2017

Further flow meters will be installed during the low flow demand period of summer 2017 to validate the calculated flows from the recalibrated software model against actual flow data. This will prove the accuracy of the recalibrated software model.

Nominated Contact Email Address(es)

innovation@northerngas.co.uk

Problem Being Solved

There has been an increase in potential production of on-shore unconventional gas sources GB in recent years. This brings potential benefits in terms of security of supply, facilitation of the transition to a low carbon economy and direct customer benefit from access to the wider energy market. However, there are significant challenges to address if these benefits are to be realised Key amongst these is how GB's gas transportation system and the associated commercial and regulatory framework can be most efficiently utilised, developed and operated to support these developments

One major challenge that needs addressing is establishing accurate low flow demands across the UK distribution networks. This is needed to provide unconventional gas developers with robust gas demand data to help inform their investment decisions and network entry agreements. The "as is" position is that network analysis uses proprietary modelling software based on peak gas demand, which makes mathematical assumptions of both flow and pressure to calculate capacities at differing demand scenarios. Whilst the gas flow through the network has come entirely from the NTS, low flow conditions haven't needed to be accurately established, as the main criteria for the network design is the high flow conditions. However, the onset of unconventional gas sources requires distribution network operators to provide developers with accurate, robust flow and pressure data for all operating scenarios. Distribution network operators need to develop their existing network analysis methodology to establish the true network capacity to determine the safe, efficient and acceptable profiles for injection rates from unconventional gas producers in advance of sanctioning applications for network entry agreements.

In 2014 NGN's were unsuccessful in their NIC 'T-Shale' project bid. OFGEM requested that the original NIC bid should be broken down into smaller more manageable NIA projects. This project is the second of three smaller NIA projects.

Method(s)

Northern Gas Networks will lead a phased programme of works to develop the existing flow modelling software to provide accurate, robust flow demand data for low flow (summer) operating conditions. This will be achieved by undertaking the following programme of works:

Phase 1 – Trialling ultrasonic flowmeters to confirm accuracy and suitability for measuring low flow network operating conditions

Phase 2 - Identifying suitable locations within the NGN network to provide a representative cross section of the community architecture across the NGN network

Phase 3 – Installation of flow meters at the locations identified to provide actual flow data during summer (low flow) operating conditions

Phase 4 – Utilising the actual low flow data gained from the flow metering phase to develop the existing flow / demand modelling software

Due to the scale and value of the project it is proposed that Northern Gas Networks undertake the delivery of Phase 1 and will then invite other GDN's to collaborate in delivery of phases 2 – 4 of the overall project scope.

Scope

The project scope has been broken into four sections:

1. Prove the accuracy and suitability of ultrasonic flow meters

An important component of this project will be to demonstrate the accuracy and suitability of ultrasonic flow metering foe low flow conditions. This will be achieved by requiring suppliers to demonstrate and prove the accuracy of their product against existing fiscal metering apparatus, and on a test rig under laboratory conditions.

2. Install flow meters and collect demand data for the low flow summer conditions 2015/2016

Network analysis has identified a number of suitable locations across the network, which will provide a representative cross section of community archetype which can be extrapolated across the gas distribution networks. Flow meters will be installed at these locations

during the low flow demand periods of summer 2015 and 2016 to log and record actual low demand flows, to be used in recalibrating the network modelling software

3. Recalibrate the network flow modelling software

The data gained from the actual summer flows will be fed into the model. At present the model assumes low demand flows of 0.5% - 1.5% of peak demand. The actual flow data will allow the theoretical assumptions in the software modelling for low demand flows to be recalibrated to represent the actual flow data.

4. Validate the developed network follow modelling software against actual flow data summer 2017

Further flow meters will be installed during the low flow demand period of summer 2017 to validate the calculated flows from the recalibrated software model against actual flow data. This will prove the accuracy of the recalibrated software model.

Objective(s)

The objective for Phase 1 of the project is to demonstrate the suitability and accuracy of ultrasonic meters for use on the UK distribution networks.

The objective for Phases 2 to 4 of the project is to work collaboratively with the other GDN's to develop the existing network demand software model to provide accurate, calculated low flow data across the network. This will allow the networks to provide unconventional gas developers with robust, year round, demand data to allow investment decisions and de-risk entry connection contracts.

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

Success Criteria

- Actual low flow (summer 2016/17) demand data will be monitored and recorded
- The existing network flow modelling software will have been recalibrated, utilising actual demand data, to accurately predict demand during periods of low flow demand
- The recalibrated software model will have been validated against actual flow conditions
- The suitability of ultrasonic meters for the measurement of low flows will have been established.

Project Partners and External Funding

n/a

Potential for New Learning

n/a

Scale of Project

The overall project scope will last three years, commencing February 2015 and completing Q4 2017.

Phase 1 of the project will initially undertake field trials and laboratory calibration of ultrasonic flow meters, to demonstrate and prove the suitability of the technology for low flow metering applications. Phase 1 will commence in February 2015 and finish on April 2015

Following the proving of the suitability and accuracy of ultrasonic flow meters in Phase 1 of the project, collaboration will be sought from the other GDN's. Once collaboration has been identified and agreed with the other GDN's, the project will identify suitable points across the NGN network, providing a representative cross section of community archetype, and monitor and record actual flows during the low flow periods of summer 2015 and 2016. The project will review and recalibrate the low flow scenario modelling of the existing flow demand software model, and validate the developed model against actual flow demand during the low flow period of summer 2017.

Technology Readiness at Start

TRL3 Proof of Concept

Technology Readiness at End

TRL7 Inactive Commissioning

Geographical Area

The project will develop and recalibrate the demand modelling software across the whole Northern Gas Network. It is anticipated the summer low flow demand data, although developed in the Northern Gas Network geographical area, will be capable of utilization and extrapolation across all the UK gas distribution networks.

Revenue Allowed for the RIIO Settlement

N/A

Indicative Total NIA Project Expenditure

£98,450

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)

Establishing accurate, robust low flow demand predictions will ensure that inaccurate / over conservative assumptions aren't made when unconventional gas developers are planning to connect to the gas distribution networks. This will ensure that the optimum connection solution is adopted, with an ultimate cost saving to consumers.

Please provide a calculation of the expected benefits the Solution

N/A

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

The actual flow data for low flow periods, by community archetype, will be applicable to all UK gas distribution networks.

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

The information gathered will be made available to all GDN's and IDN's at zero cost.

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 project will log and record actual low flow demand data, catagorised by representative community archetype. This information will be shared with all GDN's to allow them to recalibrate their models to provide accurate, robust low flow demand predictions. This will allow other distribution networks to provide potential unconventional gas developers with accurate demand data to inform investment decisions and de-risk entry connection contracts.

The project will also demonstrate, or otherwise the suitability of ultrasonic flow meter technology for use in the gas distribution networks to measure low gas flows at differing pressure tiers and pipe materials.

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