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

Mar 2020

Project Reference Number

NIA_NGN_260

Project Registration

Project Title

Universal IoT Monitoring

Project Reference Number

NIA_NGN_260

Project Licensee(s)

Northern Gas Networks

Project Start

March 2020

Project Duration

2 years and 1 month

Nominated Project Contact(s)

Keith Owen

Project Budget

£350,503.00

Summary

This project will provide NGN (and as a consequence the GDN's) understanding on how technologies linked to Internet of Things (1oT) can be deployed within NGN Business Environment and retrofitted to existing equipment to deliver improved value proposition for NGNs future digital strategy.

It will ultimately aim to explore IoT Technology and provide evidence for networks to support the transition towards digitalization and demonstrate potential future benefits across a wide range of applications.

Third Party Collaborators

Invisible Systems

Nominated Contact Email Address(es)

innovation@northerngas.co.uk

Problem Being Solved

NGN, as with wider utilities and industry face a variety of threats, directly from the continuous drive to improve the service proposition to customers, delivering shareholder value, maintaining high levels of safety whilst driving down costs, all with the added transitional challenge to decarbonise the gas industry with new gases and technologies.

The move towards digitalisation presents opportunities for NGN explore IoT technology and data can present information in an efficient real time format.

This proposal to explore the opportunity IoT technology can deliver that will provide a future opportunity to support the challenges above and deliver greater flexibility in approach to data metrics across a wide range of applications.

Method(s)

The project will be divided into four stages.

Stage 1: Project Management and discovery phase.

The purpose of this stage is to produce a clear purpose for the project, engage stakeholders and confirm roles, responsibilities and timelines.

Stage 2: Detailed Design

This stage will transform the schematic drawings, outline specifications and project definition into working drawings and specifications.

Stage 3: Project controlled and live trials

This stage will develop the Proof of Concept design, carry out essential testing and continue to develop and refine to establish the new technology at TRL8 [from TRL5]. Deliver all PoC requirements in readiness for field trials.

Develop and run field trial [max 12 syphons and comms hub at NGN district location].

Stage 4: Commissioning & Closing

This stage will complete the rereporting of trial, highlighting successes learning points and future developments for the commercial system to follow, alongside those elements listed left.

Scope

The project scope is as follows:

• To reduce cost of remote monitoring for water level in syphons
• The 'integration' of the differential pressure sensor is included in the project
• Accurate monitoring of differential pressure across the syphon for network intelligence
• Embed and demonstrate edge intelligence within the device to improve reliability of the system
• Extending the battery life of remote devices
• Universal logger for sensing various condition as mentioned
• Improve business continuity and maintain the service to customer
• Provide ‘heartbeat’ communication for ‘no visit required’ status
• Develop a device where the target cost per device to be £550 or less.

Objective(s)

Objective 1
Assess current IoT technology.
Horizon scan IoT technology to provide understanding of supply chain and applicability of technology to NGN.

Objective 2
Develop New IoT capable datalogger
The current technology is at TRL5 and this activity will develop the system to TRL8 and create a new IoT data capture technology for use with the intelligent syphon, capable of both LoRAWan and NB-IoT communications protocols

Objective 3
Develop PoC for new IoT based data capture technology and communications infrastructure.
Understanding the problem, create a new design and PoC alongside a real-world solution design to provide a baseline position at the InTEGReL site from which to determine the most suitable means to deploy the live trial stage and prove the technology.

Objective 4
Create a revised version of the Intelligent Syphon operating with new IoT technology.
The existing Syphon design will be reengineered to incorporate lower cost, IoT data capture technology and communications system and proven at InTEGReL.

Objective 5
Completion of live gas trial with 6 intelligent syphons and communications hub to demonstration overall capability and solution.
The live gas trial of the system will consist of a maximum of 12 revised Intelligent Syphons and new IoT communications hub which will be configured as a ringfenced system to determine water ingress in the chosen area on the NGN network.

In addition, the system will be linked to a newly designed dashboard, hosted by Invisible Systems to show how data can be acquired and managed effectively in a simple to use environment.

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

Success Criteria

• The new Intelligent Syphon design and communications hub is approved for use on NGN's network.

• IoT Device developed to a stage that allows ATEX submission and certification.

• Final solution must not exceed costs for current technology.

• Performance of system must be a step change improvement compared to existing installations.

• The new comms hub must demonstrate a wide range of connectivity.

Project Partners and External Funding

Northern Gas Networks

Invisible systems - £290,059.00

Potential for New Learning

This project will provide NGN (and as a consequence the GDN's) understanding on how technologies linked to Internet of Things (1oT) can be deployed within NGN Business Environment and retrofitted to existing equipment to deliver improved value proposition for NGNs future digital strategy.

It will ultimately aim to explore IoT Technology and provide evidence for networks to support the transition towards digitalization and demonstrate potential future benefits across a wide range of applications.

Scale of Project

The project will progress via two high level stages. Stage 1 will demonstrate capability of the technology with a Proof of Concept device in a controlled environment. Once it has been proven possible that the PoC is effective and suitable for network applications we will progress further.

Stage 2 of the project is a live field trial of the PoC and wider communications hub. In this stage the device will be tested in a live operational environment and will be operated by NGN engineers, supported by Invisible Systems. The actual performance will be measured, and information used to create a technical report to illustrate the benefits and capability for deployment at scale.

Technology Readiness at Start

TRL5 Pilot Scale

Technology Readiness at End

TRL8 Active Commissioning

Geographical Area

The project will be constrained to the Northern Gas Networks geographical area.

Revenue Allowed for the RIIO Settlement

None

Indicative Total NIA Project Expenditure

External Funding £290,059.00
Internal Cost £60,444.00

Total
£350,503.00

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)

The new technology we wish to develop will make use of the 'internet of Things' , which is ultra-low cost and low power. This unlock direct benefits for NGN and what part the widescale sensor deployment. The project will enable a cost reduction in Initial Capex investment and ongoing Opex costs.

The project will enable NGN to monitor network performance at an increased scale and time frame may have a positive impact on operational efficiency, customer interruptions, pressure management and ultimately shrinkage.

Please provide a calculation of the expected benefits the Solution

This project does not fit the standard CBA model at this point in the project development. The development and utilisation of IoT sensors in this discrete use case of intelligent syphons will enable further benefits and potential be unlocked on top of what has already been implemented. Moreover, the wider point in this project is the ability to confirm and demonstrate how this technology can unlock direct benefits for NGN and what part the widescale sensor deployment.
Notwithstanding this, the project will enable a cost reduction in initial capex investment and ongoing Opex. The potential CBA is based on assumptions and has potential to deliver a positive cost benefit per device of approximately £1,000 over a 10 year period. (predicted battery life period).

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

The system could be easily applied and replicable across all GB networks, once successfully developed, tested and accredited

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

he system could be easily applied and replicable across all GB networks, once successfully developed, tested and accredited. The predicted price point for the individual device is lower than current market alternatives, however the actual performance of the units and ability to undertake and increased amount of measurements at lower cost in comparison needs to be assessed to enable a full assessment of typical roll out costs to be understood.

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

Following on from the recommendations from the Energy Data Task Force Review relation to Digitalisation of the energy networks, this low power technology will enable wide scale low cost deployment of sensors support the digitation of the gas network, transition towards a Smart Gas Grid for all GDNs.

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

Reliability and maintenance, Environment & Low Carbon.

☑ 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 thorough check of the Smarter Networks Portal and external technology search has confirmed that this technology does not currently exist or is being actively pursued.

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

Internet of Things sensor technologies present NGN with an opportunity to deliver far higher levels of monitoring [and therefore metrics to the business] at much lower costs than can be achieved with datalogger technologies and connected sensors. Whilst IoT sensor technology exists in other industries, it has not been proven in the gas sector. We will aim to understand the pros and cons of such technologies and what the future options for deployment may exist.

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

New technology that has not been proven before such as in this case carries inherit risks, however the perceived risks can be mitigated with extensive testing and expert know how. The gas networks already have proven ‘market ready’ technology available to them and can complete this task, albeit at an increased cost and less efficiently than we believe may be possible if alternate technology was explored. Projects associated with IoT are at the cutting edge of digital gas network innovation. This project is in the interests of network licensees and is not specific to business as usual operations of the network with no allowance within regulatory business plans.

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

The project would only be undertaken with support from NIA funding, it is in the interests of gas customers, the regulator and the UK government and realization of any benefits are outside the control of the gas networks. There is no allowance in BAU business plans for this type of work and the commercial benefits and technical/operational risks associated with digitization projects such as this are outside the traditional environment of any gas distribution network or its shareholders.

This project has been approved by a senior member of staff

☑ Yes