NIA Project Registration and PEA Document

Date of Submission

Nov 2016

Project Reference Number

NIA_NGGD0087

Project Registration

Project Title

I-0052 Optomole Phase 4

Project Reference Number

NIA_NGGD0087

Project Licensee(s)

Cadent

Project Start

September 2016

Project Duration

1 year and 5 months

Nominated Project Contact(s)

NGGD – Adam Hassall (Lead Network), WWU- David Rees, NGN- Josh Hampshire

Project Budget

£236,937.00

Summary

The scope of the project is to widen the use of the system to four units and fully trained Networks Operatives to field trial pre-production models, learn from feedback and data analysis to improve final systems. This will also allow the development of training material and business case development.

The project will cover:

- Modifications to the OptoMole system
- Training with Gas Escape Teams at GDN Depots
- Preparation of system support documentation
- Manufacture of OptoMole systems and supply to GDN partners
- GDN field trials/testing
- Continual assessment of GDN field trial results & system feedback
- Conduct additional OptoMole system R&D
- Preparation of OptoMole system documentation as per GDN G23 requirements
- Assessment of implementation requirements
- Preparation of GB Network Business Case

Nominated Contact Email Address(es)

Innovation@cadentgas.com

Problem Being Solved

Historically the method of locating escaping gas that has entered ducts such as Telecoms or TV cable ducts is to locate where the as

is escaping from the duct, then excavate to locate the escape, or the point where the gas is entering the ducts. The current method for leak location is to drill holes through the road at 1 meter intervals between the two nearest access points (usually via manholes some 30 meters apart) and perform a point detection until the gas leak location is found. This can take several days, causes significant transport disruption and results in high manpower and associated costs to rectify.

Buried ducts across the country carry cables such as BT utilities, Cable TV, Broadband, Traffic systems and controls. As a known problem over the years, all networks have looked at the problem of duct gas source detection but owing to a number of reasons they have not been successful;

Due to the small space available in the ducting

Ambient environment (the ducting often has water and mud in it)

Potential spark / explosion risk from electrical sensors operating in a methane/air mixture

Method(s)

Phase 4 of the OptoMole project follows on directly from the original three phases of the project which successfully concluded in March 2016.

Phase Four of the project will be the development stage of the OptoMole system, which will be further developed from TRL 6 to TRL 8. GDN gas escape teams will be trained to use the equipment, and a number of systems will be supplied to allow the GDN teams to use OptoMole to investigate live gas in duct escapes on a daily basis. The substantial data and feedback from these trials will form a key part of the parallel Phase Four development of an OptoMole Business Case for future "Business As Usual" system implementation across the Networks.

As part of this phase a small number of units will be supplied to the GDNs, so that operators (trained by OptoSci) can use the OptoMole system on a daily basis. This will provide vital system feedback to guide further technical development and methods of GDN operational implementation. It will also supply accurate support data for the system value proposition when building the full business case for the GDNs to aid the future adoption of the technology.

Scope

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The project will cover:

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GDN field trials/testing

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Conduct additional OptoMole system R&D

Preparation of OptoMole system documentation as per GDN G23 requirements

Assessment of implementation requirements

Preparation of GB Network Business Case

Objective(s)

The objective is to develop an all optical Tuneable Diode Laser Spectroscopy (TDLS) based methane sensing system that could

provide an elegant and cost effective solution to this problem. This would substantially decrease the gas leak location and reinstatement costs and time, as well as limiting the associated fugitive greenhouse gas emissions to the atmosphere.

Using this technology could:

- Substantially improve the gas leak identification process and hence the integrity, safety and reliability of the gas network.
- Significantly reduce the gas leak identification and repair time.
- Decrease the overall cost of leak identification and repair cost for gas distributors
- Faster gas leak location reduces fugitive methane (a potent greenhouse gas) emissions to the atmosphere
- Reduced fugitive gas emissions and all optical sensing technique with no spark risk makes it inherently safer for the workforce and public
- No major excavation work required prior to locating the gas leak, hence minimising transport disruption

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

Success Criteria

There are four main successes that will be achieved during this phase:

- OptoMole system will be raised TRL 8 & operating reliably as a standard GDN tool for faster location of gas in duct leaks.
- GDN gas escape teams will be competent in operation of OptoMole and interpretation of results.
- GDN gas escape teams convinced of OptoMole value for Early Response Surveying of gas in duct escapes.

Sufficient data gathered during project to support a convincing Business Case for GDN adoption of technology for "Business As Usual" implementation.

Project Partners and External Funding

n/a

Potential for New Learning

n/a

Scale of Project

This phase will be carried out by three GDN's to ensure a wider benefits and operational analysis, over a nine month period to trial on a greater number of locations and engineering situations. This scale is required so that all networks share the outputs and provides a greater depth of learning.

This project cover 3 stages:

Stage 1

Implementation of agreed modifications to the OptoMole system

Integration into hard shell outer case

Operation with Windows based tablet

Translation of MoleView visual interface to tablet format

Training with Gas Escape Teams at GDN Depots

Preparation of system support documentation

Training materials V1.0

System operation & maintenance manual V1.0

Trial Feedback Form V1.0

Manufacture of OptoMole systems and supply to GDN partners

Stage 2

GDN field trials/testing of OptoMole

Regular GDN completion of trial feedback forms

Ongoing support & visits from OptoSci

Continual assessment of GDN field trial results & system feedback

Support material for OptoMole value proposition

Suggested system modifications

Conduct additional OptoMole system R&D (M4-M7)

Thinner sensor, more rigid cable, live cable feed from reel

Elevation of sensor in duct, sonde acoustic probe, remote transmission of readout

Stage 3

Preparation of OptoMole system documentation as per GDN G23 requirements

Engagement with various GDN stakeholders to determine requirements

Examination of GDN "Business As Usual" OptoMole implementation requirements

Field trial feedback Cost Savings & Benefits Analysis, GDN gas in ducts data,

System pricing structure, commercial purchase plan, ROI calculations

Business Case Development

Technology Readiness at Start

TRL6 Large Scale

Technology Readiness at End

TRL8 Active Commissioning

Geographical Area

This phase will involve trained teams from within NGGD, WWU and NGN located across the networks, determined by operational management, from a range of locations that are reported as "Gas in Ducts" situations.

Revenue Allowed for the RIIO Settlement

None

Indicative Total NIA Project Expenditure

NGGD

External Costs £83,957.00

Internal Costs £27,874.00

WWU

External Costs £46,962.00

Internal Costs £15,591.00

NGN

External Costs £46,962.00

Internal Costs £15,591.00

Total £236,937

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)

There should be significant savings in operational costs, based on early location of gas entry point. Combined with existing location techniques, local knowledge, mapping systems and surface recoding of gas levels. This will reduce the time spent on these escapes to a minimum. As a result some reduction in excavation costs should also be realised, together with any associated NRWSA costs.

Please provide a calculation of the expected benefits the Solution

Average assumed cost for Gas in Ducts Escape £2,000 from the initial development testing an average saving per escape will be around 15%, £300 / job.

A full benefits analysis is provided below.

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

All Networks encounter GID situations and are looking for an improvement in this area. Three GDN's are included in this phase of the project, while SGN will review any learning and benefits as a result.

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

WWU Repair Cost Savings over 5 Year OptoMole Product Lifespan	£1,190,325
NGN Repair Cost Savings over 5 Year OptoMole Product Lifespan	£1,190,325
NGGD Repair Cost Savings over 5 Year OptoMole Product Lifespan	£2,380,650

Total Return on investment for all GDN's around £9.5m over 5 years.

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

All GDN's have recognise the issues related to and the difficult pinpointing gas in ducts. This causes significant customer disruption and elongates gas escape location and resolution.

By working together at the development stage to place Optomole equipment in the hands of trained operatives learning can be shared on equipment, location, detection and adoption.

This equipment uses optical devices over existing gas detection equipment that requires new approaches to location this provides a unique opportunity to trial systems currently not in use by any network.

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

Improving customer service is a key objective for all GDN's and stakeholders indicated stronger on disruptions caused by streetworks. Gas entering ducts carrying telecommunication apparatus is a significant challenge for networks, as this network provides a pathway for the gas away from the leakage point. By locating the entry point into this system quickly Networks have the opportunity to complete these works in a reduced time period.

Networks are acutely aware of the traffic disruption caused by works with significant engineering difficulty as these tend to last longer, impact on operational efficiency and cause reputational damage. All these areas have been earmarked by the Networks Innovation Strategies as key opportunities. Optomole should provide a real value adding system that addresses all these areas.

☑ 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