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## NIA Project Registration and PEA Document

### Date of Submission

Mar 2020

### Project Reference Number

NIA\_NGN\_255

## Project Registration

### Project Title

Rhino OLM

### Project Reference Number

NIA\_NGN\_255

### Project Licensee(s)

Northern Gas Networks

### Project Start

March 2020

### Project Duration

2 years and 1 month

### Nominated Project Contact(s)

Luke Warner

### Project Budget

£246,940.00

## Summary

The Gas Distribution Networks (GDNs) require continuous monitoring and assurance that the odorant added at Biogas Entry Facilities results in the correct concentration of odorant being present in the biogas being injected onto the gas network to meet regulatory compliance standards.

Currently, laboratory spot samples and trained Rhinologists can only provide a snapshot in time and not continuous monitoring. Furthermore, the Rhinologist test is subjective. Masking agents can be present in biogas which may mask the odorants to human olfactory sense and laboratory tests that only identify odorants (and not masking agents that may fail to provide the necessary assurance).

The proposed Rhino OLM system will provide cost effective continuous monitoring and assurance that the correct concentration of odorant is present on the gas injected at the Biogas Entry Facilities, whilst also measuring concentration levels of masking agents.

### Nominated Contact Email Address(es)

innovation@northerngas.co.uk

## Problem Being Solved

The Gas Distribution Networks (GDNs) require continuous monitoring and assurance that the odorant added at Biogas Entry Facilities results in the correct concentration of odorant being present in the biogas being injected onto the gas network to meet regulatory compliance standards.

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## Method(s)

The project will be approached in three stages:

### Spectral Calibration

Laboratory-based research work will be undertaken to determine the UV spectral features of each of the odorant components, the lower detection levels achievable and develop new calibrated gas analysis models.

The models will be implemented into software and tested for a range of known gases. First, testing for each of the odorants individually in a carrier gas such as nitrogen and second, in a mix of gas considered to be representative of the gas on the gas network. This will be a significant step in validating that the technique will deliver the required measurement capability and sensitivity.

### Field trials

Two field trial devices will be developed – one in a location considered 'normal' and one in a location where the type of material being digested may result in significant other components being present on the gas. Gas will be manually collected (in Tedlar bags) from the network and measured in the device and also compared to laboratory measurement of the same gas. This stage will validate the capability of the technology to measure the odorants at the required levels in real gas mixtures. During this stage the impact of masking agents on the analysis and quantification of any masking agents in the measured gas will be investigated.

### Online trials

The device will be upgraded to operate in continuous mode and draw samples of gas from the gas grid for automated analysis and communicate the gas measurement results to the gas network. This online testing will validate the long term stability of the device and demonstrate its capability for wide spread deployment

## Scope

The project will validate a UV-DOAS technique that can be used for online measurement of odorant on the gas network. The project will deliver a new online odorant monitoring system (Rhino OLM) which will be based on Camlin's existing BioSENSE product. The odorant to be measured is New Blend (80% Tert-butyl mercaptan (TBM) and 20% dimethyl sulphide (DMS)).

## Objective(s)

### Stage 1

The objective of this stage is to develop and test in the laboratory, calibrated models for the determination of the concentration of TMB and DMS compounds and hence the New Blend odorant. The GDNs have confirmed that the technology must be capable of reliably measuring New Blend with a concentration range of 5 to 12mg/m<sup>3</sup>. 5mg/m<sup>3</sup> of New Blend equates to 1ppmv of TBM and 0.4ppmv of DMS.

### Stage 2

The objective of this stage is to test the technique with 'real' gas mixtures. This is to ensure that other compounds present in the gas mixture do not impact the accuracy of the odorant measurement.

### Stage 3

The objective of this stage is to upgrade the field trial units to operate continuously and provide hourly measurements to enable the long-term measurement stability and performance of the device to be confirmed

## Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

## Success Criteria

The project will be deemed a success if it is shown that the New Blend odorant can be accurately measured online (hourly measurement) within a concentration range of 5 to 12mg/m<sup>3</sup> using the proposed optical absorption-based technique.

The innovation will be fully validated since the project will demonstrate two devices operating online and communicating gas concentration levels to the GDN.

## Project Partners and External Funding

Northern Gas Networks - £246,940

Camlin - £47,000

## Potential for New Learning

This project will demonstrate and validate for the first time that a UV DOAS technique is suitable for the online measurement of odorant in biogas, with an accuracy sufficient to provide assurance to the network operator that the regulatory standards are being met. Furthermore, in the same instrument with the same technique, the level of masking agents will be monitored to provide further assurance that terpenes are not present at levels that could potentially mask the odorant. The learning from the project will be shared with IGEM and the other GDN's.

## Scale of Project

The project will develop 2 fully functional online measurement devices to carryout end to end trialing and testing in a 'local' operational environment. The trialing and testing will involve 2 regional biogas sites.

The scale of the project is reflective of the minimum requirements to demonstrate and gain assurance, such that the product is effective in an operational environment.

## Technology Readiness at Start

TRL5 Pilot Scale

## Technology Readiness at End

TRL8 Active Commissioning

## Geographical Area

Yorkshire area of Northern Gas Network.

## Revenue Allowed for the RIIO Settlement

N/A

## Indicative Total NIA Project Expenditure

External funding = £230,000

Internal cost = £16,940

Total Cost = £246,940

## 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 estimated the project could deliver £9k of annual cost savings per biogas site. Additionally, the output will provide greater flexibility to the biogas site owner in relation to the ongoing management of the facility.

#### Please provide a calculation of the expected benefits the Solution

Annually, Per site:

Base cost £10,300 – Method cost £935 = £9,365

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

The challenge being addressed by the solution is applicable to all GDN's with Biogas entry facilities and therefore could be readily adopted across the GB gas network.

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

£40k per biogas site.

### 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

New learning produced by this project will be shared with other networks who may also use the technology to monitor odorant injection levels. The development of this technology and new lessons learned may provide a foundation for other networks to conduct further development of the technology in the gas detection and analysis field.

### 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

- 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.

No current solution exists within the gas industry.

### 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

The addition of Bio-gas facilities connecting to the networks is a relatively new concept with the first connection to the Northern Gas Network being made in December 2014. As this new energy resource has developed new questions have been raised around the presence of masking agents within the gas and the need to detect them. Furthermore, GDN's are continually striving to improve efficiency and save money for customers so this new technology is an innovative way in which to deliver these required safety assurances and cost savings.

### 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

The technology is currently in its emergent/growth phase and is yet unproven in the specific task NGN require it to perform. Therefore, NGN cannot be certain the project will deliver an operationally compliant product. It is this uncertainty that is considered beyond NGN's risk appetite at the specified level of investment to progress as a business as usual activity.

**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 uncertainty of the technical performance of the solution presents a commercial risk to NGN, that would be beyond its current risk appetite.

**This project has been approved by a senior member of staff**

Yes