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## NIA Project Registration and PEA Document

### Date of Submission

Aug 2014

### Project Reference Number

NIA\_NGGD0038

## Project Registration

### Project Title

On-Line Fourier Transform Infrared Siloxane Analyser for Monitoring Biomethane Sites

### Project Reference Number

NIA\_NGGD0038

### Project Licensee(s)

Cadent

### Project Start

August 2014

### Project Duration

2 years and 6 months

### Nominated Project Contact(s)

National Grid Gas Distribution – Sharon Harrison and Tina McKie, DNV GL – Martin Brown and Diane Broomhall, Severn Trent WWTP - Simon Farris

### Project Budget

£319,953.00

## Summary

- Testing of a loan device, assess performance and report
- Testing of a purchased device, installation at Minworth, assess results and final report

### Nominated Contact Email Address(es)

Innovation@cadentgas.com

## Problem Being Solved

If Total Silicon limits are imposed by the HSE, gas distribution networks will need to demonstrate that the gas they are transporting is compliant. For biogas plant such as WWTP and food waste digesters that produce high levels of silicon compounds, monitoring Total Silicon concentrations on-line rather than taking spot samples and analysing them in a laboratory will be a safer option for gas customers and thus reduce financial risk for the gas transporter.

A high level of confidence in the monitoring techniques used to ensure compliance with statutory requirements will encourage the use of biomethane in gas networks thus removing barriers to new sources of gas whilst also facilitating the decarbonisation of the UK gas network. Therefore there is a requirement for a cost effective, reliable analyser of on-line monitoring of total silicon content of bio-methane.

## Method(s)

MKS Instruments have developed an on-line analyser (AIRGARD Siloxane Monitor) to measure silicon compounds in landfill and digester gases. Using the Fourier Transform Infrared Spectroscopy (FTIR), MKS claim to achieve a lower detection limit for total Silicon of 0.1 mg m<sup>3</sup> compared with other accredited sampling and laboratory methods, depending on the complexity of the sample

gas composition and the sample scan time.

The project will

#### Stage 1

- 1) Procure an FTIR analyser on a conditional purchase arrangement.
  1. Install the analyser at Minworth WWTP, including a heated sampling line.
  2. Take on-line samples once a day (mid week only) for 30 minutes, for 4 weeks.
  3. To confirm the accuracy of the results samples will also be taken to an UKAS accredited laboratory once a week.

#### Stage 2

1. Purchase the FTIR analyser.
2. Carry out full laboratory test programme of the FTIR analyser.
3. Carry out field trial at Minworth WWTP for 3 months with two sample lines.

To confirm the accuracy of the results samples

### Scope

- Testing of a loan device, assess performance and report
- Testing of a purchased device, installation at Minworth, assess results and final report

### Objective(s)

The aim of the project is to give us confidence in using a piece of on-line equipment to test the concentration of siloxanes in the derived biogas, to ensure we are compliant with GS(M)R Schedule 3 which is there to ensure we are not introducing material into the gas which interferes with the operation of pipes and gas appliances.

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

n/a

### Success Criteria

- Acceptance of the results from the initial field trial of the loaned device, allowing us to continue to stage 2
- Acceptance of the results from the trial at Severn Trent's WWTP at Minworth, to give confidence to roll out the device to other similar bio methane sites.

### Project Partners and External Funding

n/a

### Potential for New Learning

n/a

### Scale of Project

The scale of the project is on-line testing of a siloxane analyser, one initial test using a loaned device, and a second field trial at Severn Trent WWTP at Minworth using a purchased device.

### Technology Readiness at Start

TRL2 Invention and Research

### Technology Readiness at End

TRL3 Proof of Concept

### Geographical Area

To be tested at the biomethane plant at Severn Trent's Minworth WWTP which will be connected to NGGD WM LDZ

### Revenue Allowed for the RIIO Settlement

Not applicable

### **Indicative Total NIA Project Expenditure**

External cost £218,150

Contingency £21,815

Internal cost £79,988

Total Indicative Expenditure £319,953

## 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)

Opening the network to alternative energy sources may have a positive effect in reducing energy costs.

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

This is a research based projected looking at measurement methods

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

The measurement of Siloxanes is potentially a concern for all GDNs if bio-methanes are used.

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

Not available at this time as this is research work.

### 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

When the other networks look to connect unconventional gas into their distribution networks, which may contain siloxanes, they will be able to use the learning from the project to either utilise the product under investigation, or to conduct separate testing in another on-line analyser.

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

Unconventional Supplies – opening up the network to alternative energy sources.

- 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