national gas transmission

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

Jan 2014

### Project Reference Number

NIA_NGGT0001

## Project Registration

### Project Title

Alternatives to Venting

### Project Reference Number

NIA_NGGT0001

### Project Licensee(s)

National Gas Transmission PLC

### Project Start

April 2009

### Project Duration

4 years and 5 months

### Nominated Project Contact(s)

Dr. Quentin Mabbutt,
(box.innovationtransmission@nationalgrid)

### Project Budget

£1,553,000.00

### Summary

Planned venting can arise from a number of sources around the network, including venting at compressor sites and pipeline decommissioning for repair, replacement or modification. Planned venting at compressor sites is monitored and recorded through the on-line control system. For 2011/12, this was reported as 2984 tonnes of natural gas.

For pipeline decommissioning current best practice employed by the Pipeline Maintenance Centre (PMC) involves transfer of gas from the decommissioned section to an active section by means of a compressor but this is only feasible until the decommissioned section pressure reaches 7 bar. At this pressure the Portable Recompression Equipment operation cannot increase the pressure sufficiently to transfer the gas to the active section. So the final operation during decommissioning is to then vent the remaining gas.

To improve the environmental performance of final stages of the decommissioning process several options are available including:

- Collect the gas and use either on the decommissioned site or elsewhere with the network

- Flare the gas. Methane is recognised as having a significantly greater “Global Warming Potential”

(GWP) than carbon dioxide, approximately twenty times. Thus flaring will reduce the environmental impact. The programme of works looks to address some of these issues arising from the need for National Grid to vent either pipelines or compressor pipe sections as part of the normal operation either for maintenance requirements or as part of the normal control sequence.

Its scope looks to cover the following areas:

- Developed a venting decision/logging support tool

- Conduct trials to demonstrate mobile recompression equipment

- To develop and test the suitability of large scale adsorbed natural gas (ANG) technology to constructively reuse gas that would otherwise been vented to atmosphere.

This project is world leading with respect to the scale of the adsorbed natural gas (ANG) trials and will therefore deliver both a specific piece of new equipment and specific novel operational practices associated with the operation of the NTS.

## Third Party Collaborators

DNV

## Nominated Contact Email Address(es)

Box.GT.Innovation@nationalgrid.com

## Problem Being Solved

Natural gas, which is typically 85-93% methane, is released to the environment from the gas transmission system in a number of ways, including:

- Operational venting for decommission/repair or extension of networks
- Process venting from equipment (planned and unplanned)
- Fugitive leakage from pipeline equipment

Planned venting can arise from a number of sources around the network, including venting at compressor sites and pipeline decommissioning prior to repairs, replacement or modification activity. There are sound environmental and energy efficiency reasons for developing methods to reduce the amount of vented natural gas and improve the environmental performance of the National Transmission System.

## Method(s)

The proposed method will be as follows:

1. Technical Note relating to options for methane reduction, including report on results and recommendations. Equipment procurement and evaluation activities (lab-based).
2. Evaluation, analysis and reporting of ‘improved recompression’ and ‘flaring’ trials on a National Grid site.
3. Design, planning and procurement of equipment for large-scale evaluation trials.
4. Construction and initial commissioning of ANG demonstration facility at GL Flow Centre.
5. Initial and enhanced Pressure/Flow Rate Matrix testing programme including technical review.
6. Second Testing Phase. Incorporating rig modifications and semi-automatic capability testing.
7. Evaluation, analysis and reporting of ANG trial:
8. Report on best practice and full specification and operational procedures:

## Scope

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- Collect the gas and use either on the decommissioned site or elsewhere with the network.
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The programme of works looks to address some of these issues arising from the need for National Grid to vent either pipelines or compressor pipe sections as part of the normal operation either for maintenance requirements or as part of the normal control sequence. Its scope looks to cover the following areas:

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## Objective(s)

The desired result is the development of new best practice for lowering methane emissions during planned venting activities on the NTS.

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

n/a

## Success Criteria

The programme will provide a comprehensive set of experimental and design information relating to the behaviour of large scale ANG natural gas capture. The results will confirm whether ANG is a viable natural gas capture technology and will provide valuable design information for the assessment of suitable utilisation technologies for the captured gas.

The delivery of the ANG programme will provide National Grid with a fundamental building block towards a venting capture and fugitive emissions ‘road map’ giving the company the opportunity of employing a holistic natural gas capture strategy across the network.

## Project Partners and External Funding

n/a

## Potential for New Learning

n/a

## Scale of Project

The final stages of the project will see ANG vessel will be built and evaluated at near full scale. There are a number of variables that will be impacted by the size of the vessel (adsorption rate, temperature effects) which mean a near full scale evaluation will give valuable learning and assessment prior to implementation.

## Technology Readiness at Start

TRL3 Proof of Concept

## Technology Readiness at End

TRL6 Large Scale

## Geographical Area

The ANG programme will enhance the safety, legislative and operational framework for the National Transmission System (NTS) in the UK.

## Revenue Allowed for the RIIO Settlement

None

## Indicative Total NIA Project Expenditure

IFI - £1,436k
NIA - £117k

# 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)

A single site assumption being:

- Controlled ANG process gas vent storage utilised.
- Non simultaneous process vents of 4 tonnes per event from two compressor units.
- 95% vent gas capture.
- 10 process vents/compressor unit/year.

Annual Vented Natural Gas Captured: 76 tonnes ~1,520 tonnes CO2-e

The benefits from undertaking this work include:

- Development of new best practice for lowering methane emissions during decommissioning activities prior to maintenance
- Reduction in National Grid's methane emission inventory
- Improved energy management

A financial benefit can be derived from consideration of reduced methane emissions. CO2 emissions are currently traded at £25/tonne. Natural gas emissions are recognised to be 20x more damaging to the environment, such that £500/tonne might be expected when methane is added to the European Emissions Trading Scheme.

- Planned venting down of gas transmission pipelines for maintenance accounts for about 960 tonnes of methane emissions per year (£480,000 per year)
- Operational venting down of NTS compressor units during emergency scenarios and for maintenance accounts for more than 1800 tonnes of methane emissions per year (£900,000 per year)

If the gas can be captured, stored and used to fuel generators to provide 5kWe / tonne, and we assume that the cost of bought-in electricity is 8p per kW-hr:

- Alternatives to pipeline venting operations could provide a proportion of 8760 hours * 500kWe * 8p = £294,400
- Alternatives to compressor venting could provide a proportion of (1800 / 960) * £350,000 = £552,000

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

Not required- research project

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

The method would be applicable across the NTS, with some site or operational specific elements.

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

The target cost of the implementation of an ANG vessel would be in the region of £100,000/tonne of gas vented (captured).

### 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 learning will be used to inform investment decisions regarding infrastructure and operational equipment designed to improve the environmental performance of the National Transmission System.

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

This project is aligned to the Environment theme.

☑ 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