

## NIA Project Registration and PEA Document

### Date of Submission

Nov 2014

### Project Reference Number

NGGTGN02

## Project Registration

### Project Title

In Line Robotic Inspection of High Pressure Installations

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NGGTGN02

### Project Licensee(s)

National Gas Transmission PLC

### Project Start

January 2015

### Project Duration

3 years and 11 months

### Nominated Project Contact(s)

Tony Jackson (Engineering Manager Pipelines &amp; AGIs)

### Project Budget

£6,305,000.00

## Summary

National Grid Gas Transmission (NGGT) aims to move away from predictive asset type modelling towards condition based monitoring of its critical assets. These assets are ageing and many have already reached the end of their intended asset life.

Partnered with two Small Medium Enterprises (Synthotech and Premtech) which have proven records of success in innovation projects, NGGT is seeking to introduce in line inspection of below ground pipework at high pressure installations (AGIs), in order to determine the true condition of these assets. This will allow for pre-emptive fault detection, more targeted planned interventions to be undertaken, thereby extending the life of assets which remain in good condition and cost optimisation.

There is currently no available technology which can in line inspect below ground pipework at pressure above 2Barg. AGIs operate pipework at up to 100Barg. Current methods of inspection for below ground pipework AGIs involve visual inspection via excavation which is both financially and environmentally expensive. As such it does not regularly take place and reliance on survey techniques to target excavations is favoured. These surveys only provide a partial view of asset condition and can be inaccurate leading to unnecessary excavation to investigate potential problems. Not fully understanding the condition of our assets increases the likelihood of an asset failure at a high pressure installation which is also critical to our national infrastructure, such as those which supply power stations.

NGGT has a proven history of developing effective in line inspection technology, evidenced through In Line Inspection (ILI) of pipeline via Pipeline Inspection Guages (PIGs). As such it believes it can develop a robotic in line inspection device which can operate at up to 100Barg. This will allow NGGT to implement an intelligent and proactive asset management strategy, reducing the requirement for inefficient and expensive excavations, extending the life of assets and reducing the likelihood of an asset failure at a high pressure installation thereby securing our national resilience.

## Preceding Projects

NIA\_NGGT0063 - Investigation into Novel Robotics Locomotion Techniques

## Third Party Collaborators

Synthotech Limited

DNV

Premtech Ltd

Pipeline Integrity Engineers Ltd

## Nominated Contact Email Address(es)

Box.GT.Innovation@nationalgrid.com

## Problem Being Solved

### Method(s)

### Scope

Traditionally the onshore pipeline industry has only been able to in-line inspect high pressure pipelines using Pipeline Inspection Gauges (PIGs). In-line inspection of pipelines provides the most accurate and reliable information on the condition of buried pipelines. Other inspection methods external to the pipeline have a number of limitations. This innovative robotic technology will however increase precision in our predictive methods. Ultimately, below ground pipework within a gas installation cannot currently be in-line inspected because of a number of engineering challenges associated with complex pipework geometries, lack of access and retrieval points and flow factors.

### Objective(s)

Traditionally the onshore pipeline industry has only been able to in line inspect high pressure pipelines using PIGs. In line inspection of pipelines provides the most accurate and reliable information on the condition of buried pipelines, other inspection methods external to the pipeline have a number of limitations. This innovative robotic technology will however increase precision in our predictive methods. Ultimately, below ground pipework on AGIs however cannot currently be in line inspected because of a number of engineering challenges associated with complex pipework geometries, lack of access and retrieval points and flow factors.

The project has 4 key objectives:

- To accurately and reliably determine the condition of high pressure below ground pipework at AGIs using an internal inspection robot.
- To generate a proactive, rather than reactive, risk based approach to the management and maintenance of aging assets, based on the knowledge of the actual condition of pipework.
- Minimise the occurrence of annual unnecessary excavations and eradicate premature replacement of assets reducing significant carbon emissions and generating cost savings of circa £58m over 20 years.
- Minimise the likelihood of asset failure through proactive asset management, thereby significantly reducing the risk of a high pressure gas release into the atmosphere and the consequential financial, environmental and reputational impact.

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

n/a

### Success Criteria

- To accurately and reliably determine the condition of high-pressure below ground pipework at Above Ground Installations (AGIs) using an internal inspection robot.
- To generate a proactive, rather than reactive, risk based approach to the management and maintenance of ageing assets, based on the knowledge of the actual condition of pipework.

- Minimise the occurrence of unnecessary excavations and eradicate premature replacement of assets, reducing significant carbon emissions and generating cost savings of circa £58m over 20 years.
- Minimise the likelihood of asset failure through proactive asset management, thereby significantly reducing the risk of a high-pressure gas release into the atmosphere and the consequential financial, environmental and reputational impact.

### **Project Partners and External Funding**

n/a

### **Potential for New Learning**

n/a

### **Scale of Project**

n/a

### **Geographical Area**

### **Revenue Allowed for the RIIO Settlement**

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

## 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)

n/a

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

n/a

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

n/a

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

n/a

### 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**

n/a

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

n/a

- Has the Potential to Develop Learning That Can be Applied by all Relevant Network Licensees

**Is the default IPR position being applied?**

- Yes

**Please demonstrate how the learning from the project can be successfully disseminated to Network Licensees and other interested parties.**

**Please describe how many potential constraints or costs caused, or resulting from the imposed IPR arrangements.<**

**Please justify why the proposed IPR arrangements provide value for money for customers.**

## 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