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_NGGT0018

## Project Registration

### Project Title

Optimisation of severe winter strategy for pipeline isolation valves

### Project Reference Number

NIA_NGGT0018

### Project Licensee(s)

National Gas Transmission PLC

### Project Start

July 2012

### Project Duration

1 year and 7 months

### Nominated Project Contact(s)

Steve Johnstone & Mick Jarvis
(box.GT.innovation@nationalgrid.com)

### Project Budget

£115,000.00

### Summary

A Reliability Centred Maintenance (RCM) process highlighted a potential hidden mode of failure associated with cold winter temperatures (water ingress and freezing conditions) during the operation of Remotely Operated Valves (ROVs). Current statistical analysis implies that reliability of these ROVs is 99% (i.e. 1% fail to operate upon instruction from the Gas Network Control Centre (GNCC)). However the majority of valve tests take place during summer months, therefore a number of possible modes of failure associated have been previously un- accounted for.

There are 828 ROVs on the network in total but physical testing of each combination of component making up any one system is unfeasible due to the number of each type of valve, actuator, gearbox combinations. This project therefore looks to initially assess the scale of the problem (if in fact there is one), with physical testing of any components an option at a later stage, together with development of design modifications to mitigate the potential risks.

This project will develop a geographical profile for the risk of persistent severe winter conditions in the vicinity of the National Transmission System (NTS). The risk profile will be illustrated in the GIS-enabled package, Uptime, which already holds information of the location of AGIs, their high-level function and individual isolation valve references.

### Third Party Collaborators

DNV

### Nominated Contact Email Address(es)

Box.GT.Innovation@nationalgrid.com

## Problem Being Solved

During a Reliability Centred Maintenance (RCM) process carried out in November 2011 a potential hidden mode of failure was highlighted associated with the operation of Locally Operated and Remotely Operated Valves (ROVs).

Due to the majority of valve maintenance that takes place during summer months there are a number of possible modes of failure associated with cold winter temperatures (water ingress and freezing conditions) that have previously been un-accounted for. This project therefore looks to initially assess the scale of the problem, together with physical testing of any components as an option at a later stage, together with development of design modifications to mitigate.

## Method(s)

The proposed Method consists of the following steps:

1. Acquisition of temperature data and development of temperature risk criteria
2. Addition of weather stations and attributes to Uptime*
3. Development of AGI and valve attributes in Uptime
4. Uptime, visualisation & export analysis
5. International best practice review
6. Analysis and report and workshop

* Uptime is a GIS-enabled (geographic information system) package used in National Grid Gas Transmission, which already holds information of the location of above ground installations (AGIs), their high-level function and individual isolation valve references.

## Scope

A Reliability Centred Maintenance (RCM) process highlighted a potential hidden mode of failure associated with cold winter temperatures (water ingress and freezing conditions) during the operation of Remotely Operated Valves (ROVs). Current statistical analysis implies that reliability of these ROVs is 99% (i.e. 1% fail to operate upon instruction from the Gas Network Control Centre (GNCC)). However the majority of valve tests take place during summer months, therefore a number of possible modes of failure associated have been previously un- accounted for.

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the potential risks.

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## Objective(s)

This project will deliver a risk-based approach for the prioritization of retrofit measures to address isolation valve reliability during periods of sustained severe winter conditions.

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

n/a

## Success Criteria

The project will be considered successful with the delivery of a geographical profile using the GIS-enabled package Uptime for the risk of persistent severe winter conditions. The project will provide a number of additional new attributes to the AGIs detail in Uptime.

## Project Partners and External Funding

n/a

## Potential for New Learning

n/a

## Scale of Project

The proposed project is limited in scope to ensure the project is as simple and cost effective as possible. Following its completion

National Grid will have the opportunity to review the project output and decide whether or not to proceed with any of the options recommended. This may potentially lead on a larger project of multiple stages to fully develop and implement the solution.

## Technology Readiness at Start

TRL3 Proof of Concept

## Technology Readiness at End

TRL6 Large Scale

## Geographical Area

The project is UK based, applicable to assets across the National Transmission System.

## Revenue Allowed for the RIIO Settlement

None

## Indicative Total NIA Project Expenditure

IFI - £ 77k
NIA - £38k

# 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)

This study will bring together: a new approach to the visualisation of sustained severe temperature risk; recent developments in the GIS-based Uptime analysis capability and synchronising with the Ellipse database and the recent learning from the work to rationalise isolation valves in advance of modernisation. By doing this, it will provide the basis for prioritising the consideration of severe winter protection measures for a diverse range of
different valve actuator combinations on critical AGIs. This project is taking the first steps towards a means of modelling impact assessment of climate change on the various NTS asset groups.

Retrofit of solutions to mitigate severe winter conditions for particular valve actuator combinations could cost in the region of £10- 50k . It is therefore critical to identify of the 828 ROVs on the network those that require such modification and those that will not.

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

Base case= Retrofit severe winter mitigation solutions to 25 valves per year at a cost of £20k per valve = £500k
Method cost = Retrofit severe winter mitigation solutions to 5 valves per year at a cost of £20 per valve = £100k
Expected benefits = £400k per year.

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

The Method/Strategy to be developed is designed to cover the NTS asset base.

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

Retrofit of solutions to mitigate severe winter conditions for particular valve actuator combinations could cost in the region of £10- 50k. The method will allow for such solutions to be prioritized and implemented effectively and efficiently.

## 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 provide a risk-based approach for the prioritization of retrofit measures, which could be incorporated in the relevant Network Licensee's policies and procedures.

### 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 Optimizing Asset Management under the Reliability 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