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

Dec 2013

### Project Reference Number

NIA_NGGT0039

## Project Registration

### Project Title

Renewable Power on Remote Installations

### Project Reference Number

NIA_NGGT0039

### Project Licensee(s)

National Gas Transmission PLC

### Project Start

October 2013

### Project Duration

1 year and 1 month

### Nominated Project Contact(s)

James McCormick, Steve Johnstone,
box.GT.innovation@nationalgrid.com

### Project Budget

£40,000.00

### Summary

The National Transmission System (NTS) consists of 7,615 km of high pressure gas pipelines, 246 Block Valve installations, 87 multijunctions where pipelines connect, 183 Exit Points and 23 Compressor Sites.

Remote isolation valves are currently installed at Multi-junctions, Compressor Sites and Entry Points to allow a pipeline to be isolated remotely by Gas Network Control Centre. In addition to these, there over 200 block valve sites, which have local operated valves and would require staff to visit the site to operate the valves. Remote isolation valves are also installed at 73 Exit Points to isolate the site from the pipeline however there are 39 Exit Points where the main pipeline isolation valve can only be operated locally at the site.

The risk to the pipeline network is controlled by a number of processes and procedures to avoid damage to a pipeline; however in the event of severe damage, leak or rupture, it would be necessary to isolate and de-pressurise the affected section of the pipeline. In case of emergency the current approach would be to send staff to the block valves either side of the incident to isolate the pipeline. In the event of a major incident then the nearest remote operable valves would be used and the gas supply to the exit points between the two remote valves would be lost. This approach relies on a quick response time from staff to attend site and sufficient equipment to gain access to the valves which is some cases are located in below ground pits which would require any accumulated water to be pumped out before the valve could be operated.

The traditional way to provide electrical power to these types of facilities is to use the local electricity company's services to provide the supply. The cost for this can be extensive and therefore prohibitive. There are alternative methods to get power to remote sites which National Grid are looking to investigate.

Where possible it is preferable to reduce the carbon footprint, the most common configuration to do this is to use PV Cells and/or wind turbines with an electrical supply. The electrical supply will take over from the renewable sources when the demand for the system is greater that the renewable sources can supply.

Alternatively without using an electrical supply, batteries can be used as a permanent supply, with the renewable sources providing power for the system and charging the batteries, which then provide the power when the renewable source is insufficient. Another possibility could be to use a generator instead of renewable sources where they may not be suitable. These last two options tend to be more suitable for lower power applications.

## Third Party Collaborators

Premtech Ltd

## Nominated Contact Email Address(es)

Box.GT.Innovation@nationalgrid.com

## Problem Being Solved

There are remote isolation valves currently installed at Multi-junctions, Compressor Sites and Entry Points across the National Transmission System which allow a pipeline to be isolated remotely by Gas Network Control Centre, however there are also over 200 block valve sites, with local operated valves which require staff to visit the site to operate the valves. There are also a number of exit points where the main pipeline isolation valve can only be operated locally at the site.

National Grid have an approved strategy for local to remote conversion at strategic block valve and exit points will ensure that National Grid emergency arrangements for the NTS pipeline network are update to date will meet the requirements of the Pipeline Safety Regulations and the Gas Safety (Management) Regulations.

This project will investigate alternative methods to get power to remote sites for this conversion. The traditional way to provide electrical power to these facilities is to use the local electricity company's services to provide the supply. The cost for this can be extensive and therefore prohibitive. The project will determine if renewable power can be a suitable alternative to a electrical grid connection.

## Method(s)

Feasibility study on utilizing PV and/or Turbines with batteries as the permanent power source to provide the power to gas installations. The PV panels and Turbines are to be mounted on an instrumentation unit that is to be designed to be as efficient and environmentally friendly as it can be.

- Provide an average power available when using PV cells to capture solar energy and when using a turbine to capture wind energy.
- Investigate the possibility of solar / wind power providing power for the National Grid IRIS telemetry solution.
- Propose alternative energy efficient buildings that allow a relatively constant temperature within the building throughout the summer and winter periods, taking into consideration security, best available technology (BAT) and the whole life costs (WLC).
- Propose alternative low powered telemetry and valve actuation solutions.
- Provide schematics and layout drawings for suitable / alternative systems.
- Provide a reliability and availability assessment of the proposed concept.

## Scope

The National Transmission System (NTS) consists of 7,615 km of high pressure gas pipelines, 246 Block Valve installations, 87 multi-junctions where pipelines connect, 183 Exit Points and 23 Compressor Sites.

Remote isolation valves are currently installed at Multi-junctions, Compressor Sites and Entry Points to allow a pipeline to be isolated remotely by Gas Network Control Centre. In addition to these, there over 200 block valve sites, which have local operated valves and would require staff to visit the site to operate the valves. Remote isolation valves are also installed at 73 Exit Points to isolate the site from the pipeline however there are 39 Exit Points where the main pipeline isolation valve can only be operated locally at the site.

The risk to the pipeline network is controlled by a number of processes and procedures to avoid damage to a pipeline; however in the event of severe damage, leak or rupture, it would be necessary to isolate and de-pressurise the affected section of the pipeline. In case of emergency the current approach would be to send staff to the block valves either side of the incident to isolate the pipeline. In the event of a major incident then the nearest remote operable valves would be used and the gas supply to the exit points between the two remote valves would be lost. This approach relies on a quick response time from staff to attend site and sufficient equipment to gain access to the valves which is some cases are located in below ground pits which would require any accumulated water to be pumped out before the valve could be operated.

The traditional way to provide electrical power to these types of facilities is to use the local electricity company's services to provide the supply. The cost for this can be extensive and therefore prohibitive. There are alternative methods to get power to remote sites which National Grid are looking to investigate.

Where possible it is preferable to reduce the carbon footprint, the most common configuration to do this is to use PV Cells and/or wind turbines with an electrical supply. The electrical supply will take over from the renewable sources when the demand for the system is greater that the renewable sources can supply.

Alternatively without using an electrical supply, batteries can be used as a permanent supply, with the renewable sources providing power for the system and charging the batteries, which then provide the power when the renewable source is insufficient. Another possibility could be to use a generator instead of renewable sources where they may not be suitable. These last two options tend to be more suitable for lower power applications.

## Objective(s)

This approved strategy for local to remote conversion at strategic Block Valve and Exit Points will ensure that National Grid emergency arrangements for the NTS pipeline network are updated for new technologies and will meet the requirements of the Pipeline Safety Regulations and the Gas Safety (Management) Regulations.

Therefore, to support the delivery of this strategy a source of renewable energy is to be investigated for these remotely located sites in order to send signals to and from the GNCC to open and close the valve remotely.

This project also aims to gain knowledge about the use of alternative energy sources that are fit for purpose to power gas facilities on the National Transmission System.

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

n/a

## Success Criteria

We expect to find alternative, more environmentally friendly means to power gas sites in remote locations. This should also be more cost effective than the traditional means of supply.

## Project Partners and External Funding

n/a

## Potential for New Learning

n/a

## Scale of Project

The feasibility study will be predominantly carried out within a research and office environment.

## Technology Readiness at Start

TRL4 Bench Scale Research

## Technology Readiness at End

TRL5 Pilot Scale

## Geographical Area

The learning from this study will be transferable to other remote sites located across the National Transmission System.

## Revenue Allowed for the RIIO Settlement

Revenue has been allowed in the RIIO settlement to convert sites from locally operated to remote. If the renewable power feasibility study is proves the concept could be successful, this allowed revenue will be used to implement the renewable power option on these sites.

## Indicative Total NIA Project Expenditure

£40,000

# 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)

National Grid are forecasting an estimated saving of circa £20k per installation.

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

It is currently costing circa £43K to add a supply line for power required on site. The additional cost of the kiosk and equipment associated with the renewable power solution is estimated to be £20k. There will therefore be an estimated saving of £23K per installation by taking the renewable solution over the traditional methods, applicable to an estimated 100 sites over the RIIO T1 and T2 period, hence an estimated total saving of £2.3m.

There are additional benefits associated with reduced operational costs if a site utilises renewable power rather than a grid connection plus the reduced carbon footprint.

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

This method can be applied to all Block Valve sites that currently do not have power, and is required to be made remotely operable.

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

National Grid is currently estimating a predicted total volume of 100 sites throughout the RIIO-T1 and T2 periods for local to remote conversion. The conversion using renewable power will incure additional costs associated with the kiosk and equipment associated however savings will be generated through the avoided grid connection. Total savings estimated as £20k per 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)

- [x] 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 generated from this project could be used across gas transmission and distribution systems to generate power on remote sites with similar load requirements. Any developments to telemetry units will be specific to sites operating those types of units.

### 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 fits within the Environmental and System Operability Themes.

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

### Is the default IPR position being applied?

- [x] 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

- [x] Yes