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

May 2015

Project Reference Number

NIA_NGGT0072

Project Registration

Project Title

Portable Valve Actuation

Project Reference Number

NIA_NGGT0072

Project Licensee(s)

National Gas Transmission PLC

Project Start

May 2015

Project Duration

0 years and 9 months

Nominated Project Contact(s)

Richard Waine, box.GT.innovation@nationalgrid.com

Project Budget

£97,000.00

Summary

The National Grid Transmission network has hundreds of Above Ground Installations (AGI's) located across the UK which form part of the National Transmission System (NTS). These AGI's contain thousands of locally operated valves which are fitted with gearboxes and actuators to allow the valves to be operated with minimal operator effort. Historical best practice and design requirements have dictated that larger diameter valves would be fitted with a gearbox and valves greater than 450NB would require actuation, powered by an electrical actuator or gas hydraulic actuator, subject to the site conditions and functional requirements.

In the majority of cases these locally operated actuators are used only to undertake routine maintenance and support annual valve movements for compliance, therefore the capital expenditure and operational cost for infrequent operation is significant and expected to increase as the actuator systems age.

Third Party Collaborators

Premtech Ltd

Nominated Contact Email Address(es)

Box.GT.Innovation@nationalgrid.com

Problem Being Solved

The large valve population on the transmission network is aging, causing increasing maintenance costs of actuator systems to ensure continued operability. National Grid are therefore investigating the possibility of replacement of permanent valve actuators on non-critical locally operated valves with a portable actuation system. The project will investigate the whole life cost and operational benefit of implementing a portable solution in conjunction with replacement of existing gearboxes with higher efficiency gearboxes.

Method(s)

The project deliverables include the development of :

Technology Assessment Report

The technology assessment report will be generated from data acquisition and discussions from internal and external workshops including with equipment suppliers to understand the potential gains that can be achieved with current technologies and high efficiency gear systems.

HAZOP and Human Factors Study

The studies will review and assess impact on operational procedures and human factors when implementing a new technology, taking in account of existing routine procedures and the impacts on safety, man hour consumption, speed of response and operational risk.

Whole Life Costing Analysis

A robust whole life cost analysis will be undertaken on both the current gearbox and actuation arrangements including ongoing O&M burden to provide a benchmark for comparison with the proposed portable solutions. The output will be a report produced in conjunction with PMC Ambergate, equipment suppliers and National Grid.

Recommendations Report

A recommendations report shall be produced, detailing the findings and lessons learnt from the project, making recommendations with regard to the most suitable form of actuation, commercial benefits and potential risks. The report shall reference technical data, scoping proposed further works and recommendations for future physical trials and development.

Training Video and Virtual Reality

Following assessment and review of the potential solutions, a virtual reality model will be generated together with a short video to be used as a training demonstration, showing the application and operation of the portable technologies to a typical locally operated valve. The VR model will allow the assessment of procedural and operational requirements to be tested in a safe environment.

Scope

The National Grid Transmission network has hundreds of Above Ground Installations (AGI's) located across the UK which form part of the National Transmission System (NTS). These AGI's contain thousands of locally operated valves which are fitted with gearboxes and actuators to allow the valves to be operated with minimal operator effort. Historical best practice and design requirements have dictated that larger diameter valves would be fitted with a gearbox and valves greater than 450NB would require actuation, powered by an electrical actuator or gas hydraulic actuator, subject to the site conditions and functional requirements.

In the majority of cases these locally operated actuators are used only to undertake routine maintenance and support annual valve movements for compliance, therefore the capital expenditure and operational cost for infrequent operation is significant and expected to increase as the actuator systems age.

Objective(s)

This proposal is to review the practicality, operational benefit and whole life cost benefit associated with replacing the actuation on locally actuated valves and valves with aged gearboxes with high performance gearboxes and a portable form of actuation which could be attached by operatives as required. The project will also investigate the benefits of real time condition monitoring linked to specific valves and actual utilisation.

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

Success Criteria

To understand the potential benefits, impacts and whole life cost savings that can be achieved across the transmission network by the implementation of portable actuation solution and a phased replacement strategy.

Project Partners and External Funding

n/a

Potential for New Learning

n/a

Scale of Project

The project is predominantly a desktop based study but will require site visits to acquire existing site data, witness and monitor existing routine operations for assessment and comparison during the project.

Technology Readiness at Start

TRL3 Proof of Concept

Technology Readiness at End

TRL5 Pilot Scale

Geographical Area

The project will be undertaken from Premtech offices, Ashby de la Zouch, LE65 1NF with temporary access to National Grid sites required to obtain valve data and information relevant to the project.

Workshops and coordination meetings will be held at Ashby de la Zouch, PMC Ambergate and National Grid House in Warwick.

Revenue Allowed for the RIIO Settlement

None

Indicative Total NIA Project Expenditure

£97,000

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)

For a site with 5 x 36" local valves with end-of-life actuator systems/gearboxes:

Cost of 5 conventional replacement gas hydraulic actuator systems including gearboxes for a site with 5 local valves = 5 x £80,000 = £400,000. Estimated cost of one portable actuator system and 5 new high performance gearboxes for a site with 5 local valves = £10,000 + £10,000 x 5 = £60,000. Capital cost saving is therefore estimated at £340,000 (or 85%) compared to like-for-like replacement at such a site. Further opex savings from removal of the need to maintain 5 gas hydraulic actuator systems are expected.

These estimates are highly dependent on operational requirement, valve size, installation costs, support, trainings, spares provision etc., protection and condition monitoring arrangement costs which this project will quantify further.

Please provide a calculation of the expected benefits the Solution

N/A Research project

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

The recommendations and outputs from this project can be rolled out across the Distribution Network Operators and other infrastructure providers. The strategy could potentially be applied to many sites on the transmission network and the DNO systems.

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

Assuming a yearly replacement rate of 10 x 36" local valves across the NTS that are equipped with portable actuation and high performance gearbox instead of like-for-like replacement of actuator system.

The cost of rollout would be in the order of 8 years x 2 sites (5 valves per site) x £60,000 = £960,000 for the new method, realizing capital cost savings in the order of 16 x £340,000 = £5,440,000.

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 and development can be used to improve efficiency of network operations strategy for non-critical valves. The learning is wholly applicable to the regulated distribution networks where similar equipment and actuation methods are employed.

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 aligns to the strategic themes of delivering asset health outputs in the most efficient manner possible and investigating new intelligent tools, techniques and methods for ensuring the network can meet the increasing requirements for flexible operation and managing the ageing asset base.

☑ 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