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_NGGT0010

Project Registration

Project Title

Backup DC drive electronic starter

Project Reference Number

NIA_NGGT0010

Project Licensee(s)

National Gas Transmission PLC

Project Start

June 2012

Project Duration

2 years and 10 months

Nominated Project Contact(s)

Mark Allatson (box.GT.innovation@nationalgrid.com)

Project Budget

£125,000.00

Summary

Most compressor station Gas Turbine units have a number of battery powered emergency back up dc motors driving the vent fans, lube pumps etc. which are started in the event of a mains power failure. Currently these motors are started from resistor type starters located within each compressor unit's dc motor control centre.

At a number of compressor stations these resistor starters have overheated causing damage to the control equipment and constituting a fire risk.

It is proposed to replace these with a new dc electronic motor starter. DC electronic motor starters are not available as off the shelf products for a dc battery supply and will therefore require design and development. A prototype will be designed and tested and then a working unit will be installed at Wooler compressor station for a trial followed by the installation of the remaining 2 within the unit.

Third Party Collaborators

Kim Systems Ltd

Nominated Contact Email Address(es)

Box.GT.Innovation@nationalgrid.com

Problem Being Solved

Most compressor station Gas Turbine units have a number of battery powered emergency back-up DC motors driving mechanics such as the vent fans and lube pumps, which are started in the event of a mains power failure. Currently these motors are started from resistor type starters located within each compressor unit's DC motor control centre. There have been events where resistor starters

have overheated. This causes damage to the control equipment and introduces an increase to fire risk. Therefore this project will develop an appropriate alternative to replace resistor starters.

Method(s)

The proposed Method is as follows:

1. Initial design
2. Prototype Build - There were delays in the prototype design and build but it has now been completed.
3. Prototype Testing - Testing was delayed due to technical problems with the design. These have now been overcome and prototype testing is ongoing.
4. G35 Design for Implementation at trial compressor site
5. Production build
6. Installation and test - Installation could not be carried out over the 2013/14 winter compressor availability period but will progress in mid 2014 with installation due June 2014 with completion by end 2014.
7. Commissioning

Scope

Most compressor station Gas Turbine units have a number of battery powered emergency back up dc motors driving the vent fans, lube pumps etc. which are started in the event of a mains power failure. Currently these motors are started from resistor type starters located within each compressor unit's dc motor control centre.

At a number of compressor stations these resistor starters have overheated causing damage to the control equipment and constituting a fire risk.

It is proposed to replace these with a new dc electronic motor starter. DC electronic motor starters are not available as off the shelf products for a dc battery supply and will therefore require design and development. A prototype will be designed and tested and then a working unit will be installed at Wooler compressor station for a trial followed by the installation of the remaining 2 within the unit.

Objective(s)

The objective of the project is to develop a safer and more reliable alternative to the resistance type motor starters currently installed on compressor sites.

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

Success Criteria

The project success will be a successful trial of the performance of the dc electronic starter motors on a National Grid Compressor site. A successful starter design will provide a simplified motor starter with less discrete electro-mechanical components.

Project Partners and External Funding

n/a

Potential for New Learning

n/a

Scale of Project

The project will deliver a full scale trial of the potential solution at one National Grid Compressor site.

Technology Readiness at Start

TRL3 Proof of Concept

Technology Readiness at End

TRL7 Inactive Commissioning

Geographical Area

The project will take place on a National Grid Compressor site but will have applicability to all compressor sites.

Revenue Allowed for the RIIO Settlement

None

Indicative Total NIA Project Expenditure

IFI - £77k
NIA - £38k + £10k = £125k

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)

The key benefit to the business will be in increased reliability and safety. The resistor starters need to be modified or replaced by a new system because of the inherent fire risk in the existing design. The fire risk will be virtually eliminated with the electronic starter system because the resistor has been removed from the starter.

Potential fire damage costs are a minimum of £10k for a simple repair through £25k for a replacement and repair to a full switchboard or building if the fire were to spread wider.

The design if successful will provide a simplified motor starter with less discrete electro-mechanical components. Electronic components have been proven to have high reliability low long term maintenance costs. A variable speed drive system is essentially maintenance free and has a higher Mean Time Between Failures (MTBF) than discrete electro-mechanical components. This gives higher availability for the system and less down time.

Currently the DC starters at some sites have to be monitored regularly to check for failures at an estimated cost of 1 man day per month = £330 x 12 = £3,960.00 per annum. An estimate of 2 man days per annum has been made for reduced maintenance costs and down time following the change.

The cost of the replacement electronic starter is comparable to that of a like for like replacement system at approximately £16k per unit including installation.

Please provide a calculation of the expected benefits the Solution

Not required for research projects

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

The starter would be rolled out to all NTS compressor units.

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

£16k per unit

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 generated will be used to inform procurement decisions for these types of starters which are required on gas compressor sites.

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

The project fits within Optimising 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