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_NGET0011

Project Registration

Project Title

Detection and Measurement of ACSR Corrosion

Project Reference Number

NIA_NGET0011

Project Licensee(s)

National Grid Electricity Transmission

Project Start

November 2011

Project Duration

2 years and 5 months

Nominated Project Contact(s)

Mike Hannon

Project Budget

£840,000.00

Summary

The scope of this project is to develop a system that will measure the residual layer of zinc on the steel strands of the core of ACSR conductors and overhead steel ground wires. The corrosion sensor system is divided in three main components: Sensor Head: containing the actual measuring device and an encoder Eddy Current Electronic Unit : containing the electronics to drive the sensor head Data collection unit: Analysis software and the data presentation for the end users

Nominated Contact Email Address(es)

box.NG.ETInnovation@nationalgrid.com

Problem Being Solved

Conductor life and reliability are of increasing importance as ACSR conductor reaches the end of its technical asset life. Conductor condition information is vital when making optimised asset replacement decisions. Approximately 20 years ago, the CEGB developed non destructive overhead line (OHL) test equipment to measure steel core loss. The equipment developed from this project is still in use and is the only proven method of detecting loss of galvanising in ACSR. The existing equipment is obsolete and increasingly difficult to operate and maintain. The analysis software runs only on legacy hardware and with unsupported DOS software only. There is no modern equivalent equipment available world-wide.

Method(s)

Development

National Grid and Hydro Quebec are working in collaboration to establish an updated version of the ACSR condition assessment probe. During 2011/12 we have joined forces to understand the theory behind the technology and began work on a working prototype.

The method that has been proposed for this project includes;

Stage 1: Functional Specification

Stage 2: System Specification and Detailed Project Plan

Stage 3: Options for commercial arrangements

Stage 4: Development of Technology

Stage 5: Technology Validation

Stage 6: Optioneering

Scope

The scope of this project is to develop a system that will measure the residual layer of zinc on the steel strands of the core of ACSR conductors and overhead steel ground wires.

The corrosion sensor system is divided in three main components:

Sensor Head: containing the actual measuring device and an encoder

Eddy Current Electronic Unit : containing the electronics to drive the sensor head

Data collection unit: Analysis software and the data presentation for the end users.

Objective(s)

To develop an ACSR Conductor Corrosion detection piece of equipment.

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

Success Criteria

1. Production of a functional specification
2. System Specification
3. Development of Technology
4. Technology Validation

Project Partners and External Funding

n/a

Potential for New Learning

n/a

Scale of Project

This project focusses on ACSR conductor, which is widespread throughout the GB network.

Technology Readiness at Start

TRL4 Bench Scale Research

Technology Readiness at End

TRL7 Inactive Commissioning

Geographical Area

The project is being delivered in Canada.

Revenue Allowed for the RIIO Settlement

Zero

Indicative Total NIA Project Expenditure

National Grid contribution of $500,000 CAD is approximately equal to £280,000, based on exchange rate of 0.558.

Total project expenditure is therefore in the region of £330,000.

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)

Estimation of the saving if the problem is solved is £800k.

There is a requirement to maintain and reliably operate ACSR conductor to end of asset life. Investment decisions on scope, timing and prioritisation of full refurbishment or fittings only schemes are informed through condition information. The capability to deliver an optimised OHL asset replacement plan relies on the ability to select suitable routes for fittings only schemes. Without ACSR corrosion test equipment, extensive in span destructive sampling would be required leading to additional longer system outages, additional site resources and thus higher costs for collecting the condition information.

With a sharp increase in OHL asset replacement schemes planned over the upcoming RIIO period it is essential National Grid can continue to use a non destructive test to measure steel core loss to ensure condition information can be accurately and efficiently collected. Without this equipment it is expected the costs for collecting the condition information will increase from £1500 to £4500 for each section of a route where condition information is collected. This could equate to an additional cost of £800k for the tests which are required to support the plan for this RIIO year period.

Please provide a calculation of the expected benefits the Solution

Base = £4,500 per section

Method = £1,500 per section

B-M= £3,000 per section of OHL route.

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

This method is replicable over all transmission overhead lines in the transmission networks.

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

This project will identify the commercial aspects of the project, to ensure that the technology is rolled out in an acceptable manner. National Grid have a perpetual, irrevocable, royalty free, fully transferable license to use the technology as we see fit.

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 could be used by relevant Network Licenses as the equipment developed from this project will be the only proven method of detecting loss of galvanizing in ACSR, while the conductor is still in service.

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

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