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

Oct 2016

Project Reference Number

NIA_SPT_1607

Project Registration

Project Title

Non-Intrusive Assessment Techniques for Tower Foundations

Project Reference Number

NIA_SPT_1607

Project Licensee(s)

SP Energy Networks Transmission

Project Start

October 2016

Project Duration

1 year and 2 months

Nominated Project Contact(s)

Chris Halliday

Project Budget

£110,000.00

Summary

The scope of this project is to undertake laboratory tests and practical trial applications on a sample of transmission towers, sufficient to measure the suitability and performance of the techniques.

Third Party Collaborators

Energy Innovation Centre

Nominated Contact Email Address(es)

innovate@spenergynetworks.co.uk

Problem Being Solved

The structures that make up our transmission overhead line network can be extended with good maintenance and strategic replacement of steelwork. It is easy to observe and identify the corrosion level of the bare steelwork on a lattice tower. However evaluating the condition of the tower steelwork and concrete when buried out of sight is very difficult. The current approach for evaluating the condition of existing tower foundations involves excavating around the foundations so they can be visually inspected. The excavation increases the complexity, cost and environmental impact of the inspection. The foundations are subject to targeted assessment during, or before major works; every tension and angle tower is assessed as well as a sample 20% of suspension tower foundations. Due to the intensive labour and time effort involved, it is normal practice to intrusively inspect only a sample of towers

Method(s)

SPEN will provide validation and quantification of the potential benefits and provide guidance to Transmission Owners (TOs) and Distribution Network Operators (DNOs) for its implementation into Business as Usual (BaU).

This will be achieved through the following methodology:
1. Technology Demonstration

- Impact Excitation
- Ground Penetrating Radar

2. Validation and Verification
3. Modal Analysis
4. Finite Element Analysis

Scope

The scope of this project is to undertake laboratory tests and practical trial applications on a sample of transmission towers, sufficient to measure the suitability and performance of the techniques.

Objective(s)

The primary deliverable will be a report demonstrating how effective the two approaches, vibration and ground penetrating radar are, both separately and in combination. In some respects, the approaches are complementary, and it is expected that they will reveal different aspects of the structure. If the effectiveness of the methods is demonstrated, further optional deliverables may be pursued:

- Software to facilitate the use of the techniques by non-experts.
- Training in the use of the techniques by non-experts.

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

Success Criteria

The project will be considered successful if the aforementioned objectives are realised.

Project Partners and External Funding

n/a

Potential for New Learning

n/a

Scale of Project

Practical application on a transmission OHL circuit.

Technology Readiness at Start

TRL3 Proof of Concept

Technology Readiness at End

TRL6 Large Scale

Geographical Area

Practical application will be carried out in Scotland on 132kV OHL circuit.

Revenue Allowed for the RIIO Settlement

Until this project has been completed SPEN will not have full understanding of the potential savings to our T1 programmes.

Indicative Total NIA Project Expenditure

The indicative Total Project Expenditure is £110k.

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)

A detailed assessment will be subsequent to this initial piece of work.

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

As all TOs and DNOs extensively use towers for their networks, this technique would be of benefit to all TOs and DNOs.

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

If this initial project is successful, further work will be required to advance the TRL and generate a detailed understanding of the total costs to roll out this method to other TOs and DNOs.

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

All UK TOs and DNOs have a large volume of towers and none have an accurate method for non-destructively assessing the condition of their foundations therefore the learning will be very applicable to all network licensees so any benefits identified should be transferable.

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

Operational and process innovation — driving efficiency and service benefits.

☑ 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