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

Nov 2015

Project Reference Number

NIA_SHET_0017

Project Registration

Project Title

Pole Reclassification System Evaluation

Project Reference Number

NIA_SHET_0017

Project Licensee(s)

Scottish and Southern Electricity Networks Transmission

Project Start

November 2015

Project Duration

0 years and 7 months

Nominated Project Contact(s)

SSEN Future Networks Team

Project Budget

£60,000.00

Summary

To carry out a demonstration of the PRS system installation process on an offline Trident line and perform tests on strengthened poles in order to establish if the system is a suitable and cost-effective intervention for strengthening existing wood poles to withstand adverse weather events.

Nominated Contact Email Address(es)

transmissioninnovation@sse.com

Problem Being Solved

There is a considerable number of 132kV overhead line circuits mounted on wooden poles in various areas of GB. Wooden poles are more susceptible than steel lattice towers to adverse environmental conditions such as extreme wind speeds. Experience in Scotland has shown that greater than hurricane force winds can occur within GB. Such wind speeds exceed the expected design loadings of wood poles despite conformance with the standards applicable at the time of construction. As some work on climate change has indicated a higher probability of extreme weather events in the future, a review of the interventions available to network owners is now considered to be appropriate. The following are some of the options that are available:

• React to faults as and when they happen

In the short term, this may be considered as the least cost option as it is difficult to effectively model the effect of low probability, high impact events with sufficient confidence to justify proactive intervention. However, this may also be considered as a high risk strategy as it still leaves the network vulnerable to the effect of extreme weather events as stated above. The potential impact resulting from the loss of several 132kV circuits in extreme weather is likely to be widespread disruption to supplies with significant impact on stakeholders.
This first option would be most difficult to justify on the grounds of network security hence the following option can be considered:

• Replace poles on existing susceptible lines with higher classification ones or a different material of a higher specification

This is probably the most effective technical intervention but it comes at an unacceptably high cost.
As it would be difficult to justify this approach on the grounds of cost we need to consider another option:

• Reclassify or re-strengthen existing poles

This option involves keeping the same poles, if their current condition is satisfactory, and providing a technical means of strengthening the poles so that they are deemed fit for purpose to meet more stringent loading requirements such as those expected to be imposed by extreme weather conditions. In GB, poles are classified as light, medium, stout or extra stout depending on their top and butt diameters. A pole classed as medium will be damaged by bending forces earlier than one classed as stout when subjected to the same forces so if a medium pole can be strengthened such that it can be reclassified as being in the 'stout' class, then that pole will be able to withstand the same constraints as does the naturally stout pole. This principle is the basis of the method being investigated in this project.

Method(s)

This is a technical method to trial a solution called the Pole Reclassification System (PRS) which has potential to increase the strength of poles. The system has been successfully deployed in United States and is supplied by Laminated Wood Systems. The method involves attaching steel sections to most of the body of a wooden pole from below ground level to just below the crossarm using specialist tools.

This project proposes to identify a representative extra high voltage (EHV) line of Trident construction at an offline site built to the same specification and conditions of existing lines in one of the worst affected parts of the country. The PRS systems will then be installed on the poles on the trial line section and the process of installation will be observed and evaluated. This will be followed by tests which will be representative of the stresses imposed on typical poles in existence.

The overall methodology will establish if:

• The PRS method is suitable for use on very hard foundations or those with baulks below ground
• The PRS method can safely be deployed on lines in service
• There is a demonstrable increase in the strength of poles after installation of the PRS

A review of the entire project will be carried out after the demonstration and tests to ascertain if the method can be recommended for business as usual as well as to quantify the cost effectiveness of the method.

Scope

To carry out a demonstration of the PRS system installation process on an offline Trident line and perform tests on strengthened poles in order to establish if the system is a suitable and cost-effective intervention for strengthening existing wood poles to withstand adverse weather events.

Objective(s)

The overarching objective of this project is to ascertain if the strength of wood poles in service can effectively be improved through the use of the PRS system at a lower cost than would replacement with new poles of the relevant class.

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

Success Criteria

The project will be considered a success if it can determine the viability of using the PRS system to strengthen existing wooden poles on EHV circuits.

Project Partners and External Funding

n/a

Potential for New Learning

n/a

Scale of Project

The scale of this project reflects the potential value from exploring the proposed methodology. It is vital that the solution is trialed in an

offline and more controlled environment to gain the necessary familiarization before it can be used in an operational environment. The impact of an EHV line failure due to adverse weather can be significant and widespread hence the investment needed to ensure that suitable interventions are in place is justified. The scale of this project is deemed adequate to address the foregoing.

Technology Readiness at Start

TRL7 Inactive Commissioning

Technology Readiness at End

TRL9 Operations

Geographical Area

The demonstration will be undertaken within the SHE Transmission area, at a suitable test facility located in Scotland. Further tests on strengthened poles will be performed at an appropriately equipped test facility within GB.

Revenue Allowed for the RIIO Settlement

No revenue has been identified during the RIIO-T1 period.

Indicative Total NIA Project Expenditure

The indicative total expenditure is £60k, 90% of which (£54,000) is Allowable NIA Expenditure.

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)

If poles in exposed windy areas can be sufficiently reinforced without the need for replacement then it is estimated that significant cost savings may be achievable.

Please provide a calculation of the expected benefits the Solution

Base case cost = £520,421
Method cost = £95,125

Base case cost – Method cost = Financial saving

Financial saving = £425,296

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

The techniques employed in this method, if successful, could be rolled out to any transmission or distribution EHV line on wood pole construction where the circuit may be affected by wind-induced forces.

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

The cost of rollout of this method will depend on the number of poles which are identified to need strengthening with this method. SHE Transmission has slightly over 2100 wood poles on the EHV network which could benefit from this method. In the worst case scenario where all the poles are strengthened, the cost of rollout of this method will be approximately £5.6M. The number of EHV wood poles from other network licensees is not known but it would be expected that the total approximate roll out cost for each network will vary on a pro rata basis.

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

At the moment, there are limited options for increasing the resilience of existing wood pole overhead lines to extreme weather events. If the PRS can be successfully proven through a demonstration and tests then all network licensees in GB will be able to make informed decisions about its suitability for their networks.

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