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 2022

Project Reference Number

NIA_SHET_0034

Project Registration

Project Title

Low Profile 132kV Steel Poles

Project Reference Number

NIA_SHET_0034

Project Licensee(s)

Scottish and Southern Electricity Networks Transmission

Project Start

January 2022

Project Duration

2 years and 11 months

Nominated Project Contact(s)

Brant Wilson – Innovation Portfolio Manager

Project Budget

£1,100,000.00

Summary

Steel alternatives to the wood poles used for trident wood pole construction are required to provide an equivalent solution for the construction of non-resilient overhead lines (OHLs) at altitudes above 300m, where wood poles are impractical, and to provide an alternative supply chain to address the long lead times and creosote obsolescence risk associated with wood poles.

Preceding Projects

SSEEN03 - New Suite of Transmission Structures (NeSTS)

Nominated Contact Email Address(es)

transmissioninnovation@sse.com

Problem Being Solved

Within the next five years SSEN must provide connections to multiple wind farms characterised by their large electrical capacity or high altitude. A wood pole overhead line is infeasible in these cases and dictates that the only alternatives in the current design suite are steel structures (lattice towers or NeSTS steel poles) or cable. Each of these options carries a stepwise increase in construction costs by their inherent higher levels of system security. Hence within the current design suite there are significant technical and commercial gaps between the maximum capability of wood poles and the current alternatives.

The future use of creosote as a wood preservative is currently under review by the requirements of EU Legislation and is likely to be removed from the market within the next five years. The substitution of creosote by alternative preservatives represents a substantial risk to Scottish Hydro Electric Transmission as the understanding of their long-term service performance has not yet fully developed.

Method(s)

Steel alternatives to the wood poles used for trident wood pole construction are required to provide an equivalent solution for the construction of non-resilient overhead lines (OHLs) at altitudes above 300m, where wood poles are impractical, and to provide an alternative supply chain to address the long lead times and creosote obsolescence risk associated with wood poles.
Lessons learned during deployments of a composite pole OHL on its transmission network to connect the Dorenell wind farm, and the NeSTS trial OHL at Quoich, are available to inform this work. The most critical of these are that prototypes are utilised at full scale by SSEN and its contractors before the design is frozen, that no accessories requiring frequent inspection are designed to remain mounted to structures, and that the designs are readily manufacturable by multiple companies in response to fully detailed drawings. OHLs constructed with the new steel supports must meet the internal requirements defined for wood poles, and the functional requirements detailed in NeSTS Low Profile 132kV SC Functional Requirements.

Scope

The project will be split into three work packages to –
1. Develop prototype designs.
2. Build prototypes and report on performance and subsequent design refinement.
3. Conduct type testing for Technical Authority approval.

Objective(s)

The project objective is to create a low-profile design which replicates the visual consenting envelope, reliability levels, insulation level, and construction methods associated with wood poles, significantly reducing future construction costs. Application of the low-profile design within the existing design suite as a substitute for current steel structures could provide a significant reduction in construction costs to the year ending 2026. Lower construction costs will provide customers with lower cost connections and support energy system transition.

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

The project aims to reduce the costs of Renewable generation resulting in a reduction of costs which may benefit all consumers including those that are vulnerable.
Justification for undertaking the innovation project is based on supporting energy system transition.

Success Criteria

The project will be deemed as successful if all items in the scope, objectives and learnings are met which can be used to assess the effectiveness of low-profile steel poles as a suitable alternative to current design methods.

Project Partners and External Funding

The project will be undertaken using NIA funding by Scottish Hydro Electric Transmission supported by contractors Energyline, Norpower and PLPC.

Potential for New Learning

• Determine the potential of utilising a low-profile steel pole as an alternative to current design at altitudes over 300m.
• Develop a robust cost benefit analysis to demonstrate the potential cost savings by implementing a low-profile steel pole design.
• Demonstrate how implementing low-profile steel poles can contribute to energy system transition.
Learnings from the project will be disseminated via internal and external stakeholder event which will be conducted during the project. The learnings will also be shared within the annual project report and at relevant dissemination events such as the Energy Networks Innovation Conference.

Scale of Project

This project is designed to get maximum learning for minimal cost. This scale of project expects to provide sufficient learning to fully assess the suitability of implementing low-profile steel poles in future Transmission projects. Any smaller scale project would limit the ability to fully assess the suitability of the proposed solution.

Technology Readiness at Start

TRL4 Bench Scale Research

Technology Readiness at End

TRL8 Active Commissioning

Geographical Area

The project will be undertaken in the Scottish Hydro Electric Transmission licence area in Scotland.

Revenue Allowed for the RIIO Settlement

No allowance has been made for this type of development within the RIIO-T2 settlement. No savings are expected during project implementation; future savings may be possible depending on the outcomes of the project and future adoption of the created design(s).

Indicative Total NIA Project Expenditure

The total expenditure expected from the project is £1,100,000. 90% of which £990,000 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:

The learnings from the project have the potential to facilitate energy system transition by providing a lower cost OHL, compared to current approved design (lattice towers/NeSTS), enabling lower cost connections for renewable generation. The project aims to provide an alternative supply chain to address the long lead times and creosote obsolescence risk associated with wood poles.

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)

N/A

Please provide a calculation of the expected benefits the Solution

This is an investigative research project, if results are positive then cost savings can be estimated from the project learning and be reported at the end of the project.

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

The learnings are mainly of interest to Scottish Hydro Electric Transmission due to the geographical composition of our network and the requirements of future connection projects under development. The learnings will be of interest to other licensees who have similar limitations with current approved designs.

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

The costs of rolling out the method across GB are dependent on the operation and geography of the rest of the GB network.

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

Relevant network licensees will be given access to the designs and test results from the project. Should a suitable design(s) be implemented, other licensees can incorporate this design into their own projects where they have similar limitations as detailed in the problem statement.

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

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.

To date, no other projects have been undertaken to develop a low-profile steel pole design to address the problem statement.

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

The project is innovative as it will develop a new untrialled design which will be subjected to a product design validation process and is expected to provide a new solution to resolve an ongoing problem.

Relevant Foreground IPR

Any new designs which are completed as part of the NIA project will be made available to other relevant networks licensees. No background IPR is required.

Data Access Details

See Network Innovation Competition (NIC) and Network Innovation Allowance (NIA) Data Sharing Procedure at https://www.ssen.co.uk/InnovationLibrary/Distribution/

Please identify why the Network Licensees will not fund the project as apart of it's business and usual activities

NIA has been deemed the best method of supporting the delivery of this project. Development projects funded by NIA give suitable financial support to investigate areas for potential development that could not be funded by BAU as no allowance was made in the RIIO-T2 settlement.

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

This project can only be undertaken with the support of NIA due to the overall costs and timescales required. There is significant technical design work to be undertaken which may demonstrate there is not a suitable alternative solution to current design. There is also commercial risk that costs for a new design carry a significant risk until a draft design can be costed and a cost benefit analysis conducted. NIA is the best mechanism to fund development projects such as this.

This project has been approved by a senior member of staff

☑ Yes