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NIA Project Registration and PEA Document

Date of Submission

Mar 2022

Project Reference Number

NPG_NIA_040

Project Registration

Project Title

Pollywood II

Project Reference Number

NPG_NIA_040

Project Licensee(s)

Northern Powergrid

Project Start

April 2022

Project Duration

3 years and 0 months

Nominated Project Contact(s)

Chris Goodhand

Project Budget

£495,000.00

Summary

The original Pollywood project was developed to investigate the use of wooden veneer composite materials as a creosote free alternative to the treated, northern-latitude, slow-grown pine currently used to support overhead lines.

The initial phase of the project, completed in 2020, confirmed the promise of such materials and a second phase, Pollywood II, is now required. This project will more fully develop the concept and provide full-sized samples of poles for mechanical and other acceptance testing. Additionally the project will make the necessary preparations to transfer the Pollywood product into full production assuming a successful outcome to the project

Nominated Contact Email Address(es)

yourpowergrid@northernpowergrid.com

Problem Being Solved

Traditionally wooden power distribution poles have been preserved using creosote a chemical that is coming under EU and UK Government pressure to be replaced. Therefore, there is a need to find alternative preservatives to creosote or find alternative materials that can be used to replace traditional wooden poles.

Any alternative to traditional wooden poles would need to meet the requirements of network operators. New materials and designs would have to demonstrate longevity, ease of installation and operation, correct mechanical strength, appropriate electrical properties, be eco-friendly and cost effective.

The original Pollywood project delivered the following objectives:

*Developed a new material based on wood veneers and bio resins that can potentially meet DNO's criteria for being used as an

alternative to traditional wooden power distribution poles.

- * Developed a material that is eco-friendly.
- * Developed a new design of pole using this material that possesses all the characteristics required for a power distribution pole.
- * Develop a replacement pole design that would be cost effective to deploy.

This was demonstrated through the production of small-scale prototype poles to demonstrate the concept and allow the selection of the appropriate materials. It is now necessary to develop the full-scale manufacturing process and to produce and test full-sized poles for field testing in an operational environment to determine if the poles can be used at full industrial scale.

Method(s)

As per the original Pollywood project the methodology seeks to deliver the following

- * Poles or components that would be produced using spiral winding machines an industrial process allowing products to be manufactured to order.
- * A pole manufactured from eco-friendly sustainable resources.
- * A pole with a projected lifespan in excess of 50 years without the need to be treated with creosote.
- * A lightweight pole, which for network operators would have benefits for installation in difficult to access locations, since it will require less heavy plant for handling (could be man handled).
- * A pole which would still permit linesman to climb with the preferred inexpensive method of spiked boots.
- * A design of pole more cost effective than other traditional pole replacements
- * A hollow pole which will allow cabling to be trunked internally, giving a better performance from a safety perspective as well as being more aesthetically pleasing.

Building on the work undertaken and successfully delivered in the original project, the key project stages required to bring the product to a TRL of 8 are as follows.

- *Integration of Adhesive Application
- *Development of Machine Operating Process
- *Production of 3, 5 & 7 Ply Tubes and Fungal Accelerated Testing
- *Testing of 3, 5 and 7 ply poles by Registered Test House and FEA Comparison
- *Production of Full-Scale Prototypes for initial Testing
- *Production of Full-Scale Prototypes for DNO assessment, plus additional test and analysis against ENA TS 43-88 standard requirements.

Scope

The scope of this 36 month programme of work by Pollywood is to build on the work undertaken in the original project and to develop a manufacturing process to deliver poles to the field.

The project scope is restricted to the supply and assessment of small numbers of full-sized poles for OHL support.

The successful development of this technology for field use will open other possibilities beyond the direct replacement of existing wooden poles. Modular designs, replacement of cross arms are all potential developments once the material has been proven fit for purpose for the power industry requirements. These are out of scope for the Pollywood II project

Objective(s)

The objectives of this project are to:

*Develop and optimise a pole manufacturing process (probably suitable for sub-contractor manufacturing).

*Assess full scale poles against current standards.

*Subject poles to accelerated environmental ageing tests.

*Assess and confirm the economics and business case for pole manufacture and adoption. The full costs of commercialisation to be confirmed for poles which meet the industry standards. Including the full range of pole types and sizes.

*Identify operational acceptance issues, such as climbability, compatibility of pole fixings and pole furniture, protection of attachment holes, pole erection and staying to be assessed.

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

N/A

Success Criteria

The success criteria for the Project are:

To have met the objectives laid out above, and in doing so developed and assessed a suitable manufacturing process for ongoing manufacture of environmentally friendly poles and to have determined if and how such poles can be used in the field on an ongoing basis.

Project Partners and External Funding

Pollywood, providing knowledge, IP and other intangibles.

Potential for New Learning

The new material and designs being developed in this project could provide the networks with new, environmentally acceptable opportunities to deploy innovative alternatives to some of their existing overhead pole infrastructure. The use of this specific technology has not been undertaken and information on its physical properties and operational use when applied in the form of support poles for overhead lines is entirely new.

Scale of Project

The scale of the project remains relatively small. A manufacturing process will be developed and full-scale prototypes of poles produced for testing and field assessment. Numbers of poles will be relatively small and no substantial deployment on to the distribution network is anticipated.

Technology Readiness at Start

TRL4 Bench Scale Research

Technology Readiness at End

TRL5 Pilot Scale

Geographical Area

N/A. Trials at small scale only.

Revenue Allowed for the RIIO Settlement

None

Indicative Total NIA Project Expenditure

£450,000.

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:

The project will potentially allow faster and easier construction of overhead lines as well as allowing the continued use of current overhaed line unto the future. In rural areas overhead lines tend to be the only practical option for the connection of low carbon and other connected technologies.

How the Project has potential to benefit consumer in vulnerable situations:

The physical properties of Pollywood poles mean that under emergency conditions repairs and restoration can be carried out more quickly. In post-storm conditions this has the potential to support vulnerable customers and, following increased electrification of heat and transport, to prevent customers becoming vulnerable under such conditions.

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)

When the use of creosote to preserve wooden poles is banned there will be a need to find either an alternative preservative or a replacement to wooden poles. Currently all other alternatives such as carbon fibre composites, steel, aluminium, concrete are costlier than wooden poles. It is believed that a Pollywood pole would be of a comparable cost to wooden poles.

The initial business case for Pollywood deployment, and based on a reasonable take up of poles across the whole NPg network, gives an annual saving of approximately £2.5m pa after ten years, with the potential for a saving of £17m across the whole of the GB network.

Savings primarily come from the operational cost improvements in dealing with much lighter poles. The cost of poles themselves is likely to be very similar to slightly more expensive when compared with the current solid poles used for overhead lie support. This cost of poles is in line with what was anticipated at the start of the phase 1 project.

Please provide a calculation of the expected benefits the Solution

There are no benefits from the project itself beyond the option value of an alternative to creosote preserved wooden poles.

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

This method could be applied across the whole of GB and applies to all network operators.

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

Poles would be replaced on an as-needed basis. The output of the original Pollywood project indicates that the initial target, ie to at least match the cost of current poles over their entire lifetime, is entirely achievable, in which case the marginal cost of roll-out would be insignificant. This assumption will be revisited at the end of the project.

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

Project learning will allow other DNOs to transition to an alternative to the current slow-grown, creosote protected, pine pole supports that is mostly compatible with their current operation practices and asset policies. The learning can be used with no further investment.

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 issue of identifying and developing an alternative technology to the current creosote protected wooden pole system for overhead line support is an explicit need identified in Northern Powergrid's published innovation strategy for RIIO-1.

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.

The project is unique and based on IP that is proprietary to the project's subcontractor. This position was confirmed during the initial project which provides the development platform for this activity.

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

Based on proprietary technology and a previous project the background knowledge and learning to deliver this has not been previously available.

Relevant Foreground IPR

The relevant foreground IP will be embodied in a product available to all DNOs, in line with established NIA practice.

Data Access Details

No data sets will be generated. A full report containing any relevant quantitative conclusions will be available.

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

The project is a development activity with significant technical and economic risks. Significant financial return on the project outcomes is unlikely within the ED2 period assuming that the project is entirely successful. Returns are likely to be seen from about 2034.

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

Significant technical risk remains in the project. No full-scale testing of poles manufactured using this method has been undertaken as these have yet to be produced. Commercial issues are still to be resolved and although the production costs and price appear to be in line with targets they are yet to be confirmed.

This project has been approved by a senior member of staff

Yes