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NIA Project Registration and PEA Document

Date of Submission

Apr 2015

Project Reference Number

NIA_NPG_001

Project Registration

Project Title

Vonaq Utility Pole Strength Measurement

Project Reference Number

NIA_NPG_001

Project Licensee(s)

Northern Powergrid

Project Start

April 2015

Project Duration

1 year and 7 months

Nominated Project Contact(s)

NPG Innovation Manager Chris Goodhand, SPEN
Technology Development Manager Geoff Murphy SSEPD
R&D Manager David MacLeman

Project Budget

£267,000.00

Summary

This Method is already field proven for wood poles in the telecoms sector. The scope of this project is to develop the Method to work on power distribution poles rather than telecom poles, since many variances exist such as: different cable tensions, cable weights, pole sizes and attached equipment. In order to do so the following work will take place:

- * Stage 1 – Device trial and data gathering
- * Stage 2 – Data collection for algorithm customization
- * Stage 3 – Algorithm development
- * Stage 4 – System prototyping demonstration in an operational environment

Stage 5 – Product verification

Nominated Contact Email Address(es)

yourpowergrid@northernpowergrid.com

Problem Being Solved

Presently utility poles are tested for their condition, and thus safety, using subjective techniques such as hitting the pole with a hammer and listening for changes in sound to indicate decay. This system has its limits: firstly that it is not a reliable method test for quantifying the condition of the pole that is buried; and secondly that it is a subjective method and relies on the persons completing the tests own experience. This is not ideal and can create a great deal of unnecessary waste and cost due to poles being incorrectly identified as weak and being removed too early in their life.

Attempts have been made in the past to develop a solution that can assess the condition of a full pole, including what lies below the ground, however available solutions either require a high skill level and/or do not provide reliable results. This can result in healthy poles being replaced unnecessarily.

It is estimated that of the approx 20,000 poles that are replaced annually in GB, 4800 are replaced unnecessarily.

Method(s)

The project method is to perform a technical field trial of a system for testing the condition of wood poles in an objective manner rather than the current subjective assessment described in the problem section that's carried out by all DNOs. The project will look to trial the device on each DNOs network to understand the different parameters caused by pole attached equipment and ground type and then to use the gathered data to refine the product.

The technique itself is an objective diagnostic test that is performed on a pole, by an operator requiring a low skill level. The system comprises a small hardware probe that is strapped to the pole by the operator and that communicates with an Android smartphone that is used to control the device. The user enters some basic measurements of the pole such as its circumference, the pole configuration (switches, transformers, stays etc.) into the App running on the Smartphone. The user then stimulates the pole by hitting it with a hammer. The pole mounted probe analyses the frequency response, passes this into the patented algorithm and displays the Ultimate Breaking Strength of the pole (according to the standard EN 14229 2010) on the User Interface of the phone along with a Pass or Fail indication.

Scope

This Method is already field proven for wood poles in the telecoms sector. The scope of this project is to develop the Method to work on power distribution poles rather than telecom poles, since many variances exist such as: different cable tensions, cable weights, pole sizes and attached equipment. In order to do so the following work will take place:

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Objective(s)

The objectives of the project are:

- * Determine the usability, improved pole test process and cost saving of the initial device in an operational environment;
- * Define the different types of pole top equipment that will tend to be found on distribution wooden poles;
- * Develop the algorithm to improve results;
- * Determine the usability, improved pole test process and cost saving of the second version of the device in an operational environment; and
- * Determine whether the product can pick out rotten poles.

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

Success Criteria

For this project to be considered a success it will determine whether it is possible to objectively determine the condition of a wooden pole and consistently test for it.

Project Partners and External Funding

n/a

Potential for New Learning

n/a

Scale of Project

In order to successfully show that this form of testing is effective, will require each DNO to provide data on a 100 poles at the start of the project. Later stages will then require each DNO to trial the method more extensively to ensure it works as it should do. Any scale less than this could result in the product not being as effective as it needs to be.

Technology Readiness at Start

TRL4 Bench Scale Research

Technology Readiness at End

TRL8 Active Commissioning

Geographical Area

It is important to also have data samples from different geographic regions and DNOs since ground type will vary and potentially equipment types used, different tensions, materials and processes will vary

Field trials will be conducted in each Network Licensee area to collect this data to then be analysed as part of the project and to improve the systems efficacy.

Revenue Allowed for the RIIO Settlement

None

Indicative Total NIA Project Expenditure

The total Project cost is £266,525 of which 90% is allowable NIA expenditure (£239,873k)

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 the problem faced is solved, Network Operators will lead to less unnecessary pole changes. Through our cost benefit analysis. We have estimated an improvement of 7.5%. Additional environmental benefits should also be available.

Please provide a calculation of the expected benefits the Solution

The estimated saving for NPg is around £54,680 over the RIIO-ED1 price control, other DNO partners show savings of a similar order of magnitude.

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

The Method could be applied across all Network Licensees where there are wood poles. The average number of wood poles per DNO is 290,000.

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

Cost per DNO = Unit Cost * Number of Units + Training = £5,000 * 50 + £22,500 = £272,500

Total Cost for GB = Cost per DNO * Number of DNO's = £272,500 * 6 = £1,653,000

The expected cost for a device is £5,000.

The number of line patrol teams within SSEPD is approximately 50.

It is expected that a team would inspect 5,000 poles per year and would have 1 unit per team.

Assuming that all DNO's would have the same number of inspection teams it would cost a total of £1,653,000 for all DNO's.

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

This technology under trial is designed to improve the management of wooden poles. All relevant network licencees use wooden poles as their primary method of support for their overhead line systems.

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

This project meets the specific innovation requirements to improve network reliability and to reduce network costs.

- 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