NIA Project Registration and PEA Document

Date of Submission

Sep 2021

Project Reference Number

NIA_SPEN_0063

Project Registration

Project Title

Virtual OHL Inspections: Combining Statutory Inspection & Condition Based Assessment (CBA)

Project Reference Number

NIA_SPEN_0063

Project Licensee(s)

SP Energy Networks Distribution

Project Start

October 2021

Project Duration

0 years and 4 months

Nominated Project Contact(s)

Stephen Boyd

Project Budget

£110,000.00

Summary

This p[roject will assess and trial the use of drones to carry out condition-based monitoring on the OHL network.

Third Party Collaborators

Energy Innovation Centre

Nominated Contact Email Address(es)

innovate@spenergynetworks.co.uk

Problem Being Solved

Carrying out separate Statutory and Condition Based inspections may be sub-optimal with potential OPEX savings achieved by combining these inspections. Current use of foot patrols to capture inspection images may be enhanced by utilising drones and artificial intelligence to capture images from which to identify defects, including missing danger plates. This may enhance safety, network resilience and reduces carbon emissions via reduced site visits.

Method(s)

· Update asset model

· Gather historical images for missing danger plates

· Agree trial area image capture guidelines & plan flights

- ·   Set-up environment

- ·   Initiate missing danger plate AI

- ·   Carry out image capture (drone) flights

- ·   Install Grid Vision & fine tune AI

- ·   Grid Vision training

- ·   Carry out virtual inspection and gather feedback. Test missing danger plate AI model

- ·   Fine tune business case

- ·   Present final report

Scope

Defect detection on test areas of network via virtual inspection including the following artificial intelligence modules:

- Broken insulator
- Contaminated insulator
- Cracked pole
- Conductor strand damage
- Flashed insulator
- Woodpecker damage
- Missing danger plate (new)

Full report on OPEX savings, artificial intelligence detection of above and role of digitized defect data in predictive maintenance.

Objective(s)

Report demonstrating optimal approach to combine statutory & condition based assessment inspections via virtual inspections. To include detailed approach to optimise OPEX savings and utilise digital condition data (including identified from artificial intelligence) in future network planning.

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

N/A

Success Criteria

- ·   Demonstrate optimal OPEX savings in combining statutory & condition based assessment surveys

- ·   Identify the impact of detect detection and virtual inspection processes utilising artificial intelligence

- ·   Identify the role of digitised defect data in future network planning

Project Partners and External Funding

N/A

Potential for New Learning

How to optimize the combining of statutory and condition based assessment inspections via virtual inspections

The role of artificial intelligence in enhancing inspection processes and detecting defects, including missing danger plates on UK network assets

Developing time-series condition based defect data as the basis for predictive maintenance

Scale of Project

Survey of approx. 400 poles by drone image and subsequent desk based inspection

Technology Readiness at Start

TRL6 Large Scale

Technology Readiness at End

TRL8 Active Commissioning

Geographical Area

Southern Scotland (SP Distribution approx. 200 poles)

North West England/Wales (Manweb approx. 200 poles)

Revenue Allowed for the RIIO Settlement

0

Indicative Total NIA Project Expenditure

£110,000

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:

N/A - RIIO-1

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

N/A - RIIO-1

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)

The Statutory Inspection cost is approx. £1.3M and the Condition Based Survey is approx. £0.8M. The report will outline the extent to which savings can be achieved via merging. A target (not estimate) saving would be to merge the surveys within the £1.3M Statutory cost saving £0.8M. Longer term

Please provide a calculation of the expected benefits the Solution

See above

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

We believe that this method and report learnings could be applied to other UK & Ireland DNOs

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

Project will not lead to a rollout at this stage (feasibility study only).

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

We understand that networks generally undertake multiple surveys of network lines and learnings how to combine these surveys using virtual inspections may result in OPEX savings. Understanding the abilities of artificial intelligence on UK network assets to detect defects and streamline processes on the DSO networks will be relevant to Network Licences (including digitalized condition data for predictive maintenance).

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.

Checks on ENA Smarter Networks Portal revealed no other projects for this specific problem.

Confirmed

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

While this has been raised before, this is the first trial of the use of drones to monitor and inspect OHL that has been run within the UK.

Relevant Foreground IPR

N/A

Data Access Details

https://www.spenergynetworks.co.uk/pages/data_sharing_policy.aspx

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

As per below, there are specific technical risks to this project which neccesitates the use of NIA funding.

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

There is specific technical risk to this project, including potential damage to OHL assets, or that defects may not be detected as they would with standard inspections. These mean that support of NIA funding is neccesary for this project.

This project has been approved by a senior member of staff

☑ Yes