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NIA Project Registration and PEA Document

Date of Submission

Sep 2019

Project Reference Number

NIA_WPD_044

Project Registration

Project Title

Wildlife Protection

Project Reference Number

NIA_WPD_044

Project Licensee(s)

National Grid Electricity Distribution

Project Start

September 2019

Project Duration

2 years and 7 months

Nominated Project Contact(s)

Mike Chapman / Sam Rossi Ashton

Project Budget

£326,061.00

Summary

Contact between overhead (OH) lines and wildlife causes considerable disruption to electricity supplies, damage to plant and apparatus resulting in costly repairs as well as causing death or injury to the wildlife making contact.

From figures obtained from the National Fault and Interruptions Reporting Scheme (NAFIRS) and WPD systems it is estimated (pro rata) that it is costing the UK distribution and transmission companies in excess of £10M per annum in terms of the Customer Minutes Lost (CMLs) and Customer Interruptions (CIs) and to carry out repairs. These contacts also cause thousands of wildlife deaths through electrocution or collision.

The scope of the project is to carry out research on the interaction of wildlife with OH lines / structures in order to design, develop and produce a suite of UK and Ireland specific mitigation measures and a risk assessment (RA) Software App which will provide member companies / end users with guidance on the most cost-effective way of minimising wildlife contact.

Problem Being Solved

Contact between overhead (OH) lines and wildlife causes considerable disruption to electricity supplies, damage to plant and apparatus resulting in costly repairs as well as causing death or injury to the wildlife
3 making contact.

From figures obtained from the National Fault and Interruptions Reporting Scheme (NAFIRS) and WPD systems it is estimated (pro rata) that it is costing the UK distribution and transmission companies in excess of £10M per annum in terms of the Customer Minutes Lost (CMLs) and Customer Interruptions (CIs) and to carry out repairs. These contacts also cause thousands of wildlife deaths through electrocution or collision.

Whilst member companies do carry out work (£Ms per annum) to improve their overhead networks' resilience to wildlife contact, this is normally reactive work after several incidents have occurred and / or as a result of customer complaints. As a result, this work will be carried out on the localised affected sections only and may not be the most cost effective and appropriate method to provide the

greatest return for the capital spent.

There is a further potential risk to 3rd parties who may be tempted to access structures in an attempt to remove birds which have become entangled in the OH wires and apparatus.

Method(s)

This project will be carried out using a staged approach to bring together the learning from research, design and development phases. This will enable the production of a Software Risk Assessment tool and suitable mitigation methods and allow a trial exercise to be undertaken on a typical 11kV OH network. The learning from all stages will then be used to produce an overarching guidance document.

Stage 1 - Research

- Susceptibility of line design, apparatus and equipment layout and materials used suited to the environment they are situated in.
- Likely wildlife contact, its type and the likely impact on equipment and the wildlife. This part of the research will need to ascertain the migration patterns covering bird species most likely to cause damage across the whole of the United Kingdom and Ireland.

Work regarding wildlife collisions has already taken place within the industry. Where possible, this work will be built upon. Two notable sources are:

- ENW Collision Risk Assessment Toolkit and
- Bird and Power Lines work produced by Endesa (Spanish Energy Company)

The research will also build upon existing work through collaboration or consultation with academic institutions and stakeholders including preservation societies and international bodies such as

- International Centre for Birds of Prey <https://www.ICBP.org>
- The British Bird of Prey Centre www.britishbirdofpreycentre.co.uk
- The Wildfowl & Wetlands Trust www.wwt.org.uk
- Royal society for the protection of birds, <https://www.rspb.org.uk>
- Avian Power Line Interaction Committee- USA. <http://www.aplic.org/>

Stage 2 – Design and Development of Mitigation Methods

The design and development of mitigation measures will need to be relative to the outputs of stage 1 and require collaboration / consultation with associated manufacturers to identify and produce a suite of suitable UK and Ireland specific methods of mitigation. The Design & Development of the mitigation measures will need to consider the following, in order to ensure:

- The risk of contact is reduced to acceptable level
- The cost of the mitigation is kept to a minimum
- The method and ease of use should be 'network friendly'(i.e. applied live as switching the network out leads to other complications), as well as costs effective
- The robustness of the mitigation measure is sufficient to deal with expected service life
- The type testing requirements can achieve the above robustness
- The effects of the mitigation measures once installed to the equipment will be applied
- Expected lifespan and maintenance requirements

Stage 3 - Build and Type Testing of Mitigation Methods

The build and testing of the suite of mitigation measures identified in Stage 2 will require collaboration / consultation with an appropriate manufacturer to produce suitable UK and Ireland specific methods of mitigation; this build and testing stage will need to:

- Identify optimum design for each mitigation measure from Stage 2
- Build mitigation measures
- Define specific physical testing regimes to ensure ease of application), prove electrical, mechanical, weather and thermal withstand capabilities of the proposed solutions.
- Test device(s)

Stage 4 – Design, Develop and Produce Risk Assessment App

This stage will require the engagement with a suitable software developer who can take the outputs of stages 1 & 2 and design and produce a logically sequenced software Risk Assessment (RA) App.

The App should:

1. Ask the user a series of questions that allows for variable inputs identified in stage 1 e.g. line design, structure type, plant type & its mounting position on the structure, jumper configuration and the environment in which the structure is sited etc.
2. Assist the user, utilising the outputs of 1. above in conjunction with an interactive map, to identify the likely wildlife that will be present in the environment in which the structure is sited, identify the type of risk and calculate the likelihood that such risk will be realised.
3. Suggest, based on the mitigation measures identified in stage 2, the most appropriate mitigation method that can be applied for the identified risk.
4. Be designed so that:

a. Users are enabled to upload results obtained which will allow for collaborative learning;

b. App developers can analyse oncoming data, measure performance and issue an annual report on any finding, and where necessary recommend and carry out regular updates to the App.

Stage 5 – Real World Trial of Risk Assessment Software App and Mitigations Measures on 11kV OH Network

A real-life trial of the Software Risk Assessment Software App and the application of the mitigation measures on an existing 11kV overhead line. This stage will:

1. Identify a suitable location and structures that have suffered network issues relating to wildlife contact in the previous 12 months
2. Use the Risk Assessment Software App to identify the type and likelihood of the risk that further contact will be realised
3. Purchase and install the identified mitigation measures to the OH line
4. Monitor performance of the applied mitigation measures over a minimum period of 12 months to cover all seasonal variations.
5. Consider the success of the App and the application of mitigation measures after the trial period.

During this stage the trial should identify any shortfalls in the Risk Assessment Software App and mitigation measures in terms of their use and feed back into the final designs. The trial should also be used in the development of guides for the use of Risk Assessment Software App and the installation of the mitigation measures.

Stage 6 - Reporting on Outputs

The project will culminate with the production of a functional report that will provide;

1. An assessment of the outputs and learning points identified throughout the project
2. The benefits and drawbacks of the Risk Assessment Software App, mitigation measures i.e. their use, application and maintenance requirements and any risks that may be posed through their application
3. Guidance documents for future use including operational and strategic guidance on carrying out a Risk Assessment, specification and purchase of appropriate mitigation measures, methods of application of those mitigation measures and subsequent maintenance requirements.

Scope

The scope of the project is to carry out research on the interaction of wildlife with OH lines / structures in order to design, develop and produce a suite of UK and Ireland specific mitigation measures and a risk assessment (RA) Software App which will provide member companies / end users with guidance on the most cost-effective way of minimizing wildlife contact.

The output will be proven through a real-life trial which will involve the practical use of the Risk Assessment Software App and mitigation measures on an identified circuit.

The output of the research, development of mitigation measures, Risk Assessment Software App and trial will need to feed into a report which captures all learning and provides end users with appropriate operational and strategic guidance.

Objective(s)

1. Understand how wildlife behaves and interacts with overhead lines so as to determine those environments where lines, structures, equipment and configurations are most susceptible to inadvertent wildlife contact.
2. Design, develop and produce a set of detailed mitigation measures to mitigate the risk of wildlife interaction with Electricity Overhead Networks.
3. Identify where materials, plant and equipment could be redesigned or modified cost effectively to make them less susceptible to contact flashover.
4. Develop a Risk Assessment Software App to assist in identifying the current risk and the resultant risk once specified mitigation measures have been put in place.

5. Provision of guidance documents on carrying out a Risk Assessment, specification and purchase of appropriate mitigation measures,

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

Success Criteria

1. Production of a research paper that outlines those lines, structures and configurations most susceptible to wildlife contact and in the environments they are sited.
2. Production of a suite of suitable UK and Ireland specific mitigation measures and an accompanying report which details material specification, type test requirements, installation methods and maintenance requirements.
3. Production of a Risk Assessment Software App that could identify the current risk and the resultant risk once specified mitigation measures have been put in place. This includes the production of strategic and functional guidance on how to use the Risk Assessment Software App.
4. Real-life trial of the Risk Assessment Software App, purchase and application of the UK and Ireland specific mitigation measures on a typical 11kV overhead circuit and recommendations using an example circuit. i.e. For a circuit, use the tool to assess the risk, use the report recommendations to determine appropriate mitigation methods, apply the appropriate mitigation measures and use the tool to quantify the risk once effective mitigation methods have been put in place.
5. Production of a functional report that will take the learning from all stages to provide both operational and strategic guidance on carrying out a Risk Assessment, specification and purchase of appropriate mitigation measures, methods of application of those mitigation measures and subsequent maintenance requirements.

Project Partners and External Funding

The project will be run under the Collaborative Energy Portfolio (CEP), EA Technology will be contracted, and a University subcontracted, by ENA and the cost of the project recharged to the participating DNOs.

The project is dependent on all participating networks signing up to provide finance.

The following networks have confirmed their participation:

1. Western Power Distribution (Lead DNO group)
2. SP Energy Networks
3. Scottish and Southern Electricity Networks
4. Electricity North West Limited
5. Northern Powergrid
6. ESB - Contributing £20,148 from non NIA budget

Potential for New Learning

The learning generated during project will enable parties to:

- better understand the relationship / interaction of wildlife with overhead lines;
- better design, develop and produce UK and Ireland specific mitigation measures;
- understand how existing standard materials can be modified or changed in a cost-effective way to incorporate risk mitigation during manufacture; and
- enable industry to make cost effective strategic decisions on the best forms of mitigation measures when lines are to be refurbished or rebuilt.

Project learning will be disseminated to participating parties through the project and learning will be disseminated externally after project completion.

Scale of Project

Due to the migrations of species being different across different areas of the UK and Ireland , project stages 1-6, the research, development & production of UK and Ireland specific mitigation measures, and Risk Assessment Software App will need be designed so that it covers the this geographic area in its entirety so it can be of use to all project parties.

The Stage 5 Real World Trial will be taking place on an area of WPD's 11kV OH Network only as multiple trial areas are not required. The trial area needs to be large enough to experience a reliable number of contacts so that reduction in contacts caused by mitigation measures can be observed.

Technology Readiness at Start

TRL3 Proof of Concept

Technology Readiness at End

TRL6 Large Scale

Geographical Area

Stages 1, 2, 3, 4 & 6 is a collaboration effort with support from all participating DNOs.

Stage 5 will include a trial currently proposed on a section of identified WPD 11kV network which is to be confirmed.

Revenue Allowed for the RIIO Settlement

0

Indicative Total NIA Project Expenditure

Total Budget £326,061

NIA eligible Budget (exc. ESB) £305,913

NIA Expenditure £275,321

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)

Within WPD there are on average 430 incidents per annum where equipment is damaged and subsequent repairs are needed to the affected apparatus; this in turn leads to the loss of millions of CMLs and CIs resulting in total annual cost to WPD in excess of £3M per annum.

Conservative estimates suggested that the UK distribution companies experience 1000s of wildlife contacts that damage equipment at a cost of over of £10M per annum. If successful and implemented by member companies it is estimated that UK distribution companies could save in the region of £5M to £8M per annum.

Please provide a calculation of the expected benefits the Solution

It is expected that the risk of wildlife contact in the identified stage 5 trial area will be reduced by a minimum of 80%.

As above, WPD alone experiences around 430 incidents annually at a cost of ~£3M to cover repairs and C/CMLs, this roughly equates to £7k per collision. It is expected that a minimum of 80% of collisions in the trial area can be mitigated. If for instance the trial area currently experiences 10 collisions over six months, the trial could mitigate costs of ~£56k

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

The output of the project, if successful, should allow for the methods to be replicated across 100% of Distribution Network Licensees and some transmission systems.

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

Should the project be completed successfully; this method is applicable and be ready to use across UK at no further cost- with the exception where specific needs dictate further enhancement/development.

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

Currently the industry has a broad-brush approach, is reactive to incidents and spends considerable amounts of money on mitigation measures which are not necessarily the most appropriate and cost effective.

If successful, the learning from this project would enable network planners to make better strategic investment decisions. It would also provide guidance for planners and operational staff to quickly be able to assess both existing and proposed OH lines to determine the current risk, how to effectively protect both assets and wildlife and the resultant risk once mitigation measures have been put in place.

The production of an innovative strategic guidance document and risk assessment tool which brings together all of the factors that are involved in wildlife contact would allow existing and newly designed overhead lines to be assessed as they never have been before. This would then allow for a much more proactive, targeted and cost effective approach to be adopted when applying mitigation measures.

Project learning will be used to promote a more resilient OH Line network in a controlled and cost-effective way and the inconvenience caused to customers from unplanned outages will be significantly reduced. It will help save on the cost of emergency plant and equipment repairs and significantly reduce the wildlife deaths and injuries experienced on an annual basis.

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.

Online research suggests that an application that can perform a wildlife collision risk assessment, specify mitigation measures as well

as their application and maintenance, has never before been developed in the UK. Collaboration between DNOs under the CEP framework further prevents duplication of this work.

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

This project brings together research into animal behavior, current and historical UK OH line designs plant configuration and environment to produce an App based risk assessment tool that can be used for both immediate operational issues as well as long term strategic planning. No such tool currently exists within the UK.

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

- The project activities are unproven and thus pose technical and operational risks and uncertainties. - The Network Licensee is exposed to the operational and financial impacts of a potential failure.

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

• Technically, the project solution is first-of-a-kind for GB energy network. The NIA offers a low-risk way of testing and validating the solution; • Legally, the NIA represents a mechanism to make the knowledge and IPR generated by the project available to other GB DNOs to the benefit of all GB customers. Other mechanisms for funding this project could restrict access to the knowledge / IPR would not necessarily result in the same level of benefits for GB customers.

This project has been approved by a senior member of staff

Yes