

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 2020

Project Reference Number

NIA_UKPN0054

Project Registration

Project Title

EPRI Research Collaboration on Overhead Transmission (P35) and Substations (P37)

Project Reference Number

NIA_UKPN0054

Project Licensee(s)

UK Power Networks

Project Start

January 2020

Project Duration

3 years and 7 months

Nominated Project Contact(s)

Paul Elliott

Project Budget

£924,000.00

Summary

The results from these projects are delivered in ways that can easily be applied to improve system performance while managing costs. Many results can be applied immediately while other research may yield benefits over a longer time frame. This approach is expected to offer UK Power Networks and the GB consumer both short- and long-term value. Specific research activities include:

- Development of component specific information to assist in the selection, application and inspection processes;
- Assessment the effectiveness of inspection tools;
- Development of maintenance, inspection and assessment guidelines;
- Reference books, guidelines, and technology transfer workshops and
- Collaborative environments for sharing lessons learned and best practices.

Nominated Contact Email Address(es)

innovation@ukpowernetworks.co.uk

Problem Being Solved

UK Power Networks is in need of further technical insight into a number of specific challenges to enable ongoing effective and efficient lifecycle management of overhead transmission lines (P35) and efficient lifecycle management of electrical assets (P37).

Method(s)

To achieve this, UK Power Networks will join in six Electric Power Research Institute's (EPRI) research projects from the two programmes P35 for Overhead Transmission and P37 for Substations.

1. P35.003: Structure and Sub-Grade Corrosion Management
2. P35.005: Composite Structure Management
3. P35.002: Conductor, Shield Wire and Hardware Corrosion Management
4. P37.102: Circuit Breaker Life Management
5. P37.108: Gas Insulated Substations and Line
6. P37.113: Bushing Monitoring & Diagnostics

Scope

The results from these projects are delivered in ways that can easily be applied to improve system performance while managing costs. Many results can be applied immediately while other research may yield benefits over a longer time frame. This approach is expected to offer UK Power Networks and the GB consumer both short- and long-term value. Specific research activities include:

- Development of component specific information to assist in the selection, application and inspection processes;
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- Development of maintenance, inspection and assessment guidelines;
- Reference books, guidelines, and technology transfer workshops and
- Collaborative environments for sharing lessons learned and best practices.

Objective(s)

To further knowledge, guidance and gather tools in managing overhead transmission lines (P35) and efficient lifecycle management of electrical assets (P37).

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

Success Criteria

Expansion of UK Power Networks' knowledge to enable ongoing effective and efficient lifecycle management of overhead transmission lines from the specific outputs from these projects:

1. P35.003: Structure and Sub-Grade Corrosion Management
 2. P35.005: Composite Structure Management
 3. P35.002: Conductor, Shield Wire and Hardware Corrosion Management
 4. P37.102: Circuit Breaker Life Management
 5. P37.108: Gas Insulated Substations and Line
- P37.113: Bushing Monitoring & Diagnostics

Project Partners and External Funding

Each of the projects are facilitated by EPRI's overhead transmission line program (P35) and substations program (P37) are funded by more than 40 companies from across the world. The total contribution from all P35 members for the next three years is expected to be in excess of £30m, and the total contribution from all P37 members for the next three years is expected to be in excess of £16m.

Potential for New Learning

P35.003: Structure and Sub-Grade Corrosion Management – Providing a new tool—the corrosion probe—to identify severe corrosion on foundations, anchors, and steel poles.

P35.005: Composite Structure Management – Reduced construction and maintenance costs through new materials.

P35.002: Conductor, Shield Wire and Hardware Corrosion Management – Improved inspection and condition assessment techniques.

P37.102: Circuit Breaker Life Management – Improved reliability.

P37.108: Gas Insulated Substations and Lines – Improved environmental performance through reduced SF6 emissions.

P37.113: Bushing Monitoring & Diagnostics – Help in assessing and managing risks through early insights from new bushing diagnostics tools.

Scale of Project

The research activities for this multi-year collaborative projects are predominantly laboratory or desk based with site trials when and if required. As such there is no scope to reduce the scale of the projects.

Technology Readiness at Start

TRL3 Proof of Concept

Technology Readiness at End

TRL5 Pilot Scale

Geographical Area

The EPRI overhead transmission program and substations program reviews the latest research across the world. The research activities are predominantly carried out in the US with some outside of the US, including the UK.

Revenue Allowed for the RIIO Settlement

None

Indicative Total NIA Project Expenditure

The total indicative NIA expenditure for the three and a half years is £924k.

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)

There are a variety of potential benefits from the learning from these work programmes. Two potentially significant areas for savings are expected to reduced SF6 leakage management costs which could be up to £300k pa , and overhead conductor condition assessment which could lead to savings of up to £150k pa. Another example solution for overhead conductor condition assessment if proved successful could save approx. £168k per year.

Please provide a calculation of the expected benefits the Solution

N/A

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

It is expected that any successful research which leads to benefits for UK Power Networks would be replicable by other DNOs throughout Great Britain.

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

The project outputs would be easily repeated across the rest of GB. The licensee would simply need to become a member of the relevant EPRI project to access the learning or where available purchase any commercially available product available on the open market.

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

RIO-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

High-level detail of the learnings will be shared and this includes the the Executive Summaries and Closedown reports as stated by Ofgem in their approval letter.

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

Work conducted in EPRI research considers burgeoning research across UK and US. It seeks to further the envelop of knowledge in this field, and does not seek to replicate what is already known. As such unnecessary duplication will not occur as a result of this project.

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

Work conducted in EPRI research considers burgeoning research across UK and US. It seeks to further the envelop of knowledge in this field, and does not seek to replicate what is already known. As such work in this area has not been tried before.

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

As the work in EPRI is funded by more than 40 utilities, it has the economies of scale to conduct cutting edge research. Research by a single company, whilst possible, would not present good value for the company and their customers. In addition, research project bears a higher degree of risk, hence BAU funding has not been justified for this.

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

The nature of research presents higher technical and operational risks, and the outputs are not guaranteed. Therefore BAU funding cannot be justifiably used for this project, hence the need for NIA support.

This project has been approved by a senior member of staff

Yes