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NIA Project Registration and PEA Document

Date of Submission

Jan 2014

Project Reference Number

NIA_NGET0012

Project Registration

Project Title

Induced voltages and currents on transmission overhead lines under NSI 4 working practices

Project Reference Number

NIA_NGET0012

Project Licensee(s)

National Grid Electricity Transmission

Project Start

February 2014

Project Duration

2 years and 5 months

Nominated Project Contact(s)

Alistair Skinner

Project Budget

£135,000.00

Summary

This document summarises the issues and proposes a research work programme consisting of a series of tasks to address the questions raised. The tasks will involve detailed computations and some experimental tests with the aim to assist National Grid in developing simple and straightforward guidance relating to NSI 4 working practices.

Nominated Contact Email Address(es)

box.NG.ETInnovation@nationalgrid.com

Problem Being Solved

Previous detailed calculations carried out by National Grid, led to the currently adopted drain earth requirements being applied to National Grid transmission towers and specified in the National Safety Instruction Guidance document NSI 4. Based on questions and feedback from field engineers and maintenance staff, the NSI 4 working group propose to reconsider some of the background assumptions and explore different approaches to re-assess maximum levels of induced currents and voltages which inform work practice on or near high voltage lines.

Method(s)

Research

The method that has been proposed for this project includes;

Induced voltages and currents

Calculate the maximum level of induced voltage (steady-state and switching transient) on a de-energised phase conductor of a 275kV and 400kV line when Drain Earths are applied at every 10th tower and with Primary Earths at both circuit ends.

ALARP risk assessment

Quantify the individual risk (IR) of electrocution, measured on the ALARP scale, when accessing terminal towers and taking into account missing or broken earth tapes between the substation main earth grid and the tower. The IR will be determined for scenarios such as climbing the tower to apply drain earths* and if a significant risk is found an evaluation will be made to determine whether the risk can be controlled to acceptable levels by limiting the time spent in the vicinity of the tower*. The IR will be calculated for both steady-state and fault (EPR) conditions.

Scope

This document summarises the issues and proposes a research work programme consisting of a series of tasks to address the questions raised. The tasks will involve detailed computations and some experimental tests with the aim to assist National Grid in developing simple and straightforward guidance relating to NSI 4 working practices.

Objective(s)

The key objective of this project is to establish working practice requirements based on the application of innovative modelling techniques developed by Cardiff University.

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

Success Criteria

1. Production of a Induced Voltages and Currents progress report
2. Production of a Safety Assessment progress report
3. Production of a final report on Induced Currents and Voltages and safety practices on OHL transmission lines

Project Partners and External Funding

n/a

Potential for New Learning

n/a

Scale of Project

This project is laboratory scale.

Technology Readiness at Start

TRL3 Proof of Concept

Technology Readiness at End

TRL4 Bench Scale Research

Geographical Area

This work is being delivered in Cardiff.

Revenue Allowed for the RIIO Settlement

Zero

Indicative Total NIA Project Expenditure

NGET NIA project expenditure is £135,000

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

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)

Reduction of risk and increasing safety standards is a major issue for National Grid. Currently, National Grid operate one of the safest electricity networks in the world, and this research will continue to ensure that safety standards are maintained at a high level.

Please provide a calculation of the expected benefits the Solution

Research project - not required.

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

This method is replicable across the whole of the GB Transmission system, specifically to Over Head Lines.

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

This work will be rolled out / disseminated through existing fora, therefore no additional costs will be incurred.

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

The learning that will be generated could be used by other network licensees as they will be able to apply this to their network too. This learning will be shared in conferences and in the annual reports as well as others. Relevant Network Licenses have access to this information.

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.

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