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

Feb 2014

Project Reference Number

NIA_NGET0089

Project Registration

Project Title

Impact of HVDC Cable Operation on Telecommunication Lines

Project Reference Number

NIA_NGET0089

Project Licensee(s)

National Grid Electricity Transmission

Project Start

April 2014

Project Duration

4 years and 4 months

Nominated Project Contact(s)

Greg Tzemis

Project Budget

£64,000.00

Summary

The scope of the project covers the investigation of HVDC Cable Assets and their interactions with Telecommunication Cables. Generally, the available standards applied to induced voltages address electrocution risk, and overlooks the effect on functionality of telecommunication hardware. The published situation is confusing, as CIGRE Technical Brochure 92 indicates that no issues are likely to be experienced if HVDC transmission is via cables rather than overhead lines. VSC Technology further reduces the level of harmonic content, however, as reported on two VSC projects, problems have been experienced. The problems manifested in the telecommunication system by creating a high noise level, making communication impossible.

Nominated Contact Email Address(es)

box.NG.ETInnovation@nationalgrid.com

Problem Being Solved

HVDC cables installed adjacent to telecommunication lines and other assets can sometimes induce voltages which affect the functionality of these assets. The problem manifests in the telecoms line as a high noise level, making effective communication impossible. The problem National Grid faces, is that HVDC transmission links are crucial to the operation of the future, low carbon, transmission network, and interactions with other utility assets should be taken into consideration when installing, or solutions for mitigation should be found.

Method(s)

Research

The method proposed for this work is a desk based study involving a review of current standards related to cable interference issues, development of parameters needed to be collected for the problem to be investigated completely, discuss and review mitigation measures available pre, during and post construction and mathematical & computer modelling of the situations.

Scope

The scope of the project covers the investigation of HVDC Cable Assets and their interactions with Telecommunication Cables. Generally, the available standards applied to induced voltages address electrocution risk, and overlooks the effect on functionality of telecommunication hardware. The published situation is confusing, as CIGRE Technical Brochure 92 indicates that no issues are likely to be experienced if HVDC transmission is via cables rather than overhead lines. VSC Technology further reduces the level of harmonic content, however, as reported on two VSC projects, problems have been experienced. The problems manifested in the telecommunication system by creating a high noise level, making communication impossible.

Objective(s)

The objective of this project is determine the exact nature of the problem for both LCC and VSC interconnectors, and the mitigation measures required.

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

Success Criteria

- Review of specifications related to cable interference issues.
- Determination of the exact problem as related to LCC and VSC systems in their most common topography.
- Development of the parameters that need to be collected to completely investigate the problem.
- Discuss and review mitigation measures and the options available pre, during and post-construction.
- Development of a mechanism/process suitable for route selection.
- Discuss mathematical and computer modelling techniques and how these can be utilised & developed.
- Review measurement techniques and equipment suitable for measuring harmonic currents and induced current.

Project Partners and External Funding

n/a

Potential for New Learning

National Grid expect to learn what, if any, interferance in-service HVDC Cables cause on other assets, specifically Telecommunication lines and potential mitigation measures.

Scale of Project

The project is a desk based study. The scale of the project is small enough to be indicative of the current conditions faced with HVDC assets installed in GB.

Technology Readiness at Start

TRL3 Proof of Concept

Technology Readiness at End

TRL5 Pilot Scale

Geographical Area

The project is being undertaken in Kent.

Revenue Allowed for the RIIO Settlement

Zero

Indicative Total NIA Project Expenditure

£64,000

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)

HVDC schemes are multi-billion pound investments. If these interconnectors are shut down due to secondary issues, it could cost millions to either fix the issue, or even more to re-route the cables.

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 project can be applied to all HVDC schemes in GB.

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

This work would be rolled out via knowledge and know-how from the Technical Experts in National Grid. This would not require extra funds.

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

n/a

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

The project addresses the following area of the innovation strategy:

Reliability : Optimising Asset Management

System Operability : Smarter System Operation

☑ 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.

Following a review of the ENA Portal, National Grid confirm that this work has not been done before.

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