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

Jun 2016

Project Reference Number

NIA_SPT_1605

Project Registration

Project Title

Cable diagnostics for HVDC cables

Project Reference Number

NIA_SPT_1605

Project Licensee(s)

SP Energy Networks Transmission

Project Start

June 2016

Project Duration

3 years and 1 month

Nominated Project Contact(s)

James Yu (Future Networks Manager) & Watson Peat

Project Budget

£130,000.00

Summary

The study to be undertaken by the Collaborator, University of Strathclyde will consist initially of a review of current state of the art with respect to partial discharge monitoring on HVAC as well as HVDC cable systems.

From the gaps in the knowledge identified through the review, a systematic and logical experimental work plan will be developed to understand partial discharges in HVDC cable systems. The work plan will be based on laboratory experimentation as well as computer simulation (where appropriate) to allow a better understanding of how partial discharges are generated in a HVDC cable system and the mechanism responsible.

Nominated Contact Email Address(es)

innovate@spenergynetworks.co.uk

Problem Being Solved

The application of HVDC cables over long distances is on the increase and it is becoming clear that the ageing characteristics of the insulation in such cables are not well understood.

Method(s)

As this is a project to obtain better understanding, the method is one of understanding what is currently known about the ageing characteristics and then to consider what else needs to be done to address the knowledge gap.

Scope

The study to be undertaken by the Collaborator, University of Strathclyde will consist initially of a review of current state of the art with respect to partial discharge monitoring on HVAC as well as HVDC cable systems.

From the gaps in the knowledge identified through the review, a systematic and logical experimental work plan will be developed to understand partial discharges in HVDC cable systems. The work plan will be based on laboratory experimentation as well as computer simulation (where appropriate) to allow a better understanding of how partial discharges are generated in a HVDC cable system and the mechanism responsible.

Objective(s)

To understand the degradation characteristic of cable insulation when subjected to HVDC.

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

Success Criteria

The generation of new knowledge on the degradation characteristic of cable insulation when subjected to HVDC.

Project Partners and External Funding

n/a

Potential for New Learning

n/a

Scale of Project

No deployment or implementation of hardware is envisaged.

Technology Readiness at Start

TRL1 Basic Principles

Technology Readiness at End

TRL2 Invention and Research

Geographical Area

Not applicable

Revenue Allowed for the RIIO Settlement

Not applicable

Indicative Total NIA Project Expenditure

£50,000

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)

The new knowledge generated from this research will inform subsequent innovation activities that are expected to lead to improved asset management techniques with benefits including the following: -

· Asset replacement before failure.

· Reduced number of faults.

· Targeted investment on cables that are in greatest need of replacement.

The asset value of HVDC cables installed on networks by 2030 is expected to be over £1bn. Improved asset management techniques can be conservatively estimated to result in savings of at least £1m over a 10-year period.

Please provide a calculation of the expected benefits the Solution

This is a research project.

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

The new knowledge generated from this research will inform subsequent innovation activities that are expected to be highly replicable across GB where HVDC cables are installed, or are planned to be installed.

Estimated number of sites: - 12 including existing and planned

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

The method cannot be rolled out as it is a research project. It is expected that subsequent innovation building on this research will result in techniques that can be rolled out.

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 amount of HVDC cabling in the networks is increasing. In order to be able to manage these assets efficiently and maximize reliability, it is necessary that Licensees gain an understanding of the ageing mechanisms associated with these cables. As a better understanding is obtained, licensees will be able to develop appropriate asset management plans for HVDC cables.

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