

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

Aug 2013

### Project Reference Number

NIA\_NGET0042

## Project Registration

### Project Title

HVDC EngD – Richard Poole

### Project Reference Number

NIA\_NGET0042

### Project Licensee(s)

National Grid Electricity Transmission

### Project Start

March 2012

### Project Duration

4 years and 5 months

### Nominated Project Contact(s)

Richard Poole & Paul Coventry

### Project Budget

£87,000.00

## Summary

To deliver a successful EngD project, analysing the feasibility of connecting nuclear powers stations to the UK transmission system via HVDC links.

### Nominated Contact Email Address(es)

box.NG.ETInnovation@nationalgrid.com

## Problem Being Solved

HVDC systems are becoming increasingly more relied upon as we facilitate the change to a low carbon economy and seek new sources of renewable, offshore generation. As such, National Grid require the expertise to understand the DC system, and perform technical work that can facilitate new connections, new technology opportunities etc.

## Method(s)

The method proposed identifies Richard Poole, a National Grid employee, to complete an EngD at the University of Hertfordshire specializing in HVDC especially surrounding HVDC links with Nuclear Power plants.

## Scope

To deliver a successful EngD project, analysing the feasibility of connecting nuclear powers stations to the UK transmission system via HVDC links.

## Objective(s)

To evaluate the possibility of Connecting a Nuclear Power Station to the UK transmission system via the following methods:

- A Current Source Converter HVDC link in combination with an AC Transmission link.
- A Voltage Source Converter HVDC link in combination with an AC transmission Link.
- Two double AC Circuits.

Additional Objectives:

- To produce various strategy papers on whether the HVDC technology is technically feasible for the connection of Nuclear Power Stations or not.
- To produce Technical Guidance Documents for National grid obtained from the analysis.
- To expand HVDC technology Expertise within National Grid for possible future Generation connection scenarios utilising HVDC technology.
- To produce and publish technical papers on the subject matter.
- To introduce and analyse the suitability of PSCAD HVDC power systems analysis software for HVDC system analysis.

## Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

### Success Criteria

Delivering a guidance document for industry use on the the feasibility of connecting nuclear powers stations to the UK transmission system via HVDC links. In addition improving the industries knowledge on HVDC Technology by completing an EngD project, and submitting paper(s) in relevant academic journals.

### Project Partners and External Funding

Supplier: University of Hertfordshire

### Potential for New Learning

High, we are unclear as to what the information is yet, but it will be disseminated through standard channels – academic reports, ENA smart portal, conferences etc.

### Scale of Project

This project is at a laboratory/literature review/office based scale.

### Technology Readiness at Start

TRL2 Invention and Research

### Technology Readiness at End

TRL4 Bench Scale Research

### Geographical Area

This project has the potential to impact on the whole of the GB Transmission System.

### Revenue Allowed for the RIIO Settlement

None.

### Indicative Total NIA Project Expenditure

IF= £21k

NIA= £66k

## 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)

This is unclear at the moment, however with HVDC systems being so expensive, only a small fraction of a project being improved by Richard, or the research he is conducting, could pass on large savings for the customer.

#### Please provide a calculation of the expected benefits the Solution

This is a research project and therefore does not have a Base Cost.

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

This could affect all areas where HVDC systems are installed although at the current time no nuclear power plants are connected via HVDC.

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

There will be limited to no costs associated with rolling out the guidance note across the UK.

### 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 trialed 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 use of HVDC systems will become more crucial in the future. We will disseminate any learning that occurs, and that will be available for other relevant network licensees to use as they see fit.

### 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.

This is necessary duplication. Bringing the knowledge and understanding into the National Grid business is critical for us to be able to continue using HVDC systems.

### 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