

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 2014

### Project Reference Number

NIA\_NGET0087

## Project Registration

### Project Title

Cable Installation Design & Innovation Project (CIDIP)

### Project Reference Number

NIA\_NGET0087

### Project Licensee(s)

National Grid Electricity Transmission

### Project Start

October 2013

### Project Duration

3 years and 2 months

### Nominated Project Contact(s)

Richard Attwell

### Project Budget

£225,000.00

## Summary

The scope of the project covers the design principles that would allow 400kV circuits with two cables per phase to match the ratings of a standard 400kV OHL. This work is key to reducing the cost of undergrounding transmission lines, and has never been completed before. For this reason, the work is innovative.

### Nominated Contact Email Address(es)

box.NG.ETInnovation@nationalgrid.com

## Problem Being Solved

National Grid have a need to underground transmission routes, based on consumer consultations and existing wayleaves. The problem that National Grid face is that undergrounding transmission routes is expensive and complex. A recent report commissioned by the IET, performed by Parsons Brinckerhoff, found that it may be possible to transmit the same amount of power through 2 cables per phase, as is transmitted through a standard OHL. National Grid need to conduct some work, as detailed below, to back up these findings.

## Method(s)

### Research

The method proposed is as follows:

1. Potential Benefits from large conductor designs
2. Ratings Improvement through installation
3. Improved modelling techniques for Directional Drills
4. Review of 105c short term operation
5. Cost benefit analysis
6. Summary report and industry workshop

## Scope

The scope of the project covers the design principles that would allow 400kV circuits with two cables per phase to match the ratings of a standard 400kV OHL. This work is key to reducing the cost of undergrounding transmission lines, and has never been completed before. For this reason, the work is innovative.

## Objective(s)

The objective of this project is to determine the design principles that would allow 400kV circuits with two cables per phase to match the ratings of a standard 400kV OHL.

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

n/a

## Success Criteria

The project will be successful if National Grid have an increased learning in the area of upgrading underground transmission routes. This could be successful delivery of each of the work packages detailed above, or highlighting what area is a cause for concern and identifying further work needed in that area.

## Project Partners and External Funding

The University of Southampton are the suppliers of this work. There is no external funding being brought to this project.

## Potential for New Learning

National Grid expects to learn about key points detailed in each of the 6 work packages. This includes short term operations at 105c, improved modelling techniques for HDD, Ratings improvements, and benefits from large conductor designs. The learning will be disseminated via the ENA smart portal, and through conferences and best practice fora.

## Scale of Project

This project is focussed on a laboratory scale.

## Technology Readiness at Start

TRL2 Invention and Research

## Technology Readiness at End

TRL4 Bench Scale Research

## Geographical Area

The project will deliver in Southampton.

## Revenue Allowed for the RIIO Settlement

Zero

## Indicative Total NIA Project Expenditure

£225,000

## 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 IET report details the costs of undergrounding transmission lines as between £10.2m and £24.1m per km, depending on the installation, length, and electrical loads. In principle, this work could save upto 1/3 of the cable costs, so contributing to a decline of undergrounding costs.

#### 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

The learning from this work can be applied to the whole of the GB Transmission system.

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

It is unclear what the cost of roll out will be, however the knowledge will be applied on a case-by-case basis as implemented by the technical experts.

### 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 areas of the innovation strategy:

Reliability : Optimising Asset Management

Environment : The environment and reducing emissions

Environment : Enhanced Capacity

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.

Given a review of the ENA portal and standard supply base (including Universities and EPRI) National Grid can 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