

## NIA Project Registration and PEA Document

*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.

### Project Registration

<b>Project Title</b>		<b>Project Reference</b>
Insulated Cross Arms – Lecht & St Fergus Trials		NIA_SHET_0006
<b>Project Licensee(s)</b>	<b>Project Start Date</b>	<b>Project Duration</b>
Scottish Hydro Electric Transmission	Jan 2010	5 Years
<b>Nominated Project Contact(s)</b>		<b>Project Budget</b>
David MacLeman		£489,000

#### Problem(s)

Currently the only method open to Transmission Network Owners (TOs) who wish to uprate their 132kV lines to 275kV is to rebuild the towers to a higher specification (i.e. larger towers), at a significant cost, due to the increased clearances from ground required by law for higher voltage lines.

Insulated Cross Arms (ICAs) will enable the uprating without the need to rebuild the towers (by effectively raising the height of conductors from the ground). This would allow greater throughput of power on the existing network with less expense on upgrades and quicker time frames for increasing network capacity.

The aim of the Insulated Cross Arms is to maximise the capacity of existing infrastructure without rebuilding tower lines.

#### Method(s)

Design and trial of Insulated Cross Arm technology that will allow the voltage uprating of 132kV tower lines to 275kV:

- 1 The Lecht Trial (Scotland) will test the mechanical strength of 4 Insulated Cross Arms, the location was selected as one of our most exposed transmission lines; and
- 1 The St Fergus Trial (Scotland) will test the electrical integrity of 2 of the Insulated Cross Arms to investigate how the arms handle polluted environments, As salt is the primary pollutant in this instance, the location was selected as a coastal location.

#### Scope

The scope of this project is to design and build prototype Insulated Cross Arms, and conduct mechanical and electrical trials.

#### Objective(s)

Design and build prototypes for the uprating of 132KV tower lines

Install prototype 132KV models in a harsh weather environment test area - The Lecht

Install current L3 prototype models in a coastal trial site to evaluate the effects of salt and other pollutants on the insulation – St Fergus

#### Success Criteria

Installing and monitoring the Lecht and St Fergus trials for the Insulated Cross Arms

**Technology Readiness Level at Start**

3

**Technology Readiness Level at Completion**

5

**Project Partners and External Funding**

None

**Potential for New Learning**

The project has potential learning in the following areas:

- 1 The mechanical integrity of Insulated Cross Arms
- 1 The electrical integrity of Insulated Cross Arms

**Scale of Project**

The scale of the Project is considered appropriate to the scale of the potential benefits. If the technology is successful, the financial and environmental benefits resulting from not rebuilding tower lines could be significant.

**Geographical Area**

This project will be undertaken at the Lecht and St Fergus within the SHE Transmission Licence area.

**Revenue Allowed for in the RIIO Settlement**

We currently envisage using this technology as an alternative to new-build towers for some of our Strategic Wider Works projects. These projects are subject to Ofgem review and assessment on a case by case basis and therefore no funding is allowed as part of the RIIO-T1 settlement. We will provide further information as part of our project submissions.

**Indicative Total NIA Project Expenditure**

For 2013-14 the project plans to be funded through SHE Transmission's NIA allowance.

£15k has been budgeted for this period (of which 90% is allowable NIA spend).

Note: The Lecht trial has been completed and decommissioned, the St Fergus trial has been installed and is still running.

## Project Eligibility Assessment

### Specific Requirements 1

**1a. A 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 systems and 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

### Specific Requirements 2

**2a. Has the Potential to Develop Learning That Can be Applied by all Relevant Network Licensees**

**Please answer one of the following:**

i) Please explain how the learning that will be generated could be used by relevant Network Licensees.

Learning from this trial is expected to ultimately lead to the Insulated Cross Arms being commercially available to Network Licensees.

ii) Please describe what specific challenge identified in the Network Licensee's innovation strategy that is being addressed by the Project.

The project will support the Innovation Strategy Objective of Maximizing the use of existing assets to deliver capacity.

**2b. Is the default IPR position being applied?**

Yes

No

**If no, please answer i, ii, iii before continuing:**

i) Demonstrate how the learning from the Project can be successfully disseminated to Network Licensees and other interested parties

We have agreed with the University of Manchester and Arago that learning and reports on the installation methods can be shared with other Network Licensees

ii) Describe any potential constraints or costs caused or resulting from, the imposed IPR arrangements

None Envisaged

iii) Justify why the proposed IPR arrangements provide value for money for customers

The resulting product, which provides an alternative to rebuilding towers, will be commercially available to all Network Licensees. In addition SHE Transmission receives a 5% discount on the future purchase of the Insulated Cross Arms.

**2c. Has the Potential to Deliver Net Financial Benefits to Customers**

i) Please provide an estimate of the saving if the Problem is solved.

By uprating a transmission tower without the need to rebuild, there is a potential significant cost saving. Construction of a new tower

line involves substantial civil works to construct and de-construct temporary access roads and tower foundations.

ii) Please provide a calculation of the expected financial benefits of a Development or Demonstration Project (not required for Research Projects). (Base Cost – Method Cost, Against Agreed Baseline).

#### Not required for Research Projects

iii) Please provide an estimate of how replicable the Method is across GB in terms of the number of sites, the sort of site the Method could be applied to, or the percentage of the Network Licensees system where it could be rolled-out.

Increasing network capacity is a challenge faced by all Network Licensees. If this method has a successful outcome leading to the eventual commercial availability of Insulated Cross Arms, it will be an option available to all 132kV to 275kV transmission reinforcement projects in GB.

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

The development cost of each Insulated Cross Arm is £25k, and this would be expected to reduce significantly with mass production, to make the method a cost effective alternative to rebuilding towers to uprate a transmission line from 132 to 275kV.

#### 2d. Does Not Lead to Unnecessary Duplication



i) Please demonstrate below that no unnecessary duplication will occur as a result of the Project.

To the best of our knowledge, the use of insulated composite cross arms on a 132kV line is novel in GB. SHE Transmission has been involved with the technology's development with other parties; the 132kV trial is unique to SHE Transmission.

ii) If applicable, justify why you are undertaking a Project similar to those being carried out by any other Network Licensees.

While this project focuses on uprating 132kV towers to 275kV; National Grid are also partnering with the University of Manchester to develop Insulated Cross Arms, focusing on uprating 275kV towers to 400kV. There are several voltage levels at Transmission and at each level; the specifications for the Insulated Cross Arms would be different. Although the trial at 132kV may indeed prove successful, it does not necessarily follow that the test will be successful at 400kV due to differences in physical sizes and electrical stresses encountered at the different voltage levels. As a result, trials of the Insulated Cross Arms at different voltage levels represent distinct methods different from each other.