Scottish and Southern Energy
Power Distribution

Date of Submission

July 2014

Network Innovation Allowance Progress Report

Notes on Completion: Please refer to the appropriate NIA Governance Document to assist in the completion of this form.

Network Licensees must publish the required Project Progress information on the Smarter Networks Portal by 31st July 2014 and each year thereafter. The Network Licensee(s) must publish Project Progress information for each NIA Project that has developed new learning in the preceding relevant year.

Project Progress

Project Title	Project Reference
Insulated Cross Arms – 132kV Trials	NIA_SHET_0007

Project Licensee(s)	Project Start Date	Project Duration
Scottish Hydro Electric Transmission	Apr 2011	4 Years

Nominated Project Contact(s)

David MacLeman

Scope

To perform trial installation of insulated cross arms on the towers of an operational 132kV circuit and monitor them for a period of up to two years to evaluate their electrical and mechanical performance when used in a real live operational environment.

Objective(s)

- Install Insulated Cross Arms on an operational 132kV tower line.
- Capture the learning of the installation methods.
- Monitor and evaluate the installed trial Insulated Cross Arms for both electrical and mechanical performance in order to establish their readiness for use in the real operational environment.

Success Criteria

The successful installation of the cross arms along with capturing the learning from their installation.

Performance Compared to the Original Project Aims, Objectives and Success Criteria

Objective: Install insulated Cross Arms on an operational 132kV line

This objective aimed to provide the first energised installation on an operational 132kV line and also demonstrate the suitability of the cross arms for retrofitting as well as further implementation. The cross arms were successfully installed in 2013, having undergone prior mechanical and electrical testing for use on the 132kV network successfully. The retrofit installation took place on the SHE Transmission network, on a 132kV line between Craigiebuckler and Kintore. A total of six 275kV insulated cross arms were installed on two consecutive towers (i.e. three cross arms installed on each of the two towers, as shown in Figure 1). After installation, the line was re-energised and the cross arms are working as an ongoing operational asset. This objective has been successfully fulfilled.

Figure 1 Installation of the six insulated cross arms on the 132kV transmission line (refer to attachment for picture)

Objective: Capture the learning of the installation methods

This objective aimed to provide learning through the development of understanding about the practicalities of installing the cross arms on all three phases of a 132kV tower. The preparation of the installation described in the preceding objective involved an installation plan which detailed how the cross arms would be retrofitted to the two existing 132kV towers with regard to access and operational safety requirements as well as the sequential methodology for removal of the existing cross arms and fitting of the new ones.

The installation was carried out in liaison with Norpower, with installation work activities strictly adhering to the method statements and risk assessments in the installation plan as it was vital to identify any unplanned steps necessitated by unforeseen issues leading to the need for reviewing or modifying the plan. The works included removal of the existing steel cross arms followed by attachment of the steel stubs, installation of the cross arms and attachment of the conductors. All work was performed to procedures without incident. Lessons from the methodology of installation chosen were successfully captured and helped to identify areas of improvement in the design. They will also form part of the operational procedures to be drafted under business as usual conversion processes. This objective was met.

Objective: Monitor and evaluate the installed trial Insulated Cross Arms for both electrical and mechanical performance in order to establish their readiness for use in the real operational environment

After installation, the expectation was that the line incorporating the insulated cross arms would be successfully re-energised and then followed by full lifetime operation which would validate the cross arms' longevity. Initially, there would be two years of close monitoring and inspection to ensure that the cross arms would continue to perform safely both electrically and mechanically.

To date the cross arms have continued to operate as normal without any noticeable deterioration in electrical or mechanical integrity. The monitoring of these insulated cross arms will eventually revert to the regular maintenance and inspection routines after the initial two-year monitoring period as per the internal procedures governing such assets. This objective is ongoing.

Required Modifications to the Planned Approach During the Course of the Project

None.

Lessons Learnt for Future Projects

The use of Insulated Cross Arms has the potential of increasing the capacity of existing lines without the need to replace them, because it increases the clearance of conductors from the ground.

The insulated cross arms deployed as part of this project were successfully trialed on two decommissioned transmission lines as part of the preceding project 'NIA_SHET_0006 Insulated Cross Arms – Lecht & St Fergus Trials', with refinements made to the cross arm design as a result. This project built on the results of that preceding project. Aspects in this project such as the time taken to install the cross arms will inform the planning of future installations.

Overall, installation in this project was quick, safe and did not present significant issues. However, lessons were learnt during the installation relating to the simplification of the cross arm assembly and potential standardisation for some mechanical elements for ease of fitting in future projects. In terms of safety, pre-assembling the insulated cross arms on the ground reduced the amount of work at height. The cross arm is also lighter than the steel and glass equivalent which reduces the manual handling implications, and has the potential to reduce minor incidents due to the carrying of equipment.