Scottish and Southern Energy Power Distribution

Date of Submission

July 2016

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
Overhead Line Monitoring System	NIA_SSEPD_0020

Project Licensee(s)	Project Start Date	Project Duration
Scottish Hydro Electric Power Distribution, Southern Electric Power Distribution	Nov 2015	15 Months

Nominated Project Contact(s)

David MacLeman

Scope

Under IFI project 2014_08 Monitoring of Conductors and Poles, a prototype sensor system, comprising line mounted sensors, and a communications system was developed to operate on overhead lines up to 11kV. This project will take that work further to produce a production ready system. The newly developed sensors will be encased within environmental protective cases, and are powered by solar panel, which trickle charges a backup battery within the case. They will then be installed on overhead lines in several areas of the distribution network and left for an extended period of time to determine the suitability for use, in terms of effect on the installed infrastructure, ability to withstand weather events, and ability to maintain power on during the winter months.
Connections to the SCADA system will be made and tested.

Objective(s)

The project will:
1) Prove whether the production prototypes produced will survive winter months when mounted on live overhead lines;
2) Determine whether there is any sign of degradation to the wires where the sensors are mounted;
3) Will indicate whether there is any sign of vegetation encroachment onto the overhead line network;
4) Prove whether, or not, the sensors can communicate quickly and effectively with the SCADA system;
5) Provide an indication that non vegetation objects have collided with an overhead line or pole, examples would be poles moving due to soft ground, line collisions by raised farm trailers or forestry vehicles;
6) Determine the viability of deploying the sensor system as an alternative to replacing sections of overhead line with underground cabling.

Success Criteria

The project will be a success if:

1) It can be confirmed whether or not the system is able to detect the collision between the overhead wires and trees, branches

and/or farm, forestry, or construction vehicles, on live lines.
2) It can be confirmed whether or not the sensors, and communication system can withstand the effects of the weather on the system;
3) It can be confirmed whether or not the mounting of the sensors will have a deleterious effect on the overhead lines;
4) It has determined if and when the sensor system is a viable alternative to replacing an overhead line with underground cabling

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

• Prove whether the production prototypes produced will survive winter months when mounted on live overhead lines

Not assessed yet. Production Prototypes have not been installed. However, analysis of the original design showed that the plastic chosen for earth clamping mechanism did not have the ability to withstand temperatures higher than 90 C. The usual running temperature of an overhead line can be as high as 150C. The clamp was re-designed using a metal construction, and this form will be installed.

• Determine whether there is any sign of degradation to the wires where the sensors are mounted

Not assessed yet. Production Prototypes have not been installed.

• Indicate whether there is any sign of vegetation encroachment onto the overhead line network

Not assessed yet. Production Prototypes have not been installed.

• Prove whether, or not, the sensors can communicate quickly and effectively with the SCADA system

Not assessed yet. Production Prototypes have not been installed.

• Provide an indication that non vegetation objects have collided with an overhead line or pole, examples would be poles moving due to soft ground, line collisions by raised farm trailers or forestry vehicles

Not assessed yet. Production Prototypes have not been installed.

• Determine the viability of deploying the sensor system as an alternative to replacing sections of overhead line with underground cabling.

Not assessed yet. Production Prototypes have not been installed.

The need for the sensor re-design has resulted in the sensor manufacture phase of the project being put back several months. Sensors are now available, and installation is due to begin in October 2016. Exposure to the Winter months will be achieved to maximise the learning from the project.

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

The sensor plastic has been shown to be unable to cope with the likely heat generated by the overhead lines when operating at 50% plus of capacity, so it has been redesigned to take the temperature into account.

Lessons Learnt for Future Projects

The original design of the sensor considered nearly all of the environmental issues that the sensors would have to be capable of withstanding, such as rain, snow, ice, summer heat, etc. The one that was not considered was heat generated by the conductor. Research carried out within the company, and using external sources showed that the chosen plastic would withstand temperatures of 70 to 90 degrees C, with a maximum temperature of 100 degrees C. When the likely temperature of the line that the sensor would be installed on was confirmed, a redesign of the sensor clamping mechanism became necessary.