Date of Submission

May 2021

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

Overhead Line Monitoring System

Project Reference

NIA_SSEPD_0020

Funding Licensee(s)

Scottish Hydro Electric Power Distribution, Southern Electric Power Distribution

Project Start Date

November 2015

Project Duration

3 years and 2 months

Nominated Project Contact(s)

SSEN Future Networks Team

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.

Objectives(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

1) Prove whether the production prototypes produced will survive winter months when mounted on live overhead lines
• Successfully achieved, as trial was carried out at a remote training site using a de-energised section of overhead line,during December 2017 and January 2018.Which has proven the ability of the system to cope with the extremes of the Scottish weather.
2) Determine whether there is any sign of degradation to the wires where the sensors are mounted
• Successfully achieved, following the trial at the remote training site the conductor was examined and no signs of degradation were observed.
3) Will indicate whether there is any sign of vegetation encroachment onto the overhead line network
• Not yet achieved, however a camera will be installed to try and capture the events that trigger a notification. This visual data will enable knowledge to be built up surrounding circuit environment and the notifications received.
4) Prove whether, or not, the sensors can communicate quickly and effectively with the SCADA system
• Successfully achieved, during desktop trials in May 2018 signals were sent between the box mounted equipment and the RTS equipment that will be situated in the substation. The data from the box mounted equipment was viewable on desktop computer.
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; This has been successfully achieved during trials at the PNDC, Cumbernauld.Prototype line mounted devices were placed on the overhead conductors and a series of controlled impacts on the conductor were performed and the results of the prototype line mounted device recorded.
6) Determine the viability of deploying the sensor system as an alternative to replacing sections of overhead line with underground cabling. Not yet achieved, as the production prototypes have not been installedin an operational environment.

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.
A further Change Request for extra time for the project has been submitted. This has arisen because identifying suitable circuits and gaining authorisation to install the test system on the overhead lines has taken longer than anticipated.

Lessons Learnt for Future Projects

An alternative approach to continuous real-time signalling is being investigated, which is a notification on exception (signal sent when an abnormal event occurs). Notification on exception requires a higher level of information processing at the device location and it also requires thought to be given as to the format and parameters around a test signal to prove operation whilst in the field.
Also,associated with seeking assurances that the device only signals on appropriate movements at the trial stage a camera will be installed. The footage from the camera will be viewed prior to and after the overhead conductor mounted device has sent a notification signal. Reviewing the camera information and the physical movement of the conductor will enable;

- further development of movement processing at the device location to reduce the number of notification events; and
- confirm that the remotely installed overhead conductor mounted device reliably sends a notification which aligns with the circuit faulting.

The Outcomes of the Project

N/A

Data Access

N/A

Foreground IPR

N/A