Energy Networks Innovation Process

Project Closedown Report Document

Date of Submission: 28/05/2024

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Notes on Completion: Please refer to the NIA Governance Document to assist in the completion of this form. Please use the default font (Calibri font size 10) in your submission. Please ensure all content is contained within the boundaries of the text areas.

Project Title (*This cannot be changed once registered*)	Project Reference
Power Supply for Pole Mounted LV Monitoring Devices where no Neutral is Present.	NIA_SSEN_0066
Funding Licensee(s)	**Project Start Date**
Scottish Hydro Electric Power Distribution Southern Electric Power Distribution	March 2023
Project Duration	**Year**
13 months	2024

Nominated Project Contact(s)

Tim Sammon, Innovation Programme Delivery Manager at SSEN

1. Scope

Stage 1 Investigation as to the potential methods of deriving 230v power supply where no neutral is present including:

- Small solar panel
- CT clamp round the phase to harvest power, that would not require access to the substation LV neutral
- Phase to phase connection with no neutral in the case of multi-phase units
- Phase to HV earth through an isolating transformer or surge protector
- Battery (and combination of above)
- Install at the first pole out alongside the LV Neutral earth.
- CT clamp round the phase to keep a capacitor topped up, basically parasitic power source.

This investigative phase shall produce a short report as to the drawbacks and benefits of the potential solutions. The report will identify a solution which will be taken forward and lead to the development of 2/3 prototypes.

Stage 2 Develop a prototype using the solution identified in Stage 1 and deploy this on live pole top monitoring situations.

2. Objective(s)

Stage 1: Literature review and research to determine the most appropriate method to obtain the 23Ov supply where the neutral is not accessible.
Stage 2: Prototype development and testing of the selected solution in a pole top environment with monitoring equipment adjacent.

3. Success Criteria

The project will be deemed successful if a prototype 230V power supply unit for a pole top monitoring unit with no accessible neutral is developed.

Minimum success criteria (Must and should)	Measure
Must be applicable to all manufacturers of pole top monitoring equipment	Successful deployment of protype units providing 230V to adjacent monitoring equipment.
Must be durable and resilient to environmental conditions	Evaluation in real environment testing validates performance
Desirable criteria (Could)	**Measure**
Easy to use	Evaluation in real environment testing results in positive feedback

4. Performance compared to the original project aims, objectives and success criteria

Details of how the Project is investigating/solving the issue described in the NIA Project Registration Pro-forma. Details of how the Project is performing/performed relative to its aims, objectives and success criteria.

The project will be deemed successful if a prototype 230V power supply unit for a pole top monitoring unit with no accessible neutral is developed. All LV Monitors available require a 230V supply to power the monitor.

Over the course of the project the initial investigations progressed as planned however the project was modified slightly in that 2 protypes will be delivered.

The original concept was of a standalone ‘black box’ delivering a 230V supply from the 3 phases available on the pole by creating an artificial neutral. This 230V supply allows the monitor to be powered and measure the various parameters. This ‘black box’ will be agnostic to whichever manufacturers monitoring equipment is being used.

However, it became apparent during the progress of the project and the installation of conventional monitors onto poles that the available space is sometimes limited and that a separate black box together with a monitor would not be easily accommodated on some poles.

Consequently, it was decided to progress with both the original proposal and a secondary option where the equipment necessary to produce the 230V supply is integrated into Eneida’s proprietary monitor.

This will reduce the pole space required considerably and will be an alternative option where pole space is limited.

The environmental specification of the No Neutral Unit and the Black Box unit enclosures will be identical to that of the conventional units which have proved resilient to the locations in both the North of Scotland and South of England.

5. Required modifications to the planned approach during the course of the project

The Network Licensee should state any changes to its planned methodology and describe why the planned approach proved to be inappropriate. Please confirm if no changes were required

As described in Section 4 above the potential lack of space on individual poles could be a problem with both the black box and monitor to be accommodated and interconnected.

The decision to investigate the potential of integrating the 230V supply into one of Eneida's existing 4 pole monitor was included in the project.

6. Lessons learnt for future projects

Describe how the project (methodology, stakeholder engagement etc.) changed, or provided opportunities, from your expectation at the start of the project and therefore could be useful for a future project. In addition, please discuss the effectiveness of the research development or demonstration undertaken.

The lack of available space to install monitors on the poles was a challenge requiring the project to be modified to overcome this.

7. The outcomes of the project

When available, comprehensive details of the Project's outcomes are to be reported. Where quantitative data is available to describe these outcomes it should be included in the report. Wherever possible, the performance improvement attributable to the Project should be described. If the TRL of the Method has changed as a result of the Project this should be reported. The Network Licensee should highlight any opportunities for future Projects to develop learning further.

Two prototypes of the solution involving the integration of the 230V power supply into a monitor has been produced by Eneida and installed on a pole.
Note the poles selected for these trial installations do actually have neutrals available and each pole has been fitted with a conventional 4 wire unit and prototype 3 wire No Neutral unit.
A differential plot of the voltage measurements will allow the accuracy of the prototype units to be determined.

The production of a ''black box'' unit has proved problematic, and a protype is still awaited.

8. Data Access & Quality Details

A description of how any network or consumption data (anonymised where necessary) gathered in the course of the Project can be requested by interested parties. Please include a link to the publicly available data policy.

For information how to request data gathered in the course of this project, see Network Innovation Competition (NIC) and Network Innovation Allowance (NIA) Data Sharing Procedure at https://ssen-innovation.co.uk/innovation-strategy/.

9. Foreground IPR

A description of any foreground IPR that have been developed by the project and how this will be owned.

IPR relating to the necessary algorithms required to mathematically model the creation of an artificial neutral point from the 3-line voltages has been created and in line with NIA policy will be freely available.

10. Planned implementation, recommendations or next steps

Please describe the next steps to implement this innovation project. What policies and standards need to be updated or created as part of this implementation.

Next steps will be to procure a small number of the 'black box' and integrated power supply monitors and trial them on poles.

They will be fitted on poles where there is a neutral present along with a conventional monitor and the results will be compared to investigate the accuracy of the products.

11. Other comments

The development of this equipment will enhance the ED2 roll out of LV Monitoring equipment on pole mounted transformers.
The benefit statement will follow, probably in May/June after the data from 2 units installed on pole mounted transformers has been analysed.

12. Standards Documents

Identify any industry standards that may require updating due to the outcomes or understanding developed from this innovation project. If no standards will need to be updated, please state - not applicable

N/A