Energy Networks Innovation Process

Project Closedown Report Document

Date of Submission: 25/07/2025

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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
Net Zero Service Termination 2 Project	NIA_SSEN_0079

Funding Licensee(s)

1. Electricity North West Ltd
2. Northern Powergrid (Northeast) Limited
3. Northern Powergrid (Yorkshire) plc
4. Scottish Hydro Electric Power Distribution plc
5. Southern Electric Power Distribution plc
6. SP Distribution Ltd
7. SP Manweb plc
8. London Power Networks plc
9. South Eastern Power Networks plc
10. Eastern Power Networks plc
11. National Grid Electricity Distribution (East Midlands) plc
12. National Grid Electricity Distribution (West Midlands) plc
13. National Grid Electricity Distribution (South West) plc
14. National Grid Electricity Distribution (South Wales) plc

Project Start Date

October 2024

Project Duration	Year
12 Months	2024-2025

Nominated Project Contact(s)

Tim Sammon, Innovation Programme Delivery Manager at SSEN

1. Scope

The scope of the project is to analyse over 200 customer properties with LCTs connect to them and gain greater understanding of the risks these devices may pose to the cut-out or service cables through possible thermal damage. This data is being provided by Octopus.

It is in scope to purchase additional 30-minute data but this would be completed after the analysis of the 1-minute data, if it is deemed necessary.

This may lead to a change in internal governance for the management of cut-outs and reduce the risk of damage to either equipment of the Distribution Network Operator (DNO) or customer premises.

2. Objective(s)

The main objectives of the project are:

1. The clarification of the overall problem.
2. Data import and analysis of the 1-minute data
3. Presentation of the findings
4. A final project report

3. Success Criteria

The outputs of this project will enable DNOs to understand the risk factors associated with types of cut-outs that may exist in their license areas. It will also enable DNOs to accurately forecast how this risk may increase over time as more LCTs are connected to customers' properties.

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 original aim of this project was to clarify the overall problem, explore 1-minute data provided from real world customers and to emulate this data over the results from the previous Net Zero Termination Project. The objective was to see if these consumption profiles, when coupled with the previous learnings, would show if customers were consuming enough power over a long enough period to cause the same issues as seen in the laboratory. Based on this we would be able to begin to see if the issue of high loads is present and, if so, analyse how many customers may be overloading their cut-out terminations.

The project has fulfilled all its main objectives. It has shown customers can consume more than the maximum current rating of a domestic cut out. It showed this to happen over an extended period and within the predictions of the original Net Zero Service Termination NIA Project thermal cycling. This issue is exacerbated by multiple LCTs in the same property, especially when they are using dynamic tariffs which can mean all these loads are being utilized at the same time. We could not identify one specific LCT which caused this, but it was generally worst during the Winter and Spring. The report was completed and shared with the DNOs and several steering groups run by the ENA, mainly to discuss the findings and any next steps.

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

The project did not have the required information to be able to confirm the fuse types or size in the properties which provided the data. There was no data for the location of the cut out, this meant we were unable to apply the solar irradiance factors collected in the Net Zero Service Termination Project. The project used cut-out types which had performed poorly in the previous project and did no analysis of the solar irradiance as a factor.

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 project did not deviate from its stated goals or scope. We had several touch points where the issues and data were shared and discussed with the wider project team (wider team consisted all of members from all of the DNOs). We used these discussions to settle on the types of cut outs we should explore. We were limited on time and the project was not able to explore all of the cut outs used in the original project.

In future projects it may be useful to try and increase the amount of data present or to extend the time for analysis. We were limited to 283 customers as this was all we received from the supplier. A future project would likely benefit from a wider pool of data as this would allow more detailed analysis. Extending the time would allow any future analyses to be more detailed and account for more variables, which may provide greater depth to outputs.

7. 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/.

8. Foreground IPR

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

No foreground IPR was developed as a direct result of this Project.

9. 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.

The first Net Zero Service Termination (NZT1) project confirmed we can see overheating within several common single phase cut outs when they were subjected to high loads for several hours. These loads did not exceed the rating of the cut outs themselves. The 2nd Net Zero Termination (NZT2) project sought to identify, using real customer data, what would happen to single phase cut outs when subjected to these customer loads. We received 283 customer load profiles from Octopus Energy, all customers had a mixture of low carbon technologies (LCT) ranging from single installations to multiple technologies running in concert. The project showed we will have customers who regularly consume close to or over their maximum capacity for many hours at a time.

Both projects show we have an issue now with loads close to or exceeding the rated cut out value on our network. To progress in a reasonable manner, we now need to understand the scale of the issue we may have on our distribution networks, and explore mitigating action.

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.

The near-term steps are as follows:

1. Develop and implement a mandated alert for smart meters measuring demands greater than the thresholds for extended periods of time. Like existing voltage alerts, these would enable DNOs to assess the situation and to alert customers of risks. This could be achieved in one of three ways:
    i. DNOs are given access to customer current data.
    ii. Suppliers are obligated to create suitable alarms based on customer current data.
    iii. A third party is supplied with current data and obligated to create suitable alarms.

2. Share the findings of the report with the main suppliers of cut outs to UK DNOs. A discussion should be held about the required changes to the cut-outs to ensure they are more robust in the future, becoming more resilient to these higher load levels.

Potential longer-term work could include:

1. Investigating the impact on lifetime degradation of assets such as cut-outs or service cables that may result from prolonged exposure to high loads. This should include an impact assessment of three phase cut outs and wider exploration of the impact these LCT loads will have on legacy items on our network. This would require running a similar project to NZT1 and acquiring the necessary information from a lab-based test.

2. Examine smart meter data from other suppliers, such as those offering free energy on specific days or tariffs that encourage demand shifting such as dynamic tariffs that follow renewable generation to see if event exceedances are an issue in other scenarios, and report findings to industry stakeholders

3. Investigate the highest power demand properties to understand the drivers for high energy demand in greater detail. Used in tandem with LCT forecasted uptake rates, DNOs will be able to contextualise the risk factors of these new demands, and report findings to industry stakeholders.

11. Net Benefit Statement

A qualitative and quantitative statement of whether the Project has delivered and is expected to deliver any net benefits. This will provide an update to the statement of projected net benefits required at project registration (as set out in table 3.1). Where a completed Project is expected to deliver benefits, the statement should detail:
a) the net benefits the Project delivered so far up to the point of issuing the net benefit statement, and
b) the net benefits the Project is forecast to deliver, should the innovative solution be implemented more widely.

The project has identified an emerging risk and has resulted in a new data request to DCC to enable its mitigation, via the provision of current data from smart meters. It has provided insight into the interaction of LCTs with new tariffs and consumer behaviours which may inform policy development by industry stakeholders and regulators.

Its original net benefits were foreseen to reduce the requirement for load checks in LCT connections as detailed below, and these are likely to be delivered if the new data request is granted enabling automation of load checks for consumers with smart meters.

Base cost:

SSEN potential new LCT connection requests between 2021 and 2030 = 676,493 LCT connection requests requiring a loading inspection (42.6%) = 288,186 Inspection cost = £14.4m
Total cost = £14.4m

Method cost:

LCT connection requests requiring a loading inspection (10.7% - assumes 75% of inspections avoided) = 72,384 Inspection cost = £3.6m
Total cost = £3.6m

Base cost – Method cost = £14.4m – £3.6m = £10.8m saving between 2021 and 2030

In addition to this there will be safety benefits through ensuring service terminations can sustain additional LCT loading, mitigating potential overheating, fire or injury.

12. Other comments

N/A