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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.

NIA Project Annual Progress Report Document

Date of Submission

Jun 2022

Project Reference

NIA_WPD_066

Project Progress

Project Title

Smart Meter Innovations and Test Network (SMITN)

Project Reference

NIA_WPD_066

Funding Licensee(s)

WPD - Western Power Distribution (South Wales) Plc

Project Start Date

March 2022

Project Duration

1 year and 1 month

Nominated Project Contact(s)

Jenny Woodruff

Scope

The scope of the project involves investigating and applying algorithms that use smart meter data for the following use cases.

- 1) Customer to Phase connection prediction.
- 2) Customer to Feeder connection prediction.
- 3) Low Carbon Technology identification of potential locations and types.
- 4) Provision of LV feeder and Distribution substation planning profiles for use in network planning.

If the project is successful, it will lead to improvements in data quality and availability which will then allow for;

- 1) More accurate planning by modelling unbalanced three phased networks.
- 2) Reduced losses through better phase selection for new connections.
- 3) Reduced fuse operations from imbalanced phases.
- 4) Enhanced data available for LV Fault Location.

- 5) Improved IIS reporting.
- 6) Reduction of sites that require monitoring and more effective targeting of.
- 7) Reduced costs to confirm customer phase.
- 8) Identifying and fixing data errors ahead of need.
- 9) Enabling LV self-serve facilities.
- 10) Improved use of our data by third parties.

The financial benefits from these improved outcomes is approximately £740k per annum within WPD's licence areas made up of;

- Savings from reduced losses when connections are made to existing networks estimated assuming 20,00 connections each year to existing unbalanced networks and a 10% reduction of losses resulting from reduced imbalance. (approx. 11k).
- A reduction in fuse operations by improved management of phase imbalance and altering fuses where this is seen via modelling to be a high risk resulting in approx. £79 k per annum saving based on 100 events a year at £790 each.
- A reduction in excavating at inaccurately identified fault locations due to incorrect customer connectivity saving approx. £340k per annum assuming that this is avoided 200 times a year at a cost of £1.7k per event.
- A reduction in the cost of monitoring the network by having better data to better select locations where monitoring is required and being able to omit some locations where monitoring is not required.

Objectives

The objectives of the project are;

- 1) To determine a representative test network of selected distribution substations and validate the key features of this network by carrying out surveys.
- 2) To capture smart meter data using new aggregation groups.
- 3) To develop algorithms using smart meter data for the following use cases.
 - Customer to Phase connection prediction.
 - Customer to Feeder connection prediction.
 - Low Carbon Technology identification of potential locations and types.
 - Provision of LV feeder and Distribution substation planning profiles for use in network planning.
- 4) To apply the algorithms for data relating to the test network.
- 5) To assess the performance of the algorithms and where possible identify the factors that affect accuracy.
- 6) To capture the learning from the project and disseminate this to interested parties.

Success Criteria

The success of the project will result in;

- A set of phase validated networks and a subset where customer-to-feeder association has also been validated that can be used to test future innovations beyond this project.
- An understanding of how well the smart meter data can be used to support phase identification and what factors affect the accuracy of the algorithms used.
- An understanding of whether smart meter data can be used to support the identification of unregistered LCT and what factors affect the accuracy of the algorithms used.
- An understanding of whether smart meter data can be used to support the validation of customer-to-LV feeder associations and what factors affect the accuracy of the algorithms used.
- An understanding of how well aggregated smart meter data can be combined with other data available to DNOs to create estimated LV feeder load profiles and what factors affect the accuracy of these estimates.
- An understanding of the practical issues for using the newly developed feature for validating customer-to-LV feeder association without requiring connection to the customer's wiring and confirmation that the new feature is fit-for-purpose

- An increased insight of the phase imbalance on the test networks.
- A view of the value of disaggregated data from smart meters rather than the default position of aggregation at the LV feeder level.

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

The project has only recently begun. Work has started on the first deliverable to determine the trial area to be used but at this stage the activities have been limited to obtaining samples of available data.

The objectives are expected to be delivered in the various work packages as follows.

WP1 - D1 Area Selection report

To determine a representative test network of selected distribution substations and validate the key features of this network by carrying out surveys

WP1 - D2 Design & Build Trials Data Processing Infrastructure

To capture smart meter data using new aggregation groups

WP1 - D4 Selected Algorithms Report and implement Algorithms and evaluation processes on data environment

To develop algorithms using smart meter data for the following use cases:

- a. Customer to Phase connection prediction
- b. Customer to Feeder connection prediction
- c. LCT identification of potential locations and types
- d. Provision of LV feeder and Distribution substation planning profiles for use in network planning.

WP2 D1 - Phase Identification Report

WP3 D1 – Combination load profiles for planning Report

WP4 D1 – Voltage validation of unregistered equipment Report

WP5 D3 - MPAN to Feeder association analysis

To apply the algorithms for data relating to the test network

WP2 D1 - Phase Identification Report

WP3 D1 – Combination load profiles for planning Report

WP4 D1 – Voltage validation of unregistered equipment Report

WP5 D3 - MPAN to Feeder association analysis

To assess the performance of the algorithms and where possible identify the factors that affect accuracy

WP6 D1 Closedown Report

WP6 D2 - Dissemination

To capture the learning from the project and disseminate this to interested parties

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

Not applicable – the project has only recently begun.

Lessons Learnt for Future Projects

Not applicable – the project has only recently begun.

Note: The following sections are only required for those projects which have been completed since 1st April 2013, or since the previous Project Progress information was reported.

The Outcomes of the Project

Not applicable – the project has only recently begun.

Data Access

Not applicable – the project has only recently begun.

Foreground IPR

There is known background IPR associated with the processing algorithms to replicate the settlement process held by DGI which would be needed by others to use the Foreground IPR. The IPR developed by Loughborough university while working on the losses investigation project which will be used by SMITN is expected to be very helpful but not absolutely necessary to make use of the Foreground IPR.

The algorithms applied to identify phase, feeder, or unregistered LCT are not expected to be protected by prohibitive IPR arrangements such as requiring licencing for use, but rather being published in academic papers or developed by the SMITN team themselves.

The development of the Feeder Finder will generate new foreground IPR which will be held by Haysys but made available to third parties in accordance with NIA requirements.