

Date of Submission

May 2019

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

Recharge the Future

Project Reference

NIA_UKPN0028

Funding Licensee(s)

Eastern Power Networks, London Power Networks, South Eastern Power Networks

Project Start Date

October 2017

Project Duration

1 year and 3 months

Nominated Project Contact(s)

Jack Lewis Wilkinson & Thazi Edwards

Scope

The project will model the growth and profiles of on street, work, residential and commercial chargers connected directly and indirectly to the LV, HV & EHV distribution networks. Commercial fleet depots will not be included in this study. This is due to:

- These connections are expected to be sporadic in nature, making it impossible to predict the date, size, load profile and location that these depots will connect.

These connections must be approved by the network operator, so will not contribute to unplanned capacity shortfalls.

Objectives(s)

- Publish a report on the outputs of the Charge Use Study's relevant learning.
- Revise the EV forecasting tool based on the Charger Use Study findings.
- Test the revised EV forecasting tool by developing revised load forecasts and assessing the potential impact on investment required in the medium to long term.

Success Criteria

The success of the project will be judged against the following criteria:

- The load forecasting tool is adapted so that the accuracy of its electric vehicle module is enhanced at a substation level.
- A study is undertaken to understand the way in which various charging infrastructures will be used in the future, developing a series of scenarios to illustrate the uncertainties and sensitivities which the load forecast will have.
- The study and forecasting model will be used to generate a series of forecasts which will be used to conduct impact analyses of the network.

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

The Charger Use Study has been completed, with the corresponding report to be published later this year. It has succeeded in modelling the relationship between location and EV charging behaviour. This quantification enables the findings to be used within the EV load forecasting model.

The model methodology and scenarios have been completed, with a successful independent review from Imperial College London. The

approval of the methodology has enabled the completion of the EV load forecasting tool, which has generated load forecasts.

Parallel to the construction of the EV load forecasting model, adaptations to Imperial College London's Load Related Expenditure (LRE) model are also being completed by the academic partner. These adaptations include data updates, and modelling enhancements, which will enable greater accuracy when predicting reinforcement costs associated with load growth forecasts. The EV load forecasting model will produce anticipated load growth volumes per substation, whilst the LRE model will quantify the impact of this on network upgrades and investment costs.

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

To mitigate the recognised level of uncertainty of EV growth, the project included an additional review by Imperial College London to supplement the robustness of the methodology and provide an independent technical assurance on key assumptions. It is expected that this change will deliver further value to customers through more targeted investment to cater for customers charging needs in future.

Lessons Learnt for Future Projects

There is little GB data available on work charging behavior (i.e. EV charging done at work), the amount of charging done at work, and at which locations work charging occurs. This needs improving if the impacts of work charging are to be better understood, and is important because much of this load growth is likely to be 'behind the meter'.

The methodology that will be outlined in the Charger Use Case study will be made publically available for adoption by GB distribution network operators. The effectiveness of any research will be assessed through sensitivity and validated studies conducted by project stakeholders.

The Outcomes of the Project

Due to findings within the Charger Use Study, charging profiles have been created, these include:

Various Public & On-street charger profiles, derived by Zapmap from data provided by UK charger network operators.

Various Residential On-street & Residential Off-street charger profiles, derived from Electric Nation, My Electric Avenue, Low Carbon London & other trial data sets.

Work charger profiles, estimated by Pod Point, who build and operate an extensive UK work charging network.

Other analysis within the Charger Use Study has enabled the project team to start building a EV forecasting model, which is able to model:

How 'access to off-street parking' and building type affect the utilisation of local 'work', 'public & on-street' and 'residential' charging infrastructure.

How the time, duration & power (load profile) of charge varies from location to location.

The effects of smart charging and vehicle to grid technologies on load profiles

The effects of a more centralised and decentralised infrastructure on the utilisation of 'work', 'public & on-street' and 'residential' charging infrastructure.

The improvement to the EV load forecasting model will enable more accurate forecasting enabling effective planning. This will result in long term benefits to customers through targeted investment planning and more efficient use of existing infrastructure to facilitate EV charging.

Data Access

To view the full Innovation Data Sharing Policy please visit UK Power Networks' website here:

<http://innovation.ukpowernetworks.co.uk/innovation/en/contact-us/InnovationDataSharingPolicy.pdf>

UK Power Networks recognise that Innovation projects may produce network and consumption data, and that this data may be useful to others. This data may be shared with interested parties, whenever it is practicable and legal to do so, and it is in the interest of GB electricity customers. In accordance with the Innovation Data Sharing Policy published in 2017/18, UK Power Networks aim to make available all non-personal, non-confidential/non-sensitive data on request, so that interested parties can benefit from this data.

Foreground IPR

The following foreground IPR has been developed as a result of the project so far:

- The data analysis and findings which will be included within the Charger Use Study Report
- The EV load growth modelling methodology which will be recorded within the Final Report
- The enhancements made to the EV module of Element Energy's load forecasting model.