

NIA ENWL022

Reflect Uncertainties Around E-vehicle Charging To Optimise Network Forecasting

Progress Report

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VERSION HISTORY

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V1.0		Christos Kaloudas		

REVIEW

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APPROVAL

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GLOSSARY

Term	Description
EV	Electric Vehicle

1 PROJECT FUNDAMENTALS

Title	Reflect Uncertainties Around E-vehicle Charging To Optimise Network Forecasting
Project reference	NIA_ENWL022
Funding licensee(s)	Electricity North West Limited
Project start date	March 2019
Project duration	2 years
Nominated project contact(s)	Christos Kaloudas (innovation@enwl.co.uk)

2 PROJECT SCOPE

The Reflect project will improve the electricity demand forecasting for EV charging by reflecting the regional uncertainties around slow (<20 kW) and ultra fast (up to 450kW) charging in the forecasting scenarios and consequential cost and risk assessments. The project aims to use EV charging profiles produced from trials and analysis carried out by projects such as the Recharge the Future and the CarConnect projects and will enhance the scenario-based forecasting methodology to include probabilistic assessments. The developed methodologies will allow Cost Benefit Analysis (CBA) tools such as the Real-Options CBA (ROCBA) tool to reflect the uncertainties around slow and ultra fast EV charging in risk and cost assessments.

3 OBJECTIVES

The Reflect project will develop the forecasting methodologies to model the uncertainties around slow EV charging from the LV networks (e.g. home and destination charging) versus ultra fast charging (e.g. at service stations).

This project supports the following primary objectives:

- develop methodologies and tools that consider regional characteristics to frame uncertainties around slow and ultra fast charging;
- introduce the use of probabilistic assessments within the scenario-based forecasting approaches followed by DNOs;
- consideration of traffic flow data in modelling;
- interoperability with EV charging profiles produced by analyses and trials from other UK and European projects (e.g. UKPN's Recharge the Future and WPD's CarConnect projects).

4 SUCCESS CRITERIA

The project will be successful if:

- it delivers partial prototypes of load estimates that consider both slow and ultra fast EV charging;
- it improves the currently followed scenario-based forecasting approach by considering via probabilities the likely effects of ultra fast charging of EVs on future demand uptakes; and,
- it provides specifications on how the uncertainties modelling in the developed methodology can be used to enhance CBA processes.

5 PERFORMANCE COMPARED TO THE ORIGINAL PROJECT AIMS, OBJECTIVES AND SUCCESS CRITERIA

This progress report covers the period from 1st April 2019 up to 31st March 2020. Within this period, data assessment work was first carried out to understand the advantages and disadvantages of different datasets of geospatial data that can be used to understand regional characteristics affecting residential and public charging of EVs. The work was done by the University of Strathclyde due to previous research work in the area that was published in international journal and conference papers.

The data assessment work was used to better scope the requirements of the project. The scope of works was put out to public tender to identify the better positioned bidder within the project budget to carry out the following three work packages:

- Work package 1: derivation and processing of regional data;
- Work package 2: methodology development using the regional data; and,
- Work package 3: development of a prototype tool following the developed methodology.

Work package 1 was grouped in Lot 1 and work packages 2 and 3 in Lot 2. This was done recognising that some bidders could have an expertise limited to regional data gathering and processing, whereas others could be more advanced on methodology and tool development.

Element Energy were the successful bidder that scored the highest across the defined criteria and showed clearly they are well positioned to deliver work for all work packages within the project budget. Within this period Element Energy have delivered all products expected for Lot 1 (Work Package 1).

In line with the project scope and objectives, the completed work in Lot 1 has defined the type of regional characteristics, as well as led to the gathering and processing of the associated regional data that are required in Lot 2 to develop methodologies and tools. These tools will aim to frame regional uncertainties around slow and ultra fast charging, thus the completed work in Lot 1 where regional data has been gathered and processed to identify the future potential of residential, destination and en route EV charging is a critical milestone achieved for the project.

Completed work in Lot 1 has also considered the type of data that are required to consider the effect of traffic flows in modelling. More specifically, data showing the commuter start and end points including commuters outside Electricity North West's license area are going to be used in Lot 2 to model the regional effects on destination and en route charging.

Regarding the success criteria and in line with the project scope, completed work in Lot 1 has delivered regional data of potential future locations of slow and ultra fast EV charging. More specifically, data on regional access to off street parking and data on points of interest for ultra fast en route chargers (eg, service stations, super markets, hotels) have been gathered and processed, whereas specifications on how this data can be gathered in the future particularly from open source datasets have been documented. This data will allow in

Lot 2 the delivery of partial prototypes of load estimates that consider both slow and ultra fast EV charging.

6 REQUIRED MODIFICATIONS TO THE PLANNED APPROACH DURING THE COURSE OF THE PROJECT

No major change to the planned approach has been made.

Required modifications are limited to the use of more up to date and complete datasets regarding the EV profiles that will be used in the next stage (Lot 2) of the project. In the original scope it was mentioned that EV profiles from other innovation project trials (ie, UKPN's Recharge the Future and WPD's CarConnect) are going to be used. Although certain types of profiles (eg, for destination or home charging) from these projects could be used, more recent data from larger sample of actual EV charging events could be also used.

7 LESSONS LEARNED FOR FUTURE PROJECTS

The Reflect project has so far demonstrated that a wide range of regional data needs to be used to properly frame regional uncertainties around the different types of EV charging. This extends from understanding the existing regional characteristics, such as access to off street parking or commuters travel patterns, to potential locations of interest that different types of EV charging can take place (eg, at supermarkets, en route and at hotels as destination charging).

The data that has been gathered and processed has shown that different regions can have different future potential for the different types of EV charging. For example, regions that show significant potential for slow overnight charging due to volumes of residential customers with access to off street parking do not necessarily have the same potential for ultra fast and during the day EV charging from en route (eg, at service stations, supermarkets) and/or destination charging (eg, at work). This highlights the importance of half-hourly through the year modelling of the different types of EV charging in the next work packages of the project, given that this type of modelling can reveal the effects of EV charging at demand levels across different times of the day and across different parts of the network.

8 THE OUTCOME OF THE PROJECT

Not applicable.

9 DATA ACCESS

Electricity North West's [innovation data sharing policy](#) can be found on our website.

10 FOREGROUND IPR

There is no foreground IPR associated with the project.

11 PLANNED IMPLEMENTATION

Not applicable.

12 OTHER COMMENTS

Not applicable.