Notes on Completion: Please refer to the appropriate NIA Governance Document to assist in the completion of this form. The full completed submission should not exceed 6 pages in total.

NIA Project Registration and PEA Document

Date of Submission

Apr 2015

Project Reference Number

NIA_UKPN0004

Project Registration

Project Title

Freight Electric Vehicles in Urban Europe (FREVUE)

Project Reference Number

NIA_UKPN0004

Project Licensee(s)

UK Power Networks

Project Start

March 2013

Project Duration

4 years and 7 months

Nominated Project Contact(s)

UKPN Innovation Team

Project Budget

£74,310.00

Summary

The scope of the project can be summarised as follows:

- Collect data to facilitate the assessment of the impact of freight EV use on distribution networks.
- Analyse the data to inform understanding of the opportunities and impact of freight EV charging.
- Establish working groups to communicate lessons learnt in different areas.

Nominated Contact Email Address(es)

innovation@ukpowernetworks.co.uk

Problem Being Solved

This pro-forma is seeking funding to complete an existing IFI and EU funded project which will complete in August 2017.

In the UK, it is anticipated that there will be a proliferation of Electric Vehicles (EVs) as the nation transitions into a low carbon economy. The ambition is to achieve a 14% CO2 reduction from transport by 2020 and 'substantial decarbonisation' by 2050.

Studies have focused on the use of EVs as small to medium cars, however, there is a lot of interest in the decarbonisation of freight delivery which means there is a potential for a proliferation in EV use for freight EVs with the differing impacts on the distribution network. Distribution network operators could be seen as potential barriers to freight EV take up if the capital costs of reinforcing the network to meet the demand from charging is high.

This project will explore new insights into freight EV demands and profiles for the distribution networks. Insight to date has highlighted that the greatest impact from EV charging will be seen in the lower voltage circuits and substations, particularly in areas where there is a concentration of EV uptake and little capacity on the network.

The intention of this project is to assess the impact on the distribution network from the commercial operation of large freight EVs and the potential impacts of a larger scale deployment on local energy distribution infrastructure. Data is being collected from a fleet of 18 freight EVs, used in the logistics business, which is planned to be expanded by an additional 50 EVs – all charged from one site. The project forms part of a wider EU Framework 7 project.

Furthermore, the equipment used in the additional EV charging required is likely to cause high levels of harmonic voltage distortion. Engineering Recommendation G5/4 sets the planning levels for harmonic voltage distortion to be used in the process for the connection of non-linear equipment and LV equipment creating disturbance levels outside of this would need to be connected at HV, increasing the cost and acting as a barrier to the technology uptake.

Method(s)

The project will monitor the charge points at the freight EV operator's depot where there is currently limited capacity which means any additional charge points on the site will require a new connection to upgrade the supply, at cost to the fleet operator.

3-phase monitoring equipment will be installed against individual EV charging posts to capture data at 10 min intervals on energy consumption (for various charge cycles) which will be matched with data obtained from existing monitoring equipment at the substation.

The data will be analysed to identify the impact on the network including the diversified peak demand, the profile of the demand, the opportunities for shifting the load, the characteristics of the EV drive cycle that dictate the demand, the profile on the network meeting the demand and any associated risks to the network.

The main activities of the project are shown in bold:

Monitoring installation: 3 phase meters to monitor the power consumption of the EV chargers used. Monitoring of key parameters at the charge points at the depot.

Power Quality monitoring installation: Power quality measurement at Kentish Town local substation.

Data transfer to WP3 (Analysis) lead: Transfer of the data collected as highlighted above for analysis.

Technical assessment of EVs for logistics report: Conclusions and recommendations ontechnical suitability of EVs for city logistics – including the impact on the network.

Monitoring decommission and uninstall: Uninstall monitoring after the trials are over.

Power Quality monitoring uninstall: Uninstall PQ monitoring after the trials are over.

Grid impact presentation: Presentation will be given to an audience of the project consortia and other stakeholders on the impacts and potential mitigating measures of installing EV charging infrastructure on the network.

The Framework 7 project consists of five Work Packages (WPs) and UK Power Networks is mainly involved in WP2 (Demonstrators) and is supporting the rest of the WPs.

Project work packages

WP1 – Assessment and ICT framework: *Month 1 – 24*: Minor UK Power Networks involvement

WP2 – Demonstration trials: Month: *1 – 48*: UK Power Networks involvement

WP3 – Analysis: Month: *10 – 50*: Minor UK Power Networks involvement

WP4 – Dissemination: *Month 1 – 54*: Minor UK Power Networks involvement

WP5 – Project coordination and management: *Month 1 – 54*: Minor UK Power Networks involvement

Scope

The scope of the project can be summarised as follows:

- Collect data to facilitate the assessment of the impact of freight EV use on distribution networks.
- Analyse the data to inform understanding of the opportunities and impact of freight EV charging.
- Establish working groups to communicate lessons learnt in different areas.

Objective(s)

- Quantify the impact of the additional demand from the freight EV charging uptake.
- Provide insights into how reinforcement can be deferred.
- Understand interactions between EVs and local sub-stations and develop active management techniques for EVs to offer load balancing services to the grid.

The project will produce a joint detailed White Paper on the role of network operators in the EV rollout in logistics across Europe. As part of the FREVUE project, to encourage new networks and the exchange of know-how between project partners, a working group on grid issues and the impact on the EV logistics supply chain has been established.

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

Success Criteria

The following criteria will be considered when assessing whether the project has been successful:

- The monitoring systems have been installed and commissioned successfully at the trial site and are performing correctly.
- An understanding of whether an improved or flexible connections offering can be developed for the expansion of the charging capacity has been highlighted.

Project Partners and External Funding

n/a

Potential for New Learning

n/a

Scale of Project

The trial is being carried out at the EV operator's depot and at Kentish Town Road substation.

The substation is fairly representative of a typical substation installation within LPN.

Technology Readiness at Start

TRL2 Invention and Research

Technology Readiness at End

TRL3 Proof of Concept

Geographical Area

The trial will continue in the EV operator's depot and the substation feeding the site, which is the Kentish Town Road substation.

Revenue Allowed for the RIIO Settlement

N/A

Indicative Total NIA Project Expenditure

The bulk of the project has been completed and the remainder will be completed by August 2017.

Budget: £74,310

EU Funding: £39,539

IFI expenditure (to date): £4,771

NIA budget: £30,001

Project Eligibility Assessment Part 1

There are slightly differing requirements for RIIO-1 and RIIO-2 NIA projects. This is noted in each case, with the requirement numbers listed for both where they differ (shown as RIIO-2 / RIIO-1).

Requirement 1

Facilitate the energy system transition and/or benefit consumers in vulnerable situations (Please complete sections 3.1.1 and 3.1.2 for RIIO-2 projects only)

Please answer **at least one** of the following:

How the Project has the potential to facilitate the energy system transition:

n/a

How the Project has potential to benefit consumer in vulnerable situations:

n/a

Requirement 2 / 2b

Has the potential to deliver net benefits to consumers

Project must have the potential to deliver a Solution that delivers a net benefit to consumers of the Gas Transporter and/or Electricity Transmission or Electricity Distribution licensee, as the context requires. This could include delivering a Solution at a lower cost than the most efficient Method currently in use on the GB Gas Transportation System, the Gas Transporter's and/or Electricity Transmission or Electricity Distribution licensee's network, or wider benefits, such as social or environmental.

Please provide an estimate of the saving if the Problem is solved (RIIO-1 projects only)

Depending on the nature and associated costs of the smart optimisation approach that is identified, the savings from the learning on this trial can come in the way of savings to customers for connection requests. The need for connections, or fully traditional connections approaches, may be mitigated by using approaches that consider the accurate demand profile of the EV fleet.

Please provide a calculation of the expected benefits the Solution

N/A

This is a research project that sets the foundation for a solution that can be trialled as part of a future demonstration project.

Please provide an estimate of how replicable the Method is across GB

The method applied here can be replicated across the whole GB DNO community to provide insight into the demand profile from different forms of EV charging in order to develop suitable smart optimisation approaches.

Please provide an outline of the costs of rolling out the Method across GB.

N/A

Output of project is new learning, rollout will be in the form of reports and dissemination.

Requirement 3 / 1

Involve Research, Development or Demonstration

A RIIO-1 NIA Project must have the potential to have a Direct Impact on a Network Licensee's network or the operations of the System Operator and involve the Research, Development, or Demonstration of at least one of the following (please tick which applies):

☐ A specific piece of new (i.e. unproven in GB, or where a method has been trialled outside GB the Network Licensee must justify repeating it as part of a project) equipment (including control and communications system software).

☐ A specific novel arrangement or application of existing licensee equipment (including control and/or communications systems and/or software)

☑ A specific novel operational practice directly related to the operation of the Network Licensees system

☐ A specific novel commercial arrangement

RIIO-2 Projects

☐ A specific piece of new equipment (including monitoring, control and communications systems and software)

☐ A specific piece of new technology (including analysis and modelling systems or software), in relation to which the Method is unproven

☐ A new methodology (including the identification of specific new procedures or techniques used to identify, select, process, and analyse information)

☐ A specific novel arrangement or application of existing gas transportation, electricity transmission or electricity distribution equipment, technology or methodology

☐ A specific novel operational practice directly related to the operation of the GB Gas Transportation System, electricity transmission or electricity distribution

☐ A specific novel commercial arrangement

Specific Requirements 4 / 2a

Please explain how the learning that will be generated could be used by the relevant Network Licensees

One of the key insights into the control (or smart optimisation) of EV load is that the profile of the demand and the operation of the EVs (i.e. the duty cycle of the EVs) will largely determine the degree of flexibility in the charging demand that is possible. If successful, the learning here could be used by relevant Network Licensees to inform the approach towards smart optimisation of EV loads.

Or, please describe what specific challenge identified in the Network Licensee's innovation strategy that is being addressed by the project (RIIO-1 only)

The conclusions from this trial provides the foundation to inform on the following Innovation strategy capability themes:

- Understand current and future performance of the 11kV and LV networks.
- Develop commercial solutions and products.
- Managing residential and SME consumer demand.

☑ Has the Potential to Develop Learning That Can be Applied by all Relevant Network Licensees

Is the default IPR position being applied?

☑ Yes

Project Eligibility Assessment Part 2

Not lead to unnecessary duplication

A Project must not lead to unnecessary duplication of any other Project, including but not limited to IFI, LCNF, NIA, NIC or SIF projects already registered, being carried out or completed.

Please demonstrate below that no unnecessary duplication will occur as a result of the Project.

n/a

If applicable, justify why you are undertaking a Project similar to those being carried out by any other Network Licensees.

n/a

Additional Governance And Document Upload

Please identify why the project is innovative and has not been tried before

n/a

Relevant Foreground IPR

n/a

Data Access Details

n/a

Please identify why the Network Licensees will not fund the project as apart of it's business and usual activities

n/a

Please identify why the project can only be undertaken with the support of the NIA, including reference to the specific risks(e.g. commercial, technical, operational or regulatory) associated with the project

n/a

This project has been approved by a senior member of staff

☑ Yes