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_WPD_001

Project Registration

Project Title

Electric Boulevards (Continuation of Project LCNF_WPDT1009)

Project Reference Number

NIA_WPD_001

Project Licensee(s)

National Grid Electricity Distribution

Project Start

January 2013

Project Duration

2 years and 9 months

Nominated Project Contact(s)

Ben Godfrey – WPD Innovation & Low Carbon Engineer

Project Budget

£585,000.00

Summary

Infrastructure will be installed to provide connection to three IPT chargers in the Milton Keynes area using a number of different arrangements.

Preceding Projects

WPDT1009 - Electric Boulevards

Third Party Collaborators

Arriva

Arup

Cambridge University

Milton Keynes Council

Mitsui

Transport Research Laboratory

Wrightbus

Problem Being Solved

A capacity of 120kVA is required to deliver sufficient charge to the bus within the short window of time it will be waiting at a bus-stop. A linear load of this size should be able to be supplied by the low voltage system in most cases without thermal ratings being exceeded, however the non-linear equipment used in the IPT system is likely to cause high levels of harmonic voltage distortion.
WPD Policy Document ST6J does not allow this equipment to be connected at LV and so connections would need to be made at HV,

increasing the cost and acting as barrier to uptake.

WPD will also be developing and demonstrating the ability of the existing network off-peak capacity to be used to charge electric vehicles.

Method(s)

WPD will investigate and compare innovative techniques of connecting the IPT chargers to the grid without conventional HV reinforcement. Harmonic disturbance on the adjacent network will be monitored and controlled where possible. Opportunities for deferment of electric bus charging at times of network stress will be investigated and how active management can enable the uptake of this infrastructure. Traditional load on the LV network tends to drop off during the evening and overnight, which would free up capacity to deliver charge to electric vehicles without triggering upstream reinforcement. The delivery of this charge will need to be managed in order for the network to remain within thermal and voltage limits. Using technology, the level of charge can be managed and prioritised according to anticipated charging window of the vehicle, which will allow more vehicles to be charged simultaneously at the same location.

Scope

Infrastructure will be installed to provide connection to three IPT chargers in the Milton Keynes area using a number of different arrangements.

Objective(s)

HV and LV monitoring will be installed before and after IPT charger commissioning in order to retrieve background harmonic levels.

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

Success Criteria

1. Install HV and LV monitoring devices on the adjacent network
2. Conduct preliminary lab testing of the IPT charger
3. Connect IPT chargers to the network using innovative techniques
4. Demonstrate charge deferral based upon network constraints
5. Develop an IPT charger connection policy

Project Partners and External Funding

n/a

Potential for New Learning

n/a

Scale of Project

The project will actively control the charge delivered to the electric bus via an IPT charger and demonstrate the benefits of charge deferral.
Without being able to trial a number of innovative techniques for connection of these devices, the connection policy will not be as well informed.
The duration of the project is sufficient to monitor 6 seasons of electric bus transportation and analyse the information and data for dissemination.

Technology Readiness at Start

TRL6 Large Scale

Technology Readiness at End

TRL8 Active Commissioning

Geographical Area

Milton Keynes, East Midlands

Revenue Allowed for the RIIO Settlement

Nil

Indicative Total NIA Project Expenditure

£84,547

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)

Connection of IPT technology requested by UK customers will be standardised and the required reinforcement will be minimised by understanding the full impacts on the electrical network.

Please provide a calculation of the expected benefits the Solution

Without proving the disturbance characteristics and control methods of these chargers, they would require an HV connection. In the East Midlands, the cost of an LV supply up to 240kVA is between £2,074 and £2,717. To establish a new HV/LV substation costs between £17,833 to 21,422, as set out in the Connections Charging Statement for the East Midlands November 2014.
By allowing the chargers to connect onto the LV network where suitable, there can be a potential saving of up to £19,348 per installation.

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

This technology could be deployed throughout the UK across all areas

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

There are 42,200 buses operating in Great Britain (DFT Table BUS0601, 2014), so a 1% conversion of the existing fleet to pure electric buses by 2020 would see 420 buses, or around 40 charging schemes being required. With a minimum of two chargers being required per scheme, savings back to the customer could exceed £1.5m due to reduced reinforcement requirements.

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

As part of this project, an IPT charger connection policy will be developed for use by all DNOs

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

n/a

☑ 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