

## NIA Project Registration and PEA Document

*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.

### Project Registration

**Project Title**

Electric Vehicle Emissions Testing

**Project Reference**

NIA\_WPD\_018

**Project Licensee(s)**

Western Power Distribution East Midlands, Western Power Distribution South Wales, Western Power Distribution South West, Western Power Distribution West Midlands

**Project Start Date**

Jul 2016

**Project Duration**

11 Months

**Nominated Project Contact(s)**

Benjamin Godfrey - Innovation & Low Carbon Networks Engineer

**Project Budget**

£145,500

**Problem(s)**

Electric Vehicle (EV) manufacturers are unwilling to share the specific harmonic data on the EVs currently in circulation in the UK. Vehicles should be compliant with harmonized EU standards under UNECE R10, but various versions of this standard apply to the existing fleet and there is further uncertainty over which standards apply due to the transitional provisions for conformity. Furthermore UNECE R10 only requires compliance with 61000-3-11 and 61000-3-12 for charging over 16A, which does not provide unconditional connection to the network.

Without confirmation of the standards these vehicles comply to, the customer risks facing increased network charges, either due to conservative reinforcement requirements, or widespread reactive reinforcement schemes to ensure the network remains within limits.

Identifying the EVs which can be classed as non-disturbing and meet the technical requirements of 61000-3-2 and 61000-3-3 will enable DNOs to assess and approve these connections quicker.

**Method(s)**

This project will assess the harmonic disturbance of EVs by carrying out repeated charge and discharge tests for a range of vehicles and charging levels on monitored EV Chargepoints.

The results of the monitoring will be analysed and a report created on their level of disturbance and standards met.

**Scope**

This project will cover the testing of between 15 to 20 EVs and charging rates up to 32A.

**Objective(s)**

This project will determine the level of harmonics and flicker observed during the charging of EVs and document the emissions conducted back onto the electrical distribution network.

**Success Criteria**

1. Testing of at least 15 electric vehicles
2. Recording of power quality data for specific vehicle types
3. EV power quality data analysed for compliance with relevant standards
4. Report on EV Emissions Testing completed

**Technology Readiness Level at Start**

3

**Technology Readiness Level at Completion**

4

**Project Partners and External Funding**

Western Power Distribution: DNO Lead, acting as sponsor to the project, but in partnership with

- ┆ Electricity North West
- ┆ Northern Powergrid
- ┆ Scottish and Southern Energy Power Distribution
- ┆ Scottish Power Energy Networks
- ┆ UK Power Networks

**Potential for New Learning**

This project will provide further learning on the effects on the distribution network of electric vehicles. The report generated as part of the project will be disseminated to other DNOs and other relevant stakeholders, such as DECC, OLEV and SMMT.

The report will also be published on WPD's website and the ENA Smarter Networks Portal.

**Scale of Project**

The sample size of at least 15 vehicles will ensure that the majority of mainstream vehicles in the UK are tested. The testing regime and number of charge/discharge cycles will ensure confidence is given to the results.

**Geographical Area**

Millbrook Testing Facilities

**Revenue Allowed for in the RIIO Settlement**

None

**Indicative Total NIA Project Expenditure**

£130,950

# Project Eligibility Assessment

## Specific Requirements 1

**1a. A 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 systems and 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

## Specific Requirements 2

**2a. Has the Potential to Develop Learning That Can be Applied by all Relevant Network Licensees**

**Please answer one of the following:**

i) Please explain how the learning that will be generated could be used by relevant Network Licenses.

The learning generated from the project will be disseminated to all network operators through the ENA Low Carbon Technologies working group and will inform the level of required power quality assessment for EV Chargepoint connections.

ii) Please describe what specific challenge identified in the Network Licensee's innovation strategy that is being addressed by the Project.

**2b. Is the default IPR position being applied?**

Yes

No

**If no, please answer i, ii, iii before continuing:**

i) Demonstrate how the learning from the Project can be successfully disseminated to Network Licensees and other interested parties

ii) Describe any potential constraints or costs caused or resulting from, the imposed IPR arrangements

iii) Justify why the proposed IPR arrangements provide value for money for customers

**2c. Has the Potential to Deliver Net Financial Benefits to Customers**

i) Please provide an estimate of the saving if the Problem is solved.

Devices conforming to the technical requirements of IEC 61000-3-2 and 61000-3-3 are suitable for connection at locations with a higher impedance than device conforming to IEC 61000-3-11 and 61000-3-12. IEC TR60725 estimates 90% of properties to have an

impedance equal to or less than  $0.25 + j0.23$  Ohms and 98% of properties to have an impedance equal to or less than  $0.46 + j0.45$  Ohms. Zref for testing purposes in the 61000-3-3 standard requires an impedance of  $0.40 + j0.25$  Ohms. Extrapolating those values, an estimated 95% of properties will exceed the impedance required by 61000-3-3 and require reinforcement. Within the WPD region, this will equate to around 375,000 properties and if each property required a new service at an indicative cost of £1,200, this would total £450m.

ii) Please provide a calculation of the expected financial benefits of a Development or Demonstration Project (not required for Research Projects). (Base Cost – Method Cost, Against Agreed Baseline).

n/a

iii) Please provide an estimate of how replicable the Method is across GB in terms of the number of sites, the sort of site the Method could be applied to, or the percentage of the Network Licensees system where it could be rolled-out.

The figures of required reinforcement locations are based on UK data, so approximately 5% of UK domestic households would require works if the lower thresholds within the standards are not met.

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

If the vehicles do meet the lower thresholds within the standards, no further costs would be incurred to roll out the method, apart from dissemination and training costs.

## 2d. Does Not Lead to Unnecessary Duplication



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

No other verification work on EV electrical emissions has been conducted and no other evidence has been gathered from the public domain.

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