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## **NIA Project Registration and PEA Document**

### **Date of Submission**

Jan 2021

### **Project Reference Number**

NIA\_UKPN0072

## **Project Registration**

### **Project Title**

Voyage

### **Project Reference Number**

NIA\_UKPN0072

### **Project Licensee(s)**

UK Power Networks

### **Project Start**

February 2021

### **Project Duration**

1 year and 5 months

### **Nominated Project Contact(s)**

Shira Lappin

### **Project Budget**

£248,930.00

## **Summary**

The wide scale roll-out of high powered EV charging infrastructure is seen as a key enabler for accelerating the electrification of the transportation sector as existing and future owners of EVs will have confidence that they will be able to gain access to high powered chargepoints ubiquitously in a similar manner to conventional vehicles having access to fuel stations.

Motorway Service Areas (MSAs) and service areas in major A-roads have been identified as a specific area in which the roll-out of high powered EV charging infrastructure will be required. Most of these sites are currently connected to the 11kV network and network reinforcements are likely required to increase capacity to supply additional power to the high powered charge points. The conventional solution to providing the increased capacity is typically high in cost, time consuming and requires a large footprint.

A standardised compact scalable supply solution that can be rapidly rolled out to MSA sites and service areas on major A-roads across GB will support the establishment of a nation-wide high powered charging network on the strategic road network ultimately accelerating the uptake of EVs.

### **Nominated Contact Email Address(es)**

innovation@ukpowernetworks.co.uk

## **Problem Being Solved**

The wide scale roll-out of high powered EV charging infrastructure is seen as a key enabler for accelerating the electrification of the transportation sector as existing and future owners of EVs will have confidence that they will be able to gain access to high powered chargepoints ubiquitously in a similar manner to conventional vehicles having access to fuel stations.

Motorway Service Areas (MSAs) and service areas in major A-roads have been identified as a specific area in which the roll-out of high powered EV charging infrastructure will be required. Most of the small/medium sized sites are currently connected to the 11kV network with typically no 33kV network near-by and network reinforcements are likely required to increase capacity to supply additional power to the high powered charge points. The conventional solution to providing the increased capacity is typically high in cost, time consuming and requires a large footprint.

A standardised compact scalable supply solution that can be rapidly rolled out to small/medium sized MSA sites and service areas on major A-roads across GB will support the establishment of a nation-wide high powered charging network on the strategic road network ultimately accelerating the uptake of EVs.

## Method(s)

Engagement with relevant stakeholders have already taken place to gather the key requirements from a customer's perspective which has been taken into account in the design. The key elements are:

- 1 – 2 MVA capacity meets short/mid-term requirements
- 7 – 8 MVA capacity meets long-term requirements
- Space is a premium
- Scalability is welcomed as customers only want to pay for capacity they require in line with the different uptake stages of EV and utilisation of charge points.

This has led to two solutions being proposed:

- LV supply solution: A compact substation to supply up to 1.5 MVA at LV
- HV supply solution: A compact substation to supply 7.6 MVA at 11kV

The two solutions can also be utilised in a hybrid configuration which provides the option to offer bulk network capacity (7-8 MVA) to the service area site using the HV supply solution as well as allowing a staged approach to rolling out the LV supply solution in line with the uptake of EVs and utilisation of chargepoints. In addition, engagement with a charge point operator have taken place to confirm the trial site which has been provisionally agreed.

The project will be carried out in three phases:

Phase 1 - Build the solution with a supplier - A prototype unit will be built according to the finalised design. The project team will work with stakeholders to understand the complexities of mass scale roll-out of the solution to electrify service areas in the strategic road network and develop a strategy.

Phase 2 - Install and commission prototype unit at trial site - Preparation of the trial site will take place minimising civil works. The prototype unit will be transported to the trial site, installed and commissioned ready for the formal trials.

Phase 3 - Evaluate performance - The operational performance of the prototype unit will be evaluated following completion of the installation based on:

- Functional acceptance
- Customer acceptance / satisfaction

## Scope

The scope of the project is as follows:

Phase 1 – Build prototype unit

During the first phase, procurement of the newly designed unit will be carried out with the chosen supplier(s). All standard equipment will be ordered and a high-level roll-out strategy and plan will also be produced.

Phase 2 – Installation & commissioning at chosen trial site

In this phase, the project team will work with a customer (charge point operator) to confirm the siting of the prototype unit at the trial location and carry out site preparation work. The installation of the prototype unit and commissioning will be completed as part of this phase. The prototype unit will supply new EV charging infrastructure of the charge point operator.

Phase 3 – Operational acceptance and knowledge sharing

In this phase, the operational performance data of the prototype unit will be evaluated and assessed. The operational acceptance of the unit will be determined following the results of the performance assessment as well as customer acceptance/satisfaction. A report

summarising the results of the project will be produced and shared publicly. The project team will share all learnings with the wider industry via project reports and through targeted dissemination events.

## Objective(s)

The key objectives of the project are as follows:

Design a solution which could be installed by any authorised party across any small/medium sized MSA or service area in major A-roads to provide 1.5 – 8 MVA of capacity.

Produce a standardised solution kit that can be rolled out rapidly

Reduce connection costs as the proposed solution is scalable and allows for additional units to be added when business case supports.

Build, install and operate the solution at a trial site

Demonstrate the successful operation of the solution in a live environment

Analyse results of the trials to extract key learnings and disseminate across the industry

## Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

## Success Criteria

The project success criteria are as follows:

- Build a prototype compact solution that meets the design requirements and objectives set above.
- Install and commission solution and then complete trial
- Decision on operational acceptance following trial results analysis and roll out to BAU.

Disseminate key learnings and findings to wider industry

## Project Partners and External Funding

Envico Engineering will build the prototype to support the delivery of the project. All design work has been complete; all cabling work for the site connection will be paid for separately by the connections customer. Neither are included in this project cost.

## Potential for New Learning

The key learnings expected from the project are:

- An approved design specification of the compact scalable supply solution
- Detailed requirements for installing and commissioning the solution on a MSA site
- New standards, policies and procedures for the design, installation and operation of the solution

The benefits of the solution in terms of cost, footprint and time saved will be quantified

## Scale of Project

The project will build a prototype solution which will be installed and commissioned at a motorway (or major A-road) service area within UK Power Networks licence areas where it will be trialled in a live operational environment. The proposed site is a representative service area and learnings from this project can be scaled to other MSAs and service areas on major A-roads across GB.

## Technology Readiness at Start

TRL5 Pilot Scale

## Technology Readiness at End

TRL8 Active Commissioning

## Geographical Area

A trial site has been provisionally identified in the EPN licence area of UK Power Networks.

## **Revenue Allowed for the RIIO Settlement**

None

## **Indicative Total NIA Project Expenditure**

£224,037

## 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)

The expected benefits of rolling out the solution across UK Power Networks is estimated to be £3.36m.

#### Please provide a calculation of the expected benefits the Solution

Base Cost

- Traditional HV supply solution cost is £87k
- Traditional LV supply solution cost is £77k
- Each site requires 1 x HV solution to provide bulk supply (7-8 MVA) and on average 3 x LV solutions to supply multiple charge point operators

Base Cost (A) = 1 x £87k + 3 x £77k = £318k

Method Cost

- Method cost for HV solution is £54k
- Method cost for LV solution is £60k
- Each site requires 1 x HV solution and on average 3 x LV solutions
- Savings in time as a result of reduced on-site work is included in the method cost

Method Cost (B) = 1 x £54k + 3 x £60k = £234k

Cost savings

The expected financial benefit per site is (A) – (B) = £84k (C)

There are approximately 40 small/medium sized service areas along motorways and major A-roads across the three licence areas of UK Power Networks which leads to a total saving of £3.36m (40 x £84k).

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

There are 313 service areas in motorways and major A-roads (95 in motorways and 218 in A-roads) across GB. The project team's assumption is 80% of sites will require the solution. Therefore  $313 \times 0.8 = 250$  sites.

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

Each site will require 1 x HV solution to provide bulk supply (7-8 MVA) and on average 3 x LV solutions to supply multiple charge point operators.

The cost of a post-trial HV solution = £54k

The cost of a post-trial LV solution = £60k

The cost of rolling out the Method at a single site is:  $£54k \times 1 + £60k \times 3 = £234k$

It is estimated that 250 sites will require the adoption of the Method. Therefore the total cost of rolling out across GB is £58.5m ( $£234k \times 250$ ).

### **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**

The project is developing and trialling a compact scalable supply solution designed for application in small/medium sized MSAs and service areas in major A-roads. If proven successful, the solution can be adopted by all DNOs as the design, installation and operational requirements as well as the learnings will be openly shared. The solution will help facilitate the rapid roll out of high powered chargers on the strategic road network.

#### **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.

The solution has been specifically designed to be compact and scalable providing supply at 11kV (7.6 MVA) and LV (1.5 MVA) for application at small/medium sized MSAs and service areas on major A-roads to facilitate the rapid roll out of high powered charging infrastructure. In contrast, Western Power Distribution's Take Charge project is developing and demonstrating a compact 33/11kV substation to provide 20 MVA bulk capacity to larger MSA sites. Because the compact scalable solution being developed and trialed under this project is targeting a lower capacity requirement supplied at either HV (11kV) and/or LV, it requires specific consideration and it is envisaged that no duplication will result from this project.

### 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

This project is innovative as it will build, commission and trial in a live environment a new compact scalable kit solution which has been co-designed with relevant stakeholders to meet their requirements of rapidly rolling out high powered charge points at small/medium sized MSAs and service areas in major A-roads. The innovative elements of the design include: • Compactness as it fits into a car park space even with all doors open • Scalability as it offers the potential for customers to only pay for the capacity they require in line with the different uptake stages of the EVs and utilisation of charge points. Scalability as it allows additional units to be added when business case supports allowing customers to only pay for capacity they require in line with the different stages of EV uptake and utilisation of charge points. The innovative features of the proposed solution will help facilitate rapid electrification of the small/medium sized MSAs and service areas in major A-roads so that a nation-wide network of high powered chargers can be established to build range confidence in consumers and accelerate the uptake of EVs.

### 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

As the scalable compact solution is a novel innovative piece of new equipment being developed, built, installed and tested, the TRL is relatively low. Also as this solution is provided by UK Power Networks but paid for directly by a customer, very high confidence is needed in the cost and effectiveness of the solution for the customer to pay as business as usual. Due to the risk involved in the project and not fully knowing whether the benefits can be delivered across UK Power Networks' licence areas, these activities would not form part of business as usual activities. In order to progress an innovative project which carries significant risk in implementation, additional innovation funding is required as a stimulus.

### 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**

As the scalable compact solution is a novel innovative piece of new equipment being developed, built, installed and tested, there is risk that the design and operational performance of the solution may not fully meet all the requirements and objectives set out at the beginning of the project and therefore carries high risk in implementation thus requiring NIA funding.

**This project has been approved by a senior member of staff**

Yes