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

Jan 2018

Project Reference Number

UKPNEN02a

Project Registration

Project Title

Active Response to Distribution Network Constraints

Project Reference Number

UKPNEN02a

Project Licensee(s)

UK Power Networks

Project Start

January 2018

Project Duration

5 years and 11 months

Nominated Project Contact(s)

UKPN Innovation Team

Project Budget

£15,300,000.00

Summary

UK Power Networks (UKPN) is seeing an increase in the uptake of LCTs. Nationally, ultra low-emission vehicle (ULEV) registrations have increased by 47% since 2015 and by 118% since 2014. This means that there are currently more than 16,600 electric vehicles (EVs) registered across our three licence areas, following a trend close to the “Gone Green” scenario. However, the uptake of heat pumps is lower than previously forecast.

There has also been growth in local generation such as Combined Heat and Power (CHP) plant, largely driven by the Mayor of London’s target to generate 25% of London’s heat and power requirements locally by 2025.

In addition, Transport For London (TfL) is setting policy and targets to reduce vehicle emissions and improve air quality. This includes making taxis and private hire vehicles low emission capable, which corresponds to all new vehicles from 2018 and an entire 88,000 fleet by 2033. We estimate that electrifying the Greater London bus and taxi fleets could result in an increase of up to 2.8GW of new load on our London network by 2033 – more than half of the existing peak demand. We estimate that up to £331m of additional reinforcement would be required in RIIO-ED1 and ED2 under these circumstances, of which more than 66% would be attributable to HV reinforcement.

We expect that other local authorities will follow London’s lead to meet the Carbon Plan targets in their areas. To avoid a significant increase in infrastructure costs, DNOs require a toolbox of smart technical and commercial solutions to manage the increase in demand in the most efficient and effective way. The implementation of these smart solutions will make the distribution networks more complex, both to plan and to operate, requiring overarching systems and policies that enable visibility and allow safe operation. Within the smart toolbox, technical solutions include Powerful-CB to alleviate fault level constraints at main substations; commercial solutions include flexibility arrangements with customers to provide demand or generation response services such as those enabled in the TDI 2.0 project. These solutions do not yet cover all situations, leaving room for additional smart solutions. Active Response proposes to add additional functionality to this toolbox, ensuring that the lights are kept on at the least cost to customers.

Nominated Contact Email Address(es)

innovation@ukpowernetworks.co.uk

Problem Being Solved

Method(s)

Scope

Objective(s)

Active Response proposes to develop and trial advanced automation and power electronics to release distribution network capacity at minimum cost, equipping DNOs with suitable tools to deploy proactively as a response to the challenges presented by the uptake of LCTs.

Network meshing (connecting circuits together to share load) is a well-understood method of releasing capacity to overcome constraints on the distribution network. However, in many locations it is not possible to apply this method due to network complexity, voltage difference, uneven load sharing, phase shifts, circulating current, or fault level.

Power electronic devices are a key enabling technology that allows meshing of networks where it is otherwise not possible by direct connections. Active Response proposes to develop Soft Open Points (SOPs) at HV and LV to TRL 8 and operate these as part of an automated, meshed network.

We are looking to build on the award winning FUN – LV project, which developed SOP technology from TRL 4 to TRL 6 at LV.

Active Response will also develop an advanced automation and optimisation system, with the ability to change network configuration and control DNO and third party owned flexible devices. Elements of this system will build on learning from existing projects as discussed on page 6 under "How is the project innovative". This will allow us and other DNOs to optimise the operation of our networks measured by efficiency, cost, losses, customers at risk, or other parameters under normal conditions; and maximise supply restoration under post-fault conditions.

We intend to trial these technical solutions in two areas with different network architectures. Along with the SOPs, these areas will include measurement and remote control devices with HV remote control, LV circuit breakers (CBs) and link box switches. This will enable us to trial the interaction between the power electronic equipment and prove the benefits of the advanced automation and optimisation system.

The purpose is to prove that the SOP technology interacts positively with traditional and automated meshing techniques to release capacity at minimum cost, overcoming constraints more quickly and avoiding traditional reinforcement investment.

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

Success Criteria

n/a

Project Partners and External Funding

n/a

Potential for New Learning

n/a

Scale of Project

n/a

Geographical Area

Revenue Allowed for the RIIO Settlement

Indicative Total NIA Project Expenditure

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)

n/a

Please provide a calculation of the expected benefits the Solution

n/a

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

n/a

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

n/a

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

n/a

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

Please demonstrate how the learning from the project can be successfully disseminated to Network Licensees and other interested parties.

Please describe how many potential constraints or costs caused, or resulting from the imposed IPR arrangements.<

Please justify why the proposed IPR arrangements provide value for money for customers.

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