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

Sep 2016

Project Reference Number

NIA_UKPN0021

Project Registration

Project Title

Domestic Energy Storage & Control

Project Reference Number

NIA_UKPN0021

Project Licensee(s)

UK Power Networks

Project Start

September 2016

Project Duration

1 year and 10 months

Nominated Project Contact(s)

UKPN Innovation Team

Project Budget

£625,700.00

Summary

Install and monitor the load profiles of up to 60 residential energy storage units. The following shows the workstreams and deliverables.

1. Programme delivery

- Successful delivery of the project objectives

2. Trial design

- Monitoring trial Design
- Active control trial design

3. Recruitment/install

- Recruitment and Installation
- Decommissioning and uninstall monitoring

4. Trial operations

- Trial Operations
- Active control trial implementation

5. Reporting

- Project reports and external comms

Nominated Contact Email Address(es)

innovation@ukpowernetworks.co.uk

Problem Being Solved

More than 850,000 solar PV systems have been installed in the UK since 2010. Only a very small number of these systems have any form of electrical energy storage. Today the market is nascent but it is forecast to grow rapidly. As the price of electrical energy storage systems has fallen, their popularity has increased. The roll-out of solar PV systems coupled with small-scale energy storage (and other low carbon technologies) is likely to introduce challenges for the operation of distribution networks.

The Electricity Networks Association (ENA) and Imperial College have estimated that changes to meet these challenges could cost more than £10bn by 2030 with 90% of the cost resulting from low voltage network reinforcement.

Domestic energy storage has the potential to create benefits for Distribution Network Operators (DNO)s but, being in its infancy, the potential impacts to the network are not well understood. Powervault Ltd estimates a significant benefit to DNOs, based on a review of studies conducted by the ENA, UK Power Networks and recent research by Andrew Crossland and ENWL. The National Infrastructure Commission and Lord Adonis recently estimated that demand flexibility and electricity storage could save the UK £8bn a year and the Carbon Trust recently estimated that energy storage could save £2.4 billion a year system wide by 2030; if regulatory hurdles are overcome this could rise to £7 billion a year .

However, the impacts of domestic energy storage to DNO networks are not well characterised and other benefits to network operation are not understood. Barriers to deployment of domestic energy storage may exist. Current policies regarding notification or permission may need to be updated.

Method(s)

A field trial of up to 60 sites with monitoring equipment of up to three different types of domestic energy storage system.

Scope

Install and monitor the load profiles of up to 60 residential energy storage units

	Work-stream	Deliverables
1	Programme delivery	• Successful delivery of the project objectives
2	Trial design	• Monitoring trial Design
		• Active control trial design
3	Recruitment/install	• Recruitment and Installation
		• Decommissioning and uninstall monitoring
4	Trial operations	• Trial Operations
		• Active control trial implementation
5	Reporting	• Project reports and external comms

Objective(s)

1. Determine the minimum requirements from the DNO for the installation of Small-Scale Energy Storage (SSES) to domestic properties – connection/application/notification
2. Define typical load profile of a PV and storage-equipped household for modelling the long term effects of SSES on the distribution network
3. Improve DNOs' understanding of the residential energy solutions market
4. Gain insights into customer and DNO value propositions from aggregated SSES applications

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

n/a

Success Criteria

1. Creation of policy recommendations about notification and permissions
2. Production of load profile(s) for properties with solar PV and SSES to inform business planning load growth forecast model and LV modelling tools

Project Partners and External Funding

n/a

Potential for New Learning

n/a

Scale of Project

The method will be trialled at up to 60 sites.

Technology Readiness at Start

TRL4 Bench Scale Research

Technology Readiness at End

TRL7 Inactive Commissioning

Geographical Area

Sites will be distributed across UK Power Networks licence areas.

Revenue Allowed for the RIIO Settlement

N/A

Indicative Total NIA Project Expenditure

£ 625,700

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 National Infrastructure Commission and Lord Adonis recently estimated that demand flexibility and electricity storage could save the UK £8bn a year and a Carbon Trust report (funded by SSE, Scottish Power, E-On and DECC) recently estimated that energy storage could save £2.4bn a year system wide by 2030; if regulatory hurdles are overcome this could rise to £7bn a year.

Domestic energy storage can reduce the level of peak generation and peak consumption resulting in an estimated benefit to the DNO of between £9m and £22m from one storage provider alone.

The learning outcomes of this project are intended to facilitate the safe installation of domestic energy storage, acting as an enabler to unlocking some of the value outlined above.

Please provide a calculation of the expected benefits the Solution

This is an R&D project that will produce outputs which can inform the viability of aggregated SSES as a tool for DNOs to manage network constraints.

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

The conclusions of this trial will be applicable to typical installation of energy storage capacity/capability at a residential property in the UK. Thus it is scalable to all DNOs.

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

The application of the policy recommendations created and the load profiles produced by this project can be rolled out across GB at low cost. For example, the Transform model which is available to all DNOs can be updated with the profiles and used by GB network operators to assess the implications to their network.

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

If successfully completed, the results and learning outcomes could be used by any other DNO.

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

This project addresses “5.5 The need for Smart Grids” in “Our approach to Innovation Strategy and delivery, March 2014”. Specifically, this project will "facilitate new technologies and commercial products to enable a much wider penetration of DG from renewable or low carbon sources”.

☑ 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