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NIA Project Registration and PEA Document

Date of Submission

Dec 2021

Project Reference Number

SPEN 0066

Project Registration

Project Title

Level-Up

Project Reference Number

SPEN 0066

Project Licensee(s)

SP Energy Networks Distribution

Project Start

December 2021

Project Duration

2 years and 4 months

Nominated Project Contact(s)

Gavin Montgomery

Project Budget

£297,000.00

Summary

Level-Up will develop and trial the ZUoS energy balancing digital platform. It will leverage low carbon assets (Solar PV, Batteries, Heat Pumps) installed by the participants of the OneCarluk Community Energy Club. The ZUoS platform will utilise live energy data-feeds from the energy club's LCT assets and network monitoring. It will integrate the data collected with SP Energy Network's NAVI platform and simulations will be run on the model. This will benefit the network by:

- Developing optimisation strategies to reduce peak demand on the LV network;
- Enhancing energy system modelling in combination with data from LCTs, to build improved LV forecasting capability.

The solution will enhance forecasting accuracy; local energy balancing; and help with resilience planning to more accurately inform capacity thresholds for LCT deployment and LV infrastructure upgrades.

Nominated Contact Email Address(es)

innovate@spenergynetworks.co.uk

Problem Being Solved

To achieve the Scottish and UK Government's Net Zero Targets, all citizens and communities will need access to low carbon heat, power and transport services. The transition towards new service models and architectures will require multiple mediation models to be developed to encourage a more engaged public and greater participation. There are significant barriers to engaged participation in the current energy market which will be amplified as prices increase and fuel poverty goes up. Ofgem's recent review into the competitive market in domestic supply concluded that the market is not sufficiently competitive and customer satisfaction rates remain low. Innovative models of engagement are required to tackle these barriers and promote the adoption of new services.

In addition, technical barriers will occur. E.g. Linmill substation, serving Carluk and the wider area, has thermal constraint and fault

level issues with consequential constraints to generation connection above 200kW. The scale of community energy schemes could be affected by these constraints, leading to a barrier to LCT deployment.

Method(s)

At the national/regional level, Electricity Network Operators can play a key enabling role in innovative models of engagement as trusted public facing representatives of the electricity system from a top-down perspective; working with community energy clubs to coordinate local participation in the adoption of low-carbon technologies and flexibility services, in partnership with technology providers from a bottom-up perspective.

Carlisle Development Trust (CDT), through ONECarlisle Community Energy Club (OCCEC) has recruited multiple commercial and domestic pilot participants for the installation of low-carbon technologies (LCTs), including solar PV, energy storage, heat pumps and energy monitoring, to accelerate the transition to net zero and reduce energy costs for club members. The intention is to use the ZUoS energy services platform to optimise energy usage across club members to maximise self-consumption for club members. ZUoS can provide the technical platform for the operation of the energy club and to provide data insights and operational responses to signals from the electricity system operator. It will also enable the Solar PV and DER assets within the OCCEC to be optimised against a set of external signals e.g. Weather Forecasts, Grid Carbon Intensity, Standard and ToU Tariffs. The development of the club is being supported by Scottish Government's CARES programme, and will trial an innovative approach to community engagement in the net zero transition.

Level-Up will undertake a technical trial of the ZUoS platform to utilise data from multiple (16) secondary substations in Carlisle. The trial will use the data to provide insights into energy flows within the local LV network. The trial will benefit the network by:

- Developing optimisation strategies to reduce peak demand on the LV network;
- Enhancing energy system modelling in combination with data from LCTs, to build improved LV forecasting capability.

The solution will enhance forecasting accuracy; local energy balancing; and help with resilience planning to more accurately inform capacity thresholds for LCT deployment and LV infrastructure upgrades.

Scope

The wider initiative with ONECarlisle Energy Club will culminate with the installation of LCT assets with scheduling and live control strategies provided by ZUoS.

The work within the NIA will fund a Technical Trial, of the ZUoS Platform comprising:

- a. Installation of energy monitoring for all club participants and secondary substations;
- b. Integration of live energy data-feeds into ZUoS Simulations platform for enhanced forecasting capabilities;
- c. Development of LV peak demand scenarios
- d. Development of LCT scheduling to provide optimisation strategies to mitigate peak demand scenarios;
- e. Testing of the optimisation strategies.

In addition, Level-Up will develop a detailed cost benefit analysis for the community energy club (CEC) model and define the principles for future roll out into BaU. This will include report into the CEC economic potential across GB and potential CEC architecture framework(s).

Objective(s)

The high-level objective of Level-Up is to facilitate the deployment of low carbon technologies by avoiding delays and costs created by the need for reinforcement :

We will enhance our knowledge and develop our existing DSO toolkit to assist with the assessment of the impact of the deployment of LCT's on the LV Network.

Evaluate the technical and commercial models used in the trial to understand their effectiveness and costs/benefits of using the ZUoS method in comparison with conventional reinforcement.

Assess the potential for energy clubs to galvanise local support and engagement in the energy transition, and ensuring it is socially just.

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

N/A

Success Criteria

The project will be a success if the learning provides improved modelling and forecasting of energy flows on the LV network, and develops coordinated control strategies for LCT assets to provide a cost-effective and reliable alternative to conventional network reinforcement.

Project Partners and External Funding

SP Energy Networks have partnered with ZUoS Ltd to deliver Level-Up.

ZUoS will provide 10% of their costs as an in-kind contribution.

The project leverages LCT assets being provided by the One Carluke Community Energy Club (OCCEC). The assets provided by the OCCEC have been funded through the Scottish Government's CARES (Community and Renewable Energy Scheme) fund.

Potential for New Learning

Community Energy Clubs have been identified as key enablers to support the acceleration of public acceptance of the changes required to support the Net Zero Transition. However, there are limited examples of these Clubs operating within the UK. Further empirical evidence needs to be gathered on the methods available to support increased LCT deployments in areas where there are network constraints.

We will develop an additional set of tools in support of our existing DSO toolkit to assist with the assessment of the impact of the deployment of LCT's on our LV Network.

Scale of Project

The project will involve a trial of the ZUoS digital platform covering up to 154 households and 4 businesses/community buildings in Carluke, South Lanarkshire.

Technology Readiness at Start

TRL6 Large Scale

Technology Readiness at End

TRL7 Inactive Commissioning

Geographical Area

The project will be desktop based focussed on the area of Carluke, South Lanarkshire.

Revenue Allowed for the RIIO Settlement

None

Indicative Total NIA Project Expenditure

The project total expenditure will be £306k. The amount funded through NIA will be £237k. ZUoS will make an in-kind contribution of £19.7k.

The feasibility study into using local energy balancing in social housing will be £60k.

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:

SP Energy Networks has a strong focus and a specific strategic goal to prepare the network for the changing energy landscape. The changes of customer behaviour, demand profile and socio-economic environment post-pandemic require us to accelerate the transition. SPEN is committed to maximising the benefits of low carbon technologies to wider society, ensuring our network can accommodate increasing levels of renewable generation and facilitate transfer towards the electrification of heat and transport.

Through innovative customer engagement and real time asset simulation Level-Up will assist communities wishing to increase their LCT uptake and offer benefits to network companies through reduction of the consequent peak demand increase.

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)

Our initial analysis in the Carlisle area shows that the application of the ZUoS platform could save around £304k in the area through avoiding conventional reinforcement costs by 2050. These cost savings will be passed onto the customer through lower bills.

The project will explore how the effectiveness of the collaboration with community energy clubs using the ZUoS energy services platform can optimise energy usage, reduce energy expenditure, reduce peak demand and increase LCT deployment. During the project a detailed cost benefit analysis will be undertaken to compare of the method against that of conventional reinforcement.

Please provide a calculation of the expected benefits the Solution

We conducted an initial analysis to assess the ability of the ZUoS platform to bring financial benefits. We assessed 9 ground mounted substations in the Carlisle Area. Predicted EV and Heat Pump demand was projected onto the present base demand for each substation.

Base Cost (Conventional Reinforcement) - £243k

Method Cost (Application of energy balancing with ZUoS Platform) - £58k

Potential saving in the Carlisle area - £185k

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

The installation of ZUoS assets is replicable across the GB network as simulations are relevant to all areas of the network. Community energy clubs are not unique to the area of the project and the approach of using them is applicable GB wide. It is expected that uptake of the solution will be widespread should it be successful. Our initial estimates are that benefits across GB could be as high as £300m.

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

The simulation and operation phases of the project have a cost of around £103k for one community energy group and primary substation. The other associated costs are for industry and regulatory engagement and for commercial development, both of which are exercises that are only required for the initial deployment of the platform. There are over 400 community energy groups across the UK and the roll out cost per group is estimated to reduce by approximately 20%. The total roll out cost would be circa £44M.

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

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

SP Energy Networks has a strong focus and a specific strategic goal to prepare the network for the changing energy landscape. The changes of customer behaviour, demand profile and socio-economic environment post-pandemic require us to accelerate the transition. SPEN is committed to maximising the benefits of low carbon technologies to wider society, ensuring our network can accommodate increasing levels of renewable generation and facilitate transfer towards the electrification of heat and transport.

Through innovative customer engagement and real time asset simulation Level-Up will assist communities wishing to increase their LCT uptake and offer benefits to network companies through reduction of the consequent peak demand increase.

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.

ZUoS have demonstrated their concept through pilot projects however to date these have only been applicable to individual premises or assets. This project focuses on rolling out the ZUoS platform at local distribution and supply level and assessing its effectiveness and costs/benefits in comparison with conventional reinforcement.

We are aware of the following projects which incorporate community engagement but do not cover the scope of our project for the reasons given:

- Energy Planning Integrated with Councils (WPD) – this is a data sharing process to model future demand requirements without energy usage optimisation or load sharing between customers.
- Social Constrained Management Zones (CMZs) (SSEN) – this engages with communities by tendering for reinforcement postponement services (mostly energy storage providers) but without energy usage optimisation or load sharing between customers.
- Whole-System Growth Scenario Modelling (SSEN) – local engagement informs investment decisions and shapes future demand models but does not analyse real time data, optimise energy usage, or load share.

Another key difference our project possesses is that real-time data is analysed both pre- and post-meter i.e. customer assets and substations.

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

Level-Up combines a number of approaches which are only just emerging in the domestic energy sector: community energy clubs as a business model; and DER asset management across multiple buildings in a local area. There is significant stakeholder complexity to coordinating these participants, requiring an established community partner.

Level Up will be the first project to deploy the ZUoS platform to multiple properties in a local area.

Relevant Foreground IPR

Several reports will be generated through the project process:

- Engagement Summary Report
- CEC economic potential (GB)
- CEC architecture Framework
- Method Statement for Collective DSM approach for DNOs

These will be made available on project completion to interested licensees.

Data Access Details

It will be our intention to share generated data with relevant and interested parties who can demonstrate that their use of this is in the best interest of UK electricity customers. The provision of data is subject to anonymisation and/or redaction for reasons of commercial confidentiality or other sensitivity. Access to this data must be requested by contacting SPInnovation@spenergynetworks.com.

Please provide the following information in your request:

- Affiliation, position and contact details of requesting party
- Relevant project and type of data required
- Reasons for requesting this data and evidence that this data will be used in the interest of the UK network electricity customers
- How data will be shared internally and externally by the requesting party

Please identify why the Network Licensees will not fund the project as apart of it's business and usual

activities

Level-Up combines a number of approaches which are only just emerging in the domestic energy sector: community energy clubs as a business model; and DER asset management across multiple buildings in a local area. There is significant stakeholder complexity to coordinating these participants, requiring an established community partner.

Level Up will be the first project to deploy the ZUoS platform to multiple properties in a local area.

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

By combining network and customer energy flow data, Level-Up has the potential to lead to enhanced forecasting for local networks, and improved scheduling to mitigate network peaks, increasing the amount of LCTs which can be installed and deferring or avoiding the need for future network reinforcement. However, NIA support is essential as there are significant risks which warrant further investigation and development. These include: an uncertain business case relating to avoided network upgrade costs, the nascent position of community energy clubs in the market, and the penetration of smart meters and market-wide variable tariffs.

This project has been approved by a senior member of staff

Yes