SIF Round 3 Project Registration

Date of Submission

May 2024

Project Reference Number

10061347

Initial Project Details

Project Title

Balancer

Project Contact

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Challenge Area

Novel technical, process and market approaches to deliver an equitable and secure net zero power system

Strategy Theme

Consumer vulnerability

Lead Sector

Electricity Distribution

Project Start Date

01/03/2024

Project Duration (Months)

3

Lead Funding Licensee

UKPN - South Eastern Power Networks Plc

Funding Mechanism

SIF Discovery - Round 3

Collaborating Networks

UK Power Networks

Technology Areas

Commercial

Community Schemes

Energy Storage

Stakeholder Engagement

Voltage Control

Project Summary

Balancer will explore energy equity within the UK's net-zero transition by enabling communities to participate in flexibility markets and benefit from emerging low carbon technologies. The main objective of Balancer is trialling innovative business models utilising cutting-edge front-of-the-meter community batteries strategically placed at the grid-edge.
These batteries can offer various services and benefits to both the network and communities they serve; aspects which haven't yet been fully explored. By balancing the battery's functionality into separate parts of automatic grid-support and consumer-oriented functionalities, they can reduce network costs, ensure power quality, and increase network capacity, while delivering wider benefits to customers.

Add Preceding Project(s)

NIA_UKPN0050 - Urban Energy Club

Add Third Party Collaborator(s)

EcoJoule

Centre for Sustainable Energy

Frontier Economics

Project Budget

£166,175.00

SIF Funding

£149,557.00

Project Approaches and Desired Outcomes

Problem statement

While the UK government plans to install solar panels on 20,000 social housing properties, disadvantaged communities have been marginalised from installing expensive LCTs, such as home battery storage and heat pumps.
Large clusters of solar installations may require network reinforcement to resolve voltage rise and capacity issues. With the proposed introduction of localised marginal pricing and flexibility, underprivileged customers could be inadvertently penalised due to lack of LCTs that can participate in flexibility markets.
Efforts to involve underprivileged communities in the energy transition while reducing their energy costs have yet to scale and make a difference largely due to limited opportunities to invest in LCTs which can participate in flexibility markets.
Economical front-of-the-meter community batteries placed at the grid-edge could address these issues, but current regulations and unclear market signals exclude them. The current market lacks commercially viable business models that encourage or allow the installation of community batteries.
Balancer will address this gap by understanding which business and commercial models will engage consumers, developing a co-ownership commercial model between the community, flexibility providers and DNO. This model, utilising functionality enabled by EcoJoule's EcoSTORE battery, including a LV static compensator (EcoVAR), is divided into three aspects:
A consumer-orientated business model allowing any consumer to actively participate in the flexibility market, irrespective of their power generation capacity, and to reduce their annual bills through markets mechanisms or personal mitigation actions (e.g. self-consumption and price arbitrage).Additionally, those who have access to solar, will be able to access more revenues from a load-shift and value-stacking of flexibility services
Automatic grid support mechanisms, owned by DNOs, ensure enhanced power quality while significantly reducing associated network operating costs.
A market-facing component managed by co-owners/investors of the battery establishing the projects economic viability and adherence to Ofgem's free market principles.
The project will explore regulatory barriers, including restrictions on battery ownerships for DNOs, and opportunities to develop a model where the value proposition works for all involved. Where necessary the project will help inform regulation and policy to support an equitable transition to Net Zero.
Balancer closely aligns to Challenge 2, Theme 4 by developing a novel commercial framework for community battery co-ownership. Through this innovative approach, Balancer will enable disadvantaged consumer segments to participate in flexibility markets and benefit from novel propositions such as front-of-meter batteries.
Learnings from NIA-funded Urban Energy Club can be used to inform the commercial framework development.

Video Description

https://www.youtube.com/watch?v=Z5-ME1XKoLE

Innovation justification

Balancer aims to challenge regulatory barriers and develop an innovative commercial and technical framework for front-of-the-meter community batteries that can provide multiple services to communities, flexibility providers and DNOs. The project will focus on giving access and enabling disadvantaged customers to participate in flexibility markets using this novel front-of-the-meter community storage proposition -- a first of its kind under UK market regulation.
Behind-the-meter LCTs provide options for consumers to participate in the energy transition, however for many, the upfront costs are a barrier. Allowing DNOs to enable the installation of third-party front-of-the-meter storage to support the electricity network, issues such as system needs, balancing and power quality can be resolved. Balancer aims to demonstrate how DNO, and community-led placement of storage could maximise the benefits for both DNOs and customers. Balancer can also enable more local renewable generation by offering additional capacity.
To date, innovation projects carried out by DNOs have experimented with different technologies and market schemes to enable this consumer segment. Examples include Urban Energy Club, Resilience as a Service, LV Connect & Manage, SHIELD, and DS3. All these examples have offered learnings at the nexus of new technologies, business models and solutions for underprivileged communities. However, no project has developed a scalable and profitable storage solution for enhancing front-of-the-meter community batteries benefits.
The technology for a front-of-the-meter battery with automatic grid support, developed by EcoJoule, already exists but their

discharge and charge priority algorithms will be adapted and novel (TRL 7), based on business models which will be tested (CRL 2).
The project requires strong engagement and innovation to develop a commercial and value proposition for all stakeholders involved. This includes understanding the complex regulatory framework and possible regulatory or policy sandboxes required for Beta demonstration and business-as-usual rollout. The project will also remove barriers for disadvantaged customer segments, focusing on societal benefits while also delivering network benefits, hence aligning closely to the phased approach to the SIF rather than other funding options.
Behind-the-meter solutions and varying commercial models have been tried previously. Efforts to involve underprivileged communities in the energy transition and flexibility markets while reducing their energy costs have yet to scale and make a difference. This is largely due to the value proposition and capital cost requirements. Balancer focuses on a new approach to understand if front-of-the-meter storage involving the DNO can be the missing link in the UK's energy transition.

Impacts and benefits selection (not scored)

Financial - future reductions in the cost of operating the network

Financial - cost savings per annum on energy bills for consumers

Environmental - carbon reduction – indirect CO2 savings per annum

Revenues - improved access to revenues for users of network services

New to market – products

New to market – processes

New to market - services

Impacts and benefits description

Financial - future reductions in the cost of operating the grid:
Front-of-the-meter storage with automatic grid support placed in highly utilised networks can act as a non-wire alternative, reducing the need for traditional grid upgrades. In a previous study presented to CIGRE by Ausgrid, largest electricity distributor on Australia's east coast, and Ecojoule, one EcoVAR (part of the grid support offered) was five times cheaper than traditional upgrades. The battery will also function as a flexibility platform, reducing the need for costly upstream upgrades.
Metrics: reduction in grid reinforcement costs
Financial - cost savings per annum on energy bills for consumers:
Through market mechanisms such as battery-as-a-service, peer-to-peer sharing, and participation in flexibility markets, customers with access to the storage device will subsequently have reduced energy bills. As a reference, the Urban Energy Club saved customers £6.67 monthly on their energy bills as well as £87 through flex services.
Metrics: costs saved by consumers
Environmental - carbon reduction - indirect CO2 savings per annum:
Adding more capacity to the network, while adding more financial incentives, for LCT installations, will further reduce CO2 emissions. Balancer will also facilitate more local, faster and quicker renewable generation.
Metrics: rise in number, frequency and duration of LCTs installations deployment, penetration of renewable generation in previously excluded local areas
Revenues - improved access to revenues for users of network services:
The focus of Balancer is to provide access to flexibility markets to those who currently cannot afford to participate in the energy transition. Additionally, those who have access to PV installation, will be able to access more revenues from a load shift and value stacking of flexibility services.
Metrics: rise in flexibility access, rise in revenues from load shift and value stacking of flexibility
New to market - products:
Front-of-the meter community batteries are a never-before-tested product in the UK.
New to market - processes:
To enable community batteries to benefit the community, DNOs, and flex providers, completely novel business processes need to be applied. These might include local system needs around charge and discharge, co-ownership structures and capacity priorities, automated flexibility options from physical network signals among others.
New to market - services:

Services such as front-of-the-meter non wire alternative, battery as a service models and shared flexibility value stacking will be novel in the UK.

Teams and resources

Balancer brings together four partners for Discovery. All partners have experience of successful delivery on previous network innovation-funded projects, putting them in an expert position to deliver the high quality and ambitious outcomes expected.
UK Power Networks: UK's largest electricity distributor delivering power to 8.5million homes and businesses across London, the east and the south east of England. UKPN has a strong track record in identifying and supporting consumers in vulnerable circumstances, strategically combining their Consumer Vulnerability team with the Innovation team, emphasising their commitment to supporting customers through innovation.
Role: UKPN will be responsible for overall project management and dissemination of information across the industry. UKPN will also provide insights for WP2 (assessment of technical feasibility, data requirements and mapping) and WP3 (possible locations for trial deployment)
EcoJoule Energy: Australian-based company specialised in the design and manufacture of revolutionary, sustainable, technology solutions for the electricity grid. They have developed EcoVAR (part of the grid support offered to stabilise voltage), previously partnered with UKPN and have relevant insights on flexibility markets abroad.
Role: EcoJoule will be the technology provider and will lead the development of technical requirements of dynamic participations in flexibility and energy markets.
Frontier Economics: specialist energy economics consultancy. They are experts on UK energy policy and regulation, and business model development and assessment. They have recently worked for Ofgem, DESNZ, CCC, as well as low carbon innovation projects, including for UKPN and National Grid.
Role: Frontier Economics will lead on the identification of business models, validating a clear path forward for exploration and scale of communities in Discovery, with a specific focus on UK market regulation and potential barriers.
The Centre for Sustainable Energy (CSE): charity supporting people and organisations across the UK to tackle the climate emergency. They deliver practical work to support households and communities, alongside research to inform local and national policy. CSE's Research team expertise includes: LCTs; consumer energy behaviour and demand reduction; fuel poverty and vulnerability; and fairness in the Net Zero transition. CSE meets the partner requirement of a consumer representative group required under Challenge 2, Theme 4.
Role: CSE will lead the engagement through workshops with Local Authorities to understand preferences and opportunities, and determine network and community profile to install the batteries to maximise benefits.

Through the four project partners, there is clear access to all resources, equipment and facilities required for Discovery.

Project Plans and Milestones

Project management and delivery

In Discovery, we propose to deliver four work packages:
WP1: Identifying business models -- Frontier Economics
Aims: Review UK market barriers and opportunities and shortlist business models that will prove benefits:
Assess market opportunities, including review of UK market regulation (barriers and opportunities)
Developing basic discharge and charge schemes for business practices
Identify and qualitatively assess different business models involving the three stakeholder groups
Success criteria: alignment of market assessment, economic analysis and discharge and charge scheme, engagement with EcoJoule and UKPN
WP2: Developing technical requirements of dynamic participation inflexibility and energy markets - EcoJoule
Aims: Ensure and develop technical requirements of the solution:
Developing techno-economical practices to allow customer participation.
Assess technical feasibility aligned to business cases and optimal battery configurations
Identify any data requirements & mapping
Success criteria: removal of any technical barriers, relevant insight from flexibility and energy markets, alignment with business cases
WP3: Engagement, site identification and benefits mapping - CSE
Aims: Engage with local communities to map network and community profile for future battery installation to maximise benefits
Framework for short listing potential locations and participants (Internal online workshop)
Engagement planning
Produce engagement report including mapping of network and community profile for installation
Success criteria: framework agreed across project partners, engagement plan design confirmed to capture appropriate preferences and opportunities.
WP4: Project management - UKPN
Aims: to deliver the project on time, to budget, checking that project objectives and learning are achieved.
Success criteria: Project delivered on time, in budget and to standard quality.
Interdependencies between work packages and milestones are detailed in the Gantt Chart.
Project management will be led by UKPN using standard best practice methods and tools, including fortnightly management meetings and status reporting. UKPN has highly effective innovation governance procedures. The project has progressed through UKPN's internal Innovation and Project Governance and Control Governance processes (SR 07 005i) and will continue to be managed under this governance.
The project will use a standard risk management approach where the Risk Register generated will be regularly maintained and reviewed by the project partners. The project has identified several risks as well as associate mitigations (see PMT template).
The project will be engaging with communities and groups which may include end customers as part of WP4, however there is no potential for supply interruptions to customers as Discovery focuses purely on feasibility and engagement.

Key outputs and dissemination

At the end of Discovery, the objective is to validate the feasibility (technical and regulatory) for co-ownership for front-of-the-meter community batteries. This involves assessing business models, potential uses, and gauging local community interest. Discovery will also analyse and identify network and communities profiles to guide future trials i.e. deployment of this battery on a selected network and community area.

Key outputs
By the end of the Discovery, Balancer aims to complete the objective of each work package (see details in Q7) and produce the following key outputs which will be disseminated effectively:
WP1 - Report: Short list of business models (Frontier Economics)
WP2 - Report: Development of technical requirements (EcoJoule)
WP3 - Report: Short list of network and community profiles through engagement with local communities (CSE)
WP4 - End point reports (UKPN)

UKPN will coordinate and lead dissemination activities for Balancer. The outputs will be made available at the end of Discovery,

in the final report. Some outputs will have commercially sensitive information which will be either redacted for external sharing or made available upon request (if approved).

Knowledge Dissemination

The purpose of our dissemination is to share the learnings gained through Discovery, contributing to the wider knowledge base and fostering innovation in the energy sector. Balancer dissemination approach is developed based on UKPN's previous experience of running successful innovation projects.

Our project outputs will be uploaded to the Smarter Networks Portal and feature on the UKPN website with specific project learnings being disseminated at the IUK Show & Tell events. By being made available to other DNOs, we believe Balancer does not undermined competitive markets.

The Balancer team in general will also collaborate to deliver the dissemination activities. We intend to leverage the connections of our consortium to effectively disseminate our learnings:

UKPN will look to share project successes and learnings via its social media channels

The project will be presented at other UKPN events should the opportunity arise

Engagement with stakeholders such as LAs, energy suppliers, and other DNOs identified during Discovery ecosystem mapping, sharing learnings and insights from Balancer

Online event and materials: Balancer will host an online event, in collaboration with EcoJoule and CSE, to share the project's outcomes. Dissemination materials will be shared through local government networks and platforms

CSE and Frontier Economics' networks: CSE and Frontier Economics will leverage their networks and contacts to disseminate the outcomes of Balancer ensuring wide reach and impact.

Commercials

Intellectual Property Rights (IPR) (not scored)

The parties agree to adopt the default IPR arrangements for this project as set out in Section 9 of the SIF Governance document.

Value for money

The total project cost for Balancer is £166,175 and the total SIF funding requested is £149,557. This is balanced across the project partners as follows:
UK Power Networks:
Total costs: £32,700
Total contribution: £ 6,377 (10% of UKPN costs and 7% of CSE costs)
Total SIF Funding request: £ 26,323

EcoJoule
Total costs: £43,800
Total contribution: £4,380 (10%)
Total SIF Funding request: £39,420

Centre for Sustainable Energy:
Total costs: £44,385
Total contribution: £1,332 (3%)
Total SIF Funding request: £43,053

Frontier Economics:
Total costs: £45,290
Total contribution: £4,529 (10%)
Total SIF Funding request: £40,761

The project will meet the minimum 10% compulsory contribution from the Project Partners as an in-kind contribution via labour. There will be no sub-contractor costs, nor any other additional funding from other innovation funds.

Key points in relation to value for money:
Use of existing solutions, research and markets insights: Balancer makes use of EcoJoule's existing EcoVAR (40kVA pole-mounted Low Voltage Static Compensator), as well as learnings from previous feasibility studies and installations in Australia. Therefore, there are considerably lower costs associated in developing the necessary technology.
Combined expertise: Outside of a SIF discovery round, a detailed techno-economic study identifying innovative business models and regulatory hurdles of front-of-the-meter community batteries with the expertise of all the organisations involved would usually only be made possible through a much more expensive funding mechanism spanning many years. Therefore, networks and customers will get public validation of a cutting-edge idea at a fraction of the costs.
Competitive labour rates: CSE is a registered charity with no core funding. All its income is related to the projects and services it delivers. As a non-profit, it offers significant value for money in labour considering the level of expertise provided.

Commercialisation
The current market lacks commercially viable business models that encourage or allow the installation of community batteries. Commercial models from this project will look to explore various options such as community funding, network or investor ownership. The proposed solution, any plans for commercialisation of the proposed innovation and how the project can be moved into business as usual would be applicable to all of GB.

Supporting documents

File Upload

Discovery End of Phase Report - Balancer public.pdf - 216.0 KB
Balancer R3 Discovery Show & Tell Final.pptx - 5.1 MB
SIF Round 3 Project Registration 2024-07-08 10_35 - 60.9 KB
SIF Round 3 Project Registration 2024-05-13 10_08 - 60.8 KB

Documents uploaded where applicable?

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