

# SIF Discovery Round 2 Project Registration

## Date of Submission

May 2023

## Project Reference Number

10061242

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### Project Title

Power Block

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10061242

### Project Licensee(s)

UK Power Networks

### Project Start

Apr 2023

### Project Duration

3 Months

### Nominated Project Contact(s)

innovation@ukpowernetworks.co.uk

### Project Budget

£51,755.00

### Funding Mechanism

SIF Discovery - Round 2

### SIF Funding

£42,355.00

### Strategy Theme

Flexibility and market evolution

### Challenge Area

Preparing for a net zero power system

### Lead Sector

Electricity Distribution

### Other Related Sectors

### Funding Licensees

### Lead Funding Licensee

UKPN - London Power Networks Plc

### Collaborating Networks

UK Power Networks

### Technology Areas

Commercial, Measurement, Modelling

### Equality, Diversity And InclusionSurvey

Yes

## Project Summary

This project aims to address SIF Innovation Challenge 2 "preparing for a Net Zero power system" and the project scope "accessing grid/system support from novel supply and demand side sources".

Commercial buildings have high energy demands that will increase through further electrification. This project aims to develop new flexibility products tailored for commercial buildings that will provide DSOs with access to this untapped source of flexibility and enabling them to decarbonise without the need for significant reinforcement. In line with UK Power Networks' RII0-ED2 ambition to keep costs down by taking a flexibility and energy efficiency first approach and will market test all network needs before considering reinforcement. This will be achieved by:

- Obtaining granular behind the meter data including asset specific data;
- Developing predictive AI models that can be assess how to optimise buildings in line with building manager and occupants needs;
- Defining the level of flexibility available for the DSO; and
- Enabling loads to be dynamically managed with novel flexibility products and services created.

The project team consists of the following partners, including two DNOs with significant number of commercial buildings in their region:

- UK Power Networks has experience running bi-annual flexibility market tenders since 2017, as described in their Flexibility Services Procurement Statement. they have run several innovative flexibility projects including Optimise Prime, where the potential flexibility available from EV fleets was investigated.
- Grid Edge have undertaken V2G projects (VIGIL, GreenSCIES) which focused on dynamic curtailment using cloud-based optimisation and control to response to a grid price signal. The same concept will be applied to building assets.
- Northern PowerGrid is evaluating the value of flexible heat demand as a service to distribution networks and the current and future impact on electricity demand. They have also invited generators of electricity, businesses with high energy demands and electricity supply aggregators to express interest in providing flexibility services to the electricity network operator across its operating area which is a steppingstone in procuring flexibility services.

The main users are:

- Building operators: enabled to use to AI appropriately manage their building's energy demand, participate in flexibility services while maintain occupant comfort;
- DSOs: enabled to forecast where flexibility could be used from these predictions and enable access to a novel flexibility from commercial buildings;
- Building owners and tenants: provided by additional revenue through access to flexibility markets and reduce bills for all consumers.

## Project Description

As the UK transitions to Net Zero, we are committed to ensure that customers can benefit from a smarter energy system. With the growth of low carbon technologies (LCTs) there is considerable uncertainty regarding how much new load, generation, and storage will connect, where it will be connected, and how that will impact the network. Increasing network capacity to accommodate increased power flows is costly and takes time. The alternative solution is to buy flexibility services from distributed energy resources (DERs) such as managed charging of electric vehicles (EVs), controllable generation and battery storage, which can alter their energy generation or consumption as a service. Unlocking such flexibility in highly urbanised cities with large stocks of commercial buildings is key.

Commercial buildings form a source of untapped flexibility that is cheap, ubiquitous, and growing. However, it is yet to be harnessed at scale due to two factors:

- Limited understanding by building operators that flexibility can offer revenue streams and that flexibility solutions would not detrimentally impact occupants' comfort if implemented correctly; and
- A perception that conventional demand-response mechanisms are too rigid or ill-designed to accommodate the variable within-day loads and conditions of commercial buildings.

The proposed solution will combine energy efficiency solutions, microgeneration, and novel flexibility products, to better manage energy demand within commercial buildings, and unlock this novel flexibility source, in line with UK Power Networks' commitment to take a flexibility and energy efficiency first approach.

This can be achieved by using the complex array of behind the meter data, including asset specific data to:

- Gather and analyse behind the meter data to define the flexibility potential that exists within commercial buildings, and enable it to be used to support the development of a novel flexibility product
- Provide consumers and building occupants with automated energy efficiency tips to enable them to reduce energy demand, especially during times of peak load

- Integrate on-site microgeneration, battery storage solutions and equipment (e.g. air conditioning, heat pumps, EVs and chillers) to reduce the overall demand on the network, while also providing a novel source of flexibility
- Develop, trial, and implement a new type of flexibility product and offering that the DSOs could use to enable load shifting on the network
- Develop a user interface for commercial building owners and occupants to understand their energy usage patterns, receive energy efficiency tips, and gain the most from the flexibility offerings, while maintaining their own comfort.

### **Third Party Collaborators**

Grid Edge

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

innovation@ukpowernetworks.co.uk

## Project Description And Benefits

### Applicants Location (not scored)

#### UK Power Networks (03870728):

Newington House, 237 Southwark Bridge Road, London, SE1 6NP

#### Grid Edge (10129878):

Mclaren Building Suite 14a McLaren Building, 46 Priory Queensway, Birmingham, United Kingdom, B4 7LR

#### Northern Powergrid (Northeast) (02906593):

Lloyds Court, 78 Grey Street, Newcastle Upon Tyne, NE1 6AF

### Project Short Description (not scored)

Commercial buildings are currently an untapped source of energy flexibility for the networks. This project looks to unlock the value and increased participation of commercial buildings in the flexibility market.

### Video description

[https://www.youtube.com/watch?v=tiP7DG\\_\\_qyo&list=PLrMOhOrmeR6ldr-EVoT8ABGhTCxgyBKqs&index=12](https://www.youtube.com/watch?v=tiP7DG__qyo&list=PLrMOhOrmeR6ldr-EVoT8ABGhTCxgyBKqs&index=12)

### Innovation justification

To meet Net Zero by 2050 all buildings will need to be decarbonised. For commercial buildings, electrification without any smart technology-based interventions will impact grid capacity and require reinforcement before the additional capacity can be unlocked.

In line with our DSO strategy to, keep our costs down by taking a flexibility and energy efficiency first approach over RII-ED2 and market test all network needs before considering reinforcement, this project will look at how this approach can be applied to commercial buildings, by:

Developing a solution to gather, analyse and utilise asset level consumption data for commercial buildings;

- Providing building managers and tenants with energy efficiency guidance to reduce their overall energy consumption;
- Enabling management of local microgeneration and battery storage solutions to reduce demand on the grid; and
- Creating new flexibility products for commercial buildings through smart asset management solutions.

Knowledge from other projects:

- UK Power Networks have run several flexibility services projects for different areas of the market including Optimise Prime, which focused on electrified fleets. Learnings from these will support development of a new flexibility product for commercial building.
- Previous projects by Grid Edge have focused on optimising energy management at a site level to reduce overall energy costs and the net demand on the grid. This project will expand this concept to address whether these assets could be source of flexibility for DSOs.

This project provides the following economic value:

- Enables electrification and decarbonisation of commercial buildings in a way that reduces the need for reinforcement and significant additional spend by DNOs;
- Reduces consumer energy bills by helping to keep DUoS charges low through avoiding infrastructure upgrade spend;
- Creates new revenues for building managers and owners through the development of a novel flexibility product or offering; and
- Develops a framework for commercial building to decarbonise in a way that reduces the overall costs incurred and OPEX spend through reduced energy bills.

From sustainability standpoint this project enables the commercial buildings to better utilise renewable energy source and reduces the net CO2 produced by commercial buildings.

The potential scale/value for commercial buildings is unknown so carries risk to complete activities with BAU funding. The phased nature of SIF lends itself to do feasibility, then decide if there is enough value and should this progress to trials, the SIF Beta fund sizing is better sized to support this than other innovation funding sources.

## Benefits Part 1

Environmental - carbon reduction – direct CO<sub>2</sub> savings per annum against a business-as-usual counterfactual

Financial - cost savings per annum on energy bills for consumers

Financial - future reductions in the cost of operating the network

New to market – products, processes, and services

## Benefits Part 2

### Financial –future reductions in the cost of operating the network

- Target outcome: A reduction in the average cost of a kWh of energy consumed.
- Calculation: average price per kilowatt hour of turn down is calculated per day compared to the average wholesale cost of electricity is calculated per day.
- Justification for target outcome: The opportunity on variable energy pricing means the cost of demand side flexibility is linked to within day or day ahead price spread.
- Achieved by: End of Beta Phase.

### Financial – consumers bills cost reduction per annum

- Target outcome: reduction in electricity bills.
- Calculation: a comparison of a yearly bill based on the current energy use of the energy use with the interoperability offering.
- Justification for target outcome: Similar projects, when energy efficiency guidance and smart technologies are used, has shown a net reduction in energy bills
- Achieved by: End of Beta Phase.

### Financial – cost savings per annum for users of network services .

- Target outcome: delay or prevention of the requirement for network reinforcement.
- Calculation: Model to define reinforcement spend if no flexibility solutions were in place.
- Justification for target outcome: Flexibility solutions prevent or delay the need for network reinforcement.
- Achieved by: End of Beta Phase.

### Environmental – Direct CO<sub>2</sub> savings per annum

- Target outcome: Reduction in scope 2 emissions due to the reduction in energy use.
- Calculation: The product of energy consumption reduced and the kgCO<sub>2</sub>/kWh over the period the reduction took place.
- Justification for target outcome: conservative estimate based on case studies and similar projects.
- Achieved by: End of Beta Phase

# Project Plans And Milestones

## Project Plan and Milestones

The project will consist of the following work packages., plus a project management work package (WP4).

### WP1: Stakeholder Engagement (Grid Edge)

- Stakeholder engagement activities to support the delivery of work packages 2 & 3. This includes workshops with building managers and their tenants, project partners and other DNOs.
- Success Criteria: Develop an understanding of the different user needs and challenges that a novel buildings energy management and flexibility that could be addressed by the solution.
- SIF Funding: £5,152

### WP2: Platform Product Scoping (Grid Edge)

- Defining the requirements and specifications for the proposed solution, including requirements for the end users and the network companies.
- Success Criteria: Convert the outputs from the various stakeholder workshops into requirements and user stories that would support product development during Alpha phase.
- SIF Funding: £11,075

### WP3: Building Archetypes & Trial Sites (Grid Edge)

- Defining the different commercial building archetypes that would be supported by this solution, understanding what their different flexibility potential could be and identify archetypes to target in Alpha phase. .
- Success Criteria: Define and document all commercial building archetypes and the anticipated flexibility that can be provided.
- SIF Funding: £5,784

### WP4: Project Management (Grid Edge)

SIF funding: £13,790.64

The following risks have been identified that could impact the successful delivery of Discovery Phase:

- Limited engagement from building owners, managers and tenants resulting in limited insights available to support development of building archetypes and user requirements
- Insufficient information gathered to define the technical solution that would need to be developed as the associated product design
- The building owners and managers that are engaged with as part of the project do not represent the range of archetypes that would be trialled during alpha phase.

Our risk management is based on a risk register which will have an appropriate strategy decided by likelihood and impact. Risks will be monitored during project governance meetings to assess current status; new risks will be added at the point of identification. For high priority risks an appropriate escalation path will be followed.

There are no major constraints that could impact project delivery during Discovery Phase other than the timescales required stakeholders to be lined up potentially in advance of the project starting. For further phases, and transition into BaU, we envision additional constraints including supply chain challenges for any new hardware required, and dependencies on third parties to complete any development work if other system changes are required.

## Regulatory Barriers (not scored)

Based on the proposed solution, this project has not identified any direct regulatory barriers to delivery. This will be re-assessed at the end of Discovery and Alpha Phase when the new flexibility product will be fully defined.

Policies and regulations will form part of the requirements gathering during Discovery Phase and the project will collate any relevant findings in their reports where existing or new policies could be developed to increase the success of the project and accelerate the route to market and scale.

We do not anticipate the demonstration to require derogation or exemption.

# Commercials

## Route To Market

This project will develop a framework and a technical solution to enable commercial buildings to efficiently manage their energy consumption and participate in the flexibility market. By the end of Beta Phase, we expect the solution to be developed to a level that it can be quickly and readily adopted by commercial buildings matching a series of building archetypes within UK Power Networks' region. Through the engagement of Northern PowerGrid and other DNOs a clear view will be developed of the technical or operational changes they would need to be made to support this new flexibility product on a wider scale.

The main innovation for this project is the framework associated with the new flexibility product. Although this project will include development of the Grid Edge solution to enable commercial buildings to manage their energy consumption and partake in the flexibility market, this would form one potential technical solution. The framework would enable other technology providers to develop solutions that could provide similar services.

The DNOs would be responsible for delivering the changes that would need to be made to their existing technology, operating model, and business processes to support the new flexibility product. The building owners and managers would be responsible for procuring the hardware and technology required to enable them to enter the flexibility market. Grid Edge would provide one technical route into this market, but we envision if proven successful that others will follow suit.

The main customer segment will be building owners or managers who own, operate, or oversee buildings with a Building Management System (BMS), which extends to a wide range of national and international customers.

The value proposition for the proposed solution includes:

- A reduction in energy bills for commercial buildings through better management on onsite demand
- The introduction of a new revenue stream for building owners by participating in flexibility markets
- An increase in the ability to meet any ESG targets set out
- A reduction in the overall costs associated with decarbonising commercial buildings.

Funding strategy for adoption of your innovation:

- DNOs: Funding requirements will be embedded in the flexibility market development.
- Grid Edge Technology: funds obtention from existing investors and third parties which will allow Grid Edge to maintain the product and improve it as customers begin to sign up until such point as the revenue from subscribers supports the development work of the product.

## Intellectual property rights (not scored)

The IPR arrangements for this project will be in line with the terms set in the SIF Governance Document Chapter 9 and the project participants agree to comply with the default IPR conditions.

## Costs and value for money

Total project cost - £51,755, which is broken down across the partners:

- UK Power Networks - £22,800
- Grid Edge -- £26,955
- Northern Powergrid - £2,000

The project partners are providing the following contributions, which exceeds the minimum 10% required:

- UK Power Networks - £4,706
- Grid Edge -- £2,695
- Northern Powergrid - £1,999

Total SIF funding required for this project is £42,355, which is divided between the partners as follows:

- UK Power Networks - £18,094
- Grid Edge -- £24,620

- Northern Powergrid - £1

This project will deliver value for money by:

- Using Discovery Phase to clearly define and understand the end user requirements to ensure the proposed solution is fit for purpose;
- Leveraging learnings from the previous projects completed by UK Power Networks (Optimise Prime) and Grid Edge (Commercial Building Management);
- Using the technical solution and platform already developed and trialled by Grid Edge as the foundation for the platforms to support commercial building energy management including asset management for flexible trading; and
- Analysing and prioritising business architypes based on their complexity and commercial availability to ensure sufficient re-usable learnings can be obtained from the project.



## Document Upload

### Documents Uploaded Where Applicable

Yes

#### Documents:

SIF Discovery Round 2 Project Registration 2023-05-30 10\_26

SIF Round 2 Discovery - Power Block End of Phase (for upload).pdf

SIF Round 2 Discovery - Power Block Show and Tell (for upload).pdf

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

Yes