SIF Discovery Round 2 Project Registration

Date of Submission

May 2023

Project Reference Number

10061308

Project Registration

Project Title

Park & Flex

Project Reference Number

10061308

Project Licensee(s)

UK Power Networks

Project Start

Apr 2023

Project Duration

3 Months

Nominated Project Contact(s)

innovation@ukpowernetworks.co.uk

Project Budget

£121,500.00

Funding Mechanism

SIF Discovery - Round 2

SIF Funding

£108,554.00

Strategy Theme

Flexibility and market evolution

Challenge Area

Accelerating decarbonisation of major energy demands.

Lead Sector

Electricity Distribution

Other Related Sectors

Funding Licensees

Lead Funding Licensee

UKPN - South Eastern Power Networks Plc

Collaborating Networks

UK Power Networks

Technology Areas

Commercial, Demand Response, Electric Vehicles

Equality, Diversity And InclusionSurvey

Yes

Project Summary

Park&Flex will investigate the potential to access flexibility services from EVs in car parks, and in turn, enable the connection of low carbon demand and generation quickly and efficiently by deferring or avoiding costly network investment. Potential grid services may include energy balancing, ancillary services, and addressing local network constraints such as absorption of local generation at times of high renewable output.

This proposal therefore addresses two areas of the SIF challenges:

- Primary impact -- Challenge 4: Accelerating the decarbonisation of major energy demands -- by increasing the use of flexibility from EVs in car parks to effectively facilitate, manage, and integrate multiple demands and demand-side solutions; and
- Secondary impact -- Challenge 2: Preparing for a Net Zero power system -- by increasing the ability to access system support from novel demand-side technologies.
- The energy network innovation involved in this project is to gain insight and access to a novel new form of demand side response, and to develop and trial the new flexibility products and market mechanisms required to access this resource. This project will develop new revenue streams for market participants, to incentivise development of propositions that share the benefits that this resource can provide.

The Discovery Phase will be delivered through collaboration between the following partners:

- Fermata Energy -- a V2X technology provider, specialising in charging algorithms and user software to operate V2X chargers to maximise the benefits to the grid and the end user;
- Baringa Partners LLP -- a specialist energy sector consultancy who are ideally suited to leading the commercial design activity utilising their commercial and market expertise;
- Greater London Authority -- as the local government representative to provide access to and insight into London's car park operators, and the associated stakeholder landscape; and,
- UK Power Networks -- the DNO providing input on time and costs to unlock this flexibility, any avoided network costs, and service/incentive design.

If successful, this project will deliver these value propositions to its direct and indirect users:

- Car park and V2X EV owners -- enabling customer propositions that attract V2X car owners to plug in and offer up their battery capacity, thus accessing flexibility incentives;
- System Operators -- proving an additional resource to procure flexibility services from, helping to address system constraints and bring down service costs; and,
- Suppliers -- proving an additional resource to manage energy balance and to offset network charges for customers through DSO/ESO revenue streams.

Project Description

Net Zero requires transforming the way we produce, move, and consume energy. Rising demand, and a need to consume renewable energy when it is in abundance, may increase flows and uncertainty on electricity networks. Flexibility services from Distributed Energy Resources (DERs) will help manage these flows, and in turn integrate more low carbon demand and generation onto the system.

The Department of Business, Energy & Industrial Strategy* predicts that up to 45% of EVs could provide network services by smart charging and/or exporting electricity back to a system by 2050. This equates to 38GW of flexibility. The system served could be the grid (V2G), a home (V2H) or a building (V2B). The phrase V2X (vehicle-to-everything) is used as an umbrella term for this technology application.

Car parks have the potential to become large batteries, providing services to the energy system. Heathrow airport, for example, has c. 50,000 car park spaces, enabling a compelling customer proposition of discounted parking or free charging for V2G. Across the country this could translate to a large resource -- but at present no data on car park volumes or the flexibility potential per car park have been assessed or demonstrated.

This innovative project will investigate potential access to flexibility services from EVs in car parks. In the Discovery phase we will:

- Develop customer and car park insight -- understanding customer archetypes, mapping the location volume, and size of car parks, and developing data on car park utilisation to enable quantification of flexibility potential;
- Develop solution and ecosystem insight -- developing potential propositions with stakeholders and car park owners, identifying the underpinning technology options, and understanding cost-to-serve;
- Determine the potential for flexibility service provision -- defining the services that car park flexibility could provide and the market mechanisms required, mapping car park flexibility against network needs in UK Power Networks' area, and calculating the potential revenue for customers; and,
- Evaluate operational impacts on the DNO network -- understanding future capacity needs for car parks, the infrastructure needs and

connection options (e.g. across Transmission and Distribution networks), and assessing barriers and costs that might inhibit mass uptake ofV2X charger solutions in car parks.

Innovation can stimulate the market and design viable propositions for flexibility from car parks. This will enable DNOs to bring flexibility products to market to procure this resource, thus incentivising car park owners to invest in the capabilities required for service provision.

* https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1003871/role-of-vehicle-to-x-energy-technologies-in-net-zero-energy-system-cfe.pdf

Third Party Collaborators

baringa

Fermata

Greater London Authority

Nominated Contact Email Address(es)

innovation@ukpowernetworks.co.uk

Project Description And Benefits

Applicants Location (not scored)

UK Power Networks

Newington House, 237 Southward Bridge Road, London, SE1 6NP, UK

Project Short Description (not scored)

Park & Flex will explore the current and future opportunity for the provision of flexibility services from V2X enabled EVs in car parks and the EV and network infrastructure required to do so -- working with stakeholders to develop and test real-world flexibility products and customer propositions. The outcome will be a roadmap showing who is best placed to address any barriers to unlocking the untapped potential of this resource.

Video description

https://www.youtube.com/watch?v=l5PsKUFLfaI&list=PLrMOhOrmeR6ldr-EVoT8ABGhTCxgyBKqs&index=43

Innovation justification

Delivering Net Zero will require a transformation in the way we produce, move and consume energy. Increasing demand and a need to consume renewable energy when it is in abundance, may result in larger and less predictable flows in the electricity network. Accessing flexibility services from DERs will help manage these flows and enable quick and efficient integration of further low carbon demand and generation onto the system.

Park & Flex is innovative because it will develop insight and access to a novel new form of demand side response, and to develop and trial the new flexibility products and market mechanisms required to access this resource. If successful, this project will develop new revenue streams for market participants, to incentivise development of propositions that can share in the benefits that this resource can provide.

In this context, car parks in the future will have the potential to become large batteries, capable of providing bi-directional services to the energy system -- but the data on car park volumes or the flexibility potential per car park has not yet been assessed or demonstrated. Recent projects have demonstrated the effectiveness of V2X EVs to deliver system services -- such as Fermata Energy's Red Hook fleet deployment and UKPN' Transpower -- but none have yet addressed the role public car parks could play.

The key missing insight relates to the potential supply of flexibility from car parks (e.g. the volume, type and location of car parks, and data on car park utilisation and plug-in time); the services that car park flexibility could provide and market mechanisms needed; and the customer propositions and underpinning technology and network needs.

If successful, Park & Flex will deliver value by providing additional flexibility resources to enable system operators to effectively facilitate, manage, and integrate multiple demands and demand-side solutions, leading to reduced reinforcement requirements and lower costs to operate the network. It will also enable faster access to network capacity for low carbon technologies, thus accelerating decarbonisation.

Funding this innovation elsewhere is difficult for networks as viable customer propositions and technical solutions for flexibility from car parks are not sufficiently understood or demonstrated. Should this progress to trials, the SIF Beta fund sizing is better sized to support this than other innovation funding sources. For market participants, the limited incentive to explore customer propositions due the unclear revenue opportunities that flexibility from car parks presents.

Benefits Part 1

Environmental - carbon reduction – indirect CO2 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
Revenues - creation of new revenue streams
Revenues - improved access to revenues for users of network services

Benefits Part 2

The Flexibility in Great Britain report (2021)* forecasts benefits from flexibility of £16.7bn per year by 2050, and UK Power Networks' business plan sets out DSO benefits in the RIIO-ED2 period including £410m of reduced capital investment enabled through flexibility. Park & Flex will contribute to delivery of these benefits.

Park & Flex has the potential to reduce network operating and capital costs by enabling the use of flexibility services in new areas. These services may include several use cases, including reducing curtailment of renewable generation, managing network constraints thus reducing reinforcement, or supporting outages as an alternative to temporary generation.

These benefits can be quantified and tracked using the following KPIs:

- (K1). Capacity (MW) and volume (MWh) of flexibility available from car parks
- (K2). Capacity (MW) and volume (MWh) of flexibility provided for each service use case
- (K3). Net avoided costs (£) through the use of flexibility from car parks for each service use case

Increasing the supply of flexibility could also enable a reduction in the price of flexibility services through increased competition, but this benefit would be difficult to quantify and attribute to any particular project.

Park & Flex has the potential to deliver cost savings per annum on energy bills for consumers in the long-run through reduced DUoS charges. It would not be practical to track this impact directly in DUoS charges, but it will be possible to quantify and track the cost savings indirectly through (K3) set out above.

Park & Flex has the potential to deliver indirect CO2 savings per annum by enabling reduced curtailment, and accelerated connections of low carbon distributed generation. The reduced curtailment benefit can be quantified and tracked indirectly through (K2) by forecasting/tracking the use of a curtailment reduction flexibility product, but it would not be possible to quantify the contribution to accelerated connections.

Park & Flex will also deliver new products and the creation of new revenue streams. These can be tracked through the following KPIs:

- (K4) Number of flexibility products available to procure flexibility from cark parks

We intend to forecast KPI K1, K2 and K3 based on evidenced assumptions during the Discovery Phase; to validate these in more detail through Alpha Phase; and to gather real-world evidence to validate them in Beta Phase. The number of new flexibility products available (K4) can be tracked but not forecast.

* https://www.carbontrust.com/resources/flexibility-in-great-britain

Project Plans And Milestones

Project Plan and Milestones

Six work packages are proposed to define the customer segments, technical solutions, and network value of flexibility from V2G car parks, and select options to take forward:

- Project management (SIF Funding - £6,900) -- to ensure success of the project.
- Stakeholder engagement (SIF Funding - £26,322) -- to gather insights we will engage with local authorities, car park owners, technology providers, and EV drivers to identify barriers and customer propositions. Success criteria -- Completion of all stakeholder engagement activities
- Customer and car park mapping and forecasting (SIF Funding - £33,240) -- defining customer and car park archetypes, mapping the location, volume, and size of car parks, and forecasting the flexibility potential and network and EV infrastructure needs of each segment. Success criteria -- Creation of a customer insights report
- Technical V2G solutions for car parks (SIF Funding - £15,685) -- setting out technical V2G solutions for each priority customer and car park archetype, and data on the technical performance and costs of solutions. Success criteria -- Creation of a market insights report
- Flexibility products and outline CBA (SIF Funding - £30,550) -- defining the network needs, infrastructure requirements, and flexibility product options that can be addressed with V2G in car parks and validating the value of those services based on a geographical mapping of needs to service potential. A preliminary Cost/Benefit Assessment will be carried out to test the feasibility of an investable proposition. Success criteria -- Creation of a CBA assessment on the potential flexibility products.
- Assessment of barriers and enablers (SIF Funding - £1,452) -- developing a high-level assessment of key barriers and enablersSuccess criteria -- Creation of a report that outlines barriers and enablers

Contributors for each work pack and deliverables are set out in the accompanying Gantt chart and project management pack.

The risks and mitigation strategies are set out in the accompanying risk register, and constraints are discussed in Question 10. We will manage risks and issues using a RAID log, refreshed for weekly project meetings.

Constraints we have identified for BAU adoption of the innovation are covered in greater detail in the Regulatory barriers and route to market sections. Key areas include:

- The availability of V2G-capable vehicles could limit the number of vehicles that could participate in a trial;
- The value of service revenues may not offset the costs of V2G charging infrastructure; and
Infrastructure needs may inhibit or delay car park connections.

Regulatory Barriers (not scored)

At this stage we are not aware of any specific derogations that would be required to proceed with a demonstration or trial of the technologies within the scope of this proposal.

A number of potential barriers exist that would need to be addressed to enable the uptake of flexibility provision from car parks -- e.g:

- Flexibility products: Products must be launched that enable the procurement of flexibility from car parks. To maximise participation these should be consistent across DSOs, available for the widest possible range of devices, and provide access for car park flexibility to deliver against the widest possible range of products. They should also enable greater incentives on technology types and propositions that can be most useful to the system.
- Technology readiness: Appropriate technologies and reliability, including availability of V2G capable EVs, will need to be demonstrated to prove the ability for cost-effective flexibility provision from car parks, and appropriate licencing or standards put in place to allow their connection and operation for service provision.
- Route to market: Ownership models of car parks may introduce complexities regarding how entities can mobilise investment in V2X charger infrastructure and control services and share in the benefits of flexibility service revenues. Publicly owned car parks in particular may require policy decisions to enable investment.
- Cyber security: Minimum cyber security regulations must be met before widespread use of flexibility from car parks is introduced to the market. Primarily, the hurdle relates to ensuring that V2X solutions can meet the existing regulations, but the regulations themselves may need to be reviewed to ensure that they remain appropriate.
- Barriers to entry: Policymakers must ensure a proportionate and flexible licensing framework is in place for organisations providing services to car parks to facilitate flexibility service provision on their behalf.
- Interaction with supply and transmission: The regulatory framework currently does not support complete valuation of behind the meter flexibility. The interactions such as potential stacking and full valuation of DSO flexibility products considering energy supply and transmission costs much be considered.

Barriers and enablers will be assessed further during the Discovery, and our intention is to inform future policy and regulation through the Alpha and Beta phases by:

- Assessing the value case and urgency for enabling flexibility from car parks, thus informing the priority for policymakers; and
- Designing and trialling real-world flexibility products from car parks, thus creating evidence to support proposed policy changes.

Commercials

Route To Market

To ensure new flexibility products are quickly adopted into business-as-usual (BAU), we will work throughout the project with the relevant UK Power Networks business teams through design and testing. This will include network planners, to ensure new insight regarding car park flexibility resources can be adopted into planning policies regarding how the network is developed; the connections teams, to co-develop services to be offered to installers of car park infrastructure; and the DSO team, to ensure any resulting incentives and/or commercial products are aligned with business practices and priorities.

The relevant teams will be involved in any trials and demonstrations to ensure they are fully aware of project outcomes as they occur and ready to adopt practices should they be proven effective.

Competitive markets promotion requires flexibility products developed through this project to be made available to all markets as part of BAU. Whilst the project will work closely with a selection of providers for any installation and trials, all data gathered and insights developed -- either into technical solutions or potential market-side business models -- will be made available through knowledge dissemination.

Within the DNO, new flexibility products and services to car park owners will need to be implemented by the respective teams, such as the connections team, network planners or the DSO. Implementation of the car park propositions and technical solutions will be the responsibility of active market participants.

The customers targeted by this project are owners of car parks, including private and local authority owned. The specific segments involved in trials will be determined in the Discovery Phase. Beneficiaries of improved DNO/DSO services and the insight generated through the project will be the service providers (e.g. installers, suppliers) that will offer solutions to these customers and ultimately will need to interact with the DNO in connecting solutions to the network and the DSO in coordinating trading, dispatch and settlement.

The customer value proposition lies in access to propositions to participate in flexibility in car parks, leading to financial rewards (e.g. lower car park charges, free EV charging or payments).

Once proven effective, new services and/or incentives to be provided by the DNO or DSO would be funded through BAU allowances, given the increased confidence in delivering a return for customers and shareholders. Roll-out of technical solutions and services to car park owners would be funded by customers themselves and/or investors through business models informed by the project.

Intellectual property rights (not scored)

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

The partners recognise that knowledge transfer is one of the key aims of the SIF, and that the benefits of this project will be maximised by the ability of other licensees to be able to learn from the Project so as to create improved outcomes or reduce costs for consumers. The partners have no expectation of creating income streams or royalties from IPR outside of participation in a competitive marketplace for services that may be informed or stimulated via the outcomes of the project.

Costs and value for money

The total Discovery Phase costs are £121,500 and the project is requesting £108,554 from SIF after deducting benefit in kind contributions. The project partners are contributing 12% of the total project costs which is more than the minimum 10% compulsory contribution.

This breaks down across the project partners as follows:

Fermata

- Total cost -- £21,600
- Benefit in kind contribution -- £1,998
- Total SIF funding request -- £19,602

Greater London Authority

- Total cost -- £200
- Benefit in kind contribution -- £199 & Total SIF funding request -- £1

UK Power Networks

- Total cost -- £9,750
- Benefit in kind contribution -- £9,749
- Total SIF funding request -- £1

Baringa Partners LLP

- Total cost -- £89,950
- Benefit in kind contribution -- £1,000
- Total SIF funding request -- £88,950

Fermata Energy are a specialist vehicle-to-grid technology provider that will contribute their expertise and global experience on V2G technical solutions and customer archetypes and manage the project's conceptual direction.

Baringa Partners LLP are a specialist energy-focused management consultancy with long experience delivering innovation projects with GB DNOs in relation to EV integration, network modelling, and flexibility product design. They are ideally suited to conducting this work. Baringa will lead the commercial design, flexibility modelling, and Cost/Benefit Assessment activities. These activities are essential to the success of the project as the target outcomes are the identification, assessment and validation of flexibility products from car parks.

This project delivers value for money for three key reasons:

- It is targeted at delivering reduced costs for all through unlocking the flexibility potential from EVs in car parks. The benefits are set out in more detail in the benefits section. If the Discovery phase concludes that this resource will not be valuable, the project can be stopped before Alpha Phase. Without this project the value of this resource will remain untested.
- The project team has been specifically assembled with the required skills, prior knowledge, and existing stakeholder relationships to ensure that this project can be delivered, quickly, efficiently, and to high quality. Skills and expertise are highlighted in the project management template.
- The budgeted days and cost are based on relevant experience amongst the team of running multiple similar projects. The partners are well aware of the methodologies and tools they will follow, and are therefore confident that an efficient cost has been put forward.

Document Upload

Documents Uploaded Where Applicable

Yes

Documents:

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SIF Round 2 Discovery - Park and Flex End of Phase (for upload).pdf

SIF Round 2 Discovery - Park and Flex Show and Tell (for upload).pdf

This project has been approved by a senior member of staff

☑ Yes