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

Oct 2025

Project Reference Number

NIA_SPEN_0109

Project Registration

Project Title

V2G Commercial

Project Reference Number

NIA_SPEN_0109

Project Licensee(s)

SP Energy Networks Distribution

Project Start

October 2025

Project Duration

0 years and 11 months

Nominated Project Contact(s)

Ritika Das, Andrew Moon

Project Budget

£150,000.00

Summary

The Project aims to explore financial, social and environmental benefits of Vehicle-to-Grid (V2G) technology. Partnered with Arnold Clark and Allied Vehicles, the project explores how V2G can support grid stability, managing network constraints and provide frequency response services. Split into two phases – Phase one focuses on scoping and quantifying the value of V2G at retail and long stay sites. Phase two aims to design and demonstrate V2G technology. The project seeks to develop understanding of V2G integration for the energy transition and the uptake of LCTs.

Nominated Contact Email Address(es)

innovate@spenergynetworks.co.uk

Problem Being Solved

There are growing interests to use large fleets of Electric Vehicles for grid ancillary services and flexibility provision. These services may use for constraint management, frequency responses or even balancing demand and generation in local areas as part of DSO function. Nonetheless, there is little information on the supporting infrastructure requirements to facilitate these EV cluster ancillary services in a commercial setting.

The grid impact of these services depends on the type of network and level of power export by clusters of EVs. The impact depends on how much power is exported and the agreed response time. The necessary network design, measurement points, and control mechanisms for these services are not yet fully understood. This project, in partnership with our commercial V2G partners, aims to explore the practical aspects of integrating EVs into the grid. The goal is to enable customers to provide services like exporting excess power to help manage grid constraints or improve network services in a commercial setting.

Method(s)

- Engagement with Retailers and Manufacturers who have trialled or rolled out this technology.
- Usage of data from previous EV charger trial locations. Working with retailers who have access to site locations and EV fleets.
- Defining V2G unit requirements that meets SPEN's criteria and early market research to find the most suitable V2G charger partner for Phase 2 of the project.
- Continuous monitoring of most advanced and popular V2G technologies on the market so project scope and plan can be adjusted accordingly as required.
- Selection of Arnold Clark and Allied Vehicles sites, with a growing holding stock of EVs and other LCTs.
- Ensure that the partnership is mutually beneficial to all stakeholders by aligning project goals with the decarbonisation plans of strategically important commercial EV businesses.

Scope

The project (Phase 1 and Phase 2) aims to transition to a Distribution System Operator (DSO) by designing a flexible network that incorporates customer services and flexibility. It will design, demonstrate, and provide technical recommendations for replication, assess commercial aspects versus network investments, and explore battery use to enhance EV fleet efficiency. The goal is to showcase the necessary control, design, and operational aspects of the grid, enabling customers to offer ancillary services and support a more flexible, resilient distribution network.

This project, in partnership with two leading UK EV commercial fleet operators, will aim to explore the financial, social and environmental benefits of V2G technologies. The project will design, demonstrate, test and provide technical recommendations for network investments, and explore battery use to enhance EV fleet efficiency. The aim of this phase is to showcase the necessary control, design, and operational aspects of the grid, enabling customers to offer ancillary services and support a more flexible, resilient distribution network.

This funding is for the Phase 1 NIA project. Phase 1 is structured into four Work packages (WP). WP1 is split into two parts, with WP1.1 exploring the V2G Phase 2 project scope at commercial vehicle retail sites and WP1.2 focus on the potential for V2G from Wheelchair Access Vehicles (WAVs) in long stay car parks operated by the manufacturer and supplier of adapted and special purpose vehicles. The findings and evidence gathered in WP1 will be used in the flexibility value calculation and the net benefit calculation for the NIA Project Phase 2 proposal or proposals. Phase 2 will focus on trials and V2G control with commercial vehicles.

WP1 Project Scoping Arnold Clark V2G on Retail Sites and Public Spaces

WP1.1 V2G at Retail Sites

- Geographical Locations.
- Total Retail Fleet V2G Storage and Import/Export Capacities.
- Site Import/Export Capacities – Contracted vs guaranteed peak w. V2G.
- Number, Types, Charge/Discharge Power, Vehicle Storage Capacities/Discharge Depths.
- Network Analysis at Locations.

WP1.2 V2G Low Use WAV at Long Stay Sites

- Geographical Location(s).
- Number, Types, Charge/Discharge Power Ratings.
- Long Stay Vehicle Holding Capacity Profiles (15-Years).
- Network constraint60
- Fleet Operator Decarbonisation Plan.
- Network Analysis at Long Stay Locations.

WP2 Retail V2G Stakeholder Revenue & Decarbonisation

- Grid Balancing Services and Reactive Power Services.
- 11kV/LV Flexibility Market.
- Further Revenue Identification.
- Network Operator.
- V2G Car Retailers.
- WAV Manufacturers and WAV Users.
- V2G Lifecycle Analysis – V2G Retail Sites & Public Spaces.
- Societal V2G benefits – Identification and quantification.

WP2 focuses on quantifying the flexibility value of V2G management for retail sites and in public spaces, which would be a potential revenue stream for the V2G service provider.

WP2 also focuses on the potential scope of revenue release for disabled WAV users, who have vehicles stored for long durations at the manufacture premises. Eventually all new vehicles, at these sites, will become PEV, representing electrical storage capacity, consistent peak demand reduction and revenue opportunities for disabled people with access to WAVs in long stay parking.

WP3 Net Benefit Quantification

- Appraisal of Qualitative Benefits.
- Benefit Formularisation.
- CBA Inputs and Evidence.
- Strathclyde Benefit Review.
- BaU Integration and Rollout Plan.

W3 uses outputs from WP1 & WP2 to inform the CBA, BaU integration and rollout plan to calculate a 15-year Net Present Value, of the NIA Phase 2 outputs, when rolled out across the SP Energy Network licence areas between now and 2040.

WP4 Phase 2 Setup/Governance

- Literature Review.

Phase 2 Project Design and Scoping.

Objective(s)

The goal of this Phase 1 project is to carry out desktop studies to quantify the net benefits to commercial EV fleet operators (lease, sale and manufacturers), their customers and network operators. The CBA narrative will define the detailed scope of a Phase 2 project, which will be structured to release the benefits identified in the Phase 1 business case. The current understanding is not sufficiently mature enough to quantify benefits and define the Phase 2 scope, without a Phase 1 project.

V2G has the potential to make the grid more stable and resilient. SP Energy Networks envisions the use the energy storage of EVs and LV and HV controllable devices, maximising the benefits of V2G services to our partners, network operators and our customers. The overall project goal is to enable and incentive customers to provide services like exporting excess power to help manage grid constraints or improve frequency response. The Phase 1 project will:

- Explore the financial, social, and environmental benefits of V2G technology.
- Identify Network requirements and control mechanisms for effective integration.
- Ensure the integration of EVs onto the grid enhances the networks stability and resilience.
- Align the business investment with the trends in EV uptake to maximise business benefits.

Consumer Vulnerability Impact Assessment (RIIO-2 Projects Only)

- Vulnerable consumers may have less access to EVs and V2G technology due to higher upfront costs.
- The technology and maintenance involved in V2G systems can be complex, which might be a barrier for some consumers.
- By stabilizing the grid and reducing the need for expensive infrastructure upgrades, V2G can help ensure a more reliable power supply.
- For consumers in vulnerable situations, V2G can provide a backup power source during outages.

Success Criteria

The business will evaluate the success of the Commercial V2G Project by assessing several metrics, including the quantification of financial and network benefits, the effectiveness of trial implementations at Arnold Clark retail sites and long stay car parks for Wheelchair Access Vehicles (WAVs) at Allied Vehicles, and stakeholder engagement and satisfaction. Additionally, the technical feasibility and integration of V2G technology, the achievement of measurable environmental and social benefits, and the development of a clear plan for scaling and integrating V2G into standard business practices will be critical indicators of success. These criteria will ensure the project meets its objectives and delivers valuable insights for the future of V2G technology.

Project Partners and External Funding

- Arnold Clark – Providing insights into the V2G retail market.
- Allied Vehicles – Providing insights into the V2G retail market in long-stay car parks.

Potential for New Learning

This project aims to explore the potential of operating V2G services in both retail and long stay sites, giving new insights into the various sites import/export capacities. As well as quantifying the flexibility value of V2G management for retail sites and in public spaces and V2Gs role in active network management. Working with Arnold Clark will help explore building business models for V2G services. Working with Allied Vehicles will help explore and develop business models for WAV customers. Learnings from this phase 1 project will be used to inform the cost benefit analysis for the phase 2 proposal.

Scale of Project

The project aims to give a comprehensive overview of the technology's current state, its benefits and limitations, helping SPEN prepare for a larger phase 2 project of broader scope including trials. The Commercial V2G Project is divided into two main phases. Phase 1 (this project) focuses on initial scoping and evidence collection over 0-6 months, including work packages modelling V2G implementation at EV retail sites and long stay car parks for Wheelchair Access Vehicles (WAVs), quantifying flexibility value and potential revenue streams to feed into and fully evidenced CBA, based on the clearly defined Phase 2 scope.

For information, Phase 2, spanning 8-12 months, will involve broader implementation, a technical trial and technical recommendations, including V2G control, communication, interoperability, cybersecurity, battery integration, and site trials. This phase aims to reduce the total cost of ownership for fleets and optimize grid investments, ensuring the project's success and scalability. The scale of this phase 1 project has been kept low in case a positive benefit cannot be made, meaning a phase 2 would occur to protect customer funding.

Technology Readiness at Start

TRL3 Proof of Concept

Technology Readiness at End

TRL5 Pilot Scale

Geographical Area

Working with Arnold Clark and Allied Vehicles allow for a large geographical reach across SPENs license areas (both, SPM and SPD) and supports the project's goals of integrating EVs into the grid, ensuring stability and resilience.

Phase 1 will be a desktop study, without any physical hardware trial. For the desktop study, SP Energy Networks will work with their V2G retail partner to analyse 5 sites, which are the most difficult to decarbonise, due to site factors and network constraints. Choosing the most difficult sites, should derisk BaU rollout to sites not included in the innovation trial in Phase 2. For Phase 1, 5 sites will be identified, 4 in SP Distribution and 1 in SP Manweb.

Revenue Allowed for the RIIO Settlement

Current projection is full spend of NIA allowance based on project registration pipeline.

Indicative Total NIA Project Expenditure

Expected expenditure for phase 1 is £150,000.

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:

The energy transition involves an increase in LCTs which will increase the peak electricity demand. This project can help balance the supply and demand of the network by feeding energy back into the grid during peak times, enhancing reliability and resilience. Supporting the integration of renewable energy by storing and supplying when needed. The project also encourages customers to uptake EVs by providing extra revenue stream, reducing dependence on fossil fuels.

How the Project has potential to benefit consumer in vulnerable situations:

Working with Allied Vehicles (WAV manufacturer), enables the project to identify new V2G revenue streams for wheelchair users. WAV manufacturers are offering BEV versions, enabling V2G technology in WAVs, which have the potential to provide revenue streams for disabled persons who have their vehicles stored for long durations.

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)

n/a

Please provide a calculation of the expected benefits the Solution

The solution is expected to have several benefits but with low TRL projects under NIA governance do not have to quantify net benefits at the proposal stage. Phase 1 is structured to improve the TRL and gather evidence for a CBA for the phase 2 proposal.

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

Very replicable, the uptake of EV is being seen across GB in all license areas.

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

The project aims to gather evidence for a cost benefit analysis to calculate a 15-year net present value for rolling out across the SPEN license areas. This can then be used to quantify the costs for a rollout across GB.

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

This project provides learnings for V2G as it explores its use within retail and long-stay parking. Both these solutions offer a larger and more reliable forms of V2G due to large fleet sizes and extended parking durations. Learnings from these sites can be used to better understand and develop solutions for a large-scale rollout.

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

n/a

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.

Several relevant innovation projects have been reviewed, including TransPower V2G, CarConnect, Electric Nation and Park and Flex, and no unnecessary duplication has been identified. Specifically, the Park and Flex project explored V2X in public long‐stay car parks, focusing on lower V2G export capacity and incentivising individual participants through a complex aggregator‐led model involving multiple organisations. This approach and scope are materially different from the SPEN V2G project.

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

The project explores the commercial roll out of V2G within retail and long stay car parks. With a larger and more reliable source of grid support when compared to one off residential V2G. There is a unique focus on these retail and long stay WAV sites giving novel and valuable insight. This is what distinguishes this project from previous initiatives.

Relevant Foreground IPR

Foreground IP will not be generated in this phase of the project.

Data Access Details

Access to this data must be requested by contacting innovation@spenergynetworks.co.uk. 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

Any data request deemed unsuitable for sharing will be highlighted to the appropriate requesting party. After receiving the request, we will provide the estimated date for completing the data provision based on other requests and our team workload at that time. All requested data remains the property of SP Energy Networks

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

The project involves innovative technology with a low TRL, and the project seeks to undertake exploratory activities which are not typically funded under business-as-usual activities. Customer needs must be better understood before taking it to BaU so that the benefits can be maximised, a costing structure can be developed and how to make the technology more suitable for the end user.

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

The consumers interactions with the technology need to be better understood to allow for a strong business justification. The success of the project and associated financial benefits cannot be determined at this stage therefore it can only be undertaken with the support of NIA.

This project has been approved by a senior member of staff

☑ Yes