



NIC Project UKPNEN03

Project Progress Report

June 2022



Optimise Prime



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Table of acronyms

Acronym	Full form
ANM	Active Network Management
CAFE	Clean Air for Europe
CP	Charge Point
CPO	Charge Point Operator
CSMS	Charge Station Management System
DNO	Distribution Network Operator
DSO	Distribution System Operator
EV	Electric Vehicle
FSP	Full Submission Pro-forma
GB	Great Britain
GSA	Geospatial Analytics
ICEV	Internal Combustion Engine Vehicle
IoT	Internet of Things
IP(R)	Intellectual Property (Rights)
IT	Information Technology
LCV	Light Commercial Vehicle
LV	Low Voltage
NIC	Network Innovation Competition
OZEV	Office for Zero Emission Vehicles
PH(V)	Private Hire (Vehicle)
PM	Project Manager
POC	Point of Connection
PPR	Project Progress Report
RAID	Risks, Assumptions, Issues and Dependencies
RMG	Royal Mail Group
SFS	Strategic Forecasting System
SSEN	Scottish & Southern Electricity Networks
TOA	Trials Operational Applications
TCO	Total Cost of Ownership
UK	United Kingdom

Glossary of terms

Term	Definition
Trial Period	A 12-month period of trialling for each workstream when the minimum quantity of trial vehicles are on the road.
WS1	Workstream 1 – Trial 1 – Home Charging
WS2	Workstream 2 – Trial 2 – Depot Charging
WS3	Workstream 3 – Trial 3 – Mixed Charging
WS4	Workstream 4 – IoT Platform, Network Forecasting & Flexibility Analysis
WS5	Workstream 5 – Business Model
WS6	Workstream 6 – Reports and Documentation
WS7	Workstream 7 – Project Management and Sharing Learning
Product A	A firm forward option flexibility product, procured in advance
Product B	A day-ahead spot market flexibility product
Product C	An intraday balancing flexibility product

1 Executive summary

1.1 Project background

Optimise Prime is an industry-led electric vehicle (EV) innovation and demonstration project that brings together partners from leading technology, energy, transport and financing organisations, including Hitachi Vantara, UK Power Networks, Centrica, Royal Mail, Uber, SSEN, Hitachi Europe and Novuna (previously Hitachi Capital).

The project is gathering data from over 6,000 EVs driven for commercial purposes through three trials. Optimise Prime will also implement a range of technical and commercial solutions with the aim of accelerating the transition to electric for commercial fleet operators while helping Great Britain's (GB) distribution networks plan and prepare for the mass adoption of EVs. Through cross-industry collaboration and co-creation, the project aims to ensure security of energy supply while saving money for electricity customers, helping the UK meet its clean air and climate change objectives.

This project aims to be the first of its kind, paving the way to the development of cost-effective strategies to minimise the impact of commercial EVs on the distribution network. Commercial EVs are defined as vehicles used for business purposes, including the transport of passengers and goods. Compared to vehicles used for domestic purposes, commercial EVs will have a much greater impact on the electricity network. The potential impact of commercial EVs charging at depots results from two factors: co-location of multiple EVs at a single depot location, and higher energy demand per vehicle resulting from higher daily mileages and payloads. The latter is also a factor when commercial EVs are charged at domestic locations.

This project is seeking to answer three core questions relating to the electrification of commercial fleets and Private Hire Vehicles (PHVs):

1. How do we quantify and minimise the network impact of commercial EVs?

The project will gain a comprehensive and quantified understanding of the demand that commercial EVs will place on the network, and the variation between fleet and PHV types. The project will achieve this through large-scale field trials where significant volumes of vehicle and network data will be captured and analysed. This data will enable the creation and validation of practical models that can be used to better exploit existing network capacity, optimise investment and enable the electrification of fleets as quickly and cheaply as possible.

2. What is the value proposition for smart solutions for EV fleets and PHV operators?

The project will gain an understanding of the opportunities that exist to reduce the load on the network through the better use of data, planning tools and smart charging. Additionally, the project will consider and trial the business models that are necessary to enable these opportunities. The project will achieve this by developing technical and market solutions, and then using them in field trials to gather robust evidence and assess their effectiveness.

3. What infrastructure (network, charging and IT) is needed to enable the EV transition?

The project will develop an understanding of how best to optimise the utilisation of infrastructure to reduce the load on the network. This will be achieved through the collection, analysis and modelling of depot-based, return-to-home fleet and PHV journey data. By answering these questions, the project will enable network operators to quantify savings which can be achieved through reinforcement deferral and avoidance while facilitating the transition to low carbon transport. The trial will also assess the vehicles' journey data to understand the charging and associated IT infrastructure requirements and implications for depot and fleet managers to be able to operate a commercial EV fleet successfully.

1.2 Purpose of this document

This is the sixth Project Progress Report (PPR) for the Optimise Prime Network Innovation Competition (NIC) project, covering the six-month period between 18 December 2021 and 17 June 2022. This document will, together with the December 2022 report, fulfil the reporting requirements of Sections 8.11 – 8.15 of v3.0 of the NIC Governance Document for 2022. This document aims to keep project stakeholders informed on the progress and lessons learned from the Optimise Prime project.

1.3 Summary of progress

Optimise Prime has made significant progress in the last six months, with all three trials now nearing completion and analysis of the data coming from the trials well underway.

Over this period, the project has successfully:

- Collected and analysed data from vehicles involved in the workstream (WS) 1, 2 and 3 trials
- Carried out experiments to test the projects flexibility and profiled connection methods and began modelling the impacts of the Optimise Prime methods on the distribution network
- Undertook and analysed further behavioural surveys with fleet drivers
- Analysed factors that impact the total cost of ownership and business models
- Launched the project's Site Planning Tool
- Published [Deliverable D4](#), detailing interim findings from the trials and Deliverable D5, an interim report on business models
- Managed the project, its risks and finances.

Key progress from each project workstream is highlighted in the following sections.

1.3.1 WS1, 2 & 3 – The Home, Depot and Mixed Charging Trials

In WS1 (home trial), Centrica has over 1,000 EVs on the road, with around 900 of them charging at drivers' homes and able to take part in flexibility trials. While Centrica vehicles are all based at drivers' homes, it has been found that there are a number of locations where home charging was not possible, either due to lack of off-street parking or inability to install charge points, (CPs) necessitating the use of public infrastructure. Centrica is sharing charger and telematics data regularly with Hitachi.

Following work in the previous period to finalise the integration of the CPs with the flexibility systems, this period has focussed on the trialling of flexibility services. A series of trials of Products B and C (day ahead and intraday) were completed successfully and Centrica's initial analysis has found that the predictability of their vehicles' plug-in times was good at around 95% on weekdays.

In WS2 (depot trial), over 300 EVs are now operating from nine Royal Mail sites. The Royal Mail sites in WS2 have participated in trials of both Profiled Connections and Flexibility products A and B (month ahead and day ahead), for which there have now been five (out of six) rounds of trials completed. Analysis of the results of these experiments has shown that the sites are able to respond to demand signals. However, the prediction of the demand can be challenging at these relatively small sites, in order to create profiles and bid schedules and enact them precisely. Ongoing work has focussed on improving the forecasting of demand.

The web-based Site Planning Tool has been launched through a press release and a number of stakeholder events. The tool can be found on the project website at www.optimise-prime.com/site-planning-tool.

In WS3 (the Mixed Trials utilising Uber trip data from London-based EVs), Uber has continued to collect and anonymise trip data from EVs on their platform, while UK Power Networks and SSEN have been collating utilisation data of their secondary substations throughout Greater London. Hitachi data scientists have continued to develop models to estimate charging demand and its potential impact on the distribution networks and have updated the models to manage the rapidly increasing numbers of EVs being analysed and model the impact of future demand growth.

At the time of writing, the Optimise Prime partners have over 6,000 EVs on the road. A breakdown of EV numbers by workstream can be found in Confidential Appendix A.

1.3.2 WS4 – IoT Platform, Network Forecasting & Flexibility Analysis

During this period, the WS4 platform team continued to support the ongoing operation of the project platforms. A number of core platforms were migrated to new infrastructure during this period as a result of systems coming to end-of-life.

Hitachi and UK Power Networks have been working with Element Energy, who provide UK Power Networks' Strategic Forecasting System (SFS), to run network modelling based on data from the Optimise Prime trials. Results of the initial phase were presented in [Deliverable 5](#) and work is ongoing to further develop the tool to model the network impacts of the project's methods.

1.3.3 WS5 – Economic Analysis & Business Models

The Economic Analysis & Business Models workstream has developed a Total Cost of Ownership (TCO) model, together with the fleet partners, and the results from this initial analysis can be found in [Deliverable D5](#). The deliverable also includes an operating model for the electrification of fleets and the results of a survey with over 2,500 responses looking at behavioural factors impacting the transition of fleets to EVs.

1.3.4 WS6 – Reporting & Deliverables

[Deliverable D4](#), reporting initial learnings was published in January 2022, followed by [Deliverable D5](#), focused on business models in May 2022. During the next period the project intends to publish D6, the final datasets gathered from the trials.

1.3.5 WS7 – Project Management & Sharing Learning

The project management function has continued to manage Optimise Prime's programme plan, budget, and resources throughout this reporting period.

UK Power Networks issued a tender to invite third parties to propose data analysis projects to create further learnings for Distribution Network Operators (DNOs) from the project's data. The successful company has been selected and will start work in the coming months.

The programme has continued with a series of knowledge exchange activities, as detailed in section 8, aimed at sharing the lessons learnt throughout the trials with project stakeholders.

1.4 Risks and issues

The project operates a robust risk management process in order to reduce the probability of risks occurring and lessen the impact of any issues upon the project. The full risk register can be found in Section 10.

As the project progresses with the trials phase, the risk profile has changed and the number of risks has declined. The main risks that remain focus on potential interruptions to the trials

and analysis that may delay the publication of results or impact findings. Key risks and issues being managed during this period include:

- Resource constraints at project partners requiring re-planning of activities in order to ensure project objectives are met
- Changes in personnel at project partners potentially impacting upon project delivery
- The potential for changes in partners' systems and business processes to impact trial execution
- Potential for delays caused by the COVID-19 pandemic
- The final EV deliveries into the WS1 trials.

These are being monitored and mitigated and it is not currently expected that they will result in further delay to project completion or overspend of the project budget.

1.5 Project Learnings

The project has continued to generate a wide range of learnings as the trials and accompanying business modelling activities have progressed.

The WS1 trials have shown that, thanks to regular shift patterns during weekdays, plug-in rates of British Gas vans could be accurately predicted, with an estimated 95% accuracy. Weekends and holidays remain more challenging to predict due to irregular shift patterns. Unmanaged, the peak charging demand from return-to-home vehicles occurs between 17:00 and 19:00, coinciding with peak demand on the distribution network. The commercial case for charge at home vans continues to be challenging due to high vehicle costs. The electricity price increases in 2022, coupled with subsidy reductions, have made the commercial case for transitioning to an EV fleet more uncertain (even with the increases in diesel costs). However, EVs can offer significant value the environment, and the project's survey results have shown they are preferred by many drivers, making the business case for transition stronger.

Automating the reimbursement of charge-at-home electricity is necessary for larger fleets, but there are limitations in what can be achieved through a commercial solution at present as drivers have to settle bills with their supplier and are separately refunded by their employer. Clear communication is necessary to ensure that the process is accepted and understood by drivers.

In WS2, modelling has created predictions of charging demand in unmanaged and smart scenarios. This has been used to determine flexibility bids, and trials have shown an ability to control charging in response to flexibility requests from the DNO. However, differences between forecast and actual load have impacted performance – variations in operational behaviour can impact on the success of controlling a CP and hence the delivery of power turndown. Depots with low delivery route mileages, where charging might be infrequent, have proven less reliable in the flexibility trial, as are those depots where each CP installed are allocated to more than one EV.

Determining an accurate profile is key to being able to adhere to a profiled connection: adequate EV load is needed, in proportion to background load, where the controllable EV load has to be greater than the variation in building load. Profiled connections may need to be refined as more data becomes available following the introduction of an EV fleet.

The TCO for depot based EVs was stronger than in the home charging case. Connection costs are normally a relatively small proportion of the overall fleet electrification costs, but because there can be a small difference in TCO between EV and ICEV this could impact investment decisions. Depot drivers were found to prefer EVs to ICEVs, seeing the environmental and

cost benefits; they also highlighted how charging facilities play a key role in their ability to fulfil their daily work tasks.

The WS3 trials have identified clear patterns within and across days in trip and charging demand. Charge demand from PH EVs is likely to peak in the evening as some drivers return home and others need to 'top up' the battery. There is a significant number of locations where drivers need to travel far if they need to charge during their shift, specifically due to the lack of rapid chargers – if drivers were to always use the optimum charger many would see demand beyond their capacity. This is especially important due to the potential opportunity cost of time spent charging while on shift, which can potentially tip the TCO in favour of ICEV. Barriers to EV adoption for non-EV drivers are both financial and operational and not all drivers will place the same importance on TCO results, however positive attitudes suggest a willingness to change once concerns are addressed. Over the course of the project, UK Power Networks has seen a switch from 50 kW to 350 kW DC CPs being installed (driven largely by the requirement to reduce charging dwell time), and these higher power CPs are connected at HV. The project will now investigate how this switch will affect 'on shift' demand.

Full details of the interim learnings from the project's recent activities can be found in Deliverables [D4](#) and [D5](#), while a more detailed summary is included in Section 2 of this report.

2 Project Manager's report

2.1 Progress in this reporting period

The project has made significant progress during this reporting period and is currently on track to meet the project timelines. Significant progress made in this period includes:

- Data continues to be captured and analysed across all three project trials, with the trial periods shortly due to come to a close
- The execution of experiments continues in each of the three trial workstreams
- [Deliverable D4](#) was published in this period, detailing a wide range of learnings from the initial data science work, which focussed on analysis of vehicle usage patterns as well as the early findings from trials of flexibility and profiled connections
- The business model workstream has analysed responses of surveys of drivers and fleet managers, completed TCO assessments of the partner fleets and developed an operating model that work was published in [Deliverable D5](#) during this period
- The project partners have continued to promote the project through publications and events.

Each of these items is considered in detail in the relevant sections of this report.

2.1.1 Project Partners

Optimise Prime has continued to operate a project steering board, comprising all project partners on a quarterly basis. During this period meetings were held on 17 January and 26 April 2022.

In addition, a regular project progress reporting process is in place between Hitachi Europe, Hitachi Vantara, Royal Mail, Centrica, and UK Power Networks. All project partners contribute to the Optimise Prime workstreams.

On 14 February 2022, project partner Hitachi Capital (UK) PLC was renamed to Mitsubishi HC Capital UK PLC, and the company now trades under the brand Novuna. The Novuna name will be used to refer to this partner in any future project deliverables and reports. There is no impact on the project as a result of this change.

2.1.2 Project team

Optimise Prime has continued to maintain a project team of specialists throughout this reporting period, supported by the project partners, as shown in Figure 1. The trials/data science and business models teams have been boosted to support trial execution and data analysis. The responsible managers for Royal Mail and Centrica have both changed during this period and the handover was completed successfully.

Optimise Prime Project Organisation Chart

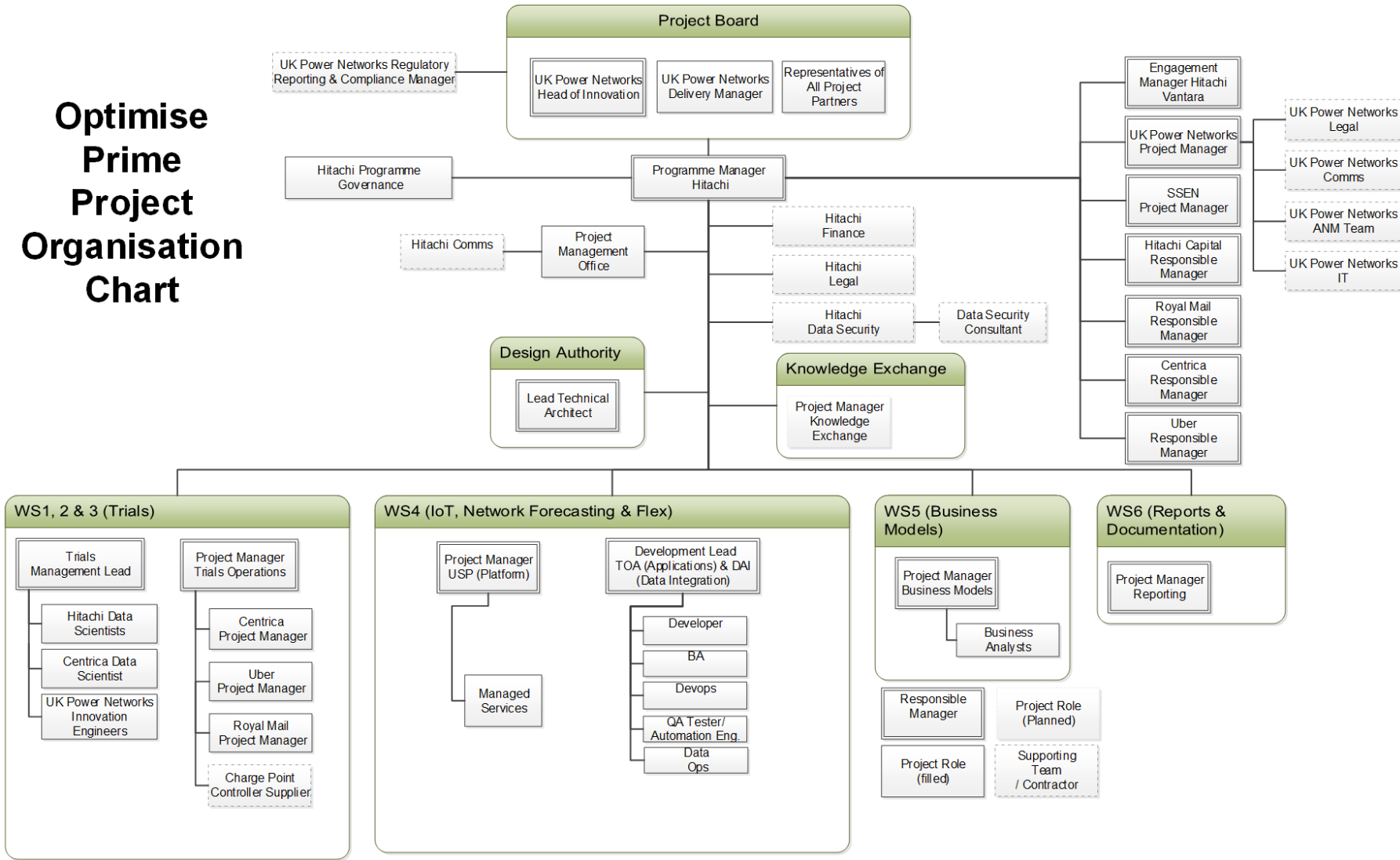


Figure 1 – Optimise Prime Organisation Chart

2.2 Workstream progress

2.2.1 WS1 – Home trial

The home trial, outlined in Figure 2, is implementing technologies to monitor and manage commercial EVs charging at home, as well as testing their ability to provide flexibility services.

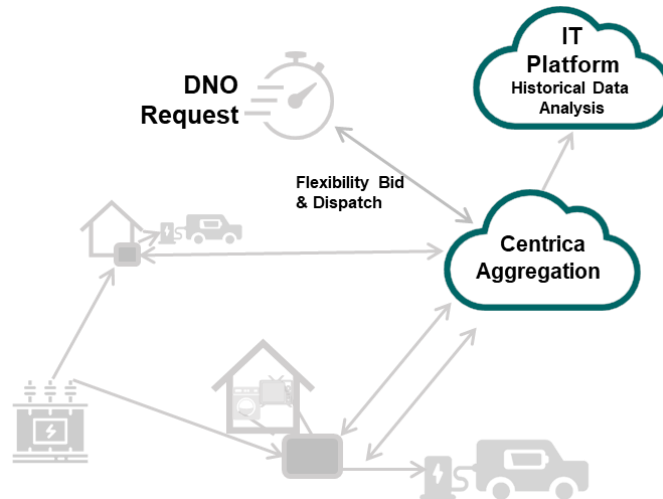


Figure 2 – Schematic of WS1 trial

2.2.1.1 Progress in this reporting period

In the home trial, Centrica has progressed the following activities:

- **EVs** – Completed the roll out an order for 1,000 Vauxhall e-Vivaro to be used by British Gas throughout the UK. The minimum volume of 300 was met before the trials began in July 2021.
- **CPs** – Continued the installation of EV charging infrastructure at drivers' homes, installing devices at over 900 locations. A number of EVs have had to temporarily utilise public CP infrastructure whilst awaiting home CP installation, while some EVs will permanently use public CPs as home charging cannot be installed. These vehicles will be monitored through telematics, but are not taking part in flexibility trials.
- **Technology** – Continued to operate a driver app as part of the CP control solution, and to capture data from CPs and vehicle telematics.
- **Flexibility** – Worked with Hitachi, UK Power Networks and SSEN to carry out a series of flexibility trials, with a minimum of 300 vehicles trialling each of Product B and Product C. Following on from these trials, Centrica has been analysing and documenting the results of the flexibility events.
- **Behavioural studies** – Organised staff participation in behavioural surveys.
- **Business Modelling** – Worked with Hitachi to develop a fleet electrification guide, provide input into the TCO analysis for home-based fleets and document learnings regarding the separation of business EV load at domestic properties.
- **Data** – Provided data from charging and telematics systems to Hitachi for analysis purposes.

UK Power Networks has:

- Carried out the tender, bid acceptance, flexibility dispatch and settlement activities for flexibility products B and C.

Hitachi has:

- Worked with Centrica, UK Power Networks and SSEN to plan and carry out the testing of flexibility products in WS1
- Received telematics and charging data and worked with Centrica to scope analysis of the flexibility trials
- Worked with Centrica to develop inputs to [Deliverable D5](#)

SSEN has participated in the flexibility experiments in WS1, including setting and publishing flexibility tenders.

2.2.1.2 *Challenges and lessons learnt*

The challenges reported in the previous PPR, relating to delays to the completion of flexibility systems and uncertainty over availability of resources have now been resolved, allowing the project to make good progress in trialling the project methods.

A wide range of lessons have been learnt as part of the trials. The following lessons were documented in [Deliverable D4](#):

- Unmanaged, the peak charging demand from return-to-home vehicles is likely to occur between 17:00 and 19:00, coinciding with peak demand on the distribution network
- Smart charging has been modelled to significantly reduce peak demand from return-to-home vehicles. However, the benefits of simply shifting load later are much less than of balancing load over a longer period
- Within the return-to-home trial there is expected to be a significant seasonal variation in power demand, based on analysis of ICEV data. Future work will look at differentiating between seasonal variations between differences in British Gas workload and other factors.
- The majority of British Gas fleet journeys should be able to be fulfilled with the current generation of EV vans. On-route charging could be used for occasional longer trips.

[Deliverable D5](#) also reported a range of learnings from WS1, focused on insights from the separation of commercial EV use from domestic bills, the fleet TCO and behavioural findings.

Key findings included:

- Automating the reimbursement of charge-at-home electricity is necessary for larger fleets and gaining the trust of drivers through clear communication is necessary for the successful implementation of reimbursement solutions
- There are limitations in what can be achieved through a commercial solution at present, because the driver first has to pay the bill and then be reimbursed
- Communicating the complexities of optimisation and engaging drivers can be challenging and reliable communications was the key technical issue faced during implementation
- Thanks to regular shift patterns during weekdays, plug-in rates could be accurately predicted with an estimated 95% accuracy. Weekends and holidays remain more challenging to predict due to irregular shift patterns
- The electricity price increases in 2022, coupled with subsidy reductions, have made the commercial case for transitioning to an EV fleet more uncertain. Reducing the lease price between 20%-30% using 2021 prices is necessary for EV fleet with a mix of home and public charging to be at a competitive level compared to ICEV TCO. Due primarily to increased electricity costs in 2022, lease costs would now need to fall by 30-50% to reach TCO parity

- Smart charging appears to be one of the best routes to improve EV TCO competitiveness at the current time, though this is not always possible for home-based fleets because fleet managers cannot ensure that drivers choose a time-of-use tariff
- After drivers have tried EVs, they tend to feel more positively about the technology, though there is some scepticism about the robustness of technologies associated with EVs, with negative feelings about range and smart charging being not uncommon
- EVs can offer significant value for drivers as well as the environment, making the business case for transition even stronger.

Further detail on these learnings can be found in Deliverables [D4](#) and [D5](#).

2.2.1.3 Outlook for the next reporting period

During the next reporting period, WS1 will focus on:

- Completing the trials, including running the final flexibility events
- Analysing the data and outcomes from the trials in order to meet the project objectives
- Creating a dataset for publication
- Documenting the results of the trials

2.2.2 WS2 – Depot trial

The depot trial, shown in

Figure 3, is implementing a range of technologies to allow depots to electrify economically by putting minimum additional peak load on the distribution network. Activity in this workstream has included the commissioning of the charge control and load monitoring systems, the development of the trial applications and the continuation of pre-trial experiments.

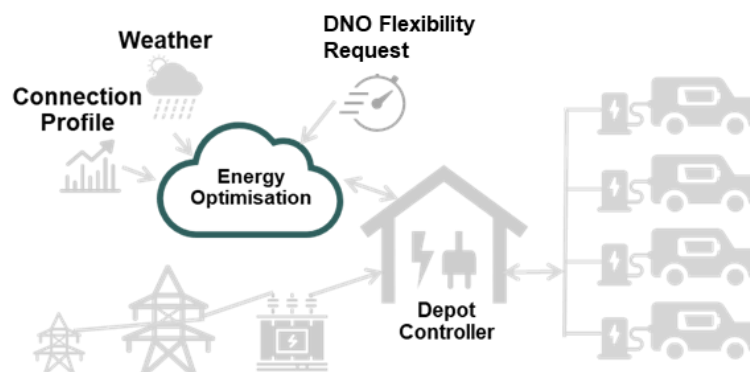


Figure 3 – Schematic of WS2 trial

2.2.2.1 Progress in this reporting period

In the depot trial, Royal Mail has:

- Continued to operate their fleet of EVs, adding further vehicles to the trials at a number of depots as part of their wider EV rollout
- Supported Hitachi in the ongoing operation and maintenance of the depot charging systems and in keeping vehicle data up to date
- Contributed to the analysis of the trial experiments
- Organised staff participation in behavioural analysis surveys
- Provided input into the development of the fleet charging guide and TCO models

Hitachi has progressed the following activities:

- **Depot optimisation** – Operated the depot management systems that capture charging data and implement flexibility products
- **Profiled connections** – Carried out trials of profiled connections, including the calculation of profiles to trial and the implementation through the optimisation system
- **Depot flexibility** – Bid for and trialled flexibility products A and B in response to tenders and dispatched from the DNO
- **Experiments** – Carried out analysis on data and the outcome of the profiled connection and flexibility trials
- **Site Planning Tool** – The tool was introduced to a range of industry stakeholders through a series of webinars and walkthroughs where the audience was encouraged to provide feedback. The tool can now be found on the project website at www.optimize-prime.com/site-planning-tool.

Within this reporting period, UK Power Networks has conducted the following activities:

- **Flexibility trials** – Coordinated the tendering, dispatch and settlement of flexibility events.
- **Profiled connection trial:**
 - Monitored profiled connections adherence via Active Network Management platform at two Royal Mail depots
 - Notified Hitachi in real time in case of breach
 - Analysed performance of profile adherence
 - Shared VisNet data with Hitachi to enable comparison with data monitored behind the meter
 - Provided network load data to help generate relevant profiles.

Within this reporting period, SSEN has conducted the following activities:

- Carried out the tender and settlement calculation process for some flexibility events.

2.2.2.2 *Challenges and lessons learnt*

A wide range of lessons have been learnt as part of the trials. The following lessons were documented in Deliverable [D4](#):

- Modelling has created predictions of charging demand in unmanaged and smart scenarios. These models demonstrate that smart charging should deliver reduction of peak demand for the networks as well as energy and connection cost savings for the depot operator.
- Flexibility trials have shown an ability to control charging in response to flexibility requests from the DNO. With the forward option product a significant difference between forecast (month ahead) and actual demand has been encountered, and so future trials will look at improving the reliability of forecasting.
- The reliability of using RFID (radio frequency identification) tags to accurately identify the vehicles that can be controlled continues to be an issue and can limit the availability of controllable load at depots (which reduces the ability to deliver flexible turn down). The project is looking at how this could be resolved through process changes.

Deliverable [D5](#) produced further findings around profiled connections as well as a range of behavioural and economic findings related to WS2, including:

- Adequate EV load, in proportion to background load, is needed for a successful profiled connection. Controllable EV load needs to be greater than the variation in building load
- Determining an accurate profile is key to being able to adhere to the profile. Profiled connections may need to be refined as more data becomes available. Fleets need to be mindful of their future electrification requirements and have full electrification in mind when requesting connections. DNOs will need to be flexible to review changes in requirements over time
- Contractual, operational and technical measures may be needed to operate profiled connections, but could make the product less attractive to customers
- At present, whether the TCO favours EV or ICEV fleets varies by depot, driven largely by EV type and cost of connection. Energy price rises have had some impact on the TCO for depot based electric fleets, impacting the investment case (despite a rise in the price of diesel)
- Connection costs are normally a relatively small proportion of the overall fleet electrification costs, but given the small difference in TCO could impact investment decisions
- Based on the depot charging model the OPEX savings for EVs, even without smart charging, can offset a 28% higher price of EVs vs ICEVs at present. Congestion Charging can provide benefits to EV TCOs, but these benefits are limited by time and location
- Royal Mail drivers prefer EVs to ICEVs and see EVs as beneficial to the environment and necessary for cost saving in the industry
- Charging facilities play a key role in drivers' perception of ability to fulfil their daily work tasks
- Insufficient availability of the right kind of EVs seen as the biggest risk and barrier to EV adoption by Royal Mail managers.

Flexibility analysis has also continued, notable conclusions from the WS2 sites include:

- While trials have shown an ability to control charging in response to flexibility requests from the DNO, differences between forecast and actual load have impacted performance – variations in operational behaviour can impact on the success of controlling a CP and hence the delivery of power turn down
- Depots with low mileage EVs, where charging might be infrequent, have proven less reliable in the flexibility trials, as are those where the CPs are allocated more than one EV.

2.2.2.3 *Outlook for the next reporting period*

During the next reporting period, the WS2 will focus on:

- Continuing to capture and analyse data from CPs and telematics
- Carrying out the final flexibility and profiled connection trials with a variety of timings, volumes and other parameters
- Continuing the execution of trial experiments in order to meet the project learning objectives
- Creating a dataset for publication
- Documenting the results of the trials

2.2.3 WS3 – Mixed trial

The mixed trial, shown in Figure 4, collects anonymised trip data from PH EVs in the London area and analyses this data to forecast future charging demands and network impacts. This trial commenced in August 2020 and is continuing to progress well.

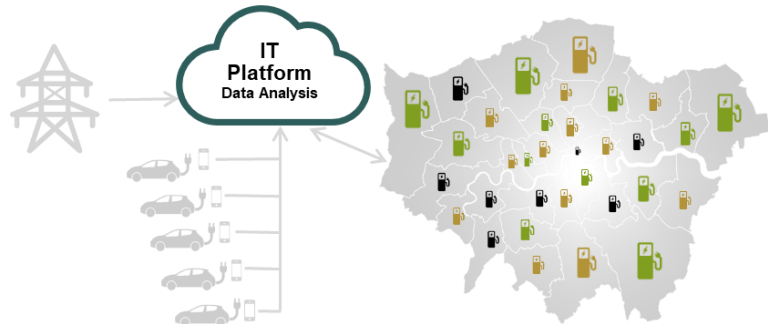


Figure 4 – Schematic of WS3 trial

2.2.3.1 Progress in this reporting period

In the mixed trial, Uber has progressed the following activities:

- **Data** – Provided anonymised EV trip data to Hitachi on a monthly basis
- **Technology** – Continued to add additional EV drivers to their platform while capturing anonymised trip data
- **Experiments** – Provided feedback on the results of data analysis based upon knowledge of Uber vehicle operations
- **Behavioural analysis** – Discussed the findings of driver surveys and provided input to and review of TCO analysis

Outside of the scope of Optimise Prime, Uber continued to operate its Clean Air Plan helping drivers upgrade to EVs and as part of this activity has developed cooperation with vehicle suppliers and CP operators. Uber's 'Uber Green' product enables customers in London to specifically request a zero-emissions vehicle.

UK Power Networks has progressed the following activities:

- **Network data provision** – Together with SSEN, provided regular updates to the maximum load data from secondary substations across their network in Greater London for use in the analysis, filtered to remove dedicated substations that could not be used to support EV charging
- **Experiments** – Reviewed and provided comment on the outcomes of the analysis and trial executions
- **Network modelling** – Worked with Hitachi and supplier Element Energy to input results from analysis of Uber journeys and charging patterns into the SFS.

Hitachi has progressed the following activities:

- **Data** – Continued to capture, validate and store the data from Uber, UK Power Networks, SSEN and CP location database Zap-Map
- **Analysis** –
 - Built on methodologies to derive estimated charging patterns from Uber's journey data in order to scale up the data to simulate future demand

- Carried out analysis of charging behaviour and patterns, and potential impact on the distribution network and reviewed this with Uber and UK Power Networks
- Continued to execute trial experiments and published interim learnings in [Deliverable D4](#)

2.2.3.2 Challenges & lessons learnt

WS3's data capture has proceeded to plan, with data being captured successfully throughout the trial period and data analysis ongoing. As the number of vehicles in the trial has increased, beyond the scope envisaged at the start of the project, some revision of models has been necessary to accommodate the larger data sets.

Interim learnings from analysis of the data published in [Deliverable D4](#) included:

- There is a clear pattern within and across days in trip and charging demand. Impact of weather on trip patterns appears to be limited. Charge demand from PH EVs is likely to peak in the evening as some drivers return home and others need to top up.
- There are a significant number of locations where drivers need to travel far if they need to charge during their shift. These are most frequently found in the Central London borough of Westminster and the City of London, where there is limited availability of rapid chargers.
- Based on modelling the optimal CP for each charge event, the most popular CPs in London are utilised way beyond their capacity, suggesting drivers will have to queue in order to charge when they are at their busiest, or travel further in order to use nonoptimal CPs.
- Current distribution network capacity varies across London, and there is likely to be capacity for sufficient growth in infrastructure in Central London. There may be more constraint in outer areas where drivers live, although slower chargers could be considered here.

Interim behavioural and economic findings were also published in [Deliverable D5](#), including:

- The congestion charging exemption for EVs plays a crucial role in the breakeven point between the ICEV and EV TCO
- Opportunity cost of public charging tips the TCO against EV
- Reliable public charging infrastructure is critical for the adoption of EVs among PHV drivers
- Operational emissions analysis shows the clear environmental benefit for PHV drivers to switch to an EV
- PH EV charging behaviour in London remains difficult to predict as EV charging locations and timings are not based on habit
- Main barriers to EV adoption for non-EV drivers are both financial and operational
- Nuances in the decision-making process mean not all drivers will place the same importance on TCO results, with other factors influencing the vehicle purchase decision
- Positive attitudes suggest a willingness to change once concerns are addressed.

2.2.3.3 Outlook for the next reporting period

During the next reporting period, the WS3 will focus on:

- Continuing and finalising the capture of journey data
- Re-running and refining analysis as more data becomes available
- Visualising results for use in deliverables and knowledge exchange

- Focusing analysis on the modelling and impact of future growth in PH EVs and the resultant impact on the distribution networks
- Assessing the impact of faster rapid DC CPs on the HV network.

2.2.4 WS4 – IoT Platform, Network Forecasting & Flexibility Analysis

This workstream is responsible for the delivery of the Optimise Prime IT platform and the use of the platform to provide analytics resources and services to the trials. Hitachi's WS4 work supports WS1 and WS2 through the development of the Trials Operational Applications (i.e. the depot optimisation system and flexibility services) and the Site Planning Tool. WS4 also supports WS3 through the development of the data analysis capability.

As part of this workstream, UK Power Networks has developed the capability, within their systems, to receive and process profiled connection applications and manage the provision of flexibility services. Additionally, UK Power Networks is utilising the SFS to translate data and learnings from the project to impacts on the distribution network.

2.2.4.1 Progress during this reporting period

This workstream has continued to make good progress during this period, managing the day-to-day operation of the IT platform and conducting the first phase of network impact analysis. The main Hitachi activities have included:

- **Data** – Supporting the ongoing process of capturing data from multiple sources for use in analysis
- **Depot flexibility, control and optimisation** – Supporting the implementation of smart charging, flexibility and profiled connections at Royal Mail sites
- **Data science** – Supporting the WS1, 2 and 3 trials through data analysis, including work to analyse the results of the profiled connection and flexibility trials
- **Platform renewal** – Work has been completed on migrating services to a new IT platform following the end of support for an underlying component of the system which had reached end-of-life. This has occurred as a result of the extension of the project beyond its original expected duration.

UK Power Networks has:

- Utilised its ANM system to set up, dispatch and settle flexibility events and monitor compliance with profiled connections
- Worked with Element Energy and Hitachi to run a first phase of network impact analysis using the SFS, project data and models from their Distribution Future Energy Scenarios to model the potential network impact of fleet electrification and smart charging
- Worked with Element Energy and Hitachi to define the second phase of network impact work, which will involve further development of the SFS and greater use of project data to analyse the impacts of the different project methods.

Centrica has operated their charging and flexibility platforms, enacting flexibility events following dispatches from UK Power Networks' ANM system and analysing the results.

2.2.4.2 Challenges & lessons learnt

Network impact work is still in progress, however some early conclusions have been made:

- The electrification of transport could be a significant driver for network reinforcement; smart charging has the potential to reduce this impact

- The impact of smart charging is non-linear in the current models; secondary peaks are likely to reduce the impact of very high levels of smart charging.

With regard to flexibility, the following general observations have been made, in addition to those reported for WS1 and 2:

- The running complex trials with multiple variations of flexibility services and smart charging can impact demand forecasting. Care needs to be taken to ensure that trial baselines are not based on periods where other interventions are taking place
- Forecasting flexibility turn down for multiple flexibility windows within the same day is complex because each window will affect the delivery during the next window. Focusing on a single period each day improves the success of turn down.

2.2.4.3 *Outlook for the next reporting period*

Over the next reporting period WS4 will focus on:

- Supporting the analytics required for WS1, 2 and 3
- Continuing to maintain and develop platform capabilities in line with trial requirements
- Working with Element Energy to make changes to the SFS and run further models based on project data.

2.2.5 **WS5 – Economic Analysis & Business Models**

This workstream is responsible for further developing the business case that was put forward in the Full Submission Pro-Forma (FSP), in addition to business models that will help speed up the transition to EVs for commercial fleets and evaluating the behavioural impacts on commercial EV use. This business modelling work will consider cost savings, behavioural analysis and improving use of capacity. It will also study the TCO impacts of the project methods and make recommendations on use of these methods by both vehicle operators and DNOs to reduce the cost and impact of the transition to EVs.

2.2.5.1 *Progress during this reporting period*

During this reporting period, this workstream has:

- Carried out analysis of the current TCO of the project's vehicle fleets
- Continued behavioural analysis work, including a second round of questionnaires, with the partners and customers of Novuna Vehicle Solutions, capturing the views and attitudes of drivers and fleet managers on the EV transition of their fleets. In total over 2,500 questionnaires have been completed
- Worked with Imperial College Consultants to undertake more detailed analysis of the behavioural survey results
- Refined an operating model for the electrification of fleets to support the development of the TCO model and provide a useful aid for fleets looking to electrify
- Interviewed a number of flexibility providers in order to gain insights into the current market for EV flexibility and potential barriers that may need to be overcome.

The initial results from all of the above activity was documented and published in [Deliverable D5](#).

2.2.5.2 *Challenges & lessons learnt*

The key lessons from the economic and behavioural analysis are presented above against the relevant workstream. Additionally, the project has made the following overarching findings:

- After drivers have tried EVs, they feel more positively about the technology. Across the fleets there were overwhelmingly positive attitudes towards EV performance
- At present, whether total cost of ownership favours EV or ICEV fleets varies considerably across and within the different use cases
- Between the two survey rounds, EV drivers have shown a growing concern with access to charging, whereas for non-EV drivers over the same time interval this concern has decreased, highlighting the importance of charging infrastructure
- While there are some difference between the survey responses of the different fleets the results have generally been remarkably similar. Overall, this suggests lessons learned can be translated between fleets.

Interviews with flexibility providers also generated a number of learnings about current market barriers:

- High complexity and the level of automation required to bring down transactional cost make it likely that fleets will participate in the flexibility markets via intermediaries such as aggregators or Charge Point Operators (CPOs)
- The value of EV flexibility remains difficult to predict
- EV flexibility at public CPs was generally believed to be too complicated to deliver.

2.2.5.3 Outlook for the next reporting period

Following the publication of deliverable D5, WS5 will focus on further refining the results of the economic and behavioural analysis. As more outcomes become available from the trials the workstream will utilise these to model the impacts of the project methods on fleet TCOs.

2.2.6 WS6 – Reporting & Deliverables

This workstream is responsible for the creation of the project deliverables that are published and submitted to Ofgem in line with the Project Direction.

2.2.6.1 Progress during this reporting period

During this period, WS6 has compiled and published [Deliverable D4](#), *Early Learnings Report on the Trials*, and [Deliverable D5](#), *Interim report on Business Models* as well as this PPR. All future Optimise Prime deliverables remain on track and their status can be found in Section 6.

2.2.6.2 Outlook for the next reporting period

During the next reporting period, WS6 will publish Deliverable D6, *Data Sets*.

2.2.7 WS7 – Project Management & Sharing Learning

This workstream is responsible for the overall management of the Optimise Prime project and its Partners, ensuring the project delivers to time, scope and budget. WS7 also incorporates a project Design Authority and knowledge exchange activities.

The Design Authority is responsible for managing the overall architecture of the project's systems, as well as reviewing the trial designs and ensuring that the design of the applications and analytical services meet the requirements of the trials.

2.2.7.1 Progress during this reporting period

During this reporting period, the workstream focused on the following activities:

- **Status & governance** – Running the project's governance and producing regular project status reports
- **Planning** – Maintaining the detailed project plan and budget

- **Resourcing** – Supporting the resourcing of all project teams
- **Risk management** – Maintaining the project Risks, Assumptions, Issues and Dependencies (RAID) log, including liaising with stakeholders regarding COVID-19 related risks
- **Status meetings** – Chairing regular project update meetings with workstream leads and project partners
- **Design Authority** – Providing the design authority function for WS1-4
- **Security Working Group** – Convening the Security Working Group and implementing the information risk management system
- **Deliverables review** – Reviewing the deliverables of the other project workstreams
- **Communications** – Maintaining the project website, www.optimise-prime.com
- **Shared Learning** – The planning of conference speaking engagements and dissemination events. Further details of these can be found in Section 8.
- **Third party data analysis** – A tender was designed and launched during this period, inviting academic institutions and other interested third parties to submit proposals to utilise the project data to develop additional learnings.

2.2.7.2 Outlook for the next reporting period

The project management workstream will continue to manage Optimise Prime in the next period in line with the established governance procedures. Over this time the project will complete the trial activity and analysis of data, compiling a project dataset and commence writing up the findings of the project.

As the project's experiments reach conclusion and generate learnings of interest to the industry the workstream will increasingly focus on developing and managing the project's programme of dissemination activities.

2.3 Business case update

The project has not become aware of any circumstances that may significantly impact upon the business case that was submitted in [Optimise Prime's FSP](#), however Optimise Prime is continuing to monitor changes within the evolving EV industry.

It is expected that there will be impacts on EV take-up as a result of vehicle availability, the effect of COVID-19 and policy changes, including the UK Government's announced end of petrol and diesel car sales in 2030. However, the longer-term outlook for EV transition has not changed in a way that would adversely affect the project outcomes.

On 3 May 2022, Ofgem published the final decision of its Access and Forward-looking Charging Significant Code Review, following several rounds of industry consultation. The review generally encourages the use of profiled connections and flexibility services, as developed in Optimise Prime, requiring DNOs to make 'non-firm' access available to customers (other than domestic and small commercial customers) as a standard option where there is a network benefit. However, the decision to introduce a fully shallow charging boundary for demand connections will result in a greater proportion of costs being met by DNOs with lower costs for the connecting customer when connection upgrades are needed. This may result in changes to the business case with regards to the profiled connections, as incentives for connecting customers may reduce. Optimise Prime will continue to monitor developments in this area and will reflect any outcomes in the final reports.

The Optimise Prime business case will be re-assessed as more data becomes available or changes occur that require a review of the original assumptions.

3 Progress against plan

This section of the report summarises the progress the project has made throughout this reporting period, highlights changes made since the FSP submission and reports issues faced by the project.

3.1 Detailed progress in the reporting period

Progress in this period has been good. Data collection and trial activity has continued throughout the period and the project is now approaching the end of the formal trials. A range of experiments have been carried out, in WS1 and WS2 in order to test the project methods and analysis of the results of these experiments is ongoing. The first results from the trials were published in [Deliverable D4](#), covering learnings from each of the trials, while a more in-depth analysis of profiled connections was published in [Deliverable D5](#).

Business modelling and behavioural analysis work, encompassing all three trials, has made strong progress, resulting in the publication of interim results in [Deliverable D5](#). Behavioural surveys have now been carried out with over 2,500 drivers across the fleets of the project partners and customers of Novuna Vehicle Solutions. The team has worked closely with the partners to develop the TCO model for each fleet and a guide to fleet electrification.

Table 1 details the status of key project activities planned in this reporting period:

Table 1 – Key Project Activities planned within the current reporting period

Task name	Sub-activities	Status at end of period
WS1 Home trial		
EV and infrastructure rollout	EV deliveries and CP installs	Minimum target exceeded. Number of EVs has continued to increase as partner fleets grow.
Formal trials	Carry out analysis and experiments	Began on 1 July 2021, ongoing
Early learning report	Draft report	Published in Deliverable D4
Run flexibility trials		Trial activity ongoing
WS2 Depot trial		
Formal trials	Carry out analysis and experiments	Began on 1 July 2021, ongoing
Early learning report	Draft report	Published in Deliverable D4
Depot planning & optimisation systems	Build and Test	Development completed
Run flexibility trials		Trial activity started, ongoing
Depot planning tool	Build web-based site planning tool	Site planning tool tested, launched and minor changes made based on feedback
WS3 Mixed trial		
Formal trials	Carry out analysis and experiments	The trial period for WS3 began in August 2020 and is proceeding to plan
Data capture and analysis (Mixed trial)	Capture of data from Uber vehicles	In progress, on schedule
	Analysis of data from Uber vehicles	In progress, on schedule
Early learning report		Published in Deliverable D4

Task name	Sub-activities	Status at end of period
WS4 IoT Platform, Network Forecasting & Flexibility Analysis		
Analytics platform	Run, test and support	Ongoing
Flexibility functionalities	Build and Test	Complete
ANM modification	Design, Build, Test	Complete
GSA/SFS Modification	Scope, Implement, Run	Ongoing. Delayed from original plan to incorporate project data and learnings in design, but still on track to deliver required outcomes. Initial findings published in Deliverable D5 .
WS5 Business Model		
TCO Model	Draft model	Run and initial outputs published in Deliverable D5
Behavioural analysis	Questionnaires and analysis	Questionnaires carried out and analysed, results published in Deliverable D5
Interim report	Draft report	Published as Deliverable D5
WS6 Reporting & Deliverables		
Deliverable D4	Compile deliverable	Complete, published on 21 January 2022
Deliverable D5	Compile deliverable	Complete, published on 10 May 2022
PPR June 2022	Compile report	Completed and published (this report)
WS7 Project Management & Sharing Learning		
Dissemination events	Present at events to update on project progress and learnings	Events held, see Section 8
Website design and build	Maintain website	Ongoing
Project management	Maintain project plan and budget	Ongoing
	Project reporting and governance	Ongoing

3.2 Summary of changes since the previous PPR

Since the FSP, there have been no material changes, as defined in the NIC Governance document v3.0. A summary of the project plan is shown in Figure 5.

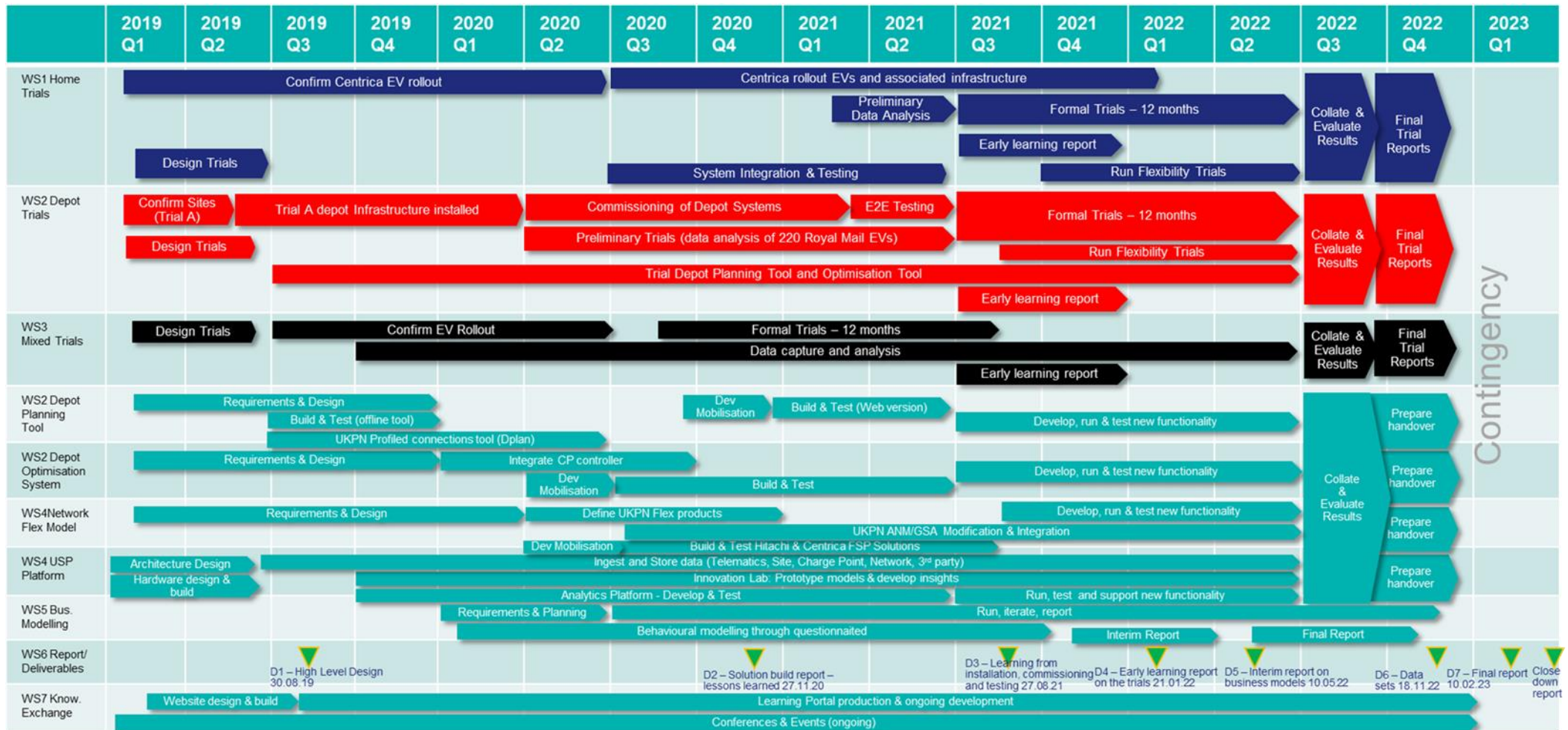


Figure 5 – Summary Project Plan

3.3 Identification and management of issues

As the project is now engaged in carrying out the trials, the previous issues around ensuring there are sufficient vehicles to complete the trials have been resolved.

The issues raised in the previous PPR regarding Centrica technical issues and internal resource pressures resulting from the project extension, have been resolved. Centrica has resolved the issues with CP control and identified the necessary resource to run trials and analyse data. Some elements of the flexibility experiments had to be retimed in response to this issue, however this is not expected to impact the overall timelines of the project or the expected learnings.

The project has also dealt with a number of changes of team members over this reporting period, across multiple partners. While this has caused some disruption to project activities, it is not expected to have any material impact on project outcomes.

Optimise Prime continues to monitor risks and emerging operational issues through regular reviews. Where necessary mitigations are put in place and lessons learnt are shared through the project deliverables. Section 10 provides a full list of the risks that are being monitored by the project.

3.4 Look-ahead to next reporting period

The detailed tasks for each workstream for the next reporting period are described in Section 0. In summary, the key tasks for the next period are:

- WS1 – Home Trials
 - Conclusion of the trial activities, including the flexibility events in products B and C
 - Compilation of data set for publication in Deliverable D6
 - Analysis of trial data in preparation for publication of Deliverable D7.
- WS2 – Depot Trials
 - Conclusion of the trial activities, including the running of profiled connections, a number of flexibility events in products A and B and periods of unmanaged and smart charging
 - Compilation of data set for publication in Deliverable D6
 - Analysis of trial data in preparation for publication of Deliverable D7.
- WS3 – Mixed Trials
 - Continue to capture and analyse journey data
 - Compilation of data set for publication in Deliverable D6
 - Analysis of trial data in preparation for publication of Deliverable D7.
- WS4 – IoT Platform, Network Forecasting & Flexibility Analysis
 - Continued maintenance of platform and applications in support of the trials
 - Use of trial data in UK Power Networks' SFS
 - Running of final flexibility events and analysis of results
 - Transitioning the Site Planning Tool on UK Power Networks' systems
- WS5 – Economic Analysis & Business Models
 - Analysis of final round of behavioural surveys
 - Business modelling activity based on findings from the trials, for fleet electrification and the project methods
 - Generate interim findings towards Deliverable D7
- WS6 – Reporting & Deliverables
 - Complete Deliverables D6 and begin preparation of Deliverable D7
- WS7 – Project Management & Sharing Learning

- Continue to monitor project progress and budgets
- Continue to update the project website
- Monitoring of trial progress and planning of enhancements
- Continue to participate in industry events and share project learnings.

4 Progress against budget

Details of project progress against budget is given in Confidential Appendix B.

5 Project bank account

A project bank account statement is included in Confidential Appendix C.

6 Project deliverables

Table 2 summarises the current progress towards completing the project deliverables. To date Deliverables D1, D2, D3, D4 and D5 have been [published](#). On 20 February 2020, the project notified Ofgem of a non-material change, delaying the publication of deliverables D2-D7 by up to one year. The 'Due Date' column reflects these revised dates. Should it become possible to bring forward the completion of a deliverable the project will endeavour to do so.

Table 2 – Project Deliverables – Showing revised deliverable deadlines communicated to Ofgem as a non-material change on 20 February 2020

Deliverable	Description	Due Date	Status
D1 High level design and specification of the three trials	Report outlining the requirements, use cases, scenarios, technologies and locations for WS1 (Home Charging), WS2 (Depot Charging) and WS3 (Mixed Charging)	30 August 2019	Published 29 August 2019
D2 Solution build report – lessons learned	Report setting out the lessons learned from the infrastructure and technology build for the trials. The report will also include a description of the methodology to be used for trials	26 February 2021	Published 27 November 2020
D3 Learning from installation, commissioning and testing	Report setting out the key learning points from the installation, commissioning and testing processes/activities	27 August 2021	Published 23 August 2021
D4 Early learning report on the trials	Report setting out how each trial is performing, data gathered, insights gained, changes required	18 February 2022	Published 21 January 2022
D5 Interim report on business models	Interim report outlining the preliminary economic and behavioural findings and high-level options for commercial solutions/business models	13 May 2022	Published 10 June 2022
D6 Data sets	Final datasets gathered from the trials for dissemination to stakeholders.	18 November 2022	In planning

Deliverable	Description	Due Date	Status
D7 Final learning report	<p>A report covering:</p> <ul style="list-style-type: none"> • A summary of the work undertaken • The insights gained from the trials • Recommendations and likely costs and benefits • Models for use of commercial EV flexibility by DNOs. • Recommendations on business models • How the trials, the infrastructure and technology should be transitioned after the project has completed and <p>How to ensure integration of the Methods with DNO/DSO systems and processes</p>	10 February 2023	In planning
Comply with knowledge transfer requirements of the Governance Document	<ol style="list-style-type: none"> 1. Annual Project Progress Reports which comply with the requirements of the Governance Document 2. Completed Close Down Report which complies with the requirements of the Governance Document <p>Evidence of attendance and participation in the Annual Conference, as described in the Governance Document</p>	N/A	<p>2019, 2020 and 2021 reports published. This report, together with the December report, will meet the 2022 requirement</p> <p>Item 2 is not yet due to start.</p> <p>The project plans to participate in this year's annual Energy Networks Innovation Conference</p>

7 Data access details

It is recognised that innovation projects of this nature may produce network and consumption data, and that this data may be useful to others. This data may be shared with interested parties whenever it is practicable and legal to do so and it is in the interest of GB electricity customers. When such data is available the project will provide access to non-personal, non-confidential/non-sensitive data on request, in line with UK Power Networks' Innovation Data Access Policy, <http://innovation.ukpowernetworks.co.uk/wp-content/uploads/2021/11/UK-Power-Networks-Innovation-Data-Sharing-Policy-.pdf>.

As part of deliverable D6, the project plans to make a comprehensive dataset resulting from the trials openly available.

8 Learning outcomes & dissemination

Optimise Prime is committed to sharing learnings with a wide group of stakeholders in order to help accelerate the EV transition. There have been a number of learning outcomes to date, which have been identified throughout the PPRs and in the project's first deliverables.

Optimise Prime continues to maintain the project website www.optimise-prime.com, together with the project LinkedIn account <https://www.linkedin.com/company/optimiseprime>, providing periodical updates to interested stakeholders. The project's twitter account https://twitter.com/optimise_prime is also sharing updates on the progress of the trials.

A number of presentations have been made to conferences organised in-person and online throughout this reporting period. Activities include:

- UK Power Networks' [press release](#) announcing the launch of the Site Planning Tool
- Walkthroughs of the site planning tool for DNOs, fleets and industry stakeholders to gain feedback for potential improvements
- Presentations of the Site Planning Tool to stakeholders at the joint SSEN and SP Energy Networks 'Electrifying your EV fleet' stakeholder event on 23 March 2022, the UK Power Networks [Competition in Connections Forum](#) on 29 March 2022 and Innovation Gateway's [EVzero](#) Event on 28 April 2022
- A [presentation](#) by UK Power Networks at the Cornwall Energy Electric vehicles and charging infrastructure forum on 19 May 2022
- A paper detailing initial findings from the project was presented by UK Power Networks at [CIRED Porto Workshop 2022 – E-mobility and power distribution systems](#), 2 June 2022
- A presentation by UK Power Networks at [ENERGYx2022 South](#) on 15 June 2022
- A [podcast](#) was made where Hitachi Programme Manager James Bracegirdle and development lead Tiago Ventinhas discussed progress made in the project
- The publication and promotion of [Deliverables D4 and D5](#) through the project's website and social media accounts and promotion by project partner Hitachi.

Where possible, presentations from events have been made available on the project website at <https://www.optimise-prime.com/presentations>.

9 Intellectual Property Rights (IPR)

This section lists any relevant IP that has been generated or registered during the reporting period along with details of who owns the IPR, any royalties that have resulted (Table 3), and any relevant IPR that is forecast to be registered in the next reporting period (Table 4).

Table 3 – IP generated last period (January – June 2022)

IP Description	Owner(s)	Type	Royalties
Deliverable D4	All project partners	Relevant foreground IPR	N/A
Deliverable D5	All project partners	Relevant foreground IPR	N/A

Table 4 – IP forecast next period (July – December 2022)

IP Description	Owner(s)	Type
Deliverable D6	All project partners	Relevant foreground IPR

10 Risk Management

Table 5 lists the risks highlighted in the FSP as well as new risks that have arisen during the reporting period. This table describes how the project is managing the risks and the potential impact on project delivery.

Since December's PPR the project has identified risks R069 and R070. The project continues to monitor risks and issues through regular risk management meetings. Following each meeting risk impacts and mitigation plans are updated. Six risks have been closed over this period, due to the risk passing, having been successfully mitigated or having evolved into an issue. Risks closed in previous reporting periods are omitted.

Table 5 – Project Risk Log

ID	Name	Risk Description	Mitigation/Comments	Impact on Cost	Probability	Impact on Schedule	Status	Owner	Last Review	Closure
Project Name: Optimise Prime										
R001	Project costs are higher than expected	Project overspend requiring additional Partner contribution or request to Ofgem for additional funding	<p>Budget completed in 2018 and submitted in the FSP Budget updated in November 2018 for contracts Budget is updated each month for actuals and new forecasts, with a new baseline every quarter.</p> <p>20/02/20 – Project extended 364 days within current budget, project consortium will explore all available options to mitigate any further extension and the associated impact on budget 05/06/20 – Risk of further cost overrun reduced by decision to alter EV targets 10/02/21 – Delay in completion of ANM flexibility features may require TOA team to be engaged for longer 13/05/21 Exploring options but flexibility trials may involve manual process for products B&C, currently impacting cost. 13/10/21 Agreed to manage overspend due to ANM delay by utilising underspend from equipment budget – no impact on overall project budget. 07/02/22 - Revised down to medium, reflecting above mitigations, overall underspend and gradually declining risk as project progresses.</p>	Medium	Medium	Negligible	Open	PM	12/05/22	
R002	Some aspects of the technical solutions are not achievable to the desired specification within the project budget	The project will not be able to investigate all of the available techniques	<p>- 14/06/19 An agile method is planned to be used. The exact method used will be flexed according to budget and time available in order to achieve the project scope.</p> <p>- 21/04/21 The majority of this risk has now passed without issue or is successfully mitigated. There is still the remaining inherent risk that an issue could occur e.g. SetPoint processing interval constraints, reducing probability</p> <p>- 09/07/21 This risk is now negligible and will be closed once all work on flexibility is confirmed as complete.</p> <p>13/04/22 – This risk is closed as the technical development aspects of the project are now complete</p>	High	Negligible	Low	Closed	TDA	13/04/22	13/04/22

ID	Name	Risk Description	Mitigation/Comments	Impact on Cost	Probability	Impact on Schedule	Status	Owner	Last Review	Closure
R004	Solution does not deliver anticipated outcomes	Lower than expected value delivered	<p>Trials design agreed on 07/06/19.</p> <p>Trial and solution design is clearly defined following set methodology clearly linking activities with outcomes. Designs are agreed with relevant Partners and linked to FSP commitments.</p> <p>Solution design and business case regularly reviewed throughout the project lifecycle and changes are made where needed</p> <p>Review of each Deliverable by UK Power Networks prior to submission to Ofgem to ensure the solution delivers the outcomes</p> <p>25/11/19 – Independent assessor has not raised issues with trials/solution design</p> <p>22/05/20 – Imperial College review supports statistical significance of the trial methods to meet learning objectives</p> <p>13/04/21 – Outcomes are under consistent report as experiments and deliverables are published, the control is to continually ask within these periods whether the project is still on target to meet the expected outcomes</p> <p>13/05/21 – Looking at benefits management to better measure progress to outcomes</p> <p>13/10/21 – No further updates to note</p> <p>13/01/22 – Profiled connection trials have found that the current form of profiled connections may not be viable at the majority of RMG depots due to the low EV demand relative to variability in background loads.</p> <p>08/02/22 Considering how to redesign profiled connections to give flexibility to customer while still delivering value to DNO, eg. additional profiled connection products to buy and sell capacity where needed</p>	Negligible	Low	Negligible	Open	PM	12/05/22	
R005	Partner performance is not contractually defined	Outputs delayed or inadequate and potential overspends	<p>Weekly meetings with Project Partners,</p> <p>Suitable incentives where required</p> <p>Shared responsibilities for deliverables</p> <p>Contracts signed on 18/03/19</p> <p>Partners remain committed and performance is tracked by weekly meetings and programme governance</p> <p>- 12/08/20 The delay has resulted in some resource constraints at Centrica for delivering flex trials. Mitigated by rescheduling of trial activity to reduce and batching some trial preparation activity.</p> <p>13/04/2022 – Resource in place from 21 March to work on Centrica Data Science. Probability reduced to low.</p>	Medium	Low	Medium	Open	PM	12/05/22	
R009	Partner or supplier may withdraw from project	Partner or supplier needs to be replaced. Partner or supplier withdrawals resulting in new technology or equipment having to be purchased.	<p>14/06/19 Working group established on 03/05/19 to find new participants for the home fleet</p> <p>Weekly status reports with the Partners, and quarterly governance meetings to assess performance.</p> <p>Do not expect any existing partner to withdraw.</p> <p>13/04/22 – Closed as have buy in from all partners and are in the final quarter of the trials</p>	Medium	Low	High	Closed	PM	13/04/22	13/04/22
R012	Changes to key personnel	Project delays due lack of availability of personnel for key roles/loss of knowledge	Ensuring project progress, systems, processes and learnings are well documented in a timely way to prevent loss of knowledge caused by staff changeover.	Low	Low	Medium	Open	PM	12/05/22	

ID	Name	Risk Description	Mitigation/Comments	Impact on Cost	Probability	Impact on Schedule	Status	Owner	Last Review	Closure
R016	Major issues with equipment causing damage to network or causes injuries	Equipment is damaged or individual is injured	Analysis of this potential is carried out early in the project and recommendations are incorporated into the design. 22/04/20 – Pilot site in place, insurance in place, no issues to date & minimal risk – change to negligible 13/04/22 – Risk has not changed in profile or controls from last review	High	Negligible	Low	Open	Trial Operations PM	12/05/22	
R019	Delays to the procurement and installation of infrastructure	Delays to the start of the trials	Plan procurement and installation as early as possible. Identify alternative suppliers if delays are likely. Monitor supply chain. Early discussion between the Partners and car manufacturers to secure sufficient number of EVs. 22/04/20 – all equipment except load/connection monitoring in place for WS2 Trial A. Commissioning and WS1 progress paused by COVID-19. 22/05/20 – Measures now in place to resume work safely. 13/04/2021 – Risk to remain open until Panoramic Power installs are complete and VisNet hubs are installed 13/05/21 – Panoramic Power now all installed, VisNet surveys are now ongoing. 09/07/21 – Visnet hubs delayed, some physical issues at sites and contractual issues delaying install – ongoing progress covered in R055 13/01/22 – Decided not to install at Orpington as there will be no profiled connection trialed there – Closed	Low	Medium	Medium	Closed	PM	13/01/22	13/01/22
R022	Legislative changes	Legislative changes mandate project methods or make them illegal by mandating alternative methods. Project business case is not achievable	Closely monitor legislative proposals with OZEV. Lobby where necessary. 13/10/21 – Ofgem's minded to decision on the Access and Forward-Looking Charges Significant code review may impact the business case of profiled connections for connecting customers and DNOs. If implemented, this type of flexibility may be more valuable to DNOs but might provide less of an up-front cost reduction for customers. 12/05/22 – Ofgem made final decision on SCR on 3 May 2022, choosing to implement a fully shallow charging boundary	High	Low	Low	Open	PM	12/05/22	
R024	Ofgem ability to Halt the Project (Cancellation)	Ofgem may halt the project in certain circumstances e.g. because it has become clear that the Method is not viable or there are other reasons why it is not efficient, or not possible to continue with the project. Ofgem will identify Halted Project Revenues; funds received by Funding Licensee which have not yet been spent (less funds to halt the project).	Critical to keep accurate and up to date records of expenditure and evidence of committed funds. Project is continuously reviewing circumstances, assessing risks and impact, preparing different options and involving Project Board in decision making. Ofgem is notified of changes and consulted where necessary	High	Low	Negligible	Open	PM	12/05/22	

ID	Name	Risk Description	Mitigation/Comments	Impact on Cost	Probability	Impact on Schedule	Status	Owner	Last Review	Closure
R029	WS1 – EV targets are not met	Potential that WS1 is unable to meet EV targets due to factors outside Project control, EU CAFE regulations place obligations on vehicle OEMs that may encourage them to delay new ultra-low carbon LCV launches into 2020 Centrica original EV purchasing timeline delayed,	Project will work with Hitachi Capital and new participants to endeavour to meet the volumes. Stage Gate process in place to manage project spend if EV volumes are ahead of, at or behind target 30/04/19 – Fortnightly meetings taking place 14/06/19 – Draft Strategy produced and a list of target potential participants being pursued. 29/11/19 – Targeted spend option chosen to give time for vehicle procurement 22/05/20 – Considering Centrica fleet cars, out of area EV vans to supplement trial as a mitigation; Exploring number of vehicles required for statistically significant result 17/07/20 – Centrica have announced order for 1,000 vehicles and should now meet project requirements. Probability changed to Low. 16/11/20 – Centrica have confirmed plans for 2020 and committed to regular rollout progress reports 13/04/21 – On track for minimum before July and all vehicles by September 14/06/21 – 322 vehicles on the road, minimum target met for data capture 14/09/21 – Rollout continues, full 1,000 EV programme delayed, expected to complete in January 2022. 30/11/21 – Work ongoing to ensure minimum number of vehicles involved in flexibility trials. 11/03/2022 – Closed as minimum numbers exceeded (300 on each flexibility trial).	High	Low	High	Closed	PM	11/03/22	11/03/22
R049	Potential changes to partner back office systems	Level of M&A activity in the segment may result in changes to CPO back office suppliers requiring more integration work	Talking to a number of CPOs as part of new participant discussions. 23/06/20 – Discussing potential to test control via back office with CPO providers as alternative method 16/11/20 – Awaiting costs and timeframes 11/02/21 – Working more closely with CPOs to resolve issues and implement over air functionality. 13/04/21 – Trials Operations lead will continue to work with all suppliers etc. to monitor risk level 14/09/21 – CPMS provider moved hosting to AWS. Testing appears to have been successful. 13/04/2022 – Probability remains low as Royal Mail changes delayed and only 3 months of trials remain	Low	Low	Low	Open	Design Authority	12/05/22	

ID	Name	Risk Description	Mitigation/Comments	Impact on Cost	Probability	Impact on Schedule	Status	Owner	Last Review	Closure
R050	Coronavirus/ COVID-19	Spread of Coronavirus may result in business disruption to project partners and/or supply chain issues. Potential delays to project from significant time off work for project members. Further delay to EV delivery and participant discussions will impact development ramp-up, Trial Period and deliverables.	Partner companies and employees to take reasonable precautions including ability to work from home as required. Partners were asked at the board meeting on 03/03/20 to report if any issues were identified that could impact the project. No direct impacts were identified at that point 16/03/20 – Uber raised risk of lower demand slowing change to EV in immediate term. Some vehicle manufacturers, e.g. Peugeot have suspended production which may have knock on effects on EV delivery. Social distancing may disrupt partner or other discussions. 07/04/20 – Site works suspended. Centrica warn that lead time on vehicles likely to be extended and other works delayed. 22/05/20 – Centrica EV order delayed and new participant discussions paused. Project has informed Ofgem of issues and is exploring options such as investigating the number of EVs needed for statistical significance to ensure the project delivers expected learnings 11/06/20 – Board decision to re-size trials mitigates some risks regarding finding partners, changed probability to low 13/10/20 – Risk remains but is low as all partners have or are committed to have vehicles. 16/11/20 – Second lockdown started – no major impact yet, continuing to monitor 08/12/20 – Lockdown passed with no material impact. 07/01/21 – Third lockdown entered. Has resulted in reduction in Uber trips and is likely to have an impact on development efficiency 16/03/21 – Uber trips now recovered. Royal Mail Depot questionnaires delayed (see R59) 13/04/21 – The continued global effects on supply chains and UK based restrictions still have impact on the programme although general signs are good, the risk will remain 09/07/21 – Sufficient vehicles in place, very few minor risks remain with most mitigated, downgraded to low. 13/04/22 – Risk remains, but impacts have been minimal	Negligible	Low	Medium	Open	PM	12/05/22	
R054	Reliance on third party systems – CSMS	The project relies on a secure connection with Royal Mail's CSMS to control RMG chargers. The project has no direct contractual relationship/SLA with the CSMS. Due to a VPN configuration change comms were disrupted.	17/08/2020 – Continuing to press CSMS to resolve the issue via Royal Mail and Nortech. Issue caused by their third party IT service provider. 16/09/2020 – Static IPs have been established to resolve this issue and prevent reoccurrence. 13/04/21 – Continuing to manage relationship with suppliers where required. 09/07/21 – Risk will remain throughout project and has not changed in profile. 12/11/21 – A platform change by a CSMS provider resulted in a short comms outage due to IP change. VPN is now in place to prevent reoccurrence. 13/04/22 – Probability revised to low as trials in final quarter	Low	Medium	Low	Open	PM	12/05/22	

ID	Name	Risk Description	Mitigation/Comments	Impact on Cost	Probability	Impact on Schedule	Status	Owner	Last Review	Closure
R055	LV monitoring of Royal Mail sites on the network side of the POC.	Profiled connection requires the network side of the POC to be monitored to ensure adherence of the customer's site to the agreed profile. For customers who are not connected via dedicated feeders or substations, an alternative monitoring solution needs to be installed at the metering point on customer's site and will require integration to UK Power Networks' ANM system to transfer the real-time analogue measurements. This integration development work will require additional time & effort and there is risk that trial activities may be delayed as a result.	<p>06/11/20 – Have identified a UK Power Networks approved LV monitoring solution that could potentially be utilised for this application. Continue to engage internally within UK Power Networks as well as with the supplier to confirm suitability of using the LV monitoring solution. Once confirmed engage with LV monitoring equipment and ANM system suppliers to develop a plan to deliver the integration development work.</p> <p>16/03/21 – Due to age of electrical installation at some sites, installation may take longer than originally planned</p> <p>14/04/21 – Risk remains until hubs are installed</p> <p>13/05/2021 – Site surveys are in progress to identify any enabling works to install the equipment. Continuing to monitor the risk.</p> <p>09/07/21 – Install only gone ahead at one site. An interim monitoring approach is needed</p> <p>12/08/21 – Three sites now monitored. One lacks space for install.</p> <p>12/11/21 – Seven devices installed at six depots, installation at final site planned. One further depot de-scoped due to site specific issues. All sites being monitored at customer side, so delay has not impacted profiled connection trials.</p> <p>13/01/22 – Orpington site descope as not needed for profiled connections. Closed as all required sited complete.</p>	Low	Medium	Medium	Closed	UK Power Networks PM	13/01/22	13/01/22
R066	Production of statistically significant data for flexibility trials	The trial partners do not have full agreement on the number of flex events and combinations of parameters needed, creating a risk of not meeting commitments with Ofgem	<p>20/09/21 – A plan for flexibility events throughout the year has been set out and is being exercised for RMG. This covers all required combinations. For Home trials, further revision is ongoing to match effort required to available resources at Centrica.</p> <p>13/10/21 – Possibility of a resource constraint in Centrica and UK Power Networks impacting the number of possible executions, though still on track to deliver statistically significant data at this time</p> <p>12/11/21 – Centrica are experiencing issues controlling CPs for flexibility purposes reliably. Working with CP manufacturer to resolve. Risks delaying flexibility trials with larger numbers of vehicles and may need extra flex periods planned</p> <p>30/11/21 – Centrica are in the process of re-testing flexibility provision with UK Power Networks in order to increase trial sample</p> <p>13/01/22 Centrica successfully ran Product B for 520 vehicles in December, reducing this risk significantly</p> <p>08/02/22 300 vehicles in both product B and C trials.</p> <p>11/03/22 Centrica's flex resource has left project and it's not clear who will run April trials</p> <p>13/04/22 – Resource appointed to coordinate data science/analysis and flexibility process at Centrica</p>	Medium	Low	Medium	Open	Hitachi PM	12/05/22	

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R067	Migration of platform results in loss of data or interruption to applications	The project systems need to be migrated to a new platform (R058) to ensure ongoing support. The transition process presents the risk of an interruption to data gathering or loss of data	Regular backup of all data and applications taking place. Thorough testing of all services will occur before cutover. 11/03/22 – Migration appears to have proceeded successfully. Monitoring. 13/04/22 Closed as migration passed successfully	Medium	Low	Medium	Closed	Hitachi Platform PM	13/04/22	13/04/22
R068	Centrica resource and technical constraints	As a result of the extended project and other internal resource pressures, Centrica have not been able to be fully engaged in the formal trials and some elements of the flexibility and smart charging solutions have been delayed. Reduced numbers of experiments, simpler experiments, or experiments over a shorter period may weaken the applicability of trial results. Some technical issues in communicating with the ANM system and controlling CPs has also delayed some trial activities and risks further delaying experiments.	Hitachi and UK Power Networks are working closely with Centrica to understand the resource constraints and re-plan flexibility trialling activities accordingly. Where possible, some flexibility tenders are being combined to cover multiple days in one event. Trialling of flexibility services with product B began, utilising the Centrica and ANM systems in October 2021, starting with a smaller subset of vehicles, but with plans to expand the sample. Some control issues were experienced by Centrica, who are working with the CP manufacturer for a resolution and are in the process of carrying out further tests with UK Power Networks. The partners have produced a revised plan of flexibility trial activities. 07/12/21 - Testing between Centrica and UK Power Networks indicates that the problem has been resolved. Centrica are entering 500+ chargers into flexible unit for next flex B run. 07/12/21 - New responsible manager has been appointed for project at Centrica 13/04/22 – Resource appointed to coordinate data science/analysis and flexibility process form 21 March. Probability reduced to low.	Medium	Low	Medium	Open	Hitachi PM	12/05/22	
R069	Royal Mail BAU electrification may impact trial conditions	Royal Mail is expanding their EV fleet. Addition of new vehicles and/or new charging infrastructure alongside trial systems may impact predictability of loads on sites. Royal Mail plan to migrate some legacy CPs.	Move to new provider before end of March may lose 18 sockets at 3 sites. Reconfiguration needed at further 30 sockets which may result in temporary disruption. Before Christmas additional 10 at Dartford and Victoria, 6 at Bexleyheath and Orpington, 5 at Whitechapel. Originally temporary but may be staying permanently and registering as either background load or other vehicles. Discussing impacts with Royal Mail. 08/02/22 - Transition date not known. Discussing how to manage impact of new infrastructure with depot managers. 11/03/22 – Adding 37 new vehicles into project data as they are becoming permanent and agreed not to migrate CPs until after 1st July - revised to low probability	Medium	Low	Medium	Open	Hitachi PM	12/05/22	

ID	Name	Risk Description	Mitigation/Comments	Impact on Cost	Probability	Impact on Schedule	Status	Owner	Last Review	Closure
R070	Delays in/failure to approve release of data may delay academic analysis and/or D6	Partners must approve data sets for release for Academic analysis tender (and later D6). Cannot proceed if data release is not approved	11/03/22 – Royal Mail have approved release 13/04/22 – Approval received from all three fleets for data for tender and for RMG/Centrica data for D6. Uber data for D6 still needs to specified and approved but given good progress probability set to low.	Negligible	Low	Medium	Open	Hitachi PM	12/05/22	

11 Material change information

No material changes have been encountered during this reporting period and none are foreseen for the next reporting period.

12 Other

There is no other information to report to Ofgem.

13 Accuracy assurance statement

The project has implemented a project governance structure as outlined in UK Power Networks' innovation policies and procedures. All information produced and held by the project is reviewed and updated when required to ensure quality and accuracy. This report has gone through an internal project review (and a further review within UK Power Networks) to ensure the accuracy of information.

UK Power Networks hereby confirm that this report represents a true, complete and accurate statement on the progress of the Optimise Prime project in the six month reporting period and an accurate view of UK Power Networks' understanding of the activities for the next reporting period.



Signed

Date 17 June 2022.....

Suleman Alli
Director of Customer Service, Strategy, Regulation & IS
UK Power Networks