



NIC Project UKPNEN03

Project Progress Report

March 2023



Optimise Prime



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Table of acronyms

Acronym	Full form
ANM	Active Network Management
CP	Charge Point
DNO	Distribution Network Operator
DSO	Distribution System Operator
EV	Electric Vehicle
FSP	Full Submission Pro-forma
FU	Flexible Unit
GB	Great Britain
GSA	Geospatial Analytics
ICEV	Internal Combustion Engine Vehicle
IoT	Internet of Things
IP(R)	Intellectual Property (Rights)
IT	Information Technology
NIC	Network Innovation Competition
OZEV	Office for Zero Emission Vehicles
PH(V)	Private Hire (Vehicle)
PM	Project Manager
PPR	Project Progress Report
RAID	Risks, Assumptions, Issues and Dependencies
SFS	Strategic Forecasting System
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 was an industry-led electric vehicle (EV) innovation and demonstration project that brought 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.

The project gathered data from over 8,000 EVs driven for commercial purposes through three trials. Optimise Prime also implemented 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 aimed 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 was 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 sought 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 eighth and final Project Progress Report (PPR) for the Optimise Prime Network Innovation Competition (NIC) project, covering the period between 18 December 2022 and the end of the project on 28 February 2023. This document fulfils the reporting requirements of Sections 8.11 – 8.15 of v3.0 of the NIC Governance Document for 2023. This document aims to provide project stakeholders with information on the activities and lessons learned from the final months of the Optimise Prime project.

1.3 Summary of progress

Optimise Prime has made significant progress in the last two and a half months. All three trials have concluded, and activity was focused on finalising the analysis of the data collected and documentation of project learnings and recommendations.

Over this period, the project has successfully:

- Completed the analysis of the data gathered in the three trials
- Published the project's conclusions in [Deliverable D7](#), Final Learnings report
- Held a [final knowledge sharing event](#) on 18 January, attended by 94 people from a range of industries
- Published an additional dataset on UK Power Networks' [Open Data Platform](#), containing summarised charging and vehicle trip data
- Continued with the dissemination of the project learnings through social media, videos and the project website
- Decommissioned the remaining project systems and backed up key data
- Managed the project, including its outstanding risks and finances
- Started drafting the project's Close Down report.

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 ended the trials with 1,083 EVs on the road, around 900 of which were charged at drivers' homes and able to take part in flexibility trials. The remainder of the fleet made use of public charging. Centrica shared charger and telematics data regularly with Hitachi, covering the duration of the trial period.

In this reporting period analysis of the WS1 trial data was completed and the results were included in [Deliverable D7](#).

The **WS2** depot trial concluded with 342 EVs operating from nine Royal Mail sites. The Royal Mail sites in WS2 participated in trials of both Profiled Connections and Flexibility products.

In this reporting period analysis of the WS2 trial data was completed and the results were included in [Deliverable D7](#).

In **WS3** (the Mixed Trials utilising Uber trip data from London-based EVs), Uber ended the trials with 6,713 EVs on their platform in London. Throughout the project, Uber has collected and anonymised trip data from EVs. During this reporting period, a final round of analysis of the Uber data took place in order to create insights for London's local authorities. A meeting was held by Uber and Hitachi with representatives of several boroughs on 8 February 2023 to share these findings.

Insights from the analysis of Uber data were presented in [Deliverable D7](#).

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 to enable the final analysis work. Project data was backed up, ensuring that necessary data will be preserved, and the final elements of the project's IT platform were switched off on 28 February 2023.

Hitachi and UK Power Networks worked with Element Energy, who provide UK Power Networks' Strategic Forecasting System (SFS), to run network modelling based on data from the Optimise Prime trials. This data was analysed and presented in [Deliverable D7](#).

1.3.3 WS5 – Economic Analysis & Business Models

The Economic Analysis & Business Models workstream made final updates to the Total Cost of Ownership (TCO) model and operating model for the electrification of fleets in this period, as a result of reviews by project partners. The final results were published in [Deliverable D7](#).

1.3.4 WS6 – Reporting & Deliverables

[Deliverable D7](#), the final learning report, was published on time in February 2023. During this reporting period, the project has also drafted the Close Down report, which will be published following the end of the project and this PPR.

1.3.5 WS7 – Project Management & Sharing Learning

The project management function continued to manage Optimise Prime's programme plan, budget, and resources throughout this reporting period. The project has concluded with an underspend of budget and no outstanding risks that need to be addressed.

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, including a series of short films and a final learning event was held on 18 January 2023 in London.

1.4 Risks and issues

The project operated 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 neared completion, the number of risks declined. Outstanding risks, which were primarily related to potential for delays to project outcomes, have now been closed and have not resulted in further delay to project completion or overspend of the project budget.

1.5 Project Learnings

The project generated a wide range of learnings as the trials and accompanying business modelling activities concluded. The project's final set of learnings were published in [Deliverable D7](#) during this period.

For Method 1, British Gas vehicles charging at home were aggregated into Flexible Units (FUs) in order to provide turn-down services to the Distribution Network Operator (DNO). This method was extended to the depot-based vehicles of Royal Mail in order to study the differences between the two fleet types when it comes to flexibility provision. The British Gas home-based fleet was found to be very reliable in the delivery of flexibility services, over a 1-hour period and at specific times, due to its predictable pattern of charging load. The short and

sharp load peaks at some depots limited the duration and volume of flexibility that could be reliably offered.

For Method 2, the project tested profiled connections at nine Royal Mail depots. The project successfully demonstrated how a profiled connection could be set and how a charging management system can be used to control EV charging in order to prevent the majority of breaches of the profile. A key finding was that profiled connection may be less suitable for locations where the EV load is relatively small, or the background load is particularly variable. To be successful, the controllable EV load must exceed the potential variation in background load, otherwise breaches may occur. The trial depots also demonstrated how seasonal/periodic revisions of profiles may be needed for fleet customers with operational patterns that vary throughout the year.

In addition to the methods, learnings from the project covered an array of areas dealing with organisational, financial, planning and technical issues in addition to the insights gained from the analysis of the project data and the trial of the project methods. Some key learnings include:

- Unmanaged, home-based fleets will create concentrated load peaks from 17:00 due to the timing of the end of shifts coinciding with network peaks
- Depot load profiles are site specific and can change seasonally, with two main peaks appearing at 14.00 and 19.00, which follow the depot delivery schedules. More rural Royal Mail depots are likely to see their demand peak in the afternoon
- Most (77%) demand from PHVs occurred off-shift, with plug-ins peaking at about 20:00, but continuing through the night – later than other fleets
- It is expected that the rapid growth in the number of Uber EVs will result in a maximum load from off-shift charging in Greater London increasing from an estimated 10 MW in May 2022 to 69 MW by the end of 2025. Over the same period, annual electricity demand from these EVs is expected to reach 497 GWh, compared to 63 GWh used in the year to May 2022. Based on modelling of driver shift times, charging needs and home locations, Optimise Prime estimates that about 33,500 fast CPs may be required to service this demand if drivers opt for overnight fast charging Winter EV energy requirements can be up to 30% higher than in the summer
- Smart charging can be very effective at changing load patterns, however it may lead to significant secondary peaks overnight. Incentives to drive the smart charging behaviour (such as through flexibility services or varying profiled connections) should be considered to reduce the impact of this behavioural change on the network.

2 Project Manager's report

2.1 Progress in this reporting period

The project has made significant progress during this reporting period and has successfully delivered the final project deliverables. Progress made in this period includes:

- Completion of all trial analysis and published this in [Deliverable D7](#), final learnings
- Running a final dissemination event to share project learnings with stakeholders
- Preparing for project closure by backing up data, decommissioning systems and drafting the Close Down report

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. No further meetings were held during this reporting period.

In addition, a regular project progress reporting process has taken place between Hitachi Europe, Hitachi Vantara, Royal Mail, Centrica, and UK Power Networks. All project partners have contributed to the Optimise Prime workstreams, including the review of project deliverables.

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 the project has come to an end the team has been gradually disbanded throughout this reporting period.

2.2 Workstream progress

2.2.1 WS1 – Home trial

The home trial, outlined in Figure 1, implemented technologies to monitor and manage commercial EVs charging at home, as well as testing their ability to provide flexibility services.

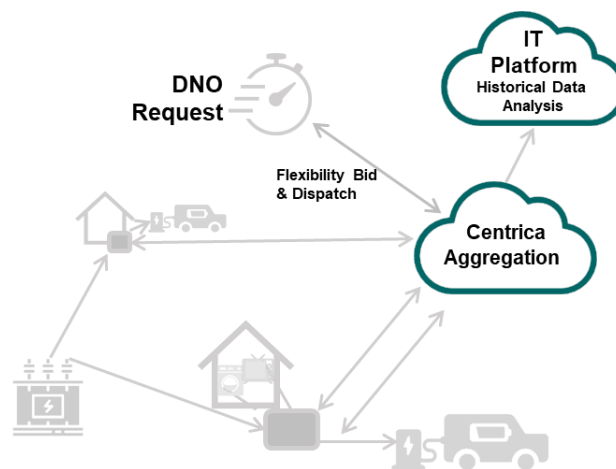


Figure 1 – Schematic of WS1 trial

2.2.1.1 Progress in this reporting period

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

- Reviewed the project's final learnings [Deliverable D7](#) where it relates to WS1 and the TCO for home based EVs
- Centrica's Fleet Manager joined the fleet panel at the project's close down event to share learnings from the electrification of the Centrica fleet.

UK Power Networks has:

- Reviewed the results of the WS1 trials and considered how this will be implemented in business-as-usual processes
- Contributed to the development and review of the findings relating to WS1 in the project's final deliverables.

Hitachi has:

- Completed analysis of the results of the WS1 trials and drafted the sections of [Deliverable D7](#) relating to WS1.

Scottish and Southern Electricity Networks has reviewed the project's final deliverable, [D7](#).

2.2.1.2 Challenges and lessons learnt

Following the end of the trials, the technical challenges of delivering the products have now passed and work in this reporting period has focused on presenting the results of, and drawing conclusions from, the trials.

A wide range of lessons have been learnt throughout the WS1 trial of Optimise Prime, and these were reported in full as part of [Deliverable D7](#). In summary, key conclusions reached include:

- The trials with British Gas have shown that current EV models are suitable to replace the internal combustion engine vehicle (ICEV) fleet, and can carry out the same workload
- If left unmanaged, the home fleet created a concentrated load peak in the early evening, coinciding with the network peak
- Aggregated home-charged EVs respond well to requests for flexibility services, with a 95% success rate, and vehicles being able to respond within one minute
- Smart charging can also significantly reduce load at peak times, but if it is driven by a single price signal the ramp up can cause a significant secondary peak
- Load is seasonal, driven both by changes in shift patterns and variation in vehicle efficiency in line with changing temperature
- Charging load, and available flexibility, varies by day of the week due to variations in workload and associated daily mileage driven. Where there are longer gaps between shifts, such as weekends, drivers may choose to delay charging if it is not convenient. This needs to be considered in the design of flexibility products
- A significant amount of public infrastructure will be needed to support home-based fleets, as a large proportion will not be able to charge at home off street.

2.2.2 WS2 – Depot trial

The depot trial, shown in Figure 2, implemented a range of technologies to allow depots to electrify economically by putting minimum additional peak load on the distribution network.

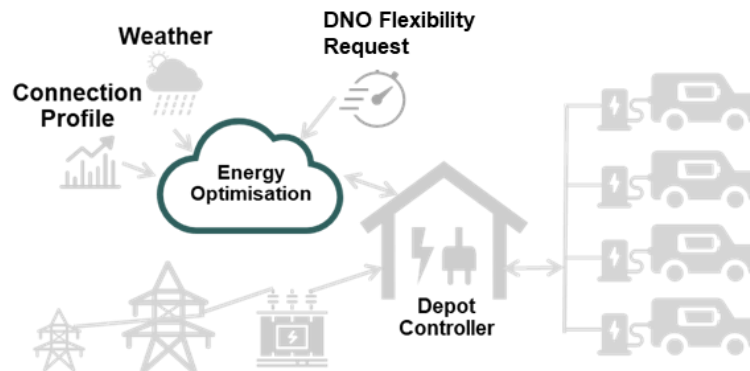


Figure 2 – Schematic of WS2 trial

2.2.2.1 Progress in this reporting period

In the depot trial, Royal Mail has:

- Reviewed the project's final learnings [Deliverable D7](#) where it relates to WS2 and the TCO for depot based EVs
- Royal Mail's Head of Fleet Transformation joined the fleet panel at the project's close down event to share learnings from the electrification of the Centrica fleet.

Hitachi has progressed the following activities:

- Completed analysis of the results of the WS1 trials and drafted the sections of [Deliverable D7](#) relating to WS1
- Decommissioned all remaining trial infrastructure.

UK Power Networks has conducted the following activities:

- Reviewed the results of the WS2 trials and considered how this will be implemented in business-as-usual processes
- Contributed to the development and review of the findings relating to WS2 in the project's final deliverables
- Continued to run the site planning tool on UK Power Networks' website.

Within this reporting period Scottish and Southern Electricity Networks reviewed the project deliverable, [D7](#).

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 D7](#):

- Load profiles are depot specific, and can be impacted by a wide range of factors including shift patterns, seasonal operational changes and local depot routines
- While ICEV telematics can be used to predict the overall quantum of power needed at a site, plug in times cannot always be accurately derived, as vehicles do not plug in

immediately on return to depot, for example while unloading of cargo at a different location before parking by the CP. Vehicles that do not need to charge every day can also cause inconsistencies – while, for example, a once in three days charging pattern can be modelled, drivers may in practice plug the vehicle in more frequently

- While the depots have shown they can respond to flexibility requests, the reliability and duration of their response is mixed. The load at larger depots can be more easily predicted, resulting in better results. The number of EVs sharing each CP also has a significant effect on load predictability
- Depot operators may want to limit demand response offered in order to manage operational risk. While this limits the amount of flexibility available it also has the impact of limiting side effects such as secondary peaks.
- Using smart charging to manage load in line with a profiled connection was shown to save some depots up to £95,000 on the cost of connection and up to 12 weeks in the time to connect. While the changes to connection charges announced in the Access and Forward Looking Charges Significant Code Review will lead to customers no longer having to pay for reinforcement of shared assets, these costs were in respect of extension assets that would still be the responsibility of the customer after the change
- Profiled connections can be successfully implemented, but EV load must be the dominant load in the depot for its control to reliably ensure compliance. A process to revise profiled connections is needed to allow changes in fleet operations during the life of the connection.

2.2.3 WS3 – Mixed trial

The mixed trial, shown in Figure 3, collected anonymised trip data from PHEVs in the London area and analysed this data to forecast future charging demands and network impacts. This trial commenced in August 2020 and finished in June 2022.

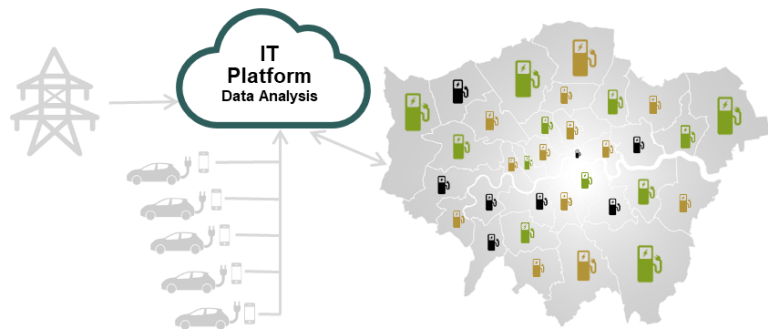


Figure 3 – Schematic of WS3 trial

2.2.3.1 Progress in this reporting period

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

- Reviewed, together with Hitachi and UK Power Networks, the final results of the data analysis
- Reviewed the project's final learnings [Deliverable D7](#) where it relates to WS3 and the TCO for electric PHVs
- Uber's New Mobility Lead joined the fleet panel at the project's close down event to share learnings from the electrification of Uber PHVs.
- Presented findings from the project to Greater London local authorities, together with Hitachi.

Outside 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:

- Contributed to the development and review of the findings relating to WS3 in the project's final deliverable, [D7](#).

Hitachi has progressed the following activities:

- Concluded analysis of charging behaviour and patterns, and potential impact on the distribution network and reviewed this with Uber and UK Power Networks.
- Drafted the sections of [Deliverable D7](#) relating to WS3
- Presented findings from the project to Greater London local authorities, together with Uber.

2.2.3.2 *Challenges & lessons learnt*

A range of lessons have continued to be learnt throughout the WS3 trial of Optimise Prime, and these were reported in full as part of [Deliverable D7](#). In summary, key conclusions reached include:

- Demand from charging of Uber PHVs is more spread out throughout the day than in the other trials, with peak demand falling in the evening after 20:00 and continuing into the night
- Battery capacity of EVs is continuing to increase, this is expected to result in demand for charging from PHVs to shift, with less enroute charging required in central areas, as vehicles can complete a full day without recharging
- As the PHV fleet electrifies, the locations where more CPs are needed will change, as the locations of the new EV drivers changes.

2.2.4 **WS4 – IoT Platform, Network Forecasting & Flexibility Analysis**

This workstream was 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 supported 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 supported WS3 through the development of the data analysis capability.

As part of this workstream, UK Power Networks developed the capability, within their systems, to receive and process profiled connection applications and manage the provision of flexibility services. Additionally, UK Power Networks used 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:

- Creating an additional dataset which summarises some of the [data released in Deliverable D6](#), allowing the use of the project data be a wider range of stakeholders

- Supporting the WS1, 2 and 3 trials through data analysis, including work to analyse the results of the profiled connection and flexibility trials
- Following the end of the trials and analysis phases of the project, work has taken place to decommission systems, back up trial data and destroy confidential data that is no longer needed.

2.2.4.2 Challenges & lessons learnt

The network impact work has revealed a number of conclusions:

- The electrification of transport could be a significant driver for network reinforcement. The Optimise Prime trials have provided valuable data which can be used to improve forecasting to be more reflective of the real behaviour of fleet vans and PHVs.
- Time-of-use based smart charging profiles led to the lowest reinforcement costs and volumes for the network overall with the lowest total reinforcement costs, fewest mapped distribution transformer upgrades and lowest demand of fleet vans and PHVs at the time of the peak load of substations. Other smart charging approaches such as flexibility and profiled connections also benefitted the network, however are more challenging to accurately model as the timing of profiles and flexibility events needs to be aligned to local network constraints.

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

- The running of 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 trial 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, for up to one hour (WS1) and three hours (WS2), each day improves the success of turn down.

2.2.5 WS5 – Economic Analysis & Business Models

This workstream was responsible for 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 considers cost savings, behavioural analysis and improving use of capacity. It also studies the TCO impacts of the project methods and makes 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:

- Completed the revision of the TCO and Behavioural studies outputs and published them in [Deliverable D7](#).
- Updated the project's cost benefit analysis, which will be published in the Close Down report.

2.2.6 WS6 – Reporting & Deliverables

This workstream was 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 D7](#), Final Learnings, as well as this PPR. The project's final output will be the Close Down report – this has been drafted and will be published following the completion of the project.

2.2.7 WS7 – Project Management & Sharing Learning

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

The Design Authority was 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 and managing the downsizing of the team as the project has come to an end
- **Risk management** – Maintaining the project Risks, Assumptions, Issues and Dependencies (RAID) log and ensuring all risks and issues are closed as the project ended
- **Status meetings** – Chairing regular project update meetings with workstream leads and project partners
- **Design Authority** – Providing the design authority function for WS1-4
- **Deliverables review** – Reviewing the deliverables of the other project workstreams
- **Communications** – Maintaining the project website, www.optimise-prime.com and the project's social media accounts
- **Shared Learning** – The planning of conference speaking engagements and dissemination events. Further details of these can be found in Section 8.

2.3 *Business case update*

During this reporting period the project has been reassessing the business case that was submitted in [Optimise Prime's FSP](#) based on the project's findings.

This reassessment has been done by updating inputs to UK Power Networks' SFS based on data from the Optimise Prime trials. Commercial EV load curves were created based on vans utilising profiled connections, flexibility services, smart charging and an unmanaged charging base case. The cost of network reinforcement resulting from these scenarios was compared and assumptions made in the original FSP business case have also been revisited.

Based on initial results, it is likely that the potential savings to network customers from the methods will be lower than predicted in the FSP business case. This is due to a number of factors, including:

- **The SFS had not been created at the time the FSP was drafted.** The original business case was based on:
 - Manual calculations of limited accuracy in the absence of a load flow model to forecast network load and savings
 - Limited commercial EV charging behaviour data available at the time

- **Commercial vehicles are a small proportion of total load on the network**, therefore altering their charging patterns alone has relatively little impact on need to upgrade network infrastructure, especially when considering other low carbon technologies such as heat pumps
- **The base case load from commercial EVs monitored in the trial was significantly lower than originally predicted.** This results in less ability to shift demand and a lower requirement for network upgrades as a result of fleet electrification
- **Availability of flexible demand from the fleet did not always coincide with the network's peak demand**, especially at Royal Mail depots, resulting in flexibility not always mitigating the need for network upgrades. The amount of flexibility available could also be impacted by the need to avoid impacting upon fleet operations
- While profiled connections have shown that they can manage load below a profile, avoiding peaks caused by EV charging, this has a relatively small impact on overall demand due to **the need to accommodate non-controllable depot background load**
- A standard load curve for each method had to be entered into the SFS, which was then applied to a proportion of the commercial vehicles connected to each substation. **This standard profile may not correspond to the specific local load constraints on each substation**, and profiled connections/flexibility events that are specifically designed to target local constraints may result in more impactful results.

The initial business case also considered mostly direct benefits to network customers. Optimise Prime has shown that the project and its methods also deliver benefits to connecting customers, and additional substantial indirect benefits through the provision of improved data to inform forecasts and tools that streamline DNO processes.

The full reassessment of the Optimise Prime business case will be presented in the project's Close Down report, due for publication shortly.

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. A summary of the project plan is shown in Figure 4.

3.1 Detailed progress in the reporting period

Progress in this period has been good. Analysis of the data collected during the project trials has concluded and the results have been published in [Deliverable D7](#).

Following the completion of analysis the project's IoT platform has been decommissioned.

The Close Down report has been drafted and will be published in the next few months.

Table 1 details the status of key project activities that were completed in this reporting period:

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

Task name	Sub-activities	Status at end of period
WS1 Home trial		
Final Trial Reports		Complete. Findings published in Deliverable D7 .
WS2 Depot trial		
Final Trial Reports		Complete. Findings published in Deliverable D7 .

Task name	Sub-activities	Status at end of period
WS3 Mixed trial		
Final Trial Reports		Complete. Findings published in Deliverable D7 .
WS4 IoT Platform, Network Forecasting & Flexibility Analysis		
GSA/SFS Modification	Scope, Implement, Run	Complete. Findings published in Deliverable D7 .
IoT Platform	Data backed up and platform decommissioned	Complete.
WS5 Business Model		
TCO Model	Updated model	Complete. Findings published in Deliverable D7 .
Behavioural analysis	Updated analysis	Complete. Findings published in Deliverable D7 .
WS6 Reporting & Deliverables		
Deliverable D7	Compile deliverable	Published on 7 February 2023
Final PPR	Compile report	Completed and published (this report)
Project Close Down Report	Compile report	Drafted. Due for publication within three months of project conclusion
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	Complete
Project management	Maintain project plan and budget	Complete
	Project reporting and governance	Complete

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.

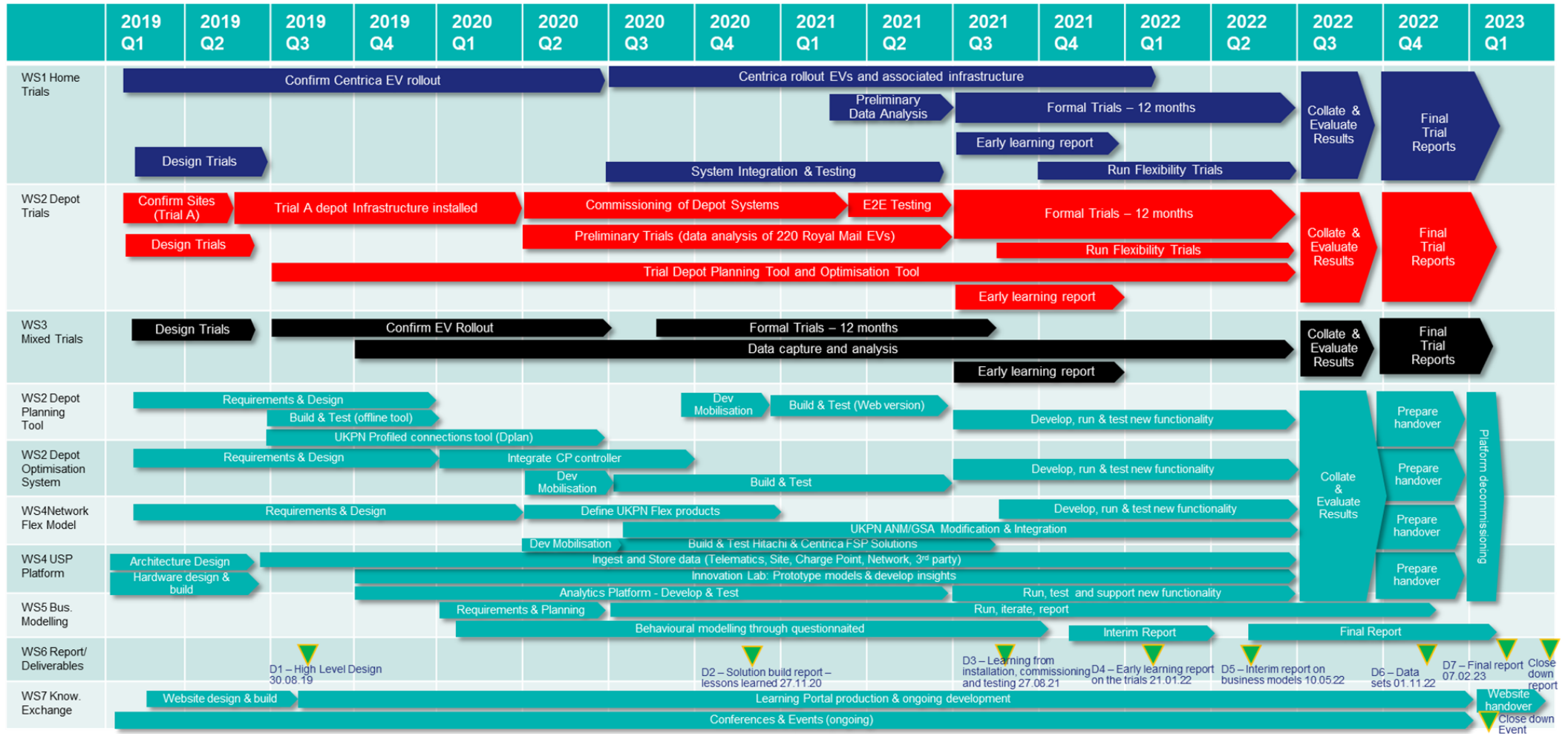


Figure 4 – Summary Project Plan

3.3 Identification and management of issues

As the trials are now complete and the project's main deliverables have been published, the project has not encountered any significant issues.

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

4 Progress against budget

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

5 Project bank account

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

6 Project deliverables

Table 2 summarises the current progress towards completing the project deliverables. To date Deliverables D1, D2, D3, D4, D5, D6 and D7 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.

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 on time 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 early 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 on time 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 early 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 on time 10 May 2022

Deliverable	Description	Due Date	Status
D6 Data sets	Final datasets gathered from the trials for dissemination to stakeholders.	18 November 2022	Published early 1 November 2022
D7 Final learning report	A report covering: <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 • How to ensure integration of the Methods with DNO/DSO systems and processes 	10 February 2023	Published on time 7 February 2023
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, 2021 and 2022 reports published. This report meets the 2023 requirement.</p> <p>The Close Down Report has been drafted and will be published within three months of the end of the project.</p> <p>The project has attended the Annual Conferences and details of this can be found in the Close Down Report.</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 has made a comprehensive dataset resulting from the trials openly available. Additional data has been made available on the [UK Power Networks Open Data Portal](#) in this reporting period.

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. A large number of learning outcomes have been presented throughout the PPRs and in the project's deliverables.

Optimise Prime continued 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 also shared updates on the progress of the trials.

Following the conclusion of the project, the Optimise Prime website is being transferred from Hitachi to UK Power Networks, who will maintain it for a year to ensure project learnings can continue to be accessed by project stakeholders. Key deliverable reports and data can also be found on [UK Power Networks' Innovation website](#) and the [UK Power Networks Open Data Portal](#), and will remain there after the Optimise Prime website is taken down. The posts on the project's social media accounts will be kept online but will not be updated following project closure.

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

- The project held a knowledge sharing event [Optimise Prime: Helping Fleets go Electric](#) on 18 January in London. The event featured an overview of the methods tested in Optimise Prime and a Q&A panel with project partners
- Additional datasets have been made available on the [UK Power Networks Open Data Portal](#). This transformed and aggregated data should prove simpler to interpret, making it useful for a wider range of stakeholders
- The project has engaged with London Councils in order to share findings from the mixed charging trials with local government stakeholders. A meeting was held on 8 February 2023 where Uber and Hitachi shared analysis related to the need for CP infrastructure in London with several London Boroughs
- The project has been shortlisted for The Engineer [Collaborate to Innovate awards](#) in the Information, Data and Connectivity category and for the [edie awards](#) in the Partnerships and Collaboration of the Year category
- A series of videos introducing the project and key findings – these can be found at www.optimise-prime.com/videos.

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).

Table 3 – IP generated last period (December 2022 – February 2023)

IP Description	Owner(s)	Type	Royalties
Deliverable D7	All project partners	Relevant foreground IPR	N/A

10 Risk Management

Table 4 lists the risks highlighted in the FSP as well as new risks that have arisen during the project. This table describes how the project has managed the risks and the potential impact on project delivery. As the project activity has drawn to an end all risks have now been closed.

Since December's PPR the project has not identified any further risks. The project continued to monitor risks and issues through regular risk management meetings. Following each meeting risk impacts and mitigation plans were updated. Seven risks have been closed over this period, due to the risk passing or having been successfully mitigated. Risks closed in previous reporting periods are omitted.

Table 4 – 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										
R005	Partner performance is not contractually defined	Outputs delayed or inadequate and potential overspends	Weekly meetings with Project Partners, Suitable incentives where required Shared responsibilities for deliverables Contracts signed on 18/03/19 Partners remain committed and performance is tracked by weekly meetings and programme governance 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. 13/04/22 – Resource in place from 21 March to work on Centrica Data Science. Probability reduced to low. 12/01/23 – Closed – Project activities that rely on the partners are now largely complete and any issues are unlikely to impact completion.	Negligible	Low	Medium	Closed	PM	12/01/23	12/01/23
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. 13/02/23 – Closed as time critical deliverables have now been completed and closedown phase is in progress	Low	Low	Medium	Closed	PM	07/12/22	13/02/23
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 09/06/22 – From April 2022 the EV Homecharge Scheme is no longer available for single unit properties, impacting some home charging TCOs. 12/01/23 – Closed – The project deliverables are now complete and even if there were changes announced it would not be reasonable to include them in the project.	Negligible	Negligible	Negligible	Closed	PM	12/01/23	12/01/23

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.	<p>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</p> <p>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.</p> <p>07/04/20 – Site works suspended. Centrica warn that lead time on vehicles likely to extended and other works delayed.</p> <p>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</p> <p>11/06/20 – Board decision to re-size trials mitigates some risks regarding finding partners, changed probability to low</p> <p>13/10/20 – Risk remains but is low as all partners have or are committed to have vehicles.</p> <p>16/11/20 – Second lockdown started – no major impact yet, continuing to monitor</p> <p>08/12/20 – Lockdown passed with no material impact.</p> <p>07/01/21 – Third lockdown entered. Has resulted in reduction in Uber trips and is likely to have an impact on development efficiency</p> <p>16/03/21 – Uber trips now recovered. Royal Mail Depot questionnaires delayed (see R59)</p> <p>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</p> <p>09/07/21 – Sufficient vehicles in place, very few minor risks remain with most mitigated, downgraded to low.</p> <p>13/04/22 – Risk remains, but impacts have been minimal</p> <p>12/01/23 – Reduced impact and probability to negligible due to the limited time and tasks remaining</p> <p>13/02/23 – Closed as time critical deliverables have now been completed and closedown phase is in progress</p>	Negligible	Negligible	Negligible	Closed	PM	12/01/22	13/02/23

ID	Name	Risk Description	Mitigation/Comments	Impact on Cost	Probability	Impact on Schedule	Status	Owner	Last Review	Closure
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 Royal Mail. 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 is 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> <p>12/05/22 – Putting together analysis of statistical significance of the trials</p> <p>07/12/22 – Analysis completed and results being written up</p> <p>12/01/23 All deliverables that could be impacted have been reviewed by partners and UK Power Networks team – no issues identified. Closed.</p>	Medium	Low	Medium	Closed	Hitachi PM	12/01/23	12/01/23
R072	Network modelling work not complete for D7 drafts	The Strategic Forecasting System and external data analysis work has a very tight deadline to get content into the initial drafts of D7 in time for reviews.	<p>11/08/22 – Both workstreams report as on schedule. Planning to delay the completion deadlines for D7, which should provide a larger time buffer between this work completing and finalisation of D7.</p> <p>08/09/22 – Some slippage, but mitigated by changes to plan</p> <p>12/10/22 – Completion has slipped further, but sufficient time remains in plan</p> <p>07/12/22 – Final draft received. Risk will close when integration with D7 is complete</p> <p>12/12/22 – Closed – input from these reports is now included in deliverable D7</p>	Negligible	High	Medium	Closed	Hitachi PM	12/12/22	12/12/22
R073	Partner industrial action	Industrial action taking place at partner company may impact staff available for review and feedback	<p>12/10/22 – Documents for Review will be shared as soon as possible to give as much time as possible for review.</p> <p>07/12/22 – Drafts of final deliverables shared with all partners</p> <p>12/01/23 – Partners have reviewed main D7 document – Closed</p>	Negligible	High	Low	Closed	Hitachi PM	12/01/23	12/01/23

11 Material change information

No material changes have been encountered during this 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 final reporting period.



Ian Cameron
Director of Customer Service and VICE, UK Power Networks
30 March 2023



Suleman Alli
Director of Finance, Regulation, Strategy & Technology, UK Power Networks
30 March 2023