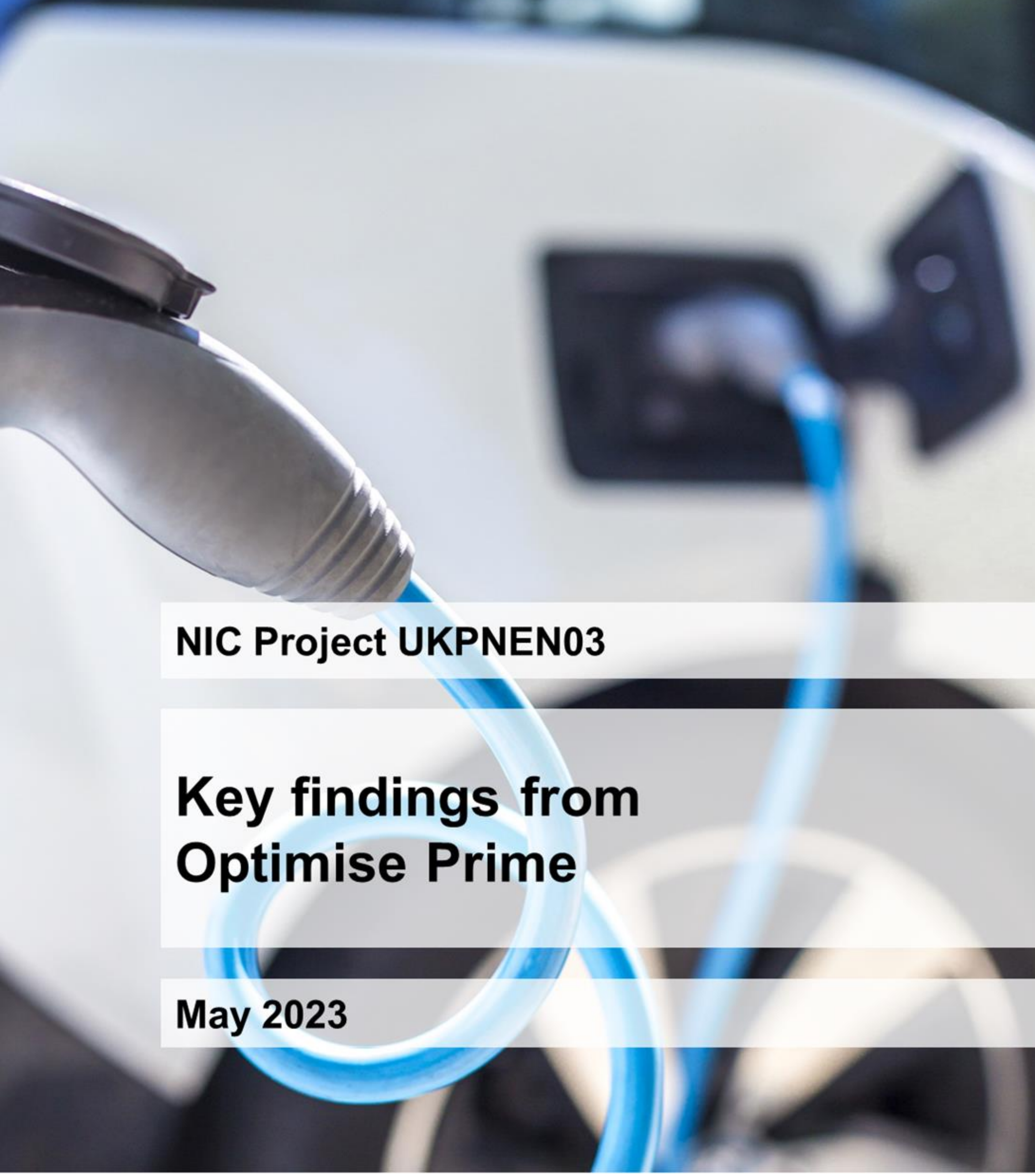

NIC Project UKPNEN03

Key findings from Optimise Prime

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Optimise Prime

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Key Findings from Optimise Prime

Optimise Prime was a Network Innovation Competition funded Optimise Prime is a third-party industry-led electric vehicle (EV) innovation and demonstration project running from January 2019 to February 2023.

This document provides a summary of the key findings highlighted in Optimise Prime's deliverable reports. Full supporting details can be found in the deliverables published on the Optimise Prime website at https://www.optimise-prime.com/deliverables.

Findings are presented by deliverable and have been separated into categories based on category. Some early findings may be developed further in the later deliverables.

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1 Deliverable 1: High level design and specification of the three trials

The following key findings were identified in the initial deliverable, D1, which focused on trial design activities.

1.1 Trials design

By its nature, this project involves introduction of unfamiliar technologies and processes into a busy environment where uninterrupted operations are crucial. It was therefore essential that the trials were designed to minimise risk of disruption to business-as-usual activities, which could foreseeably conflict with some of the project's innovation ambitions. To address this, a 'simulation before application' methodology was designed to enable any potential unacceptable risks to be identified and mitigated through simulation at each level of technological complexity, before any changes to physical systems are implemented. In addition, the project is planning to install all physical equipment at a test facility prior to installation at trials partner locations.

1.2 Total cost of ownership

One of the learning ambitions for Optimise Prime is to clarify the impact of adoption of EVs on fleet total cost of ownership (TCO). For this learning to be useful to other fleets with different TCO models, the impacts should be visible at an individual line-item level (e.g., impact on fuel costs). Much of this baseline data is commercially sensitive, however, and is unable to be shared across the trial partners. The project will therefore develop a generic TCO model and use this to calculate the impact on each line item. The impact will be verified by the trial partners, who will share the overall percentage change to their TCO resulting from fleet electrification.

1.3 Connections

For the depot charging trial, there is no established process for defining and establishing a profiled connection agreement at present, as it is a new product that this project seeks to design and trial. The trial has been structured to generate a range of profiles for the

Distribution Network Operator (DNO) to consider (cost optimal, network optimal, operations optimal), within a proposed connection offer, agreement and order cycle with the DNO. The formalisation of this into an ongoing process for future profiled connection agreements has been included within the project objectives.

It is possible that some or all of the depots selected for inclusion in the trial may not suffer from network constraints at the level of EVs planned to be introduced during the trial. The connection agreement in place may provide enough capacity to cover the additional EV charging load. In these cases, assessment of the benefit of profiled connection agreements will be simulated by considering the potential cost and capacity benefits to the wider distribution network, rather than the depot itself. The simulated profiled connections will be live for the trial period only.

1.4 Telematics

For the mixed trial, baseline telematics data from Internal Combustion Engine (ICE) Vehicles is not available due to privacy restrictions. This is due to the nature of Uber's business model – responsibility for the vehicles providing transport services via their platform rests with the driver partners. This situation is likely to arise with other companies working with owner-driver fleets. This creates a challenge for the project as EV data cannot be directly compared with ICE vehicle data to identify differences. Instead, the project will define baseline vehicle operation as that observed for the part of Uber's existing EV drivers who charge their vehicles at or close to their home, outside of their working times. These vehicles will be identified through continuous analysis of Uber trip data alongside the location and operational status of public charge points (CPs), thereby showing which vehicles do not use public charging infrastructure during their working hours. For this solution to address the issue, the assumption must hold that EVs that do not require charging during their working hours behave in an equivalent manner to existing ICE vehicles. This assumption will be validated by continuous analysis of behaviour of off-shift charging EV drivers and discussions with Uber.

1.5 Network Data

There is a wide variation in the availability and accuracy of utilisation data for different assets on the distribution network, particularly at low voltage where monitoring is limited and is currently being deployed at strategic locations. As such, the necessary data may not be available in all locations to enable detailed analysis of the impact of EVs on network asset performance – for example the maximum demand at a transformer resulting from addition of EV charging load at a specific home or public CP. To address this, the trials plan to identify the crucial infrastructure requiring monitoring early in the implementation process, so that it can be set up as a priority in UK Power Networks' LV (Low Voltage) monitoring roll-out process. Royal Mail sites will all be monitored, and clusters identified in the Centrica and Uber trials will also be fitted with monitoring. Assets with the necessary monitoring data available will be used to incrementally improve modelling capabilities as the trials progress, with these modelled impacts being applied to other locations. This will be conducted across multiple voltage levels, to explore the interaction of flexibility across at different levels in the network.

1.6 Statistically significant results

For the findings of the trials to be applicable beyond the scope of the project, the experiments must be designed to provide statistically significant results. Due to the nature of these field trials, the experiments will be conducted subject to a wide range of uncontrolled variables (e.g., weather, traffic incidents, driver behaviour, events). To address this, trials will be structured to produce statistically significant using representative sample groups. Multi-level models will be developed that account for variation both within the sample group and between sample groups. The quality of crucial learnings will be controlled through experiment success criteria, demanding stringent statistical significance before experiment completion in order to be considered viable.

2 Deliverable D2: Solution build report: Lessons learned

The following key findings were identified in the second deliverable, D2, which focused on lessons learned from the 'build' phase of the project. Numbers in brackets relate to sections of the report where more information can be found.

2.1 Complexity of implementing infrastructure on operational sites with existing infrastructure

The project's original design-build-install approach to systems and infrastructure had to be adapted to fit the pace of introduction of EVs by the partners (1.4)

Clearly establishing the roles of all interested parties, such as CP contractors, charge point management system (CPMS) providers and facility managers is key to the smooth introduction of smart charging (2.3.3.1)

Large fleets may have a complex estate of multiple telematics providers, and the datasets are very large, requiring use of dedicated data analysis tools (2.3.3.2 and 3.2.2.5)

When overlaying systems onto existing infrastructure, changes made by third parties not directly involved in the project can impact project systems and processes (2.3.3.2)

2.2 Requirement to consider data security and flexibility services early in the design

Data security requirements of different partners vary significantly. Sufficient time is needed to understand the impact of this and implement the required policies and technical solutions (2.5.2)

The detailed design of flexibility services impacts on system design and should be defined as early as possible in the project (3.1.1)

2.3 Potential Benefits and limitations of the project methods

Smart charging offers significant optimisation potential to depots (3.2.1.5)

In some cases, the operational implications of profiled connections could present a barrier to adoption (3.2.1.5)

Actual vehicle movements from depot fleets may vary significantly from expected shift patterns (3.2.2.5)

Minimising only EV load at a depot is of limited value. The full load of the site must be taken into account (3.2.2.5)

2.4 Data limitations

While comprehensive CP location databases exist, care must be exercised regarding their accuracy (3.3.1.3)

3 Deliverable D3: Learning from installation, commissioning and testing

The following key findings were identified in the third deliverable, D3, which focused on lessons learned from the installation, commissioning and testing phase of the project. Numbers in brackets relate to sections of the report where more information can be found.

3.1 Feasibility of the methods

Aggregation of demand response from distributed EVs can be technically achieved through the system implemented for WS1. In order for a specific customer to ensure that they are able to respond to a flexibility commitment, allowances need to be made regarding the number of EVs available to take account of constraints such as unplanned unavailability of vehicles and urgent need for charging. The project will continue to analyse the reliability of flexibility response as the trials progress (2.4.3)

3.2 Practical considerations for infrastructure implementation

Where possible, when implementing a smart charging solution the CPs should be designed/procured together with the control system, to simplify the process of integration, as retrofitting can create significant complexity (3.2.3.1)

There can be a complex range of actors involved in the provision of depot charging, such as CSMS providers, facility and IT systems maintainers, and it is essential to clearly define responsibilities during both the installation and operational phases (3.2.3.1)

The use of RFID tags to identify which vehicle is using which charger within a depot is not always reliable, as tags could be swapped, get lost and replaced or drivers may not authenticate the charging session properly. Tighter vehicle and CP integration (where the vehicle itself identifies to the CP) would make optimisation of charging more reliable, simpler to implement and operate (3.2.3.1)

Power infrastructure at larger and older sites can be complex and require additional time and resources to implement successfully (3.2.3.4)

There may be a lack of consistent routines/policies for charging vehicles at the end of shift, and these will need to be put in place to enable smart charging (3.2.3.5)

Different CPs, settings and firmware can result in varying results. This needs to be understood or standardised in order to effectively optimise (3.3.3.1)

It’s not always possible to install point of connection monitoring within distribution network infrastructure and installing on customer premises can be complex (3.4.1)

There may be a requirement to measure both current and voltage to monitor profiled connection adherence and measuring voltage can sometimes be challenging or disruptive (3.4.1)

3.3 Developing self-service tools for customers

When implementing self-service planning tools there is a trade-off between accuracy and ease of use and assumptions need to be made when modelling average weeks based on historic data (3.5.5)

3.4 Need for assumptions when scaling up findings

When charge locations are estimated or forecasted, there is no simple way to accurately map estimated charging demand to network infrastructure at scale, so assumptions need to be made when considering local network impact (4.3)

3.5 Risk of interruption to third party data

Reliance on third party data sources can create risks. Monitoring of data sources is important and periodic changes to data feeds should be expected (5.2.4)

4 Deliverable D4: Early learning report on the trials

The following key findings were identified in the fourth deliverable, D4, which focused on findings from initial trial activities. Numbers in brackets relate to sections of the report where more information can be found.

4.1 Findings from WS1, the Return-to-Home Trials

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. (2.6.5)

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. (2.6.5)

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. (2.7.1)

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. (2.7.1)

4.2 Findings from WS2, the Depot Trials

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. (3.6.3)

Initial trials and modelling of profiled connections have shown that it should be possible to utilise control of EV charging to keep sites within an agreed profile. However there may be some sites where there is too little controllable EV demand to do this reliably. (3.6.4)

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, so future trials will look at improving the reliability of forecasting. (3.6.5)

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. The project is looking at how this could be resolved through process changes. (3.7.2)

4.3 Findings from WS3, the Mixed Trials

The data from Uber trips has allowed the trials to model charging events and demand throughout Greater London. Charge demand from PHVs is likely to peak in the evening as some drivers return home and others need to top up. (4.6.2.2)

There is a clear pattern within and across days in trip and charging demand (4.6.1). Impact of weather on trip patterns appears to be limited (4.6.1.4).

There is 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. (4.6.1.3)

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 non-optimal CPs. (4.6.1.3)

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 (4.6.2).

Throughout the project there has been continual growth in both CP infrastructure and the average range of vehicles in the WS3 trial. Both of these factors will need to be factored in to modelling of future charging patterns. (4.6.1.5)

5 Deliverable D5: Interim report on business models

The following key findings were identified in the fifth deliverable, D5, which presented initial work on business models, including TCO analysis, behavioural surveys, profiled connections and commercial load separation at domestic premises. Numbers in brackets relate to sections of the report where more information can be found.

5.1 Practical findings from EV fleet operation:

There are a wide range of factors that fleet managers need to consider when transitioning to EVs. Careful planning is essential and must consider business needs, site constraints (both physical and electrical) and the management of changes to business processes. A comprehensive guide based on the experiences of the Optimise Prime partners can be found in the report (Section 2).

5.2 Economic findings from Total Cost of Ownership (TCO) analysis of the project's Home, Depot and Mixed fleets:

At present, whether TCO favours EV or ICE fleets varies considerably across and within the different use cases. (3.5)

EV prices are the key determinant of whether EVs make purely economic sense for a fleet, but there are many other factors influencing the cost, including connection costs for depots. (3.5)

There have been significant increases in both electricity, diesel and petrol prices during the project, and prices remain unpredictable. The impact of recent electricity price rises is especially noticeable in fleets using public charging. (3.5)

The Congestion Charging exemption for EVs plays a crucial role in the breakeven point between the ICE and EV TCO for Uber, and significantly impacts other fleets operating in London (3.5)

Operational emissions analysis shows the clear environmental benefit for PHV and fleet drivers to switch to an EV. (3.5)

5.3 Behavioural findings, based on over 2,500 survey results from drivers and fleet managers:

After drivers have tried EVs, they feel more positively about the technology (4.2.2.6)

EVs can offer significant value for drivers as well as the environment, making the business case for transition even stronger – there were overwhelmingly positive attitudes towards EV performance. (4.2.2.6)

Charging facilities play a key role in giving drivers the confidence that they can fulfil their daily work tasks. (4.2.1.5)

Reliable public charging infrastructure is critical for the adoption of EVs among PHV drivers, and will become more important as traditional home-based fleets rely more on public charging. (4.2.3.4)

PHV charging behaviour in London remains difficult to predict because EV charging locations and timings are based on opportunity rather than habit. (4.2.3.4)

Financial and operational barriers to EV adoption exist for PHV drivers; however, positive attitudes suggest a willingness to adopt once concerns are addressed. (4.2.3.4)

Cross-fleet analysis of the behavioural results has shown remarkable consistency of views across the different fleets. (4.3.3)

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. (4.3.3)

Drivers who are not happy with their EV generally have broad concerns over a range of technical, organisational, economic, and environmental aspects – there is not a single area that needs to be improved to get them on board. (4.3.4)

5.4 Lessons learnt regarding profiled connections:

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. (5.4.1.3)

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. (5.4.1.1)

Fleets need to be mindful of their future electrification requirements and have full electrification in mind. DNOs will need to be flexible to review changes in requirements over time. (5.4.2)

Contractual, operational and technical measures may be needed to operate profiled connections, but could make the product less attractive to customers. (5.4.2)

5.5 Lessons learnt regarding separation of commercial load at domestic premises:

Automating the reimbursement of charge-at-home electricity is necessary for larger fleets. (6.1.3)

Gaining the trust of drivers through clear communication is necessary for the successful implementation of reimbursement solutions. (6.1.3)

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. (6.1.3)

Communicating the complexities of optimisation and engaging drivers can be challenging. (6.2.1)

Reliable communications was the key technical issue faced during implementation. (6.2.1)

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. (6.2.1)

5.6 Insights from interviews with flexibility providers:

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). (7.5)

The value of EV flexibility remains difficult to predict. (7.5)

EV flexibility at public CPs was generally believed to be too complicated to deliver. (7.5)

6 Deliverable D6: Data sets

This deliverable consisted of a series of data sets and instructions for use. This data can be accessed on the UK Power Networks Open Data Portal. No specific findings were identified.

7 Deliverable D7: Final learning report

The following key findings were identified in the seventh and final deliverable, D7, which presented the final results of Optimise Prime. Numbers in brackets relate to sections of the report where more information can be found.

7.1 WS1 – Return-to-Home Trials

Unmanaged, home-based fleets will create concentrated load peaks from 17:00 on weekdays due to the timing of the end of shifts coinciding with network peaks. (2.1.1.1)

Smart charging can be very effective at changing load patterns, however, leads to significant 'secondary peaks' overnight. Incentives to drive the smart charging behaviour should be considered to reduce the impact of this behavioural change on the network. (2.1.3.4)

The British Gas home-based fleet was found to be very reliable in the delivery of weekday flexibility services, over a one-hour period at specific times, due to its predictable pattern of charging load. Revenue from flexibility, which could amount to around £215 per vehicle per year, can help to improve the TCO for home-based fleets (2.2.2)

Winter EV energy requirements are approximately 30% higher than in the summer (2.1.1.1)

The proportion of the home-based fleet that relies on public infrastructure has increased throughout the trial. This is because drivers that could charge at home were initially targeted, before moving on to those who needed to use public infrastructure. British Gas estimate that up to 60% of their fleet may need to use public infrastructure once fleet electrification is complete. (2.1.1.1)

7.2 WS2 – Depot Trials

Load profiles are depot 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. (2.1.1.2)

The short and sharp load peaks at some depots limit the duration (up to three hours) and volume of flexibility (up to 25% of the depot's charging capacity) that can be offered. Flexibility products should incentivise participation from fleets that can offer flexibility very reliably and fleets that are less reliable, as well as different volumes of flexibility, to maximise access to controllable load at the best possible price. (2.1.4.2)

Factors impacting reliability of flexibility services include:

- the size of the depot – minor changes at small depots can have a large impact on delivery of flexibility
- the CP to EV ratio – sharing CPs results in higher utilisation, but timing of charge events can be challenging to predict
- daily EV mileages – impacting how long flexibility events can be sustained
- operational processes – such as when EVs are plugged in, the variability of shift patterns and the use of vehicles on different shifts. (2.1.4.2)

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 made on extension assets that would still be the responsibility of the customer after the change. (2.2.3)

Trials suggest that between seven and 20% of fleet charging costs could be covered by revenue from flexibility services. However, whether this can be achieved depends on the DNO's requirements for flexibility services, the electricity tariff and how this aligns with the depot's charging schedule. (2.2.2)

Profiled connections can be successfully implemented, but EV load must be the dominant load in the depot for its control to reliably ensure compliance. (2.1.5.4)

7.3 WS3 – Mixed Trials

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 would normally plug in. (2.1.2.2)

Future demand from PHVs is likely to shift further towards off-shift charging close to home, as vehicles with larger batteries are able to complete full shifts on one charge, further reducing the proportion of on-shift charging. (2.1.2.2)

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. (2.1.2.2)

7.4 Network impacts of the methods

Smart charging has a beneficial impact on network upgrade costs (2.1.2.3)

Flexibility and Profiled Connections reduced load at times of substation peak. At the times when individual substations experience their peak demand, the use of flexibility services and profiled connections have been modelled to reduced load. (2.1.2.3)

The difference between the impact of the different managed charging scenarios was limited. Overall, all managed charging methods resulted in an improvement over the unmanaged scenario; however, the magnitude of the difference between the managed charging methods was much smaller. (2.1.2.3)

The Optimise Prime EV data helps improve network forecasting capabilities. Changing EV behavioural input data from the SFS' pre-existing approximative default data to Optimise Prime data led to a larger change in reinforcement requirements than changes in smart charging uptake. (2.1.2.3)

Smart charging can reduce the number of transformers required to supply fleet and PHV electrification, however, seems to have very little impact on cable upgrades required (2.1.2.3)

7.5 Flexibility services

The month (or more) ahead product should allow fleets to re-forecast their baseline in the run up to delivery to improve predictability/reliability of outcome. (2.1.4.3)

Pricing incentives should be structured to reward good performance without disincentivising participation by some fleets. A range of products with different performance/reliability thresholds could be implemented to achieve this, with fleets with a higher probability of successful delivery attracting a higher price. (2.1.4.2)

Automation is required in the tender, bidding, dispatch and settlement calculation processes to make provision by smaller assets cost effective. (2.1.4)

Baselining establishes a ‘normal’ level of load against which the delivery of flexibility is judged and rewarded. As EV demand fluctuates, establishing an accurate baseline can be difficult. Tests of several baselining methodologies highlighted the need to use recent data and demonstrated that the most accurate method varied and needs to be chosen based on fleet characteristics. (2.1.4.2)

Incentives should be structured to prevent the occurrence of secondary peaks which could cause additional problems for the network. (2.1.4.2)

7.6 Profiled Connections

A process to model the expected load flow (such as using UK Power Networks’ LV utilisation modelled data), as a proxy for the substation data may be required if no monitoring is available, supplemented with half-hourly data and/or diversity modelling. (2.1.5.6)

Planning systems need to have the capability to assess network loading at a half-hourly granularity, in order to assess the feasibility and benefit of a profiled connection. (2.1.5.4)

The range of contracts should allow for dynamic profiled connections, that can be changed or activated at the request of DNOs to act as flexibility products. (2.1.4.3)

A process to revise profiled connections is needed to allow changes in fleet operations during the life of the connection. A review is likely to be required approximately one month after implementation to ensure the EV load is in line with the forecast. Seasonal updates may also be required, in addition to ad hoc reviews in response to significant changes in fleet or depot operations. (2.1.5.5)

Integrated monitoring is required to provide the DNO with visibility of breaches, a method of communicating alerts to the provider is also required. (2.1.5.6)

A method to police the profile, either through physical disconnection, economic penalties, or a combination of the two, must be agreed in the contract and implemented. (2.1.5.6)

8 Close down report

The close down report primarily summarised the findings which had been detailed in earlier deliverable reports. In addition, the following more general insights were reported which may be of use to future innovation projects.

8.1 Lessons learnt for future innovation projects

8.1.1 Risk of reliance on the market in rapidly developing industries

When implementing projects dealing with fast developing technologies, such as the growth of EVs, there is heightened risk of external changes and factors impacting on project delivery. For example, as detailed in Section 6, the ability of project partners to buy EVs was critical for the trials to proceed. While partners committed to reasonably endeavour to provide the vehicles, they were not in a position to do so to the original project timescales due to external factors. Optimise Prime identified this risk at an early stage and as a result was able to extend the project timescales and manage the costs of doing so through careful management of the project budget, highlighting the importance of comprehensive risk management.

8.1.2 Reliance on third parties to deliver solutions

The solutions implemented as part of the project required a large number of interfaces between different information systems. Some of these were directly contracted to the project and others indirect suppliers to project partners over which the project had no control. On several occasions, changes were made to systems with little or no notice to the project team. Over a project the length of Optimise Prime, it should be expected that systems change or are replaced – it is important to plan to have the resources available to respond to such changes promptly.

8.1.3 Measuring project outcomes in a complex environment

The potential benefits from a project such as Optimise Prime are varied and are likely to accrue to a range of stakeholders over a significant period of time. As a result, measuring future value at a network or GB scale of interventions is particularly difficult. Methods like flexibility and profiled connections need to be designed to overcome local constraints, with the timing of events varying based on load. When events are modelled across large areas, for which they were not designed, they are likely to appear less beneficial than less targeted products such as time-of-use tariff based smart charging. It is therefore important to consider the full range of potential benefits and the impact on non-network parties to judge the benefits of project methods.

8.1.4 Non-licensee led project with multiple project partners

Hitachi ran the project on behalf of the lead DNO group, UK Power Networks, who provided oversight. A great deal of benefit is gained from the involvement of non-DNO parties, however, a close partnership between the sponsoring DNO and the project lead is essential to ensure the needs and constraints of GB DNOs are fully understood. In Optimise Prime this was achieved through regular meetings and reporting, complemented by additional sessions with DNO subject matter experts where required. It is especially important to ensure sufficient time is allocated to the review of deliverables and developing aspects of the project such as implementation into DNO business as usual processes, where external parties have more limited expertise.

8.1.5 Project partners sharing large amounts of potentially sensitive data

The project has shown how an ambitious, data driven project can create significant benefits for the fleet and electricity sectors. However, as a result of the nature of the data being handled, particular care had to be taken in the drafting of data sharing agreements and in putting in place the necessary control systems and processes. A significant amount of time may be required to put such measures in place. Care must also be taken in the creation and publication of project deliverables, to ensure that learnings are communicated effectively without compromising confidentiality.

8.1.6 When dealing with live operational sites of customers, a safe test environment is especially important

Optimise Prime set up a test site at Novuna’s offices in order to replicate the infrastructure installed at Royal Mail depots without impacting live operations. A range of issues with CP control and integration were identified through testing.