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OPTIMISE PRIME

Accelerating the transition to EV for commercial fleet operators

Optimise Prime

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Aims to be the world's largest commercial EV trial

3,000 Electric Vehicles in London and the Southeast of England

Gathering data and trialing charging solutions across 3 use cases

Home based fleets

Depot based fleets

Private Hire Vehicles

Accelerating the transition to EVs for fleets

Faster move to EV resulting in CO2 and air quality improvements

Minimising network impacts, reducing costs for electricity customers

Cross industry collaboration and co-creation

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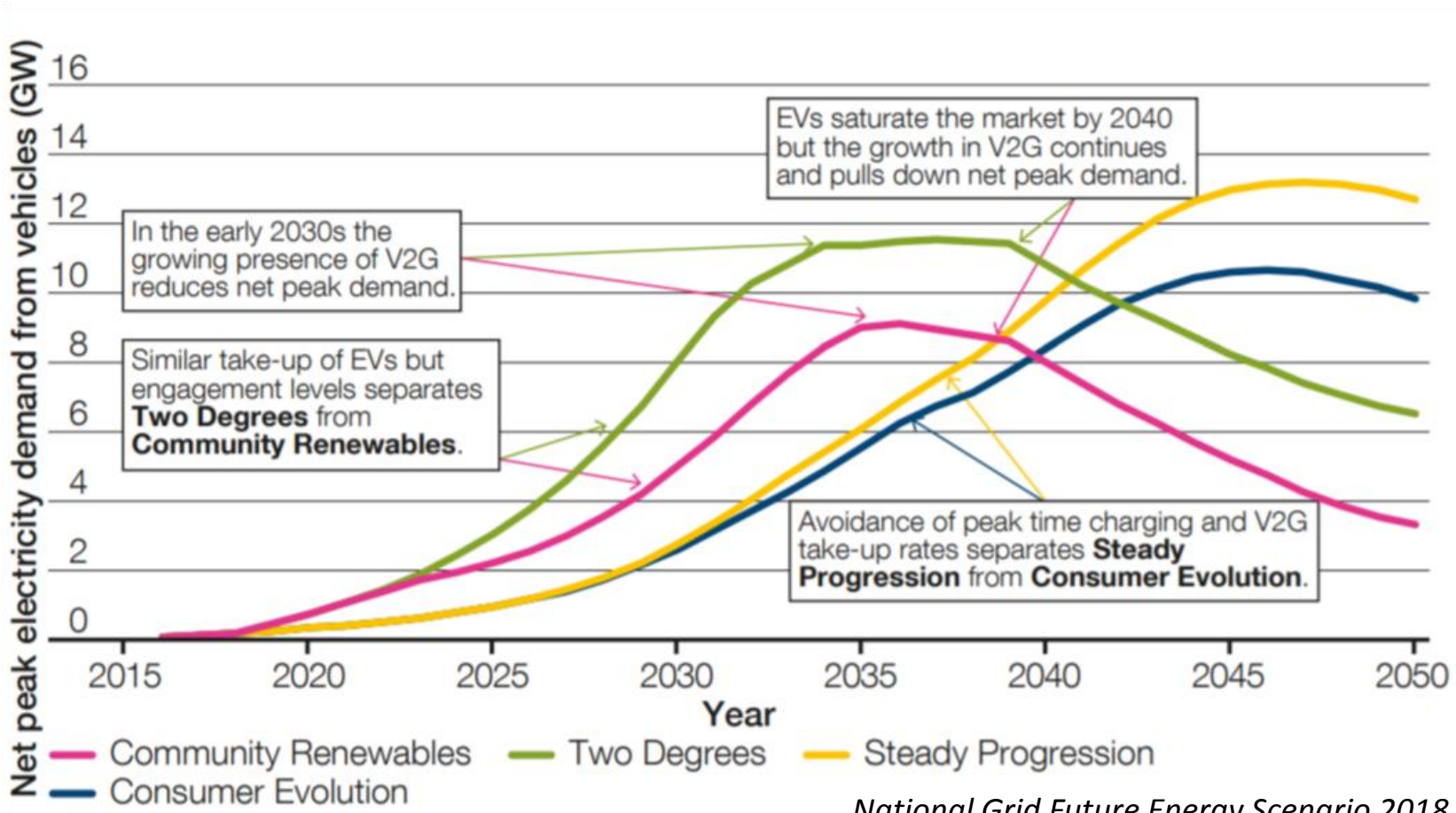
RIIO NIC NETWORK INNOVATION COMPETITION

£16.4 million funded through Great Britain's gas and electricity regulator Ofgem

What is the potential impact of EVs the grid? – some projections….



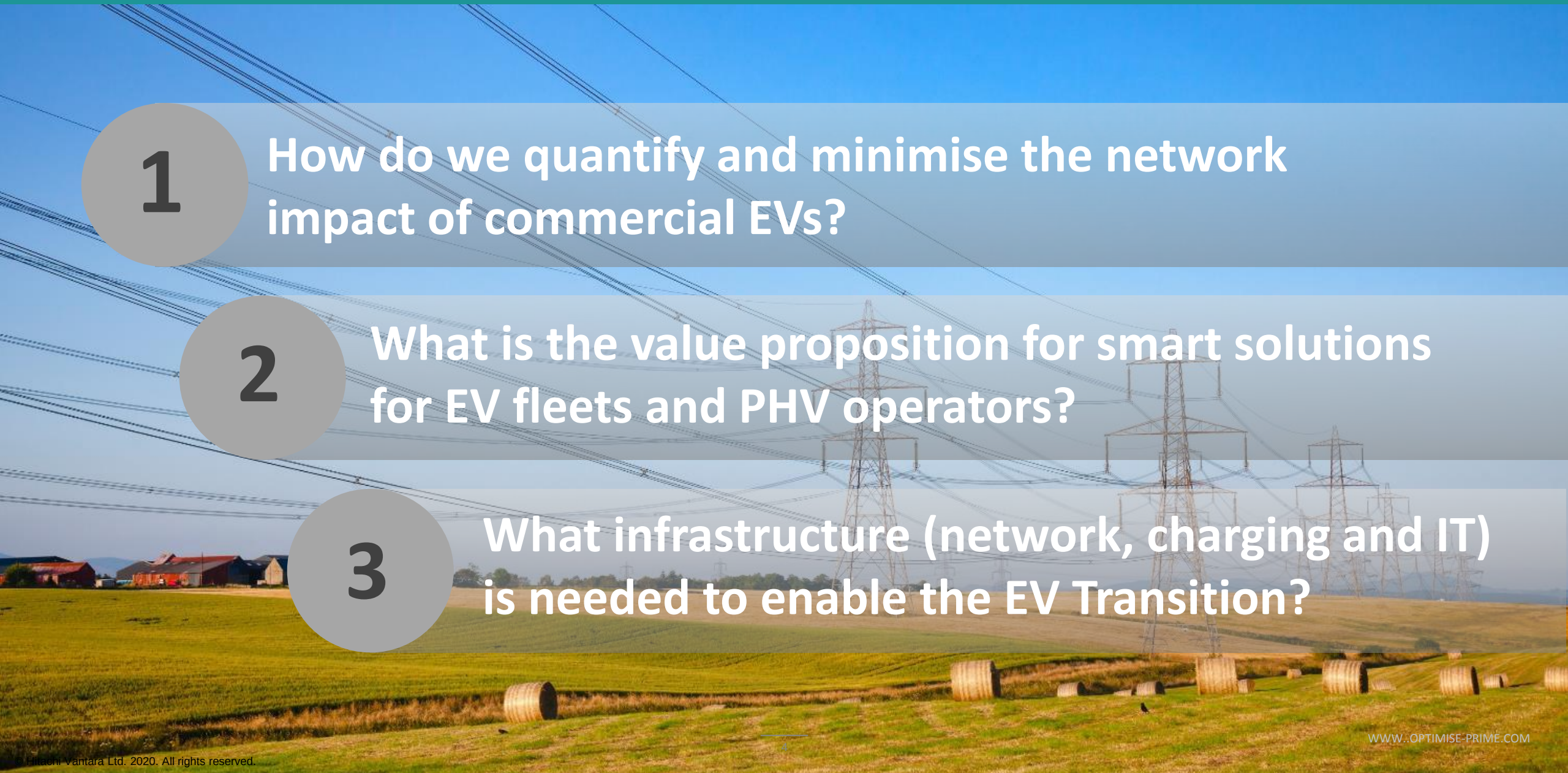
National Grid Future Energy Scenario 2018

For the UK to achieve its "net-zero" targets by 2050, we will need to install a further 25 mil EV chargers & 22 mil heat pumps

£48.5 bil will need to be spent on network infrastructure upgrades to meet future demand

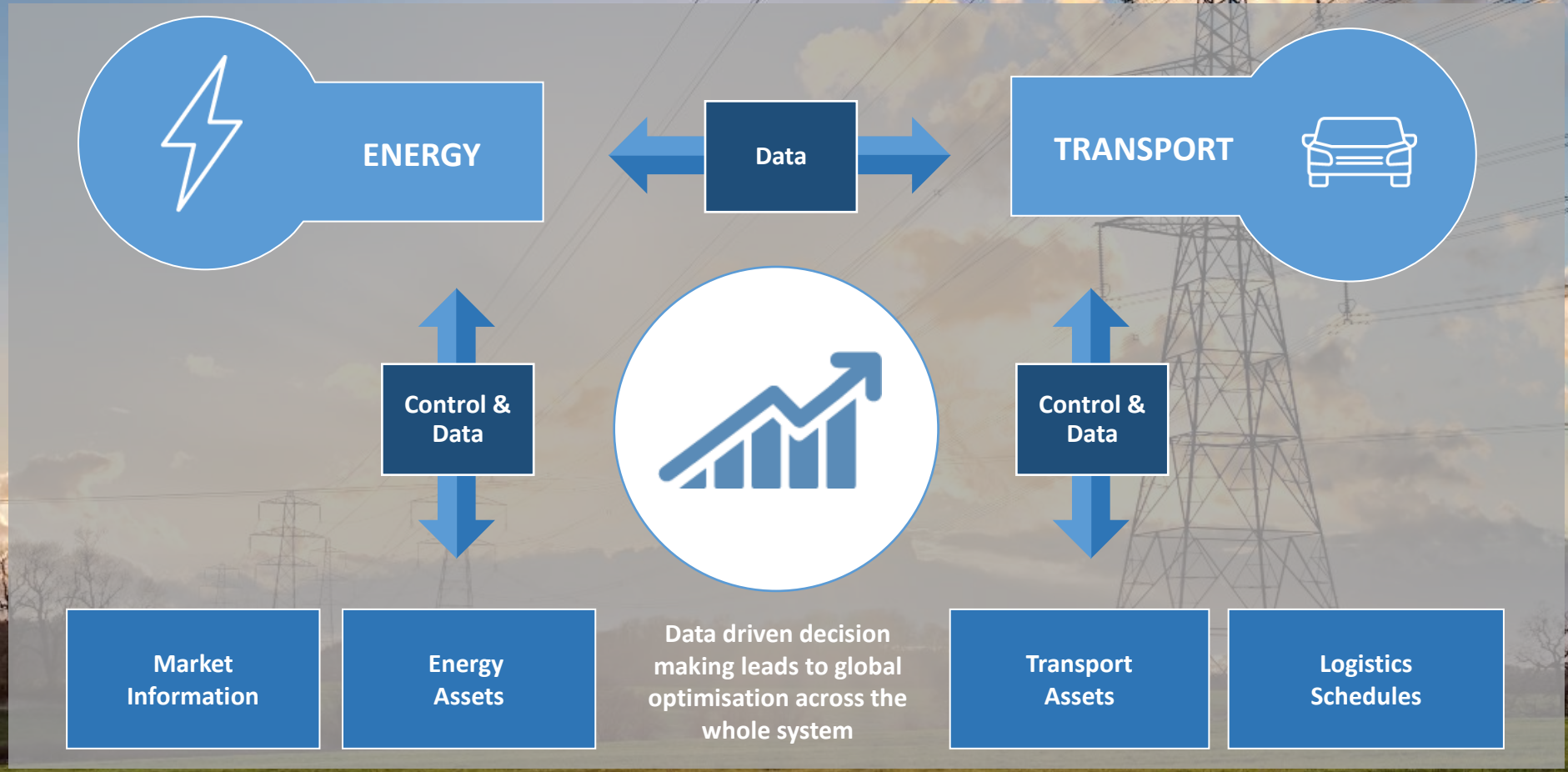
https://www.ft.com/content/9cba0522-f564-11e9-b018-3ef8794b17c6

….there's still a lack of certainty and data



1. How do we quantify and minimise the network impact of commercial EVs?
2. What is the value proposition for smart solutions for EV fleets and PHV operators?
3. What infrastructure (network, charging and IT) is needed to enable the EV Transition?

We need to take a whole system view in order to properly understand requirements



Depot Based Fleet Trial – Royal Mail Partner

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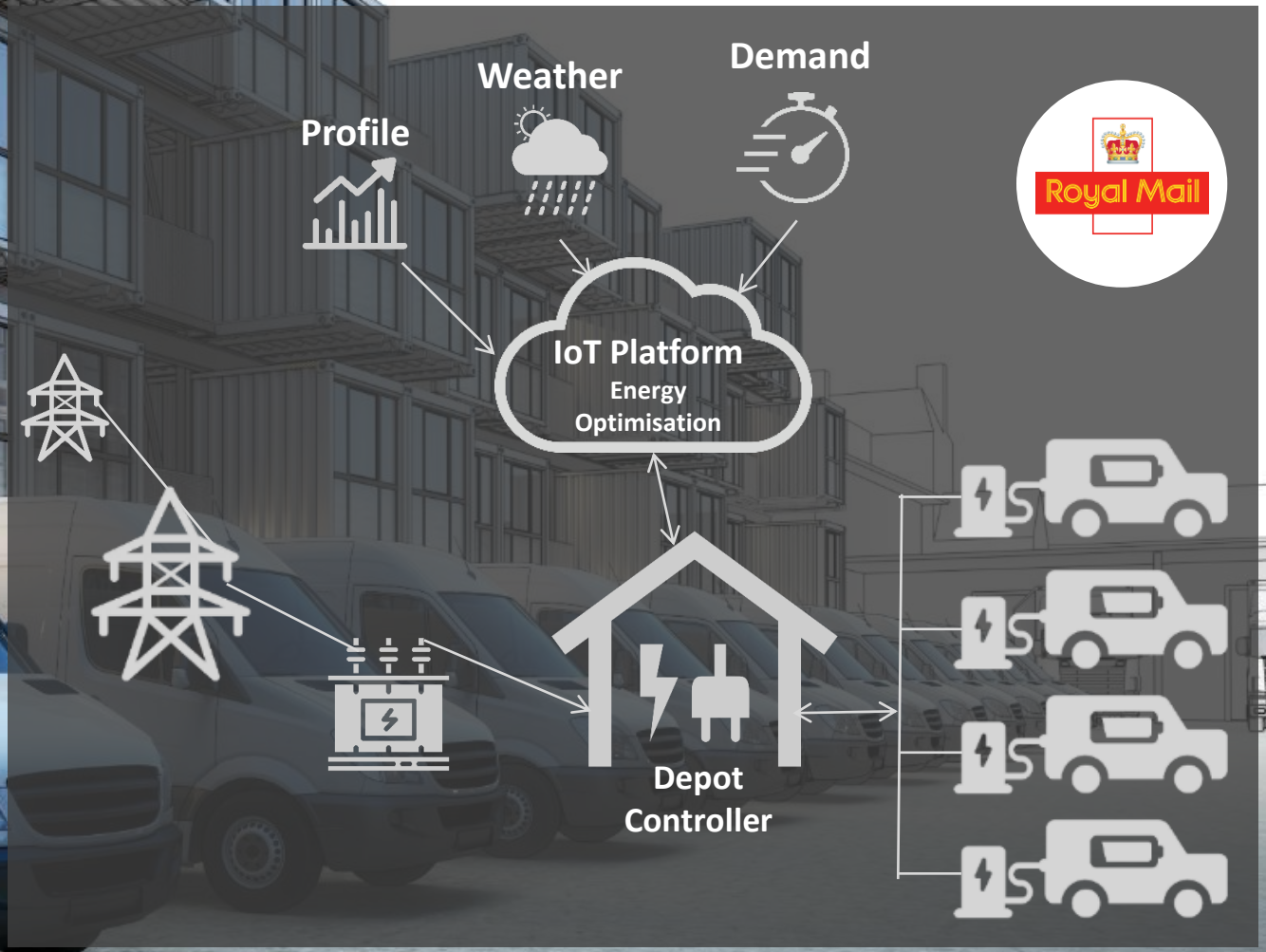
Commercial depot based fleets present potentially significant issues to the energy networks.

Deploying a large number of chargers on one site may result in potentially prohibitive connection costs.



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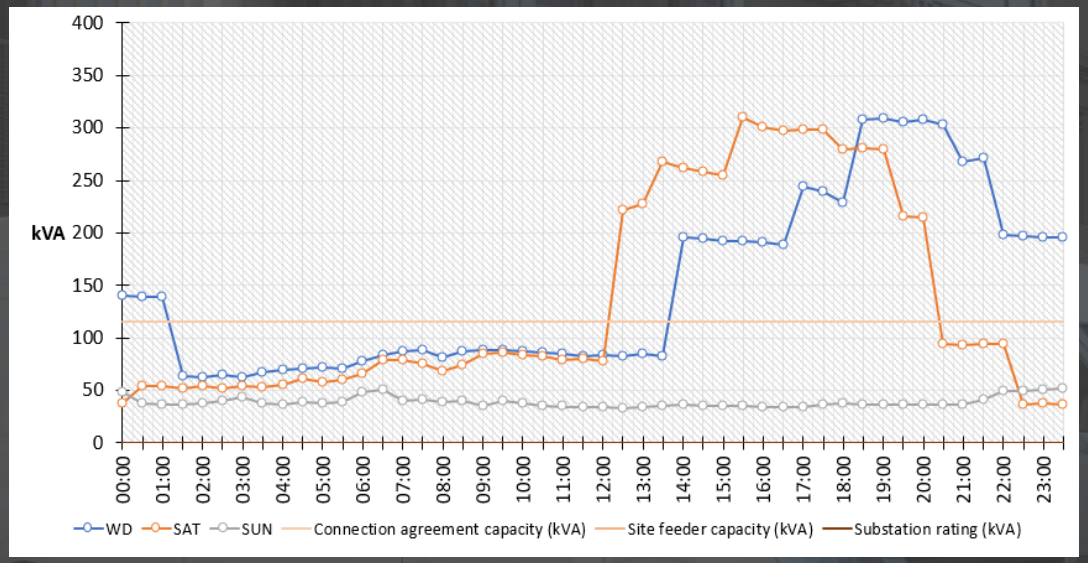
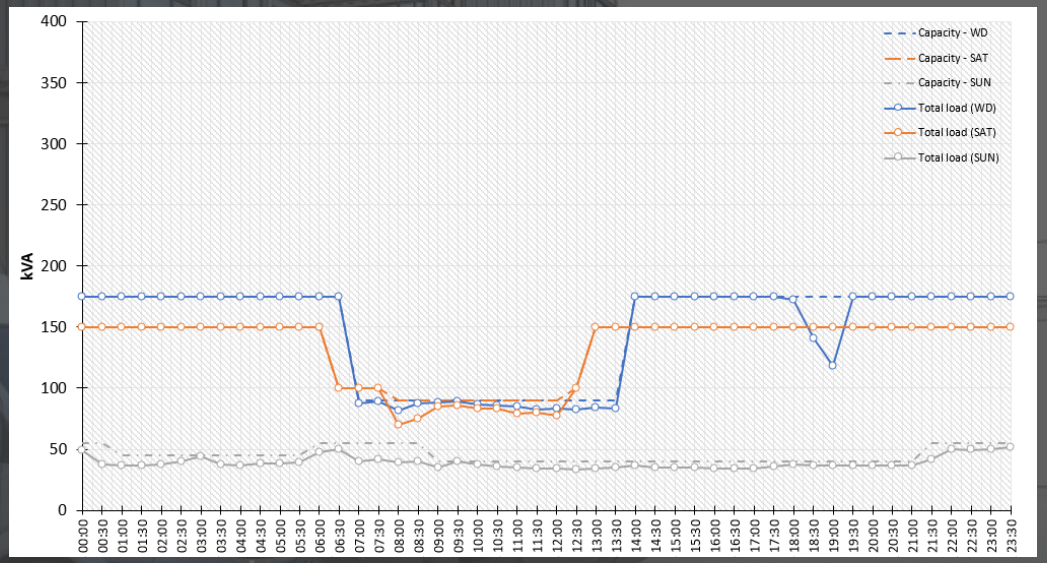
The depot planning tool allows us to simulate the capacity impacts of different charging regimes, allowing the depot to commit to lower, flexible, capacity agreements

Unmanaged charging at depot



EVs charge to full as soon as they are plugged in
There is no regard for capacity constraints, hence there is a significant capacity breach

Smart profile-constrained charging



Optimisation process searches for a solution that distributes charge to EVs so they meet the required state-of-charge at plug-out-time, whilst ensuring the aggregated load does not breach the capacity constraints

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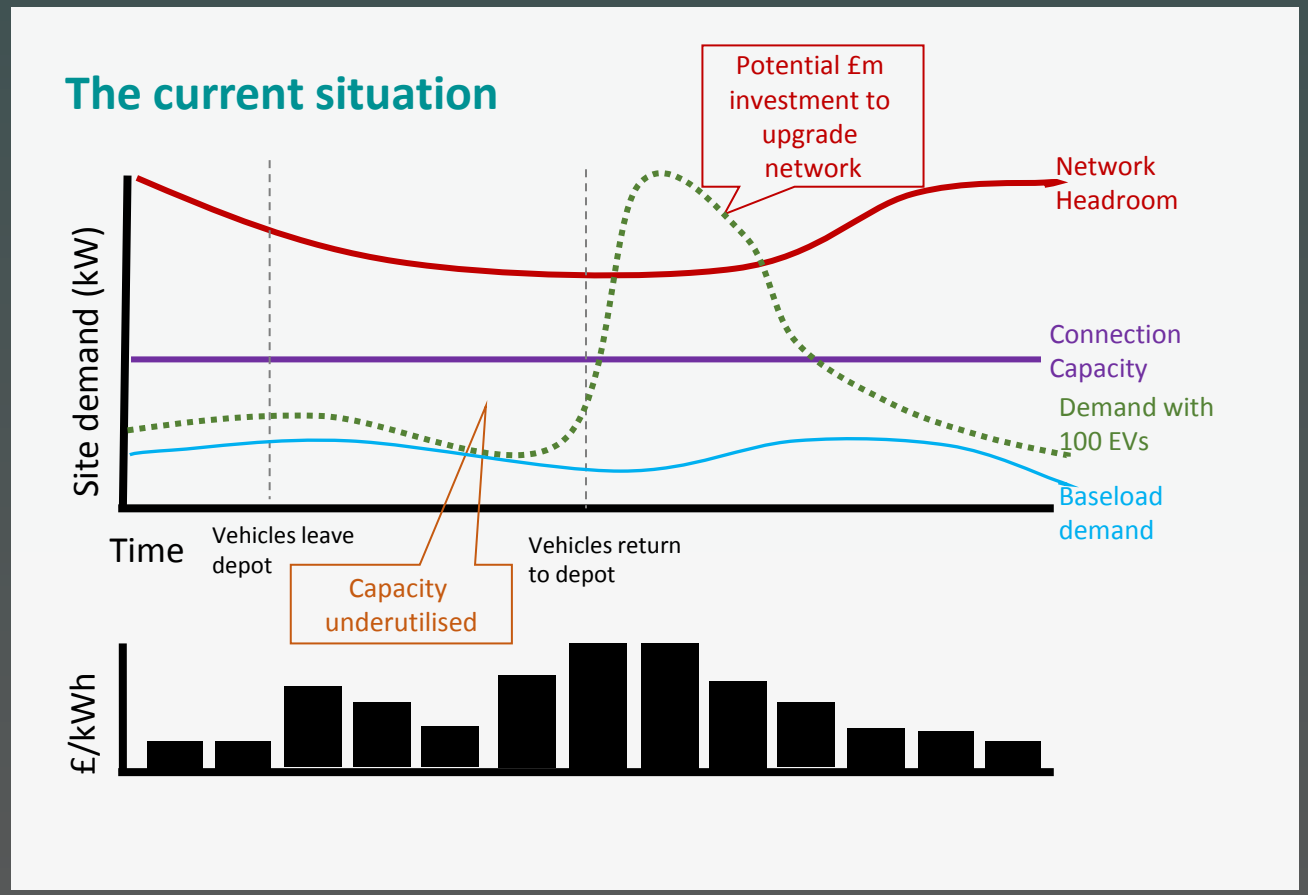
Optimise Prime's depot optimisation tools will serve two purposes: saving money for the fleet operator and ensuring the network capacity limits are not exceeded



- Without smart charging, depots may face bills for **network reinforcement**, or need to limit electrification plans
- Network capacity reserved for depot is **not fully utilised**
- Charging times are not aligned with power prices

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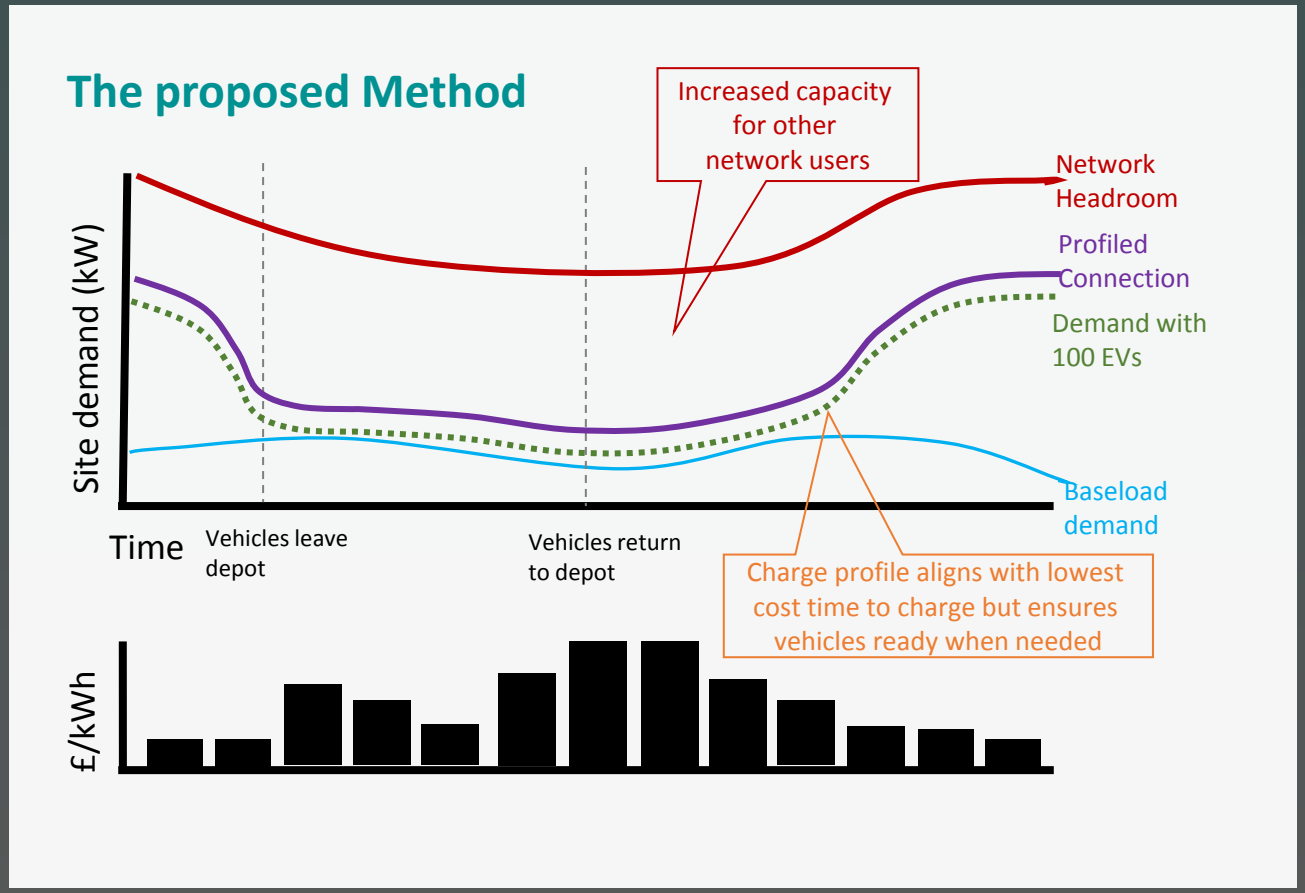

- Charging is re-planned using **depot planning tool** to meet fleet requirements at lowest cost.
- New '**profiled connection**' applied for, based on modelled demand.
- **Depot optimisation system & controller** ensures site complies with profiled connection and re-plans to account for changes is tariffs, vehicle use or flexibility requests.
- More efficient network use frees up capacity.

Home Based Fleet Trial – Centrica (British Gas) Partner

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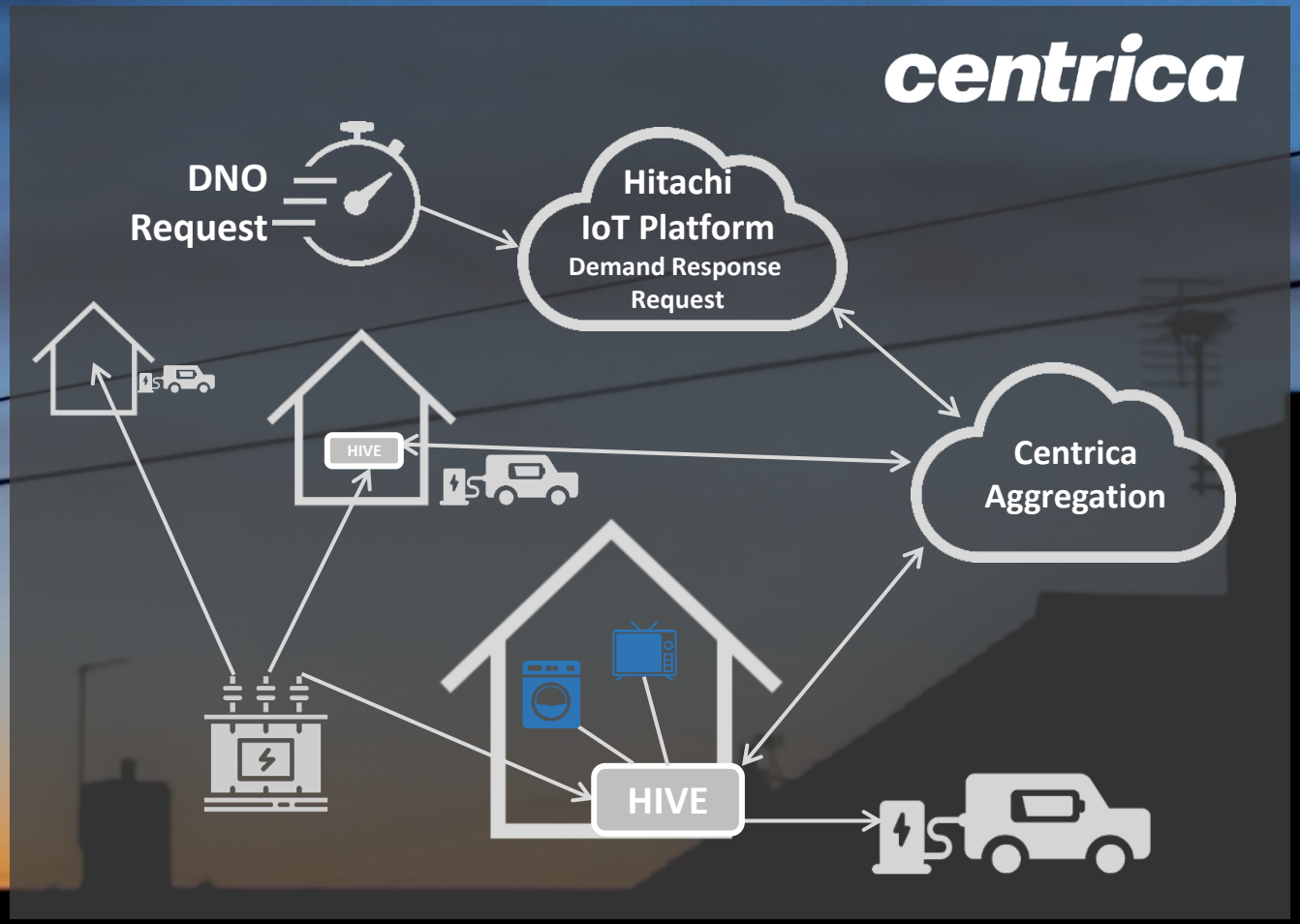
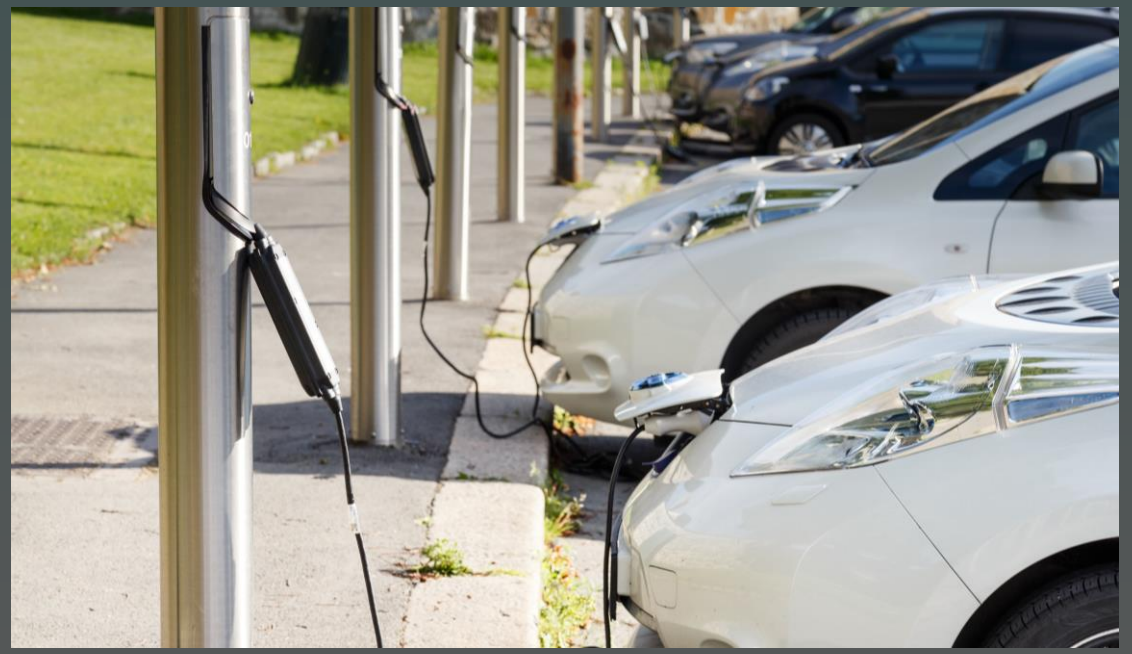
Clustering of EVs in domestic streets has the potential to create localised network challenges.

Potentially compounding this residential based fleets are likely to have larger impacts on the networks when compared to private domestic EVs due to:

- Higher utilisation of EV's resulting in vehicles being charged more regularly and for longer
- Less incentive for user to charge at off peak times if company is paying for electricity

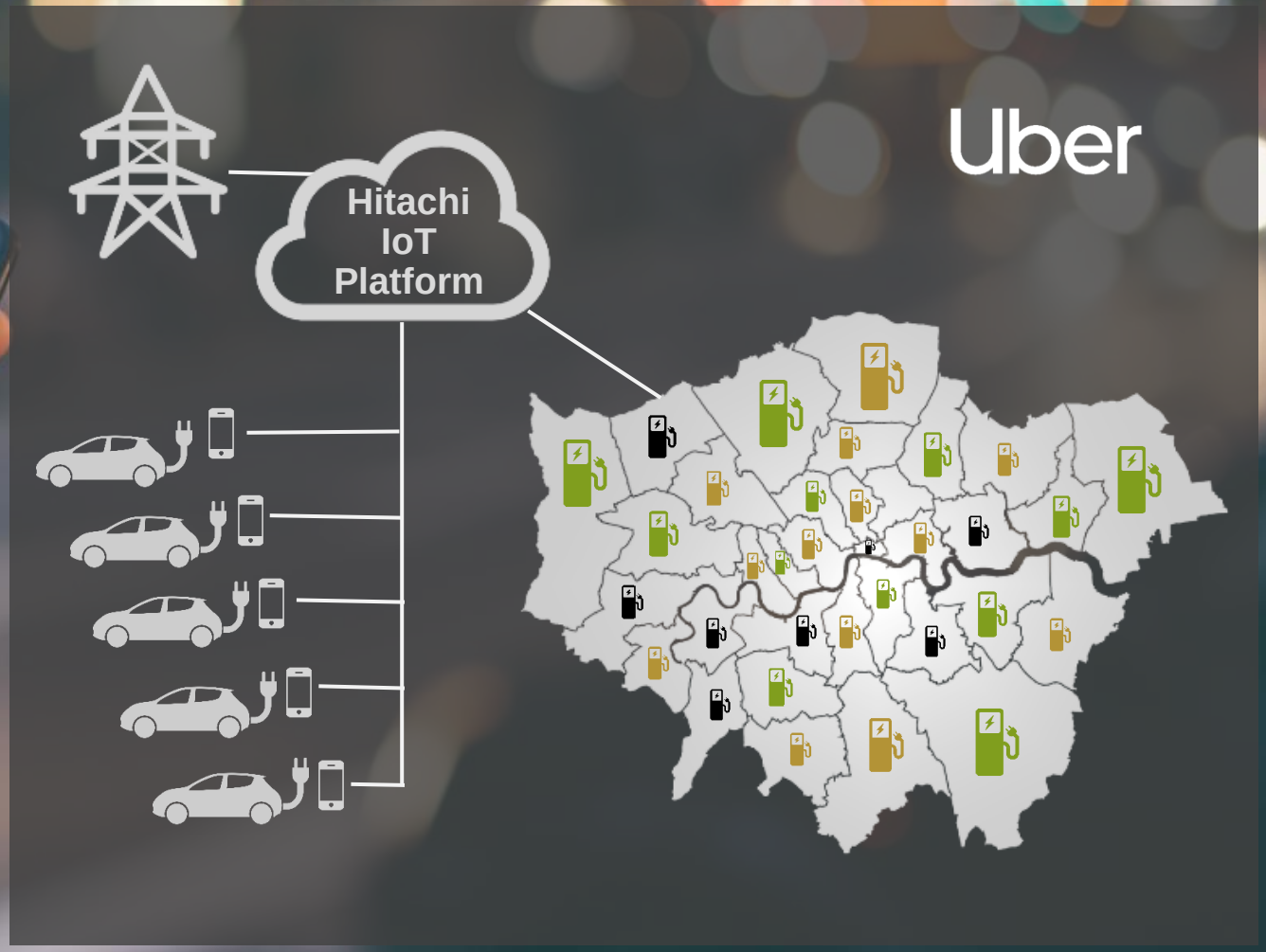


Mixed Fleet Trial – Uber Partner



Some commercial fleets, like Uber's private hire vehicles, don't have a defined operating mode - They may charge at homes, charging hubs or at roadside chargers throughout the city.

Demand for these services is growing, yet the potential network impact is not fully understood.



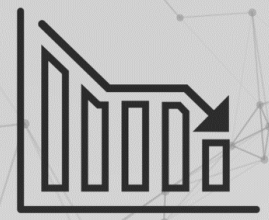
The learnings and technology demonstrations resulting from Optimise Prime will pave the way to allowing fleets and utilities to accelerating the adoption of low carbon technologies.

Data will be made openly available.

2.7 million tons of CO2 by 2030

1,484 times

REDUCED LOAD ON THE OVERALL NETWORK



1.9 GIGAWATTS

And this is just in the UK. Hitachi is currently discussing how the technologies in this programme can help fleets in the USA, Europe and Asia accelerate their journey.

Across all the trials, Hitachi will collect vast amounts of data. We'll be using analysing and forecasting to develop a range of insights of use to network and fleet operators

Optimise Prime brings together stakeholders from across the value chain

Energy

Mobility and Logistics

Technology

Taking a whole system view, enabled by IOT, we can optimise across silos, avoiding local optimisation and creating the maximum value for all parties

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IoT Platform

IoT Platform

The USP hosts the following subsystems:

- Trials Operational Applications (TOA)
- Shared Services (SSV)
- Data, Analytics and Innovation (DAI)

The USP is built on top of Hitachi Enterprise Cloud (HEC)