Delivering EV charging infrastructure

ADEPT Conference

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LowCVP
Low Carbon Vehicle Partnership

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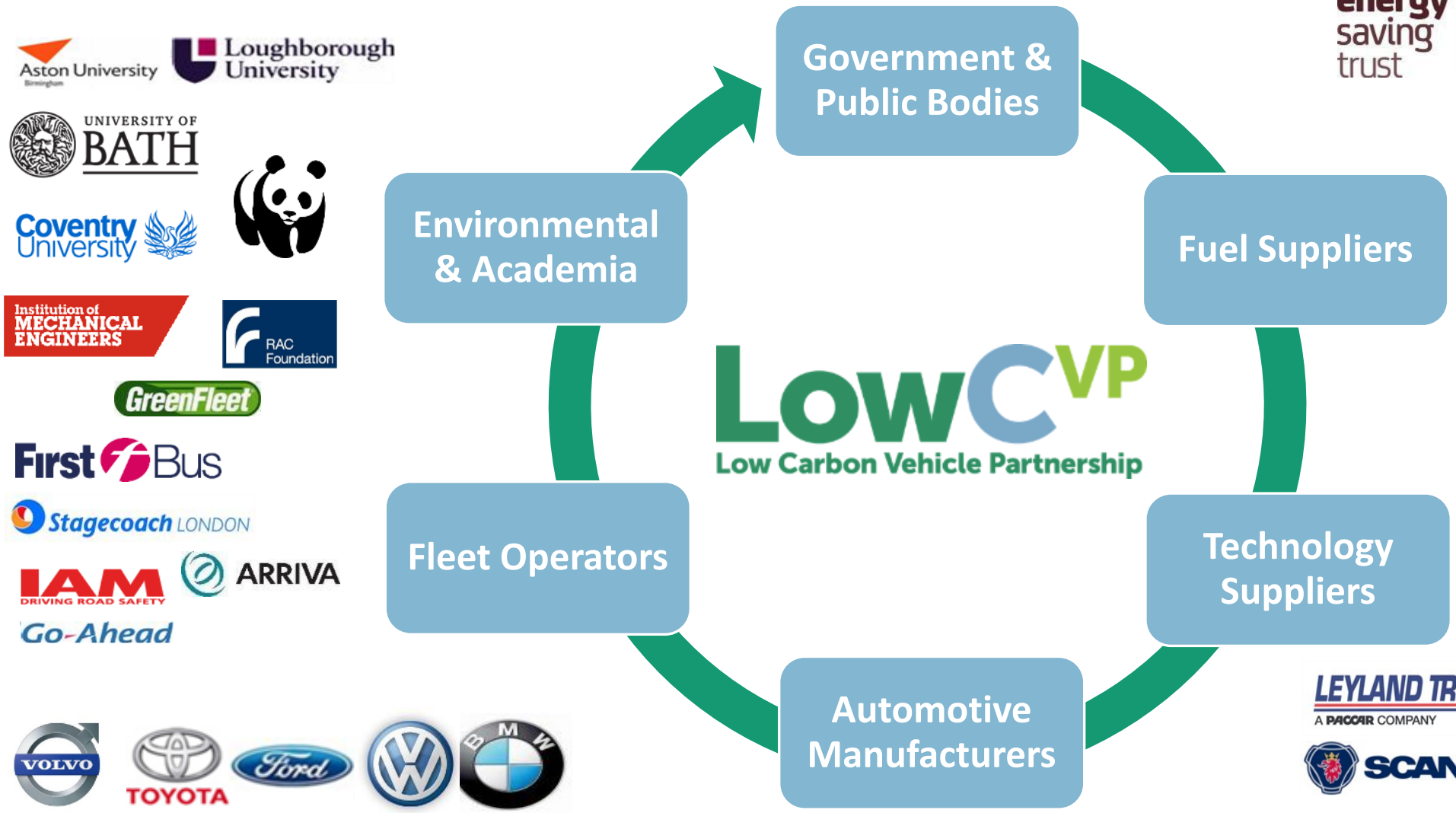
LowCVP: A unique public-private membership organisation, building evidence and creating robust policies and innovation in the UK



Aston University
Loughborough University
University of Bath
Coventry University
Institution of Mechanical Engineers
RAC Foundation
GreenFleet
First Bus
Stagecoach London
IAM Driving Road Safety
Arriva
Go-Ahead
Volvo
Toyota
Ford
Volkswagen
BMW

energy saving trust
Transport for London
Department for Transport
Office for Low Emission Vehicles
Transport for Greater Manchester
City of York Council
Nottinghamshire County Council
UKpia
Shell
REA Renewable Energy Association
autogas
elementenergy
Ricardo
MIRA
SMMT Driving the Motor Industry
Leyland Trucks
Scania

And Many More...

- The vast majority of EVs are either charged at home or at a fleet depot.
  - 25% of cars parked on street over night
- Public Charge Points (PCP):
  - 34,363 charge point connectors across 12,444 locations across the UK.
  - PCPs provide invaluable additional charging to support home and business charging, and the opportunity to extend journey distances in EV mode.
- Depot-based charging:
  - Bus fleets
  - Local authority fleets
  - Delivery fleets

Charge point type	Power transfer		Typical charging time
Slow	≤3kW	Single phase	8-12 hrs
Fast	≤7kW	Single phase	3-4 hrs
	≤22kW	Three phase	1-2 hrs
Rapid	≤43kW	Three phase	80% in 20-30 mins
	≤50kW	DC	
Super-rapid	>43kW	Three phase	<20-30 mins
	>50kW	DC	

Source: UKEVSE

User cases & infrastructure

User Category	Vehicle Type	From or near home or at depot (Slow charge)	While 'grazing' of at workplace (Slow/Fast/Rapid)	'On the go' or in transit (Rapid/Fast)
Private Cars	BEV	Regularly	Occasionally	Occasionally
	PHEV			Occasionally to never
Shared Vehicles (Car Clubs)	BEV	Regularly to daily	Occasionally to Regularly	Regularly
	PHEV			
Taxi / Private Hire	BEV/PHEV	Nightly	Rarely or never	Regularly to daily
Privately Owned LGVs	BEV	Regularly to Nightly	Occasionally to Regularly	Regularly
	PHEV			Occasionally
Company Fleet LGVs	BEV	Regularly to Nightly	Occasionally to Regularly	Occasionally to daily
	PHEV		Rarely to never	Occasionally

Source: London Electric Vehicle Delivery Plan

Issue: delivering infrastructure required from existing electricity network

Electrification of transport will increase electricity consumption significantly.

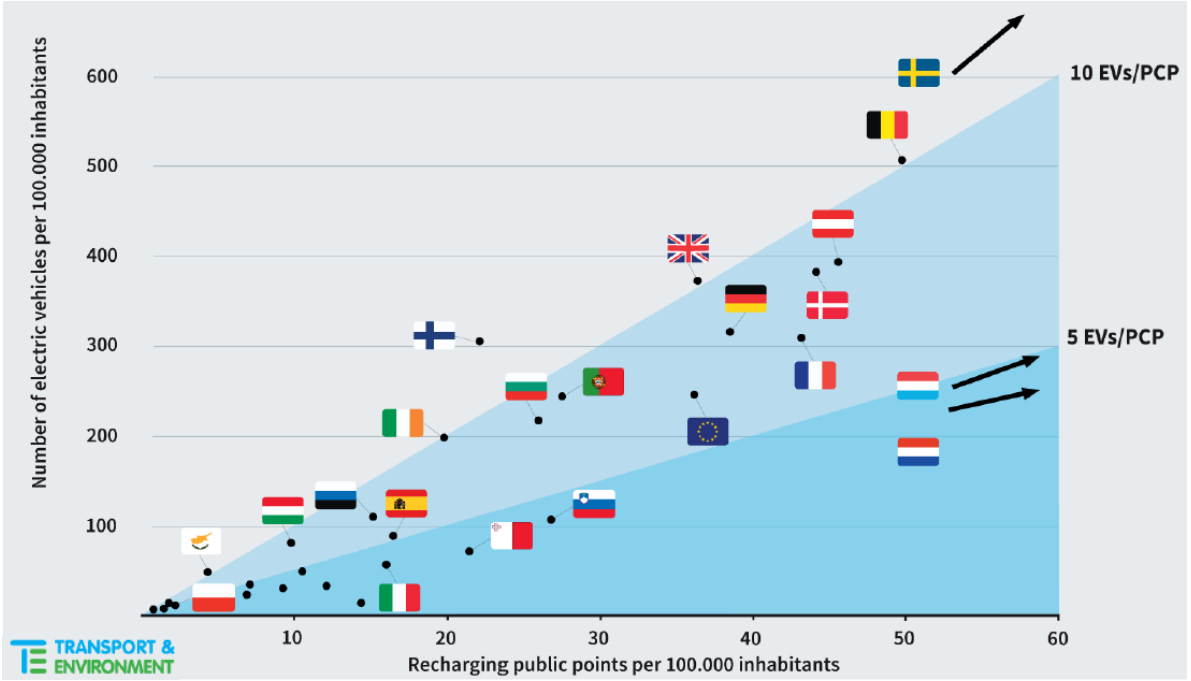
- Smart charging
- Best utilisation of the network

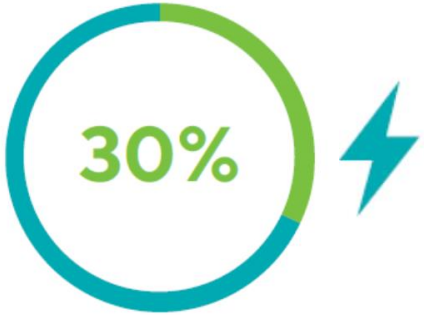
EU currently recommends a ratio of 10 EVs to each Public Charge Point (PCP):

- UK currently 10 EVs/PCP
- UK forecast to need 500,000 PCPs by 2030

Importance of PCPs influenced by population density and access to off-street parking:

- Sweden > 13 EVs/PCP – 23 pop/km^2
- Netherlands < 4 EVs/PCP – 521 pop/km^2





The Road to Zero could potentially increase today's electricity consumption by about 30% by 2050

Understanding demand for EV infrastructure

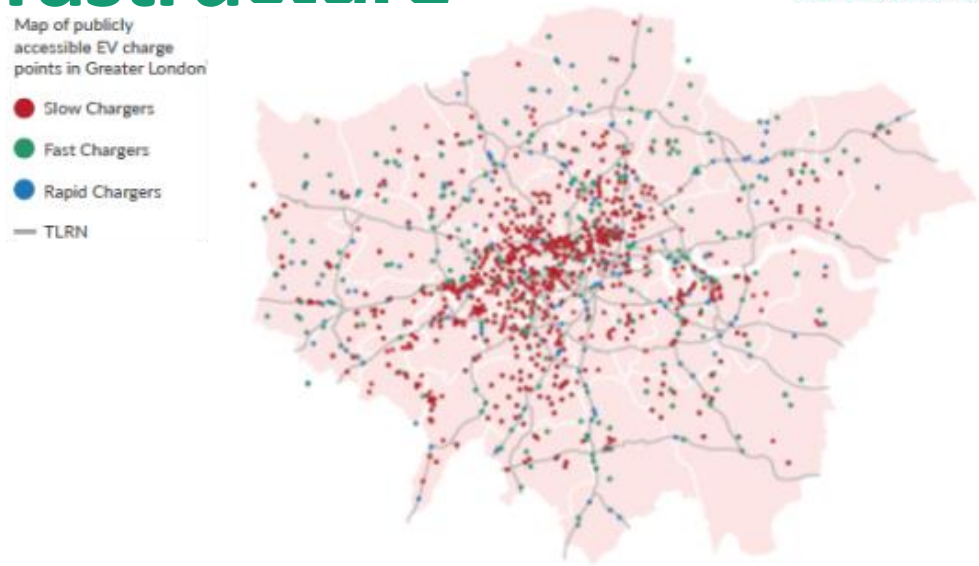
Charging requirements will differ between use cases:

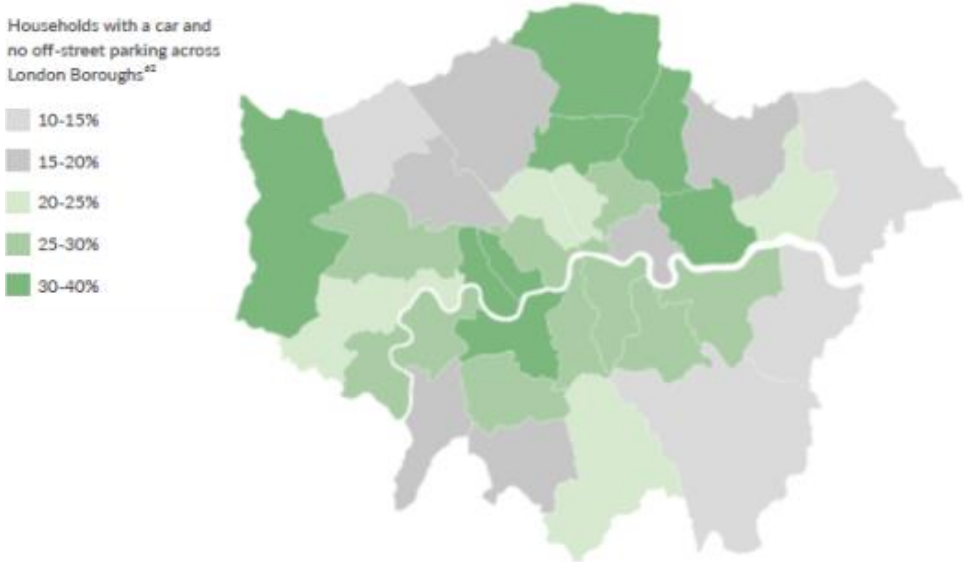
- Private cars
- Shared mobility e.g. Car Clubs
- Taxis, Private Hire
- Community transport
- Buses
- Private vans
- Delivery fleets

Charging requirements are likely to change over time:

- Mass market likely to be more dependent on public charging network
- Urban mobility modal shift
- Increased demand for home delivery

Transport electricity consumption will need to be met by the electricity network both temporally and spatially.





Source: London Electric Vehicle Delivery Plan

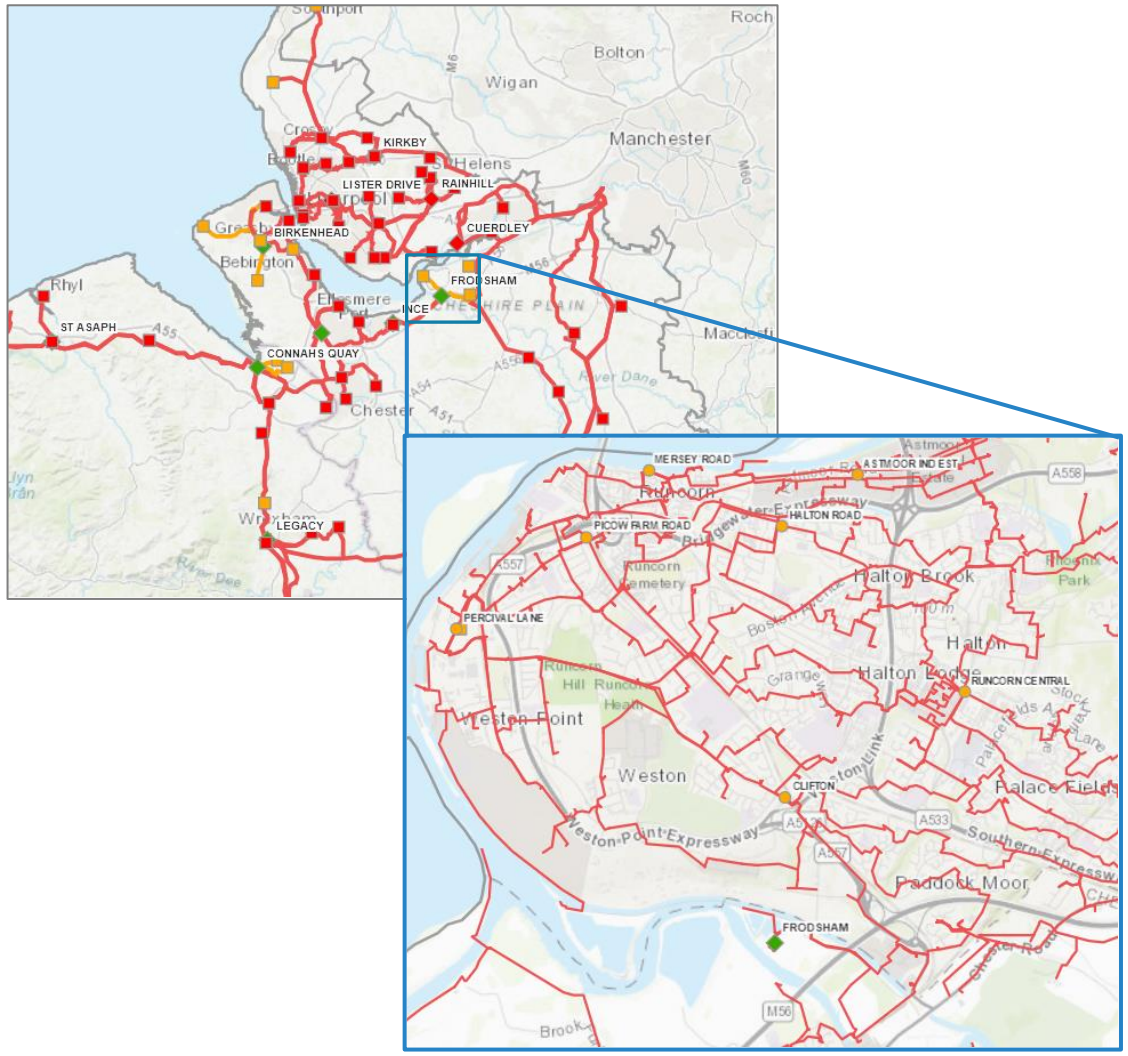
Understanding supply – new tools

The GB electricity network is undergoing a transformation:

- Renewable and dispersed power generation
- Decarbonisation of transport and heat
- Smart grid – TOU tariffs
- New regulatory regime RIIO2

Current network has significant constraints in managing peak load:

- Ability and cost of connecting to grid can be time consuming and costly.
- Distribution Network Operators producing new tools to assist.



Getting public and private charge points connected

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Involve the distribution network operator, the supplier and a qualified installation company early.

When? Who? Why?

The following steps should be followed when considering installing a charge point:

1
- Identify some candidate locations
- Decide on the number and type of charge point(s)
- Make initial contact with your DNO to submit an enquiry and discuss network capacity at the locations concerned
- Appoint an electrical contractor for the charge point installation

2
- Apply for an electrical network connection from your DNO
- Submit a map where the preferred location is marked with a circle rather than a specific point
- For multiple applications, prioritize the locations in rank order (most favoured to least favoured) if possible
- Provide your DNO with the technical data sheet for the charge point types you are planning to install

3
- Receive, review and accept the DNO design and quotation received
- Appoint an electricity supplier who will bill for the electrical energy used
- Your supplier will appoint a meter operator to install a meter for the charge point

4
- Agree start and end dates for DNO works
- Energise your charge point(s)
- Operation and maintenance

Small (up to 70kVA)	Medium (200kVA – 1,000kVA)	Large (above 1,000kVA)
Number of charge points		
1-3 fast or 1 rapid charge	More than 3 fast or more than 1 rapid charge	Multiple fast/rapid charge points
Approximate connection time		
8-12 weeks	8-12 weeks	6 months +
Approximate connection cost		
£1,000 - £3,000	£4,500 - £75,000	£60,000 - £2 million
Other considerations that may affect the cost		
Street work costs	Street work costs Legal costs for easement and wayleaves	Street work costs Legal costs for easement and wayleaves Planning permission and space for a substation

Source: UKEVSE

Planning for the future – local area energy plans

To meet Net Zero emissions by 2050 will need a radical transformation of local energy systems.

This will key to transport as well as other sectors: heat, local power generation, energy storage, development.

A strategic ‘Whole System’ approach to Local Area Energy Planning has been proven to be beneficial and cost effective.

Local authorities and network operators will be key stakeholders in developing.

Summary

- There will need to be a significant increase in public charge points to support the growth in EVs.
- A range of residential on-street, work and on route charge points will be needed for the range of users.
- The electricity network could be a constraint on the deployment of public and private charge points. Consult your DNO early or use capacity maps.
- Transport and energy planning should be brought together at a local and regional level.

Useful sources

- Energising our electric transition, EV Energy Taskforce
- Decarbonising transport - Accelerating the uptake of electric vehicles, LGA
- London Electric Vehicle Infrastructure Delivery Plan , GLA
- Recharge EU: How many charge points will the Europe and its member states need in the 2020s, T&E
- A guide on electric vehicle charging and DNO engagement for local authorities, UKEVSE & WPD
- Local Area Energy Planning: Guidance for local authorities and energy providers, ES Catapult

Thank you. Any questions?

Interested in joining the Partnership?

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