

Strictly Highways 2025

DynaCoV: Dynamic Charging of Vehicles

01 October 2025

Who am I

- Shamala Evans-Gadgil: Part Time Researcher (Ph.D.), with a Civil Engineering and Contract Management background
- Working as a consultant to Coventry City Council in a Senior Programme/Project Manager capacity on Innovation Projects in Transport and Innovation Division.
- Project Lead for:
 - ◊ Electric Vehicles Charging Infrastructure Strategy
 - ◊ All Electric Bus City
 - ◊ Renewable Energy and Battery storage
- Chair of TTF Electric Vehicle Charging Infrastructure Working Group

Coventry City Council

Why Electrify Coventry?

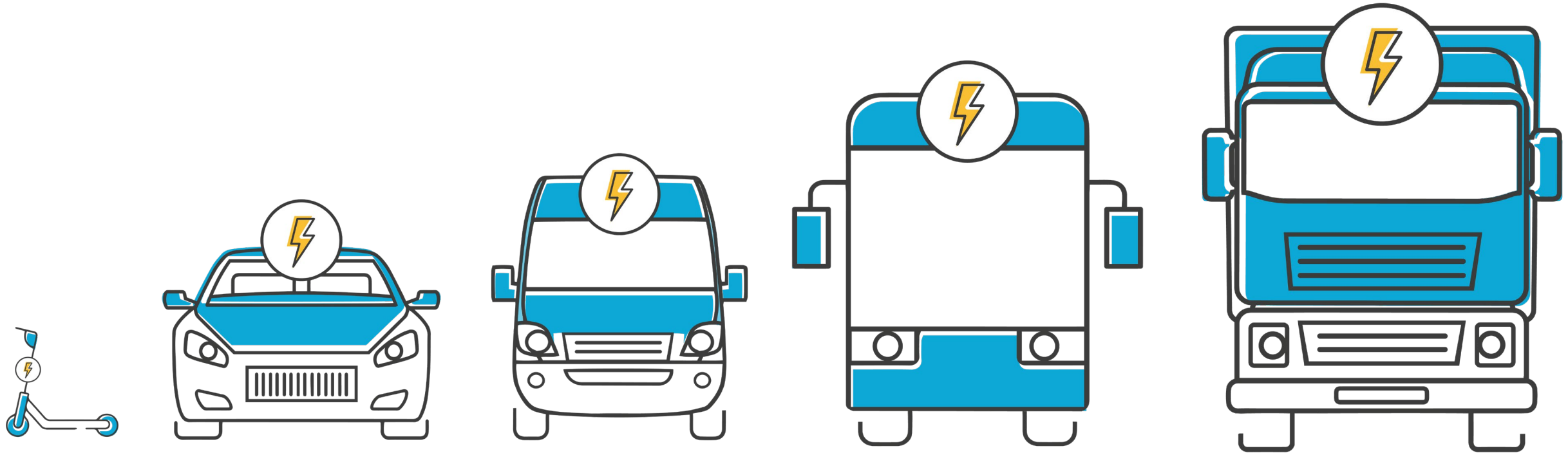
- Climate Change Strategy
- Coventry Local Air Quality Action Plan
- Zero carbon transport system
 - Very Light Rail
 - Electric buses
 - Electric taxis
 - Electric vans
 - E-Scooters
 - Public EV charging network
 - Plug in Charging
 - Static Charging
 - Pantograph Charging and
 - Dynamic Charging of Vehicle



Coventry City Council

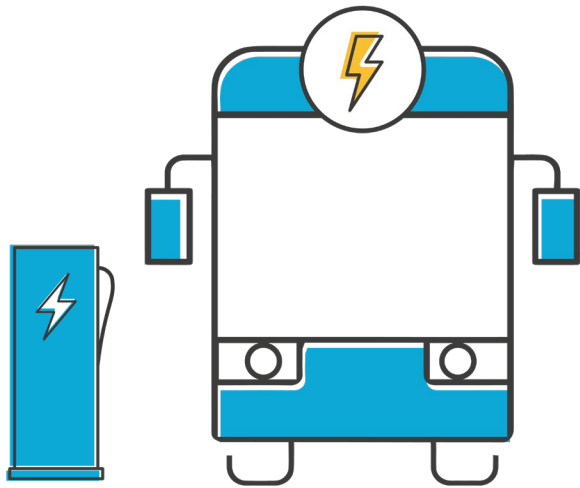
- Coventry has one of the most comprehensive EV charging networks outside London.
- Ultra Low Emission Buses – Office for Zero Emission Vehicle (OZEV) grant funding of £2.255m for 10 electric buses in partnership with National Express – Launched end of August 2020
- All Electric Bus Town [AEBT] – Coventry secured funding of £50 million, through Transport for West Midlands, to fully electrify the bus fleet in the city and key corridors into Warwickshire. The first 130 DD buses were ordered by NX in January 2022 and there are now 204 buses currently operating in the city of Coventry.
- Electric Fleet First project – Coventry was awarded funding by Highways England for a fleet of electric vans, pool cars and taxis for local businesses to try before they buy electric vehicles for their fleets.
- DynaCoV project – Dynamic Charging of Vehicles, a feasibility study was concluded in December 2021 with a cadre' of like-minded organisations.

What is the problem?



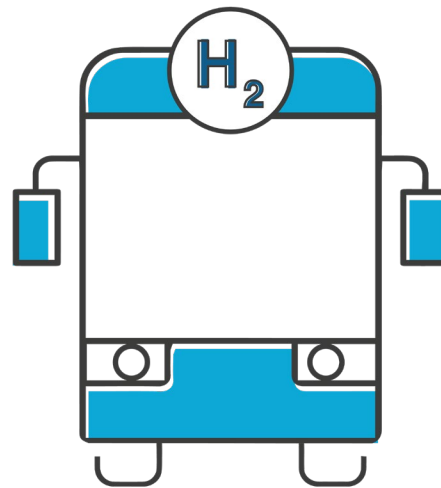
Ease of electrification

What are our options?



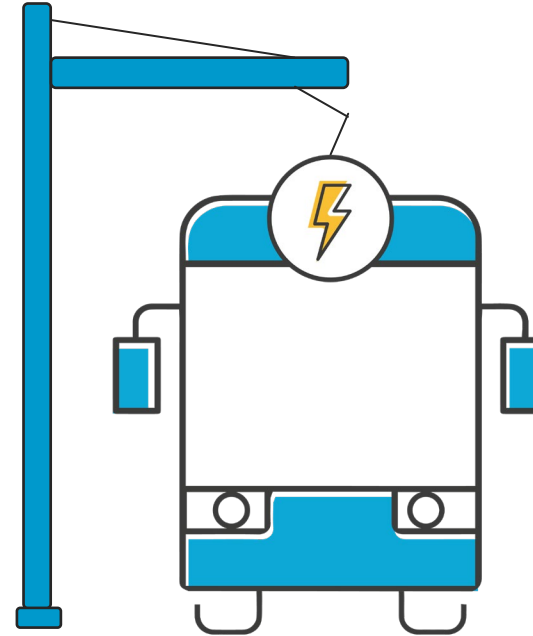
Depot Charging

- Large Battery
- Limited Range



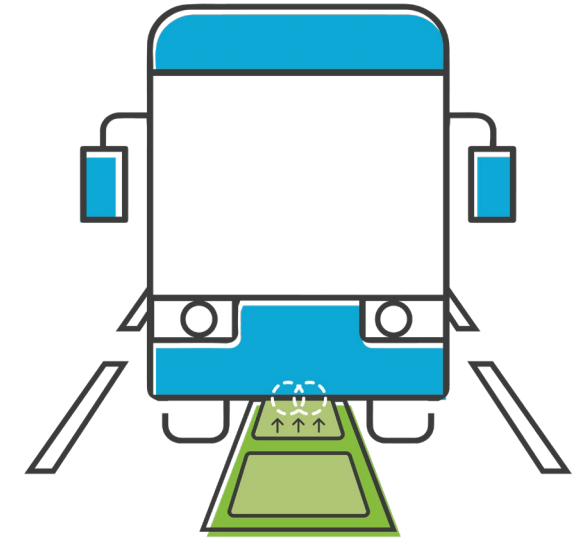
Hydrogen

- Limited & Expensive Infrastructure
- Higher Operational Costs



Pantograph / Catenary

- Limited & Expensive Infrastructure
- High maintenance / Downtime



Wireless Power Transfer

- Expensive Infrastructure
- Reduced Battery Size
- Improved Range

Why DynaCOV?

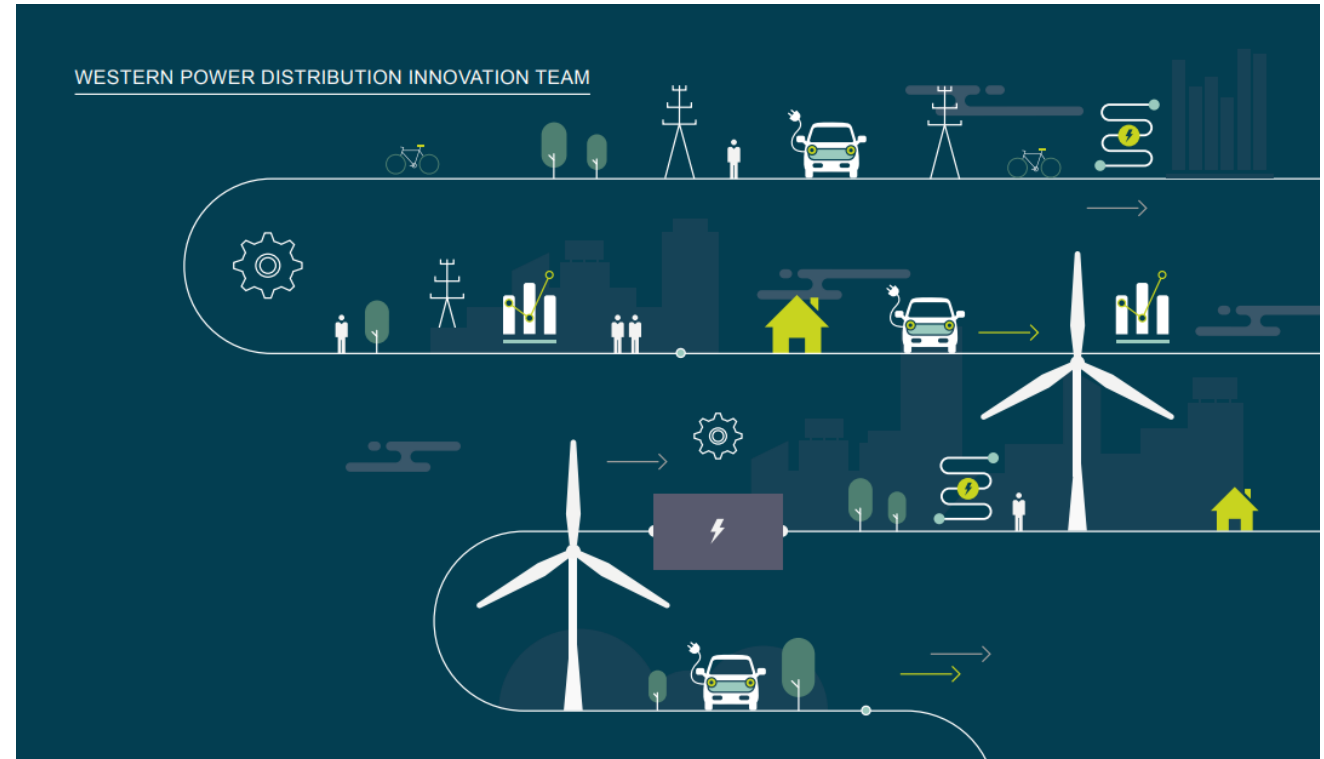
Funded by Network Innovation Allowance (NIA)

NG (formerly WPD) Innovation Forward Plan (2019) Priority Area: Transport

- On-Street Charging Solutions
- EV Filling Stations
- Electrification of Freight

Objectives:

- Review current DWPT technologies already available worldwide
- Assess the electrical impact of Dynamic Wireless Power Transfer (DWPT) technology on the distribution network
- Examine issues such as earthing and having multiple connection points
- Model DWPT on a selected case study within Coventry
- Deliver a set of Electrical values which can be adopted into NG (WPD) modelling as business as usual
- Report on the feasibility of DWPT in the UK
- Forecast DWPT uptake within the UK
- Evaluate the business case and feasibility for DWPT in the UK



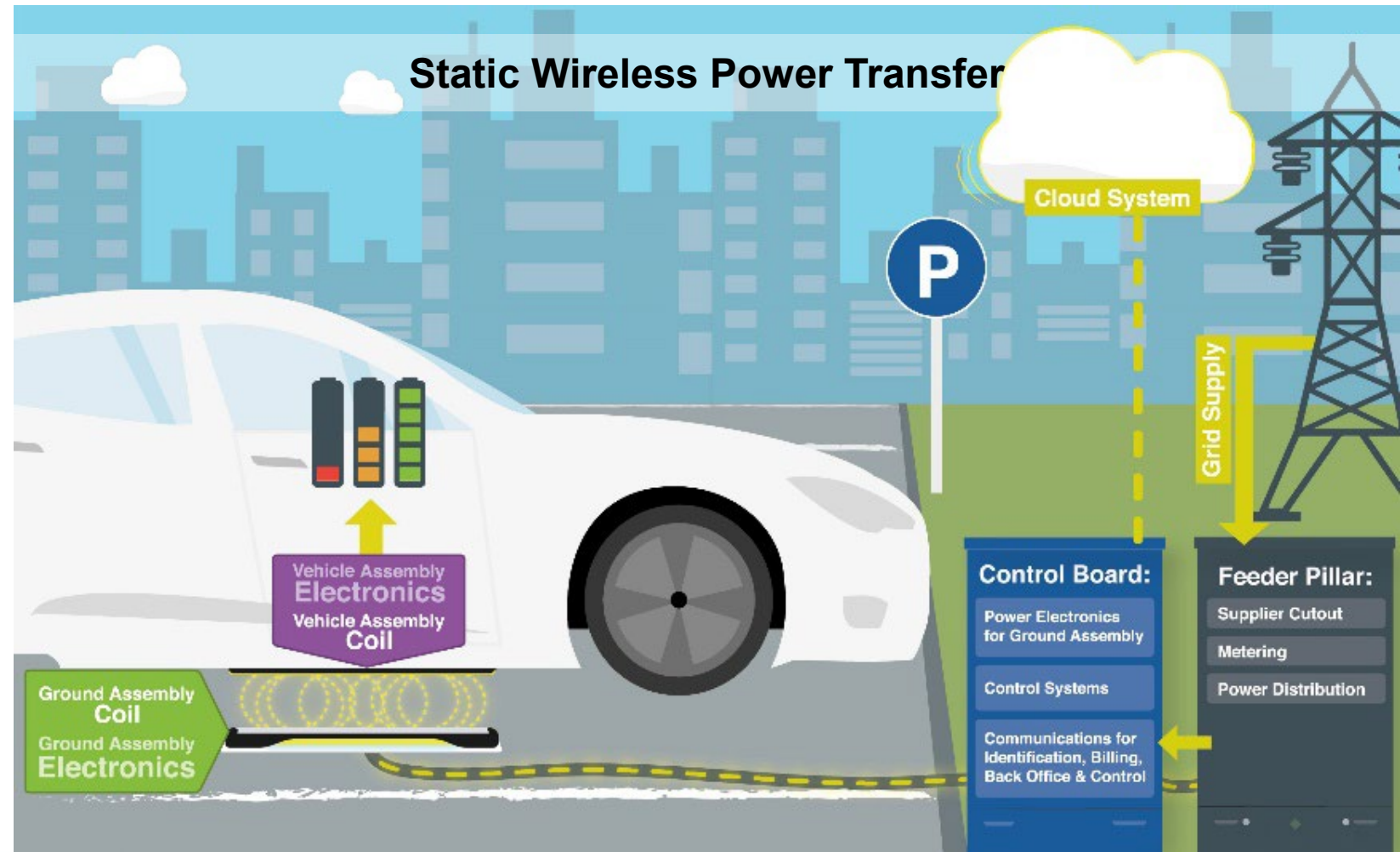
Innovation Forward Plan
December 2019

**WESTERN POWER
DISTRIBUTION**
Serving the Midlands, South West and Wales

How does it work?

Key Applications:

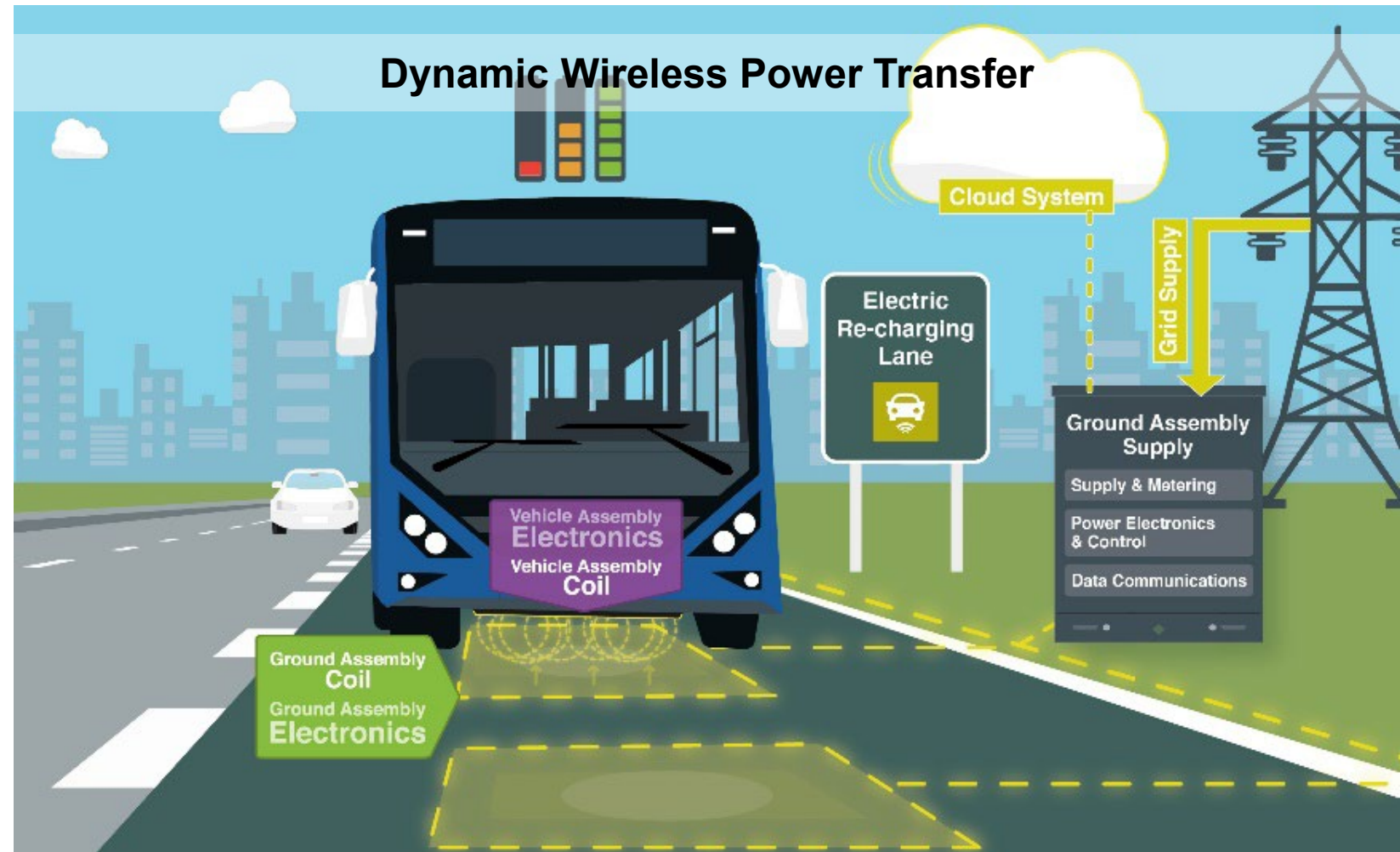
- Taxi Ranks
- On-street parking
- Disability parking
- Autonomous Vehicles



How does it work?

Key Applications:

- Buses / Coaches
- Heavy goods transport
- Last mile delivery
- Strategic road networks (e.g. TEN-T)



How does it work?

Depot Charging:

- Limited range
- High battery capacity requirement

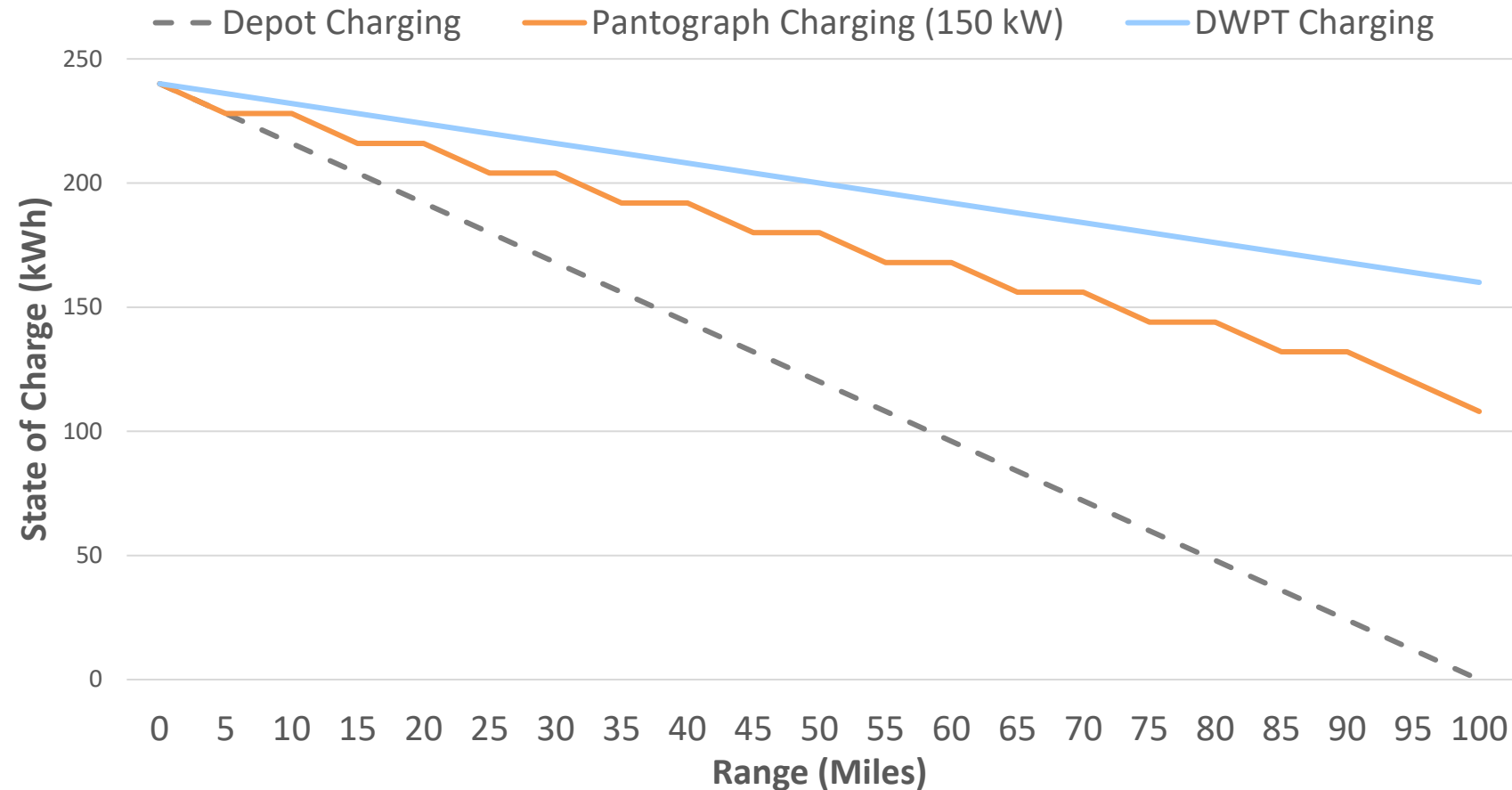
Pantograph Charging (150 kW):

- 5 minute stop every 10 miles
- Improved range or smaller battery capacity requirement

DWPT Charging:

- Near unlimited operation
- Reduced battery capacity requirement
- Energy demand spread geographically

Comparison of Charging Options

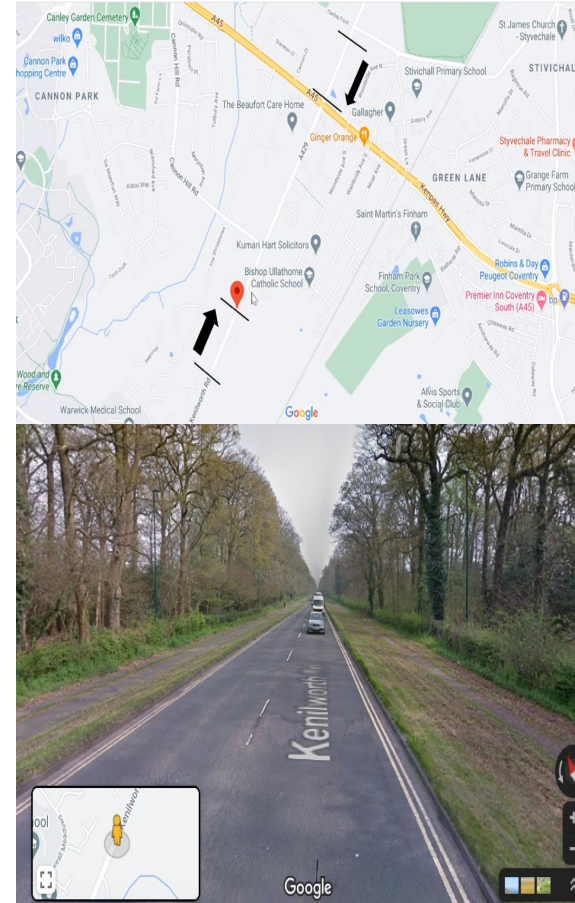


What have we done so far?

PHASE 1: Feasibility

- Technology review – global DWPT pilots & providers
- Network impact study – grid demand & reinforcement needs
- Simulation modelling – Kenilworth Rd case study (buses & mixed fleets)
- Business case analysis – rollout scenarios; HGVs on motorways most viable
- Site identification – Kenilworth Rd shortlisted for UK demonstrator
- Feasibility costing – £1.5m pilot (installation + retrofit)
- Deployment considerations – safety, standards, cyber security, supply chain

PHASE 2: Demonstration



Existing Solutions

Key DWPT Components:

- Management Unit (MU);
- Ground Assembly (GA); and
- Vehicle Assembly (VA).

Deployments:

- Demonstrators in past 10 years: 8
- Typical vehicle types: buses and HGVs.
- Distances covered: Up to 1.6km
- Locations: Most projects have taken place on single-lane private, curated or bespoke test tracks, although three involved public roads.

Providers:

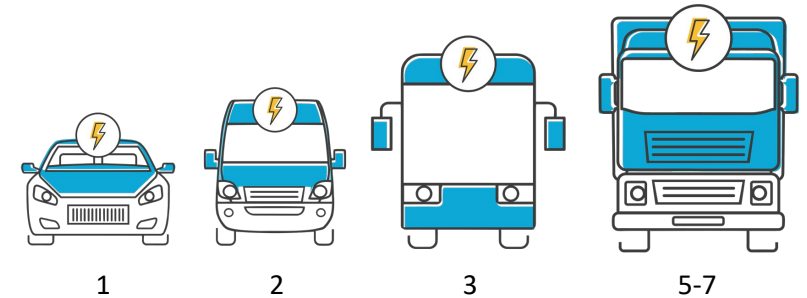
- KAIST (retired), Bombardier Primove (acquired by IPT) and Qualcomm Halo (acquired by WiTricity), ElectReon (active).



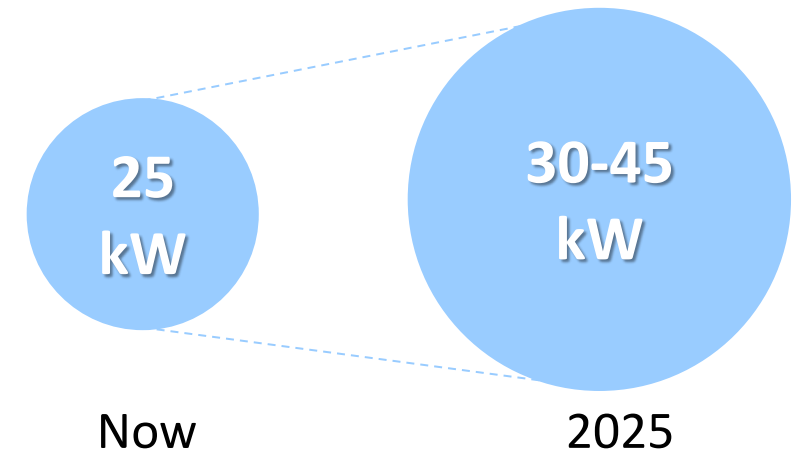
Use Cases

	Convenience & Accessibility	Limiting Downtime	Depot Energy Demand
Private (light) vehicle	✓		
Commercial vehicle	✓	✓	✓
Bus	✓	✓	✓
HGV	✓	✓	✓

Receivers per Vehicle



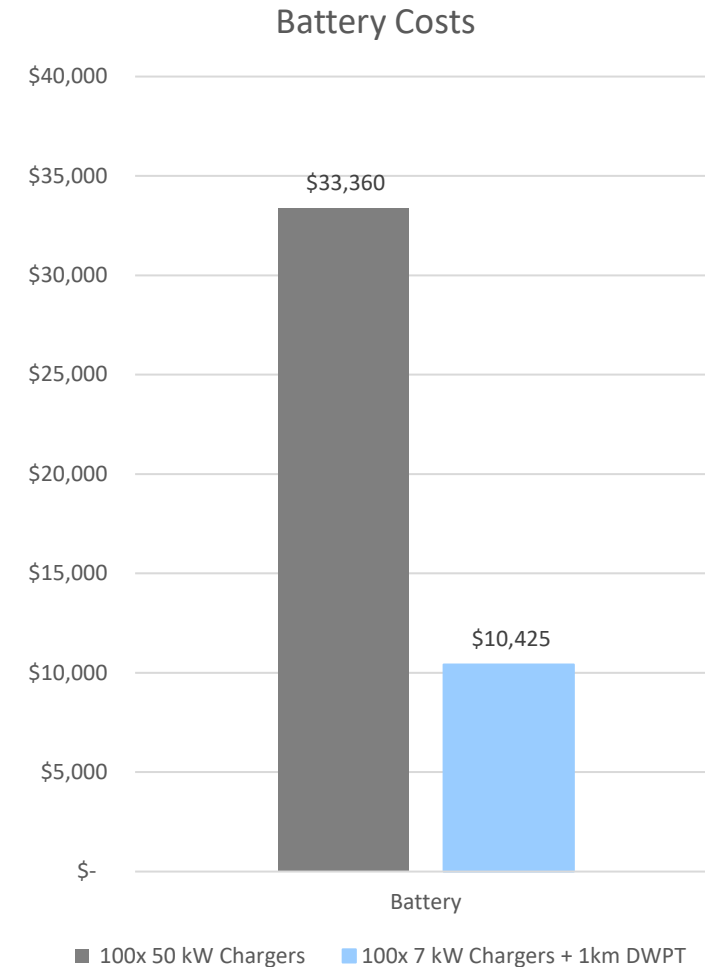
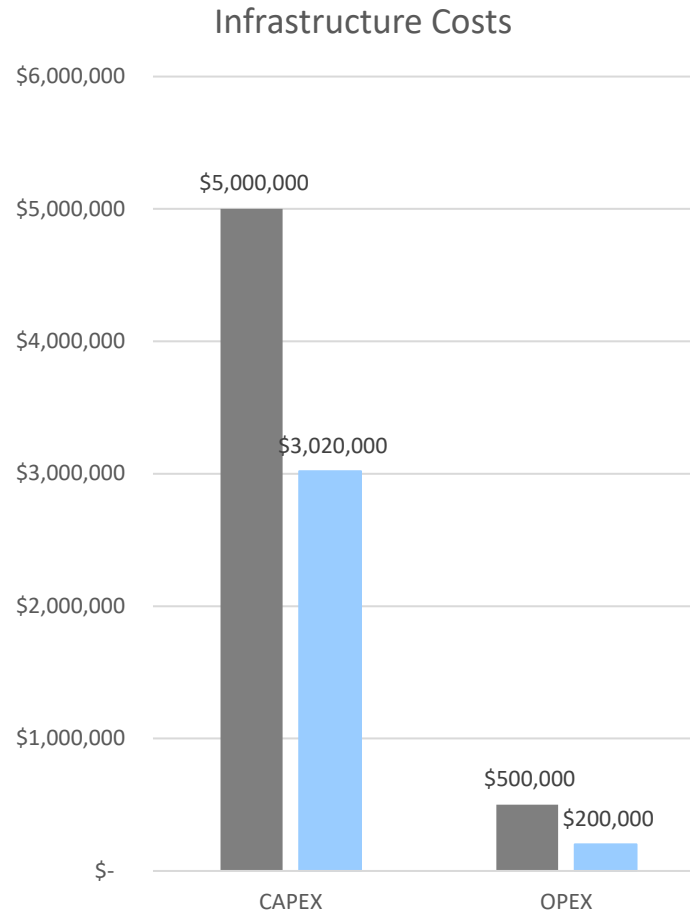
Power per Receiver



Worked Example

in 2021

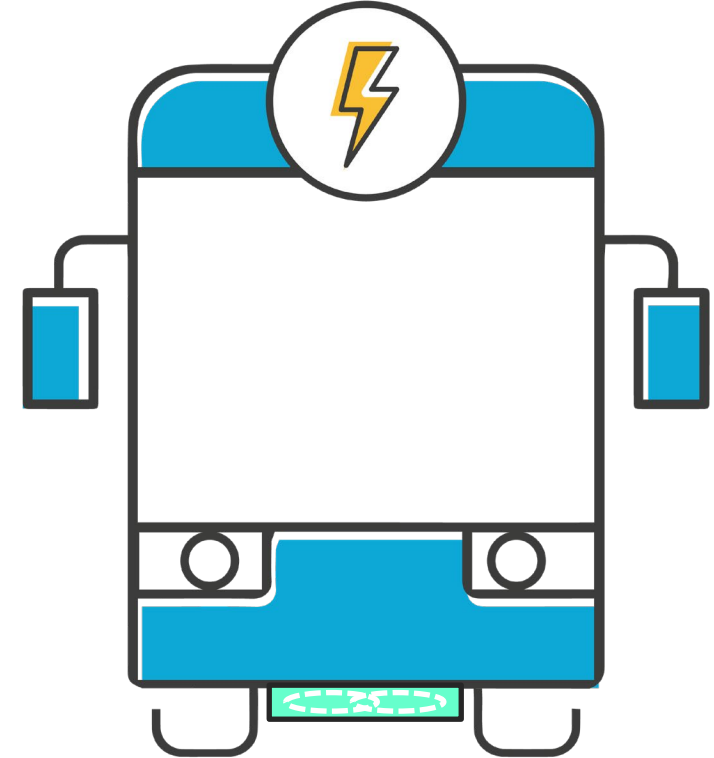
- Coventry – All Electric Bus City
- If Fleet of 100 Buses in a single depot
- Depot only charging
 - 240 kWh battery
 - 100 x 50 kW chargers
- With DWPT
 - 75 kWh battery
 - 100 x 7 kW chargers
 - 1 km DWPT
- Potential Savings
 - \$4.3m upfront investment
 - \$7.3m saving over 10 years



Retrofit v Built in

- Retrofit requires fitting the VA to the undercarriage
- Most vehicles are not designed with this in mind, leading to VA sticking out
- Design & installation is extremely expensive and vehicle specific
- Installation can impact vehicle performance and void warranties
- DWPT VA standards are currently in development, reducing risk of implementing

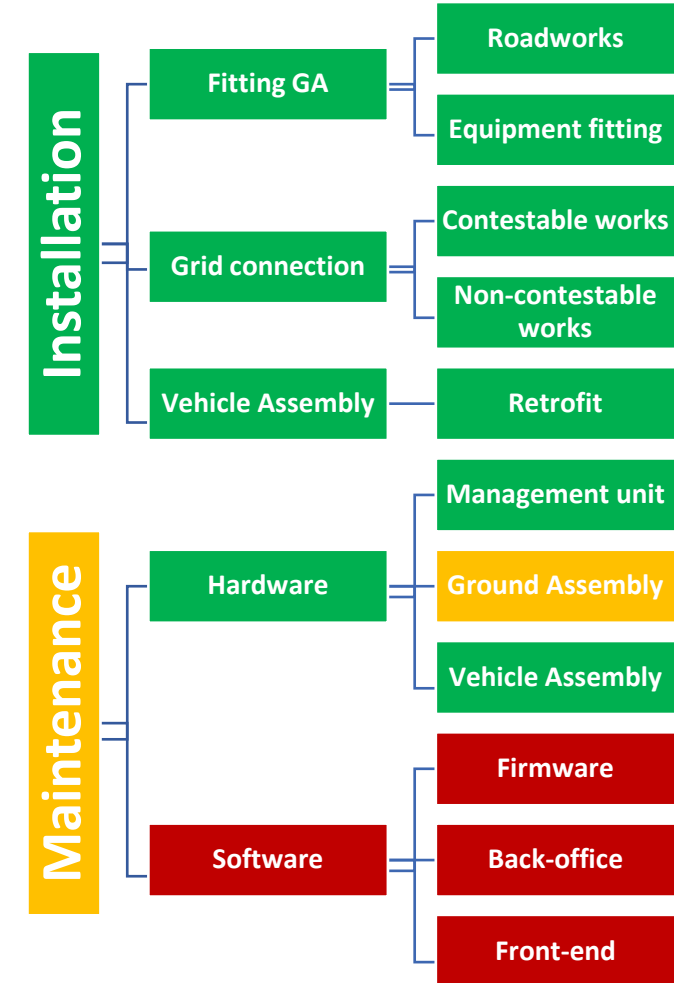
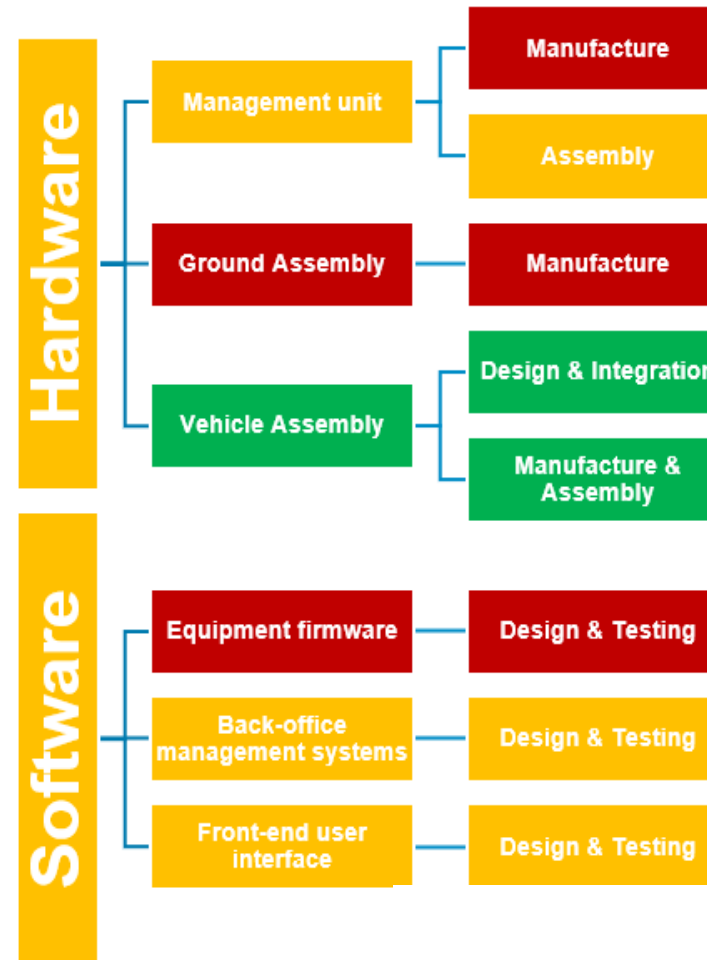
For DWPT to take off, Vehicle OEMs must design “DWPT-Ready” vehicles, allowing easy fitting of a DWPT VA



UK Supply Chain Evaluation

Order of opportunity:

1. **Electrical & Civil Installation** – Strong UK business capabilities which could be developed
2. **Vehicle Assembly Development** – Led by OEMs and retrofit
3. **Hardware Maintenance** – On-vehicle particularly
4. **Development of Software** – Range of e-mobility software solutions which could be adapted to meet DWPT systems



What does this mean for Buses & HGV Operators?

1. Electrification of heavy and long-range vehicles is still a significant challenge
2. Wireless charging still requires significant infrastructure investment and is not without challenge, but gives real benefits for certain use cases
3. DWPT gives opportunity to significantly reduce vehicle cost and overcome potential challenges around power supplies at depots
4. The UK Supply Chain is almost entirely lacking at present, but is largely within the capabilities of UK businesses to develop
5. For Industry to succeed requires Vehicle OEMs to design vehicles DWPT-Ready

Opportunity!!!

DWPT offers real promise for decarbonising heavy vehicles, particularly as ultra-rapid charging with heavy cables is not accessible to all; progressing with pilots is essential to gather tangible evidence, establish standards, and secure government support.

also,

Pilots will prove DWPT's role in an inclusive EV future.”

Thank You Any Questions?

Shamala.Gadgil@coventry.gov.uk