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# A guide to innovations in electric charging



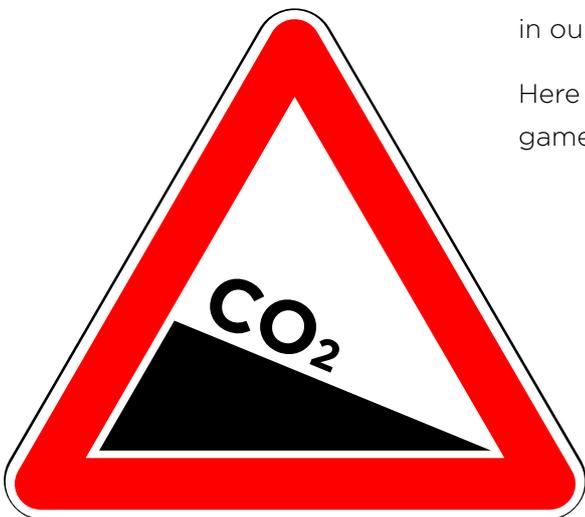
## Introduction

The cutting-edge technology powering the latest generation of electric vehicles rolling off production lines is accelerating our existential journey to a low carbon future.

The reshaping of the transport sector, however, calls for an extensive ecosystem of transformative tech, beyond the electric powertrain.

Indeed, the e-mobility revolution is seeing a wide range of scientific wizardry and inspirational thinking – most notably in the field of EV charging – as we look to leave the humble internal combustion engine in our rear-view mirror.

Here we look at some of the most exciting and game-changing electric vehicle charging innovations.





# Paving the way for e-highways

Could dynamic charging be the future of the electric truck?

With Heavy Goods Vehicles (HGVs) currently emitting 18 per cent of all road vehicle CO2 emissions, despite only representing five per cent of the total miles driven<sup>1</sup>, plans for a network of 'e-highways' are already underway.

A nine-month feasibility study into Heavy Goods Vehicles (HGVs) recharging using overhead wires while they journey across UK motorways has taken place in North East Lincolnshire, as part of a £20 million funding package for zero emission road freight from the Department for Transport.

There have been similar trials of the electric road system, which supplies battery-electric trucks with electricity from overhead catenaries via a pantograph, in Germany.

The concept of electric roads is not actually a new one. The first electrified road to recharge the batteries of cars and trucks opened in Sweden in 2018, with electric rails embedded in the road surface. Similar to a Scalextric track, this technology - [shown here](#) - works by transferring energy from the rails via a movable arm attached to the bottom of a vehicle.

But what does the future hold in store? Will electric roads power the future?

Although there have been dissenting voices, the Centre for Sustainable Road Freight has said that catenary, dynamic charging systems are "technically viable, economically attractive and could be achieved by the late 2030s<sup>2</sup>".



**Discover more about driving a truck on an e-highway**



<sup>1</sup> Costain, Green light for path to UK's first 'electric motorway', 2021

<sup>2</sup> SRF, Decarbonising the UK's Long-Haul Road Freight at Minimum Economic Cost, 2020



## Electric avenue: transport unplugged

The concept of dynamic charging becomes even more compelling where it can be conducted wirelessly.

Inductive charging of EVs hit the headlines back in 2013 when the Wall Street Journal called on people to “hop on the world’s first wireless charging bus”. Its [video report](#) extolled the notable strides in wireless charging made in the South Korean city of Gumi, where electric cables installed under roads began powering buses.

Reports suggest the system was bugged by reliability issues<sup>3</sup>, but fast forward and wireless EV technology is being rebooted.

The Arena Del Futuro test circuit, for example, built by motor manufacturer Stellantis and partners in Italy, recently opened to test the latest in induction charging technology. It has been cited by Time magazine as one of the one hundred most important inventions of 2021.

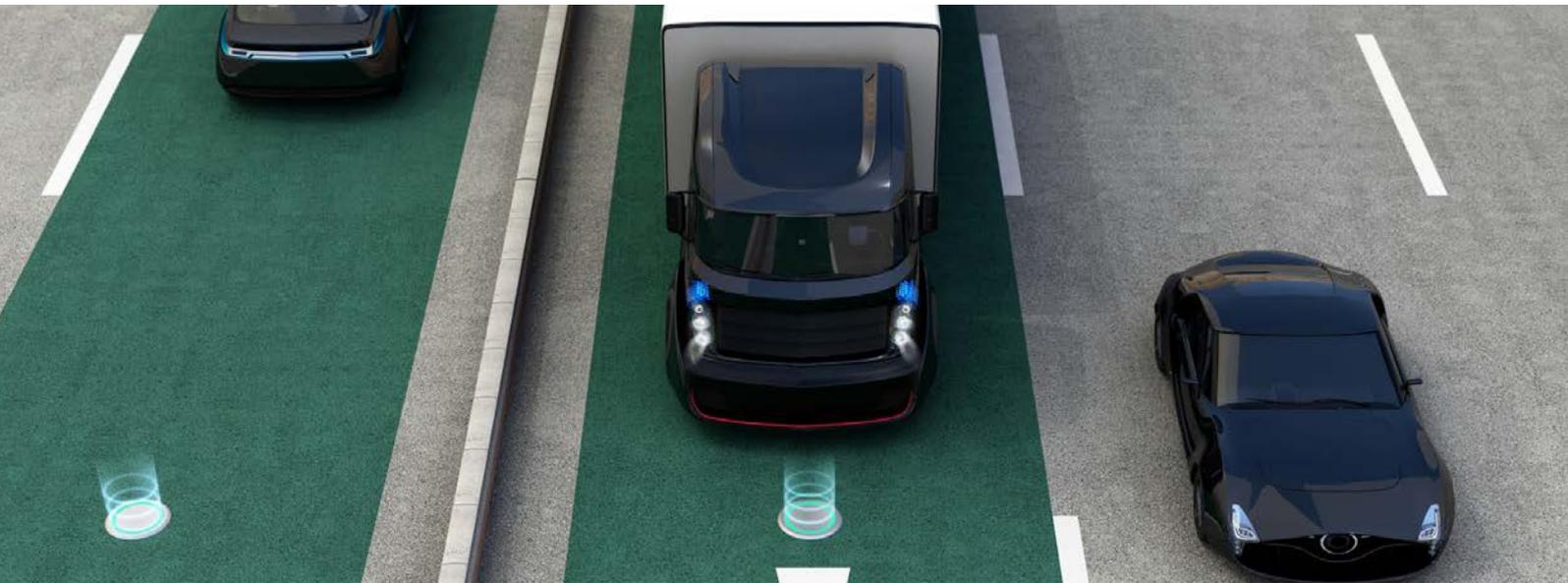
Electric vehicles can be charged “wirelessly” by driving them in wired lanes with an innovative under-tarmac technology. This can be adapted for all vehicles equipped with a special “receiver”, which transfers the energy incoming from the road to the battery.

<sup>3</sup> The Korea Herald, Bus of the future could charge itself while moving, 2021



**Check out the circuit**





Elsewhere, companies have already started developing static wireless charging systems, which utilise charging pads that can be parked over to transfer electricity to the battery pack, without the need for a bulky cable. These operate in a similar vein to wireless smartphone charging.

Volvo's new system is currently being trialled in Gothenburg by Cabonline taxis. For the fully electric XC40 Recharge cars, the wireless charging power will be more than 40 kW, making the charging speeds around four times faster than a wired 11 kW AC charger and almost as fast as a wired 50 kW DC fast charger.

Closer to home, the WiCET (Wireless Charging of Electric Taxis) project sees the Office for Zero Emission Vehicles (OZEV) funding a trail of wireless charging in Nottingham using nine electric taxis. OZEV is also funding a 12-month trial of wireless electric vehicle (EV) chargers, developed by Char.gy with IPT Technology, in Marlow, Buckinghamshire.

**“Wireless charging technology has clear commercial and consumer experience opportunities, but most importantly could help address some accessibility challenges associated with charging an EV.”**

**Abdul Chowdhury**

Head of innovation at OZEV



## Kerbside convenience: pop-up and lamp post chargers in the spotlight

Pop-up and lamp post chargers are offering a convenient, space saving solution to on-street charging.

Up to 60 per cent of drivers living in major UK towns and cities do not have access to private parking and, consequently, are unable to easily charge at their doorstep overnight.

Lamp posts charging offer a possible solution. Utilising the existing highway infrastructure – if they are close enough to the kerb and use LED lamps – new chargers can already be found in lamp posts across the UK and the roll-out of installations continues.

Shell subsidiary Ubitricity, for example, has been busy converting existing lamp posts into charging points for electric vehicles in UK residential areas and has already hit a 5,000-install milestone. The company is on a mission to install 50,000 across the country by 2025.

Pop-up charging stations, which retract into the ground so they're flush with the pavement when not in use, are offering another innovative kerbside approach that helps avoid clutter and trip hazards.

These low impact charge points, which can be activated using a smartphone app, are now being installed in cities such as Oxford, Dundee and Plymouth, funded by Innovate UK.

**Find out more** about Dundee's successful pop-up charging project, along with the city's wider charging infrastructure, from Dundee City Council's Fraser Crichton at the Webfleet Mobility Conference.



**Here's a video that shows how Plymouth's new Urban Electric pop-up charge points work.**





## Charging robots

Could EV charging robots make charging more convenient? In the near future, charging stations may autonomously navigate through streets or car parks directly to you, saving you the time of looking for an available charging point.

Volkswagen has already shared its vision for a mobile charging robot, while Quanergy Systems, in partnership with iCent, recently showcased its next generation charging robot, using LiDAR sensors, 3D perception software and AI at CES 2022.



**Volkswagen has already shared its vision for a mobile charging robot**

 **WATCH**



## Getting smart with energy

Smart charging solutions, which give fleets and drivers greater control over the best times of day to charge, can help keep a lid on costs and support electricity networks as energy prices and demand on supplies rise.

Data intelligence from telematics systems, such as the WEBFLEET EV solution, can offer valuable insights into the charging process and vehicle charge levels.

The WEBFLEET Charger Connection Report will help ensure charging occurs at the times of day when tariffs are most favourable and just before vehicles are needed for operation. Furthermore, it has been designed to ensure charge levels are maintained between the optimal 20 and 80 per cent to minimise costly battery degradation.

Using smart charging software tools, EV drivers can also plug-in during more expensive peak hours, without the vehicle drawing power until cheaper off-peak hours kick-in.



**the WEBFLEET EV solution, can offer valuable insights into the charging process and vehicle charge levels.**

[WATCH](#)



## From grid to vehicle ...and back again

Vehicle-to-grid (V2G) charging is set to be one of the most significant developments for the electric vehicle market.

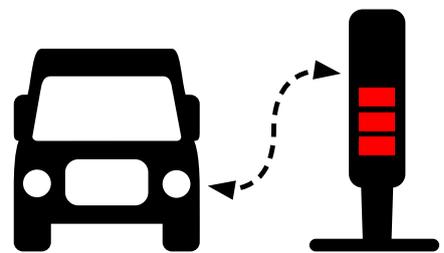
V2G chargers offer a two-way exchange of energy, giving drivers the option to discharge and sell surplus electricity from their electric vehicle batteries back to the electricity grid. By doing so, this helps to improve energy supply at times of peak demand.

A three-year trial of vehicle-to-grid (V2G) charging recently found that drivers could offset most of their domestic annual energy bills by using the technology.

Project Sciurus, led by OVO Energy and funded by the Office for Zero Emission Vehicles (OZEV) and Department for Business, Energy and Industrial Strategy, calculated, using 2020 data, that drivers selling energy at set times could save £513, compared with using an unmanaged charger.

V2G technology is still at an early stage of development, but trials are continuing worldwide and V2G-compatible EVs are already being produced by companies such as Nissan, Mitsubishi and Toyota.

For fleets, V2G technology has the potential to offer significant cost savings and revenue earning potential.



**drivers selling energy  
could save £513**



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