

## COP26: Electric Car Charging Infrastructure

### Highlights

- The Government intend to replace fossil fuel vehicles with electric vehicles, with no fully fossil fuel vehicles being sold after 2030.
- Electric vehicle infrastructure is currently insufficient, and the Government plan does not deal with the problem sufficiently.
- To meet the energy requirements of electric vehicles, more than 6 additional new nuclear reactors, or equivalent, must be built in the next 14 years.
- Hydrogen fuel cell vehicles are complementary technology to battery vehicles, but infrastructure is almost non-existent.
- Electric vehicles still emit pollutants, such as particulate matter from braking.

### Zero-emission vehicles in the ten-point plan

Zero-emission vehicles are the fourth pillar of the Government's "*Ten point governmental plan for a green industrial revolution*" and are probably the most visible consumer target on the way to a zero-carbon economy. However, the zero-emission vehicle project is fraught with difficulties. There is current legislation to **ban the sale of new petrol and diesel cars by 2030** (although hybrid vans and cars will be allowed to be sold until 2035), so that all **new domestic and small commercial vehicles are planned to be 100% zero emission by 2035**. However, 14 years is a short period to replace around 30 million private cars. To encourage the uptake of electric vehicles (EVs,) updates to existing emissions regulations and the motoring tax system are planned, with a green paper on the matter promised during this parliament. Some of these revenues are intended to update the infrastructure needed to make the transition to EVs, though **there are challenges to creating this infrastructure**.

### Battery electric vehicle infrastructure

The Government has promised **2,500 "superchargers" for UK motorways by 2030 and 6,000 by 2035**. No formal definition of what constitutes a "supercharger" has been presented, other than the vague specification that a supercharger-user could be expected to add 100 miles of charge "in the time it takes to drink a cup of coffee". **Tesla's proprietary 150 kW supercharger could add about 100 miles range in around 15 minutes**. There are about 300 UK motorway and trunk road services stations, so we can estimate that the plan calls for the installation of about 20 superchargers per site. It is not clear that that would be enough to meet the demands of a busy motorway service station but **20 such chargers would require about 3000 kW of electrical power**. For comparison, the two reactors in Hartlepool have a combined output of 1100 kW, **so we would need about 6 new nuclear reactors (or offshore wind equivalent) to be built in the next 14 years just to supply the motorway service stations**. The government's plan also wants to double the UK's current electricity production by 2050, through increased offshore wind and nuclear capacity, however, they haven't specified where the funding for this will come from, although massive private sector commitment is evident.

As recent supply chain difficulties have drawn attention to, there are some 8,900 petrol stations in the UK and the **infrastructure investment required to convert all these to EV charging stations would be massive**. But, superchargers would only be required for long journeys, and most users would probably simply “top up” their vehicles. Nonetheless, the scale of the charging infrastructure required to service a fleet of 30 million of so EVs is staggering, as some simple calculations show. **A 7 kW home charger can add around 20 miles/hour so overnight charging should work for most car users for general daily needs**. However, **30 million cars would require installation of 5,800 home chargers a day for the next 14 years**, and on street parking in urban areas remains a concern. New chargers are being installed every day but not at the scale required. **The “plan” apparently ignores these details but does provide some numbers on the size of the likely support package needed to assist British manufacturers manage the transition (£2.8 Bn) as well as support for producing the necessary battery technology (£0.5 Bn in this parliament).**

## Hydrogen fuel cell electric vehicle infrastructure

While much focus is given over to battery EVs, EVs can alternatively be powered by hydrogen in a “fuel cell”. These vehicles convert hydrogen directly to electricity in the vehicle itself. Infrastructure for these vehicles differs again compared to battery charging infrastructure, with **requirements similar to existing fossil fuel vehicles** – vehicles are fuelled similarly to fossil fuel vehicles, with **hydrogen dispensed at a station**. Hydrogen fuel cell EVs are less common than their battery-based counterparts, and there is significantly less infrastructure available to support them (**currently there are only 11 stations in the UK**). These vehicles may grow in popularity in coming years, particularly as refuelling times are like those for fossil fuel cars (unlike battery EVs’ slower charge times). Fuel cell and battery vehicles should not be pitted against each other, however – **the technologies are complimentary**, with different systems suiting different user needs, much as how petrol and diesel vehicles are seen. While hydrogen fuel cells themselves are inherently carbon neutral, questions remain about hydrogen-powered vehicles, particularly how we might mass-produce hydrogen, which is an expensive, energy intensive process.

## Other challenges and infrastructure timeline

It should be noted that EVs are not entirely “green” – vehicles will do little to alleviate urban pollution due to traffic as the majority of particulate matter under 2.5 micrometres associated with traffic comes from braking systems and tyre abrasion. The plan for the electrification of transport was published in November 2020 and it set out a number of milestones:

- 2021 – A delivery plan setting out key milestones to be published.
- 2021 – A green paper on the UK’s post EU emissions regulations and the car and van phase out dates, as well as launch a consultation on the phase out of new diesel HGVs.
- 2030 – Network of 2,500 high power charge points on England’s motorways and major A road in place.
- 2030 – End of sales of new petrol and diesel cars and vans.
- 2035 – England’s motorways and major A roads will have “around” 6,000 high powered charge points. All new cars and vans to be zero emission.

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## Further reading

### Quick reads

#### [Supercharging](#)

*FAQ page.* Tesla's web summary of their "supercharger", technology, covering frequently asked questions about supercharger stations.

#### [Hydrogen: Fuelling cleaner motoring](#)

*Web article.* UKH<sub>2</sub>Mobility's summary website, discussing hydrogen fuel electric vehicles Here is a short description of the article, that summarises it, so a lazy reader would only have to read this summary, not the entire article

#### [Pollution From Tyre Wear 1,000 Times Worse Than Exhaust Emissions](#)

*Web article.* Emissions analytics discussion piece on pollution caused by tyre wear.

### Longer reads

#### [The ten point plan for a green industrial revolution](#)

*Government report.* The UK Government's report on their plans for a green industrial revolution, covering their "building back better" strategy, how they intend to support green jobs and how they intend to move towards net zero.

### Other media

#### [Hydrogen vs battery electric cars – Video \(13 mins\)](#)

YouTube video by popular science communicator, Dianna Cowern on both types of electric car, discussing aspects of each system. Part of a short 4-part series on green energy. A good summary **but be aware that this video was sponsored by the hydrogen fuel cell industry.**

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