

Electric vehicle charging

Enabling the switch



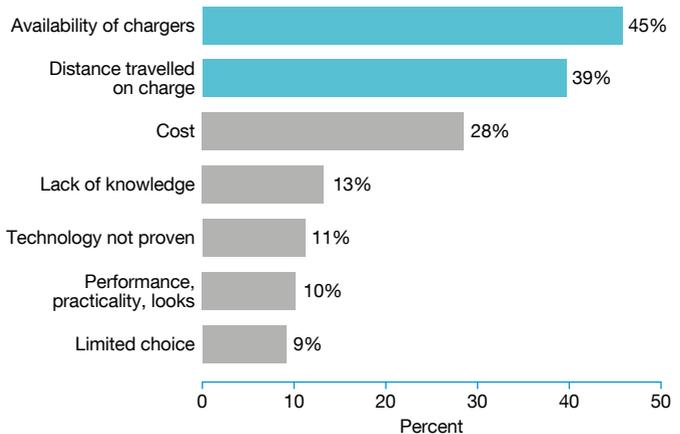
We need a network of chargers at strategic locations to unlock electric vehicle uptake

The mass adoption of electric vehicles (EVs) will bring significant benefits to society, including public health, environmental protection and economic growth.

A comprehensive network of car chargers will be vital to ensure we are ready for EV uptake, which could come much faster than anticipated. It will also help drivers make the decision to switch from traditional fuel types.

Range anxiety is a key reason for not purchasing an EV¹ i.e. having nowhere to charge or facing long waiting times to charge during journeys.

Department for Transport: reason for not purchasing an EV (multiple selections possible)



¹. Source: Department for Transport, 2016 study on 'reasons for not purchasing an EV' (multiple selections possible)

Electric vehicle charging will be needed at five locations, with appropriate charging speeds



Home

Or on residential street, typically overnight



Local fast

At petrol station equivalent, visited for the recharge



Destination

While doing another activity e.g. at work



Fleet

At depot/hub for fleets



Motorway

At service station, on driver routes enabling long journeys

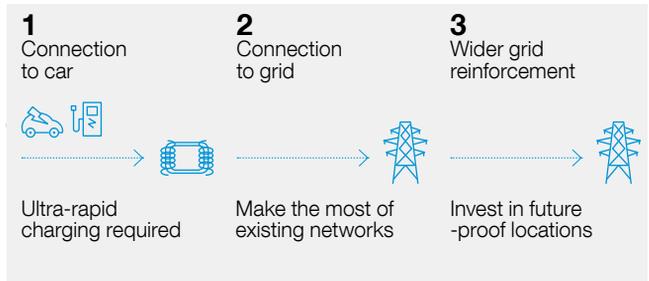
While charging at home will be a convenient option for many, there is also a need to supplement this with local fast charging stations and charging facilities at destination points e.g. place of work, shopping centres etc.

In addition, a network of ultra-rapid chargers (up to 350kW) will be needed at strategic points along the motorway network.

Motorway charging infrastructure

Three types of infrastructure will be needed to support EV charging along the motorway network.

We will collaborate with industry and Government to develop the most cost-effective solutions for consumers.



Ultra-rapid electric vehicle charging will be necessary along the motorway network

60%

of the 165 motorway sites in England and Wales are within 5km of the transmission network infrastructure

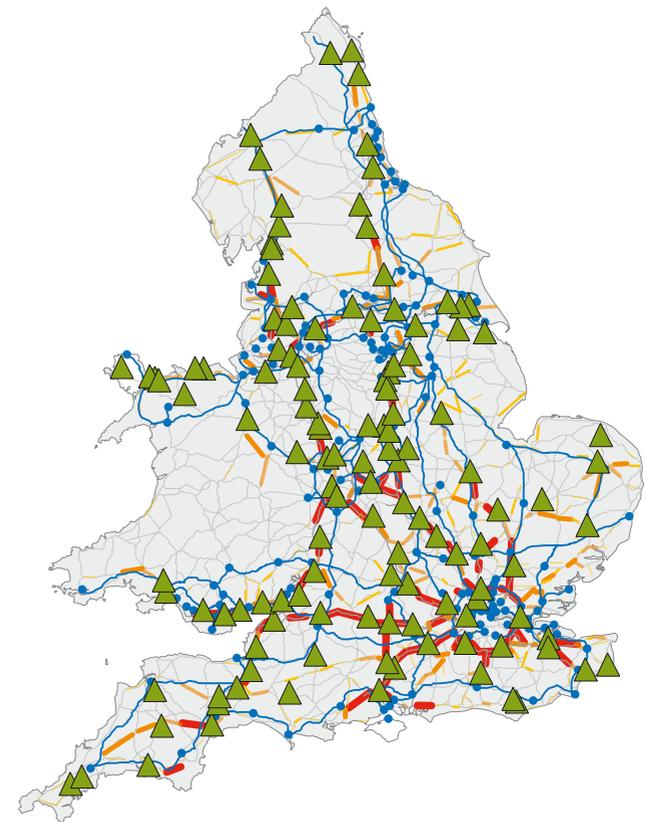
20%

of these motorway sites are within 1km of the transmission network infrastructure

Key

Traffic (miles)²

- Very high (163-336K)
- High (101K-163K)
- Medium-high (71K-101K)
- Medium (49K-71K)
- Low (34K-49K)
- Transmission overhead line
- Transmission substation
- Existing MSA³ and select petrol station sites⁴



² Traffic is calculated by multiplying the AADF (annual average daily flows: number of vehicles passing a point in the road network each day) by the corresponding length of road and by the number of days in the year; Length of road is one section (episode) of each road between junctions; Traffic of only cars and taxis. Source: Department for Transport (2016); Retail Locations (2017); National Grid (2017).

³ MSA: Motorway Service Area.

⁴ 30 non-MSA petrol stations within 100m of M- and A-roads, covering 'gaps' which do not have an MSA within a 20 mile radius.

We've been working with motorway service station operators to look at the power capacity to their sites. And we've been assessing the infrastructure needed to support sufficient numbers of ultra-rapid EV chargers in the future, to avoid queues at peak times and to minimise the time-to-charge.

Transmission connections are likely to be the most economic and efficient option at many sites. We will work with the Distribution Network Operators and others to determine the optimum solution site-by-site.

We need timely investment to ensure this infrastructure is installed quickly enough

The private sector is poised to invest in the installation of EV chargers at motorway services, but these companies are facing economic challenges around the grid connections.

An upgraded grid connection will be needed at most motorway sites to allow for additional numbers of faster EV chargers. Investment in a future-proof solution upfront, which allows for expansion over time, will avoid inefficient rebuilds in years to come.

What we are proposing:

50 locations	Cost: £0.5bn – £1bn
50 strategic motorway service locations will allow 95% of drivers in England and Wales to be within 50 miles of a charging station, regardless of their direction of travel.	50 future-proof, high powered grid connections will cost: £0.5bn – £1bn. This equates to 66p per car per year over the life of the assets.

How could this be paid for?

Conversations are required across industry and Government departments to agree the best way forward. Options include:

Private sector	EV drivers to pay a premium for ultra-rapid charging on the motorway
Via tax	Government funding through department budgets or other allocated pots
Drivers	Through vehicle excise duty or car tax
Electricity bill-payers	As part of wider network costs

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