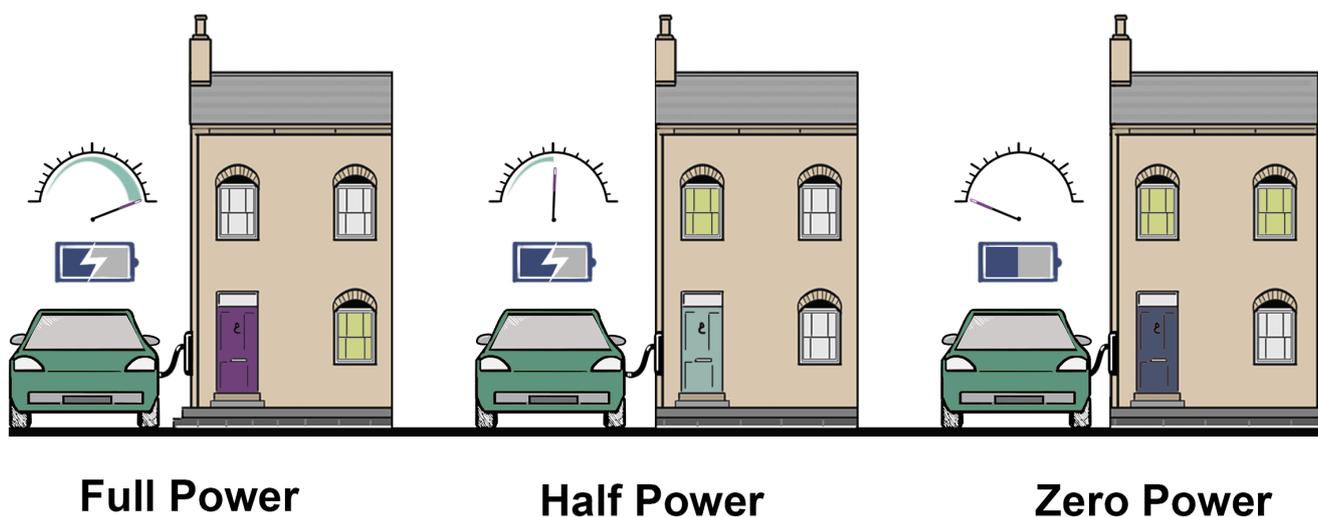


## The growth in electric vehicles

**Electric Vehicles (EVs) have been identified as one of the major tools to decarbonise the transport sector in the UK. With the electricity consumption of some electric cars comparable to an average household, a rapid growth of EV use could cause additional pressure on the electricity network. The growth in EVs presents a challenge to the electricity distribution system. However by using smart and managed charging, EVs could also present opportunities for new business models to emerge.**

There is an increase in the number of people buying EVs due to lower costs and concerns about air quality. In addition, the government has confirmed a ban on the sale of new conventional diesel and petrol vehicles from 2040. By 2030 there will be millions of EVs on the road in the UK. These electric vehicles could increase the demand in the electricity network at certain times. To cater for this additional network demand, network upgrades could be required which can take a long time to complete and be expensive.

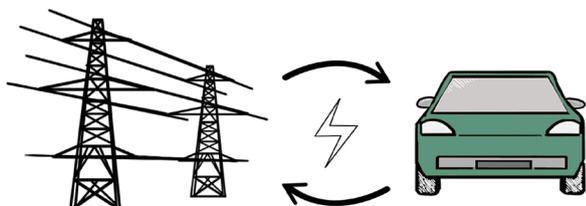
The adoption of smart and managed charging could avoid or greatly reduce the need for network upgrades. This is done by controlling when and how fast EV charging occurs to spread the demand across different times of the day. Charging rates could be slowed or charging could be paused during peak electricity demand periods and return to normal during times when there is low demand and high amounts of renewable energy generation - helping maintain network security (Figure 1).



**Figure 1:** Smart and managed charging of EVs at illustrative homes at different charging rates.

*With a typical electric car using a similar amount of electricity as an average domestic home, they have the potential to significantly alter the traditional daily energy usage profiles today's network was designed around.*

### **Western Power Distribution, Distribution System Operator Strategy**



**Figure 2:** Vehicle to Grid could allow EVs to charge and then provide energy back to electricity network when needed.

EVs have the ability to provide electricity to the local electricity network from the energy stored in their battery (Figure 2). During periods of peak electricity demand they may be rewarded to do so. This is known as Vehicle to Grid or V2G. This, in conjunction with other flexibility could help manage the local electricity network and help allow more EVs to keep charging at peak times. This technology needs to be developed and deployed further if we are to harness the value from the millions of EV batteries due on our roads.

## **CASE STUDY**

### **Electric Nation**

Electric Nation is a WPD innovation trial which sets out to understand how the charging of a variety of Plug-In Vehicles (PIV) affects demand on the electricity network. In addition, the project explores the use and acceptance of smart and managed charging to minimise the stress of PIV on the electricity network.

PIV charging data is to be collected from 678 participating customers in the WPD licence areas – South West, South Wales, East and West Midlands. Each participant will be provided with a free smart charger at home and incentivised by payments.

The smart charging management system either slows or pauses charging during periods of peak energy demand. Demand management is shared fairly across all EVs that are plugged in at the time.

The trial will give an understanding of how smart charging systems are received by consumers and how they influence charging behaviour. It will also indicate how effective the use of demand management using smart chargers is in comparison to network reinforcement. The results will give a better understanding of parts of the network that are likely to be affected by the adoption of EVs. Find out more information at [www.electricnation.org.uk](http://www.electricnation.org.uk)

**More information is available on our website:**

[www.westernpower.co.uk/Community-Energy](http://www.westernpower.co.uk/Community-Energy)