



Briefing document

The UK's transition to electric vehicles

A report by Terri Wills for the Climate Change Committee.

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1. The 2030 electric vehicle transition

The full transition to electric vehicles (EVs) will be one of the most important actions to achieve the UK's Net Zero target. By 2032 at the latest, the Climate Change Committee (CCC) has called for all new light-duty vehicles sold, including passenger vehicles, taxis, vans, motorbikes and mopeds, to be fully battery-electric vehicles. To reach Net Zero, all vehicles – including heavy-goods vehicles (HGVs) – must be fossil fuel free by 2050. For passenger vehicles and vans, this will mean accelerating the uptake of EVs from around 400,000 today (including battery-electric and plug-in hybrid models; 1% of all UK vehicles) to 23.2 million by 2032 (55% of all vehicles), and by 2050 possibly up to 49.0 million (100%).¹ To achieve this, UK Government and industry must implement a range of policy and market mechanisms needed particularly for passenger vehicles and vans, while also addressing wider transportation emissions through reduced vehicle usage as well as moving towards electric, hydrogen or 'cabling' of heavy-duty vehicles. While the steps needed to reduce wider transportation emissions are complex, the pathway to a full transition to electric passenger vehicles is clear and relatively straightforward.

a) Emissions from transport must fall

Transport is now the highest emitting sector of the UK economy, accounting for 22% of total GHG emissions, 113 MtCO_{2e} in 2019. Cars comprise 13% of the UK's GHG emissions, vans 4% and HGVs 4%.¹ Urgent action is required to drive down transport emissions, as they have remained largely flat since 1990. Although vehicles have become more fuel-efficient, this has been offset by increasing travel demand.² Emissions from transport – and from passenger vehicles – will need to be cut by over 70% to meet the Sixth Carbon Budget³, which sets a limit on UK emissions in the mid-2030s in order to stay on track to meeting Net Zero by 2050.

b) Current barriers to a 2030 transition

Despite the recent Government announcement to phase out sales of new petrol and diesel vehicles by 2030, the UK is currently not on track to switch all new vehicles to fully battery-electric by 2030. Beyond 2030, significant questions remain that need to be addressed – such as the increased demand for electricity and where this will come from, sourcing and supply of rare earth materials for battery production and capacity for battery recycling. Policies and strategies are needed to overcome these challenges longer-term, but short-term, several key barriers must be overcome in order to reach the 2030 transition date:

- **Lack of an overarching strategy and targets for sufficient charging infrastructure, particularly on-street.** Currently, there are approximately 18,000⁴ public charging points for around 400,000 plug-in electric vans and passenger vehicles. In order to grow the UK's EV fleet to 23.2 million EVs by 2032, the CCC estimates 325,000 public charging points will be needed.¹ While the UK Government has set targets to double rapid charging by 2024⁵ and ensure access to 2,500 high powered charging points across England's inter-urban routes⁶, no targets have been set for on-street or at-home charging. Currently, 80% of EV users charge their vehicles at home overnight⁷, while 34% of households do not have off-street parking and need to charge on-street or elsewhere.⁸ Charge point grant programmes have been rolled out, but there is an absence of an overarching strategy to coordinate and support Local Authorities to ensure that the required

number of charge points by region is available in time. Currently, over 167 Local Authorities have 20 or fewer charging points.⁹

- **Restricted network capacity and cost of upgrades.** Across the UK, there are constraints on the capacity and reliability of the Transmission Network Operators (TNOs) and Distribution Network Operators (DNOs) to enable sufficient EV charging infrastructure. Companies seeking to install charging points for their fleets, staff and customers at forecourts as well as Local Authorities can be faced with significant costs (e.g. some have been quoted costs of millions of pounds to pay for the necessary reinforcement upgrades), which can prove an impediment to proceeding with charging infrastructure. Furthermore, a company requesting capacity from DNOs must solely fund the cost of reinforcement upgrades even when others will later use the capacity, which can deter a company from being the first to request the upgrades.¹⁰
- **Limited supply of electric vans.** While supply and availability of passenger vehicles have improved in the last few years and are expected to continue to improve dramatically in future – from 20 models of EV in 2019 to Volkswagen alone planning over 70 new models by 2030¹¹ – few electric van models are available. Six models of electric van are currently available in the UK, and a further fourteen are expected in the next few years¹², but supply of these vehicles is expected to be limited with long order wait times. Some fleet owners have indicated that they believe the incentives available in the UK are not currently sufficient to encourage enough vehicle manufacturers to retool their operations for electric vans and create sufficient supply.

c) Enabling policy: what needs to happen?

The UK Government has put in place a number of positive measures, programmes and regulations to support the transition to EVs – including innovation in smart energy technologies¹³, funding schemes for public rapid, on-street, home and workplace charging as well as additional incentives for EV uptake. However, more work is needed to ensure that the framework is in place to drive the required market transformation towards a full EV transition by 2030:

- **Align incentives and mandates to targets and monitor impact.** Establishing and communicating long-term clarity on the availability and approximate timing of incentives and targets – ideally to 2030 – will enable industry to plan fleet strategies and Local Authorities to plan for charge point roll-out. Linking incentives to targets will also ensure that funding is focussed on the necessary preconditions for petrol and diesel vehicle phase-out, and will allow funding to shift to the next priority once particular targets are met. For example, grants for passenger vehicle purchase could be gradually withdrawn once EVs reach price parity with conventional petrol and diesel vehicles and then redirected to vans. Communicating such an approach in advance could stimulate increased production, and ideally reduce the length of time grants are needed as supply increases. Agreeing and communicating a replacement for the EU Emissions Trading Scheme will also be critical to ensure that the right level of disincentives for the purchase of petrol and diesel vehicles exists.¹⁴ Transition to fiscal instruments, such as vehicle excise duty (VED), VAT and fuel duty, should also be explored and can be considered as part of the fiscal changes needed to aid the COVID-19 recovery.¹⁵ Furthermore, tracking the overall supply of vehicles and relative share of sales that are zero-carbon should also inform timing and scaling of additional Government mandates,

including a Zero-Emission Vehicle Mandate which would require increasing shares of sales to be zero-carbon, reaching 100% by 2032 at the latest.^{16,17}

- **Devise a comprehensive charging strategy, including for on-street charging.** Sufficient access to charging infrastructure is essential to enable a full EV transition. Owners and drivers of corporate fleets, taxis, shared vehicles and private vehicles must all have confidence that they can access charging infrastructure in the locations that fit with their needs – including the 34% of households without off-street parking. A strategy with input from corporate fleets and residents must be developed to ensure that the challenges facing Local Authorities in rolling-out infrastructure – including lack of staff capacity, lack of forecasting capability to assess where and how many charging-points will be needed, how to cover maintenance costs and how to ensure fair and equitable use of parking – can be addressed and overcome. As part of this strategy, there also needs to be greater citizen awareness and better understanding of how to get a charge point installed when off-street parking is not available. While the focus on rapid charging along inter-urban routes and rapid charging hubs is commendable, comprehensive on-street charging is a necessary precursor to a full EV transition.
- **Reinforce the distribution network and provide a fair funding model as well as smart charging.** While significant funding has been applied to smart charging, the reality is that installing many charge points will still require network upgrades. Government must continue to work with industry and network operators to ensure there is a fair funding model to enable maximum charging infrastructure installation, without placing undue cost burdens on Network Operators or the first-mover company or Local Authority in a particular region. Furthermore, electricity grid upgrades must begin in the 2020s, as ensuring these networks are ready to meet future demand is more cost-effective than implementing network reinforcements once demand outstrips capacity.¹⁸

d) The role of the private sector

The private sector will be instrumental in the EV transition.¹⁹ Provided there is sufficient long-term clarity of policy to address market barriers, the various actors in the EV ecosystem can work together to create a sustaining market transformation. These primarily include manufacturers (including charge point manufacturers, battery manufacturers, vehicle manufacturers – both traditional Original Equipment Manufacturers (OEMs) and specialist EV manufacturers, vehicle component manufacturers and raw materials suppliers), electricity providers (including Distributed Network and Transmission Network Operators and energy suppliers) and charging infrastructure providers (including retailers, workplaces, highway service stations, forecourts, Local Authorities, property owners and housing providers). In particular, the private sector will need to:

- **Deliver a charging point network with increased availability, reliability and interoperability, alongside smart charging.** Charge point manufacturers will need to ensure reliability, with long-term business models and plans in place to provide for charge point repairs and upgrades. This is an essential step to instil confidence among EV users and Local Authority partners. Charge point manufacturers must also work collaboratively to enable customers signed up to one charge point system to easily use charge point systems from another, appreciating that ease of use will encourage more consumers and corporates to access charge points. For all companies, installing charge points for customers and employees will not only help drive the transition but also ensure their businesses are resilient to employee and

customer needs once the transition happens. Further innovation and provision of smart charging solutions will open up markets faster for EVs and charge points, as delays to electricity grid capacity and network upgrades create less of a bottleneck, encouraging increased EV uptake.

- **Transition manufacturing for vans and passenger vehicles.** Manufacturers of high-emissions vehicles in 2020 will need to become manufacturers of zero-emissions vehicles by 2030. Numerous manufacturers around the world have already signalled an end to the production of conventional petrol and diesel combustion vehicles, and are re-orienting operations and business models to EV production. UK manufacturers should set out their plans to 2030 and begin the necessary shift of their manufacturing processes and supply chains. While many companies are still maximising their past R&D investments by focusing on conventional vehicles², delaying a shift in R&D and planning could leave UK companies behind by 2032 if overseas manufacturers have stepped up with the necessary provision. Innovating business models for the new electric future will also be as essential as technical innovation, and work should start as soon as possible to ensure margins remain attractive and viable. Battery-electric vehicles have fewer parts than petrol and diesel vehicles and are mechanically less complex, meaning they are simpler to assemble. However, car manufacturers will need to either manufacture battery cells and packs in-house or set up new supply chains working with battery manufacturers.² As they shift their production, companies should actively sell and promote EVs and raise awareness among consumers that vehicle choice can be as effective as other lifestyle choices in reducing personal carbon footprints. Companies will need to make the full pivot to electric as soon as possible to achieve the 2030 target.
- **Develop long-term EV strategies and signal future demand.** Over 20 companies with operations in the UK have now committed to fully electric fleets by 2030²⁰, and 34 companies, Local Authorities and governmental organisations have committed to transition to electric vans by 2028.²¹ Planning for full fleet transitions not only enables companies – as well as central and local Government – to prepare for the inevitable shift to electric, but also helps to break down market barriers.²² Importantly, signalling future demand enables Government and the private sector to improve supply planning for EVs, the charging infrastructure required and the electricity grid and network capacity required for the full transition. Electric passenger vehicles are expected to reach price parity with conventional petrol and diesel vehicles on a total cost of ownership basis by 2024²³ and in terms of upfront costs by 2030³, so planning now for longer-term scale-up is wise as demand will increase. Corporate fleets also feed the second-hand market; by scaling their fleets sooner, companies will provide a larger supply of lower-cost vehicles to the public in the years ahead.²⁴

e) Opportunities and benefits

The transition to EVs will bring significant benefits and present market opportunities, particularly as the UK seeks to recover from COVID-19:

- **A green recovery.** The green recovery will require the prioritisation of infrastructure projects that not only reduce emissions but are labour-intensive, spread geographically across the UK and have high multiplier effects. These include national infrastructure projects such as improved charge point infrastructure and electricity grid upgrades, which could be brought forward to stimulate jobs and investment.¹⁵

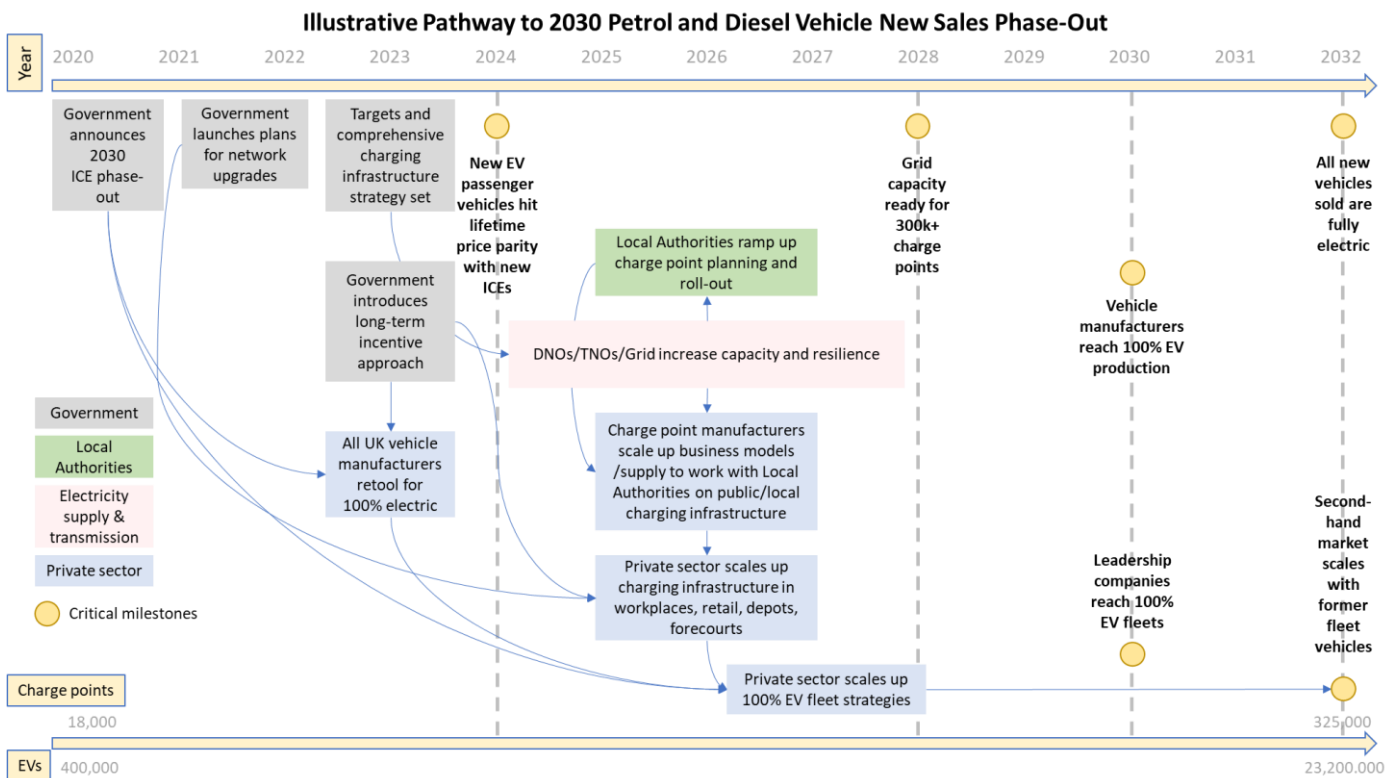
- **Improved air quality.** The link between EVs and air quality is clear. Air pollution is the top environmental risk to human health in the UK²⁵, and in the UK alone in 2016 was responsible for 40,000 premature deaths.²⁶ Poor air quality has also been linked to increased deaths from COVID-19. A full shift to EVs by 2050 will have one of the highest impacts particularly on reducing nitrogen dioxide (NO₂) and non-methane volatile organic compounds (NMVOC)²⁷, responsible for asthma, inflammation and other lung problems. A further study conducted for the CCC indicated that air quality and noise impacts from the electrification of transport could result in annual benefits close to 0.1% GDP in 2030.²⁸
- **New market opportunities.** There is an opportunity for the UK automotive manufacturing sector to become a world leader in the development and production of EVs. Early investment in EVs will help to deliver this. Consultants Vivid Economics found that a UK transition to 100% market share of EVs by 2030 is likely to increase investment in the EV industry, with potential to increase UK production from around 16,000 EVs today to around 880,000 EVs per year, creating 89,000 green jobs in the EV industry.¹⁸

f) Conclusion

The 2030 EV transition will happen if the right policy frameworks implemented by Government support and direct the right corporate actions by the private sector. As the infographic (overleaf) illustrates, every Government policy lever – if designed well – could lead to the right actions at the right times, ensuring that the UK is able to deliver on its commitment to end new sales of petrol and diesel vehicles by 2030.

2. Illustrative pathway to deliver the EV transition

Figure 2.1 Infographic showing an illustrative pathway to deliver the 2030 EV transition



Notes: This figure shows an illustrative pathway through which the sales of EVs could be scaled up to meet the Government's planned 2030 phase-out date for new sales of petrol and diesel vehicles and to deliver 100% of all sales being zero-emission by 2032, as required to meet the Sixth Carbon Budget Balanced Net Zero Pathway. Most dates shown within this infographic are illustrative and are not representative of commitments made or recommended approaches. Other pathways may be possible, and there could be opportunities to deliver some phases of the transition sooner.

Endnotes

- ¹ CCC (2020), *The Sixth Carbon Budget – methodology report*.
- ² CCC (2019), *Net Zero – technical report*.
- ³ CCC (2020), *The Sixth Carbon Budget – the path to Net Zero*.
- ⁴ Department for Transport (2020), *Electric vehicle charging device statistics*.
- ⁵ HM Government (2019), *Electric vehicle smart charging*.
- ⁶ Department for Business, Energy and Industrial Strategy, Department for Transport and Office for Low Emission Vehicles (2020), *Government vision for the rapid chargepoint network in England*.
- ⁷ HM Government (2019), *Electric vehicle charging in residential and non-residential buildings*.
- ⁸ Ministry of Housing, Communities and Local Government (2016), *English housing survey: stock condition*.
- ⁹ Department for Transport (2020), *Electric vehicle charging devices by Local Authority*.
- ¹⁰ Ofgem (2020), *RIO ED-2 – ongoing review of price control, access and forward-looking charges review*.
- ¹¹ Business Green (2019), *VW ups electric model ambitions by 50 per cent*.
- ¹² Parkers (2020), *Electric van guide – everything you need to know*.
- ¹³ HM Government (2017), *The clean growth strategy: leading the way to a low-carbo future*.
- ¹⁴ CCC (2019), *Net Zero – the UK's contribution to stopping global warming*.
- ¹⁵ CCC (2020), *Letter to the Prime Minister on COVID-19 Recovery*.
- ¹⁶ CCC (2020), *Progress Report 2020*.
- ¹⁷ CCC (2020), *The Sixth Carbon Budget – policy recommendations*.
- ¹⁸ Vivid Economics and Imperial College London for the CCC (2019), *Accelerated electrification and the GB electricity system*.
- ¹⁹ CCC (2019), *Business Guidance to Net Zero*.
- ²⁰ The Climate Group (2020), *EV100*.
- ²¹ Global Action Plan (2019), *Clean van commitment*.
- ²² CCC Expert Advisory Group (2019), *Report to the Committee on Climate Change of the Advisory Group on costs and benefits of Net Zero*.
- ²³ Deloitte (2019), *Battery-electric vehicles – new markets, new entrants, new challenges*.
- ²⁴ PricewaterhouseCoopers (2020), *Fleets set to unlock an electric vehicle revolution*.
- ²⁵ HM Government (2019), *Clean air strategy*.
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- ²⁷ Department for Environment, Food and Rural Affairs (2020), *Impacts of Net Zero pathways on future air quality in the UK*.
- ²⁸ Ricardo-AEA for the CCC (2013), *Review of the impacts of carbon budget measures on human health and the environment*.



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