Electric vehicles: driving the transition

Fourteenth Report of Session 2017–19

Report, together with formal minutes relating to the report

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Business, Energy and Industrial Strategy Committee

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Summary

Electric vehicles (EVs) represent exciting opportunities for the UK: as a technology to reduce greenhouse gas emissions from our largest-emitting sector; as a tool to reduce local air pollution, the second-highest cause of avoidable mortality in the country; and as a new industry with substantial export opportunities. International market trends suggest that electric cars and vans will reach price equivalency with internal combustion engine (ICE) vehicles by the mid-2020s, and that EV sales will overtake petrol and diesel sales by the late 2030s. The UK’s automotive sector will need to take a lead in this transition if it is to remain a major player in the global market. A shift away from ICEs to zero emission vehicles on UK roads is further essential if we are to achieve our national decarbonisation targets at least possible cost.

Targets

Recognising these challenges, the Government has set ambitions to ensure that almost every car and van in the UK is a zero emission vehicle by 2050, and to make the UK a world leader in EV and battery technologies. However, its targets for 2040—to phase out sales of new ‘conventional’ petrol and diesel cars and vans, and to require all new cars and vans to be ‘effectively’ zero emission—are vague and insufficiently ambitious to deliver on its longer-term aims. If the Government is genuinely committed to leading the EV transition and meeting its decarbonisation targets, it needs to promote investment in this new technology by clarifying and increasing the ambition of its sales targets. We recommend that the Government bring forwards a clear, precise target for new sales of cars and vans to be truly zero emission by 2032.

Purchase support

The upfront costs of purchasing an EV remain very high relative to ICE vehicles. Significant additional deterrents to EVs include ‘range anxiety’ (the concern that an EV will not have sufficient charge to complete a given journey) and the limited choice of vehicle models. These factors mean that incentives are required to encourage motorists to make the switch to EVs. However, the Government has recently announced sudden and substantial cuts to the Plug-in Grant Scheme, in a move that runs counter to the advice of the Committee on Climate Change and witnesses to our inquiry. We recommend that purchase support for EVs should be maintained at October 2018 levels for the time being, and more generally until the cost of EVs nears price parity with conventional ICE vehicles. In addition, existing grants and tax incentives are in practice only accessible to wealthier motorists. The Government should explore more creative support options to ensure that all motorists can benefit from EVs, for example through car clubs and the second-hand market.

The current fiscal regime for EVs provides inconsistent messages about the Government’s ambitions for EVs. We recommend that the Government aligns new fiscal changes with the zero emissions target. EVs should be promoted by preferential Vehicle Excise Duty rates and other incentives, and preferential rates on company car tax for EVs should be brought forward without delay.
Commercial vehicles

Commercial vehicles have been largely overlooked by emissions reduction policies to date. We recommend the Government set firm targets for the deployment of ultra low emission commercial vehicles, and consider replacing the voluntary target for emissions reductions from HGVs with a firm target, should progress fall off track.

Charging infrastructure

Poor provision of charging infrastructure is one of the greatest barriers to growth of the UK EV market. The existing charging network is lacking in size and geographic coverage, with substantial disparities in the provision of public charge points across the country.

We welcome assessments by National Grid, and others, that the EV transition is unlikely to present a risk to the security of national electricity supply. Adverse impacts are more likely to be experienced on distribution networks. The cost of managing these impacts can be reduced through smart charging, with vehicle-to-grid technologies offering the potential for further savings in the future. We strongly recommend that the Government make full use of powers introduced in the Automated and Electric Vehicles Act 2018 to make regulations to provide an extensive, reliable and standardised public charging network. Any new generation capacity built to meet increased electricity demand from EVs must be low carbon, to ensure that EVs contribute to national decarbonisation targets.

The Government’s ambition to develop national charging infrastructure is at odds with its decision to leave delivery largely to local authorities (LAs) and private actors. A whole systems perspective is needed to identify solutions that will deliver required functionality at least overall cost, and which will ensure adequate provision of charge points nationwide. We recommend the Government recognise its responsibility in this role and coordinate a shared approach to planning national charging infrastructure at least cost by December 2019.

The Government should also review the financial and technical support it provides to LAs to develop charging infrastructure. We recommend that the Government introduce a strategy to support LAs that have been less successful in accessing funding so far by 2021. We further recommend the Government proactively engage with LAs and other stakeholders to identify mutually agreeable charging solutions for motorists without off-street parking, and that the Government increase the flexibility of funding so that LAs can install charging infrastructure that fits in with local priorities.

The nature of ‘sufficient provision’ for charge points will differ across geographical regions. We recommend that the Government sets out a strategy by June 2019 that allows for the nature of local provision to be determined locally, and to deliver charging infrastructure to ‘difficult’ and remote localities, so that these are not further isolated by the EV transition. We also recommend that the Government subsidise the provision of rapid charge points in remote and rural areas without delay and by 2022, as recommended by the National Infrastructure Commission.
Industrial opportunities

The automotive sector is a major contributor to the UK economy. The industry must move with—and ahead of—the transition to EVs that is already underway at the global level, if the UK is to retain its share in this global market. The Government should work to create an attractive investment environment that will encourage manufacturers to locate new EV facilities in the UK, and to repurpose, rather than retire, existing ICE production lines for EVs. Policies set out so far to support battery technology such as the Faraday Challenge are welcome, but they are not sufficient to enable the UK to overtake existing world leaders in battery production. Longer-term, 10-year support with a strategic focus on high-value niche areas where we already hold a comparative advantage is the best approach to help the UK take a leading edge in battery supply chains. The Government should also explore potential to develop UK expertise in nascent areas such as EV and battery disposal and recycling.

EVs present a substantial technological shift, which will require workers across the automotive supply chain to develop new skill sets. The current shortfall in EV skills is increasing the running cost of EVs, deterring dealerships from entering the EV market, and putting workers’ lives at risk. We recommend the Government develop EV-specific qualifications for mechanics and engineers. Government and business should also work together to develop a joint plan to help companies repurpose ICE manufacturing facilities, to help workers develop new EV skills, and to ensure that independent dealerships and mechanics are equipped to advise on buyers on EV options and to conduct repairs safely.
1 Introduction

The electric vehicle revolution

1. Electric vehicles (EVs) are changing the face of the global automotive sector. The global stock of electric cars rose to over 3 million last year, up from 14,260 in 2010 (illustrated in Figure 1). The International Energy Agency has estimated that the number of electric passenger cars and light commercial vehicles could reach 125 million by 2030, on the basis of existing and announced policies, and there is potential to reach 228 million if governments increase their ambitions in line with international climate change goals.\(^1\)

Figure 1 Global electric vehicle stock by year and engine type.

The lower range of these estimates are based on current policies, whilst the upper range assumes that member countries of the Electric Vehicles Initiative fulfil their pledges to increase the EV market share to 30%.


2. The UK is at the forefront of this revolution. In 2017 the UK ranked fourth worldwide by market share, with EVs representing 1.7% of all new car and van sales, and seventh by volume, with 47,250 EVs sold (Figure 2 and Figure 3).\(^2\) Projections by National Grid suggest that the UK stock of EVs could reach between 2.7 and 10.6 million by 2030, and could rise as high as 36 million by 2040.\(^3\)

\(^1\) Committee on Climate Change, Reducing UK emissions 2018 Progress Report to Parliament (June 2018); Statista, Electric vehicle registrations as a share of total in selected countries worldwide in 2017

\(^2\) National Grid, Future Energy Scenarios (July 2018)
3. This transition is of particular relevance to the Department for Business, Energy and Industrial Strategy (BEIS), due to the opportunities and challenges that the move from internal combustion engines to EVs would entail for the automotive industry, as well as the potential role that EVs could play in meeting the UK’s climate change mitigation targets. Under the Climate Change Act 2008, the Government has committed to reduce UK greenhouse emissions by at least 80% compared to 1990 levels by 2050.4 Transport is
the largest emitting sector of the UK economy, accounting for 28% of all UK greenhouse
gas emissions in 2017.5 Recent research indicates that EVs have the potential to reduce
greenhouse gas emissions by over 50% compared with equivalent conventional petrol and
diesel vehicles over the lifetime of their use.6 The EU has recently agreed to cut carbon
dioxide emissions from cars and vans by 35% by 2030.7

4. The Committee on Climate Change (CCC) has recommended that if the UK is to
remain on a 'least cost' pathway to the 2050 target, 60% of all new cars and vans sold should
be electric by 2030, and all new cars and vans should be zero emission by 2035.8 The CCC's
technical assessment of the Road to Zero Strategy, published 11 October, concluded that:

“existing and newly agreed policies for road transport … are insufficient
to ensure the reductions in emissions necessary to meet the 5th Carbon
Budget in the most cost-effective way”.9

This assessment is line with earlier, repeated statements from the Committee that existing
policies—including the Clean Growth Strategy and Road to Zero Strategy—do not go
far enough to tackle transport emissions, putting the UK's long-term carbon reduction
targets at risk.10

5. Looking at broader cross-Government challenges, EVs are considered a key solution
in the drive to improve local air quality. Poor air quality is the greatest environmental risk
to public health in the UK, responsible for an estimated 40,000 early deaths each year,
and the second largest cause of avoidable mortality after smoking.11 These health impacts
are estimated to cost the UK economy over £20 billion per annum.12 The main pollutants
of concern are nitrogen oxide, particulate matter and ozone, with risks to public health
depending on local concentrations. The UK has been unlawfully breaching nitrogen
dioxide limits since 2010, with road transport responsible for an average 80% of nitrogen
oxide emissions in areas where the limits are exceeded.13 The House of Commons Joint
Inquiry into Improving Air Quality reported in March that, despite publication of a
national plan to tackle roadside emissions in 2017, there is “insufficient urgency in current
policies to accelerate vehicle fleet renewal”.14

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5 Committee on Climate Change, Reducing UK emissions 2018 Progress Report to Parliament (June 2018)
6 Cambridge Econometrics, Fuelling Europe’s Future (February 2018)
7 Financial Times, EU ministers agree 35% car emissions reduction by 2030 (10 October 2018)
8 Committee on Climate Change, Reducing UK emissions 2018 Progress Report to Parliament (June 2018)
9 Committee on Climate Change, Letter to Chris Grayling and Greg Clark (11 October 2018)
10 Committee on Climate Change, Government’s Road to Zero Strategy falls short, CCC says (10 July 2018)
11 Department for Environment Food & Rural Affairs, Air Quality: A Briefing for Directors of Public Health (March
2017); Environment, Food and Rural Affairs, Environmental Audit, Health and Social Care, and Transport
Environmental Audit Committee, Third Report of the Health and Social Care Committee, and Second Report of
the Transport Committee of Session 2017–19, Improving Air Quality, (7 March 2018)
12 Royal College of Physicians and Royal College Of Paediatrics and Child Health, Every breath we take, February
2016, p.xiii
13 Environment, Food and Rural Affairs, Environmental Audit, Health and Social Care, and Transport Committees,
Committee of Session 2017–19, Improving Air Quality, HC 433
14 Environment, Food and Rural Affairs, Environmental Audit, Health and Social Care, and Transport Committees,
Committee of Session 2017–19, Improving Air Quality, HC 433
6. In light of these concerns, the Government has introduced a series of policy aims to promote the development of the EV market. Notably, it set an ambition to “ensur[e] almost every car and van is a zero emission vehicle by 2050” in 2015, which has been more recently accompanied by sales targets for 2040, and a goal for the UK to be a world leader in the development and manufacture of both zero emission vehicles and the batteries used to power them. This laudable aim will not be easy to reach. Major barriers include: the high costs of EVs and batteries; the limited choice of EV models; the small number of existing charge points; the technical challenge of managing increased electricity demand from EVs; the industrial challenges of moving to EV technology for automotive manufacturers, retailers and after-sales service providers. These challenges pivot around a central dilemma: how to increase the number of EVs on UK roads whilst simultaneously developing a national charging network, given the investment case for both depends on the pre-existence of the other.

**Our inquiry**

7. Our predecessor Committee launched an inquiry into developing the EV market in March 2017. This work was cut short by the dissolution of Parliament and the subsequent general election. The evidence submitted highlighted a number of barriers to EV development which appeared not to be adequately addressed by the then Government’s policies, but the Committee did not have the opportunity to investigate these in detail.

8. On 21 September 2017 we launched our inquiry, *Electric vehicles: developing the market and infrastructure*, to build on the evidence base collated by the former Committee. We sought:

- to identify the key opportunities and barriers for the development of the EV market, from both a consumer and industry perspective;
- to assess the adequacy of existing policy to address these barriers and maximise opportunities, and;
- to investigate the particular challenges of developing new charging infrastructure.

9. In response to our call for evidence, we received 83 written submissions and held six oral evidence sessions between February and June 2018. These were in addition to the 58 written submissions received by our predecessor Committee, which we have reconsidered. We also received six letters from local authorities, and one from the Minister, in response to specific requests for information. On a visit to Norway, the world’s leading country for EV deployment, we held meetings with Ministers and government officials, the Energy and Transport Committee, Oslo City Hall, and the Norwegian EV Association, as well as a broad range of public bodies, research institutes and businesses involved in the EV, automotive and energy sectors. We also took the opportunity to visit Milton Keynes to see

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15 GOV.UK, *UK government pledges bold ambition for electric cars*, (3 December 2015)
the EV Experience Centre and to hold discussions with stakeholders in the Go Ultra Low Cities initiative, and to visit the London EV Company’s electric taxi factory in Coventry. We are grateful to all those who took the time to contribute to our inquiries.

This Report

10. Chapter 2 of this report investigates the adequacy of the Government’s targets for EV deployment. Chapter 3 assesses barriers to EV purchase for motorists and options to mitigate these, focussing on cars and vans, whilst Chapter 4 considers the particular challenges to uptake of commercial EVs. In Chapter 5 we explore obstacles to the development of charging infrastructure, focussing on technological difficulties, the particular needs of rural areas, the role of local authorities and the potential for improved coordination and planning. Chapter 6 examines opportunities to maximise the industrial opportunities of the EV transition. In Chapter 7 we present our overarching conclusions.

Box 1 Definitions

For the purposes of this inquiry, the term ‘electric vehicle’ is taken to mean a vehicle with a battery that can be recharged by plugging in to mains electricity.18 This definition covers:

- Battery electric vehicles, also known as ‘pure’ or ‘100%’ electric vehicles, which are always powered by the battery;
- Plug-in hybrid electric vehicles, which combine a small plug-in battery with an internal combustion engine (ICE). These typically use the battery to drive the wheels at low speeds, or for a limited range, with the petrol or diesel fuelled ICE used for greater speeds and longer distances;
- Extended-range electric vehicles, which combine a plug-in battery, electric motor and an internal combustion engine. Unlike plug-in hybrids, the electric motor always drives the wheels, with the internal combustion engine acting as a generator to recharge the battery when it is depleted.

Government policies and targets often refer to ‘low emission vehicles’, ‘ultra low emission vehicles’ and ‘zero emission vehicles’. As this nomenclature suggests, such vehicles are defined in terms of tailpipe emissions. Ultra low emission vehicles are usually defined as vehicles that emit less than 75 grams of carbon dioxide emitted per kilometre (gCO₂/km) and that are capable of driving at least 10 miles with zero emissions.19 However, policies and incentives cite a much broader range of eligibility requirements, based on various emissions limits, zero emission mileages and European Emission Standards. Electric vehicles are represented in all of these vehicle categories.

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18 Hydrogen fuel cell vehicles and conventional hybrid vehicles are also sometimes described as ‘electric vehicles’. For clarity we have chosen to ignore this technical definition, because these vehicles cannot be plugged into mains electricity.

19 HM Treasury, Company car tax for ultralow emission cars (August 2016), Box 1.A
2 Targets

Existing EV targets

11. Target-setting is important to indicate policy goals, and to support investment by providing greater certainty to businesses, energy providers and consumers. The Government set a target in 2015 to “ensur[e] almost every car and van is a zero emission vehicle by 2050”. It has set additional targets over the past year to guide this transition:

- In July 2017 the Government announced that “it will end the sale of all new conventional petrol and diesel cars and vans by 2040”;
- In May 2018 the Prime Minister announced a further target for 2040, that all new cars and vans should be “effectively zero emission”;

In July 2018 the Road to Zero Strategy set an aspiration for “at least 50%, and as many as 70%, of new car sales and up to 40% of new van sales being ultra low emission by 2030.” Alongside the sales targets, the Government has set a goal for the UK to be “a world leader in the development, manufacture and use of zero emission vehicles… [and] in the design, development and manufacture of batteries” in the Automotive Sector Deal.

Delivering the 2050 goal

12. We welcome the Government’s new targets for vehicle sales, which provide some measurable deliverables en route to the 2050 goal. However, as we explain below, in our view they lack the necessary specificity to address the urgent challenges of climate change and air quality, and they are not sufficiently ambitious to set the UK EV sector in a ‘world-leading’ position.

Setting the destination: zero emissions

13. Policy targets need to be expressed clearly if they are to guide effective investment; ambiguous goals run the risk of either deterring investors, or inadvertently promoting developments that do not align with the policy intention. Clarity is also essential to provide a measuring stick against which policy performance can later be assessed, and policymakers held to account. In the case of EVs, clear policy direction is needed to encourage the development of new vehicle models, to promote the growth of charging infrastructure, and to give motorists confidence in the long-term viability of owning an EV.

14. The first 2040 target, set in July 2017, describes an intention to phase out “conventional” petrol and diesel, without specifying the types of vehicle that this covers. Witnesses to our inquiry understood “conventional” to include mild and full (conventional, non-plug-in) hybrids (see Box 2), implying that these should be banned from 2040. The second target,

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20 GOV.UK, UK government pledges bold ambition for electric cars (3 December 2015)
21 GOV.UK, Air quality plan for nitrogen dioxide No 2 in UK 2017 (26 July 2017)
22 The Rt Hon Teresa May MP, PM speech on science and modern Industrial Strategy (21 May 2018)
23 Department for Transport, The Road to Zero: Next steps towards cleaner road transport and delivering our Industrial Strategy (July 2018)
25 Q101 [SMMT]: University of Southampton (EVD0046)
to ensure that new vehicles are “effectively” zero emission, is similarly opaque. Neither Ministers nor officials were not able to clearly explain the meaning of either term to us, nor to confirm whether the targets would still allow for the sale of non-plug-in hybrids. The best explanations that the Minister for Business and Industry, Richard Harrington, could offer were that “conventional” referred to “old” technology, and that “effectively” meant “pretty much” zero.26

15. The Director of Energy, Technology and Innovation at the Department for Transport (DfT), told us that consumers would “potentially” be able to buy cars that are not zero emission in 2040.27 Both the ‘conventional’ and ‘effectively zero’ terms have persisted, undefined, in the Road to Zero Strategy. Rather than setting a clear target, statements made to us and in the Road to Zero Strategy indicate that the Government simply expects new cars and vans to have “significant zero emission capability” by 2040, and “the majority of new cars and vans sold to be 100% zero emission”.28

16. The Government’s lack of clarity on the meaning of the 2040 targets is unacceptable. Industry cannot be expected to make supportive investment decisions when Ministers and officials themselves cannot say how the target should be interpreted. This means that car manufacturers do not have certainty about the types of vehicles they will be able to market in the UK in the near future, and charging infrastructure providers are less able to make assessment about future demand for their product. The unclear messaging from Government is damaging and unfair to those companies wishing to drive the transition to EVs. The Government cannot rely on expectations alone to deliver desired policy outcomes.

Box 2 Hybrid vehicles

The term ‘hybrid’ can be used to describe a broad range of EV technologies. Mild and full hybrids (also known as conventional hybrids) combine an ICE with an electric motor, and a small battery that is typically charged by braking, but they cannot be plugged in to charge from mains electricity. Mild hybrids are completely unable to travel with zero emissions, while full hybrids have a very short zero emissions range (1–2 miles). Newer plug-in hybrids also combine an ICE, electric motor and a battery, but their battery recharges by plugging into the electricity mains. They can complete whole journeys with zero emissions, provided the battery has sufficient charge; the petrol ICE is used as a back-up for longer journeys.

17. We are concerned by the Road to Zero’s Strategy’s launch statement, which indicated that non-plug-in hybrids will not be covered by the “conventional” vehicle phase-out.29 Advice from the Committee on Climate Change (CCC) indicates this is inconsistent with the UK’s long-term decarbonisation targets. The CCC has advised that only pure battery electric vehicles and long-range plug-in hybrids should be eligible for sale post 2035, to ensure that almost all trips are completed without using the petrol/diesel engine.30

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26 Q371 [Harrington]; Q393 [Harrington], Q380 [Harrington], Q370 [Bruce]
27 Q383 [Harrington]
28 Q370 [Bruce], Q379 [Bruce], Q401 [Bruce], Department for Transport, The Road to Zero: Next steps towards cleaner road transport and delivering our Industrial Strategy (July 2018)
29 “The government has no plan to ban any particular technology - like hybrids - as part of this strategy”. GOV.UK, Government launches Road to Zero Strategy to lead world in zero emission vehicle technology (9 July 2018)
30 Committee on Climate Change, Government’s Road to Zero Strategy falls short (10 July 2018); Committee on Climate Change, Letter to Chris Grayling and Greg Clark (11 October 2018)
18. Witnesses to our inquiry had mixed views on the potential role of both plug-in and non-plug-in hybrids for cars and vans. Car manufacturers and other automotive stakeholders saw plug-in hybrids as an important transitional technology to alleviate motorist ‘range anxiety’ (the concern that an EV will not have sufficient charge to complete a given journey), whilst battery ranges are limited and charging infrastructure is still being developed. They assumed that these vehicles could be replaced with fully electric vehicles in the longer term. Toyota and Ford viewed conventional hybrids as a long-term solution for lowering car and van emissions—but not reducing them to zero.

19. Plug-in hybrids could have a role to play during the EV transition, at least in the near term—but non-plug-in hybrids are not compatible with the Government’s long-term climate change commitments. Whilst we support the principle of technology neutrality, the Government should recognise that by allowing the ongoing sale of conventional hybrids, and short-range plug-in hybrids, the current ‘ban’ fails to ensure that only the cleanest new vehicles will be available for sale from 2040. **We recommend that the Government either acknowledge that petrol and diesel will ultimately need to be fully phased out from cars and vans, or admit that it is not seeking a zero emissions fleet. It cannot have both. We recommend that the Government aim for zero emissions, in line with its longstanding 2050 target, and phase out non-plug-in and all but the cleanest plug-in hybrid vehicles. This should include more stringent zero emission range requirements for plug-in hybrids to ensure that vehicles deliver on targeted emissions reductions.**

### Accelerating ambition: a 2032 target

20. The Industrial Strategy has set an aim to make the UK a world leader in the development, manufacture and use of zero emission vehicles, with the decision to host the world’s first Zero Emission Vehicles Summit this September providing a strong demonstration of intent. Yet comparison with stricter international targets makes it clear that the UK’s position is anything but world-leading (Table 1). The target to phase out petrol and diesel by 2040 lags behind similar aims set by Norway (2025) and China (2030). It is less ambitious than Scotland’s own target (2032). Nissan told us that the 2040 deadline establishes the UK as a “second tier” country in the EV race.

21. It is not clear that a 2040 target will push—rather than follow—market trends. Many manufacturers have themselves set targets for 15–100% of new sales to be EVs as early as 2025 or 2030, with Porsche aiming for 100% by 2030 (Table 2). Further, the National Infrastructure Commission has recommended, on the basis of market projections, that government, Ofgem and local authorities enable the roll out of sufficient charging infrastructure to allow EVs to reach close to 100% of new vehicle sales by 2030. The

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31 Many indicated that hybrids of all varieties would have a long-term role to play in the commercial and larger vehicle segments, which face different challenges to cars and vans. Q101 [Unite]; Qq 295–6 [Toyota]; Q296 [Nissan], Q300 [BMW]; Committee on Climate Change, CCC welcomes UK Government investment in electric vehicles (11 September 2018); Committee on Climate Change, Letter to Chris Grayling and Greg Clark (11 October 2018)
32 Q46 NFDA, Q46 RAC Foundation, Q300 BMW, Q296 Nissan; Tesla [EVD0032]
33 Q286 [Nissan]
35 GOV.UK, Birmingham to host world’s first zero emission vehicle summit (24 May 2018)
37 Q286 [Nissan]
38 National Infrastructure Commission, National Infrastructure Assessment, page 53 (July 2018)
relatively low ambition of the 2040 deadline aligns with statements we heard from DfT Director Richard Bruce, which suggest that Government has conceded its ‘world leading’ ambition in all but name. Mr Bruce explained to us that a truly zero emission target was not necessary in the UK, because stricter regulations abroad would likely lead to a de-facto zero emission standard:

“the vast majority [of vehicles in the UK]—will be 100% zero because, in regulatory terms, that is what manufacturers are going to have to make to sell cars in China, in the US and in Europe”.39

22. This unambitious approach undermines the Government’s aims to become an EV world-leader, and hampers UK prospects to develop a competitive edge in the EV market. It is further unclear why the Government is choosing to set an ambition lower than that anticipated by our international competitors. The 2040 deadline is not even consistent with the Government’s longstanding 2050 target for an almost entirely zero emissions fleet. The average age of a car at scrappage is 14 years, meaning that sales of new petrol and diesel vehicles will need to cease around 2035 in order to achieve an almost entirely zero emission fleet by 2050, a concern that has been highlighted by the Committee on Climate Change.40

Table 1: Government commitments to the end of sales of conventional vehicles

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Table 2: Manufacturer commitments on electrification

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<td>2030</td>
<td>BEVs, plug-in hybrid electric vehicles and hydrogen vehicles 15% of sales</td>
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Source: Reproduced from CCC, *Reducing UK emissions: 2018 Progress Report to Parliament*, June 2018, Table 5.4

23. The shortfalls of the 2040 target date are widely recognised amongst stakeholders. 14 Mayors of the UK’s largest cities, National Grid, E.ON, environmental groups, and

39 Q387 [Bruce]
40 Committee on Climate Change, *Reducing UK emissions 2018 Progress Report to Parliament* (June 2018); Committee on Climate Change, *Letter to Chris Grayling and Greg Clark* (11 October 2018)
charging companies have called for it to be brought forwards to 2030.41 The House of Commons Joint Inquiry on Improving Air Quality recommended that the target be brought forwards in more general terms - a view shared by Royal Dutch Shell, amongst others.42 Only four of our witnesses specifically advised against bringing the target forwards.43

24. The transition to EVs is set to accelerate over the coming decades; the UK will need to match, or better, international commitments if we are to be a ‘world leader’. A leadership position would enable the UK to develop sought-after expertise in EV technology, manufacturing and charging infrastructure, with substantial potential export opportunities. The current 2040 target for ‘effectively zero emissions’ vehicles places the UK in the passenger seat, leaving us to accept vehicle emission standards set by more ambitious international regulations. Stronger ambitions are also needed to ensure that the Government delivers on its goals to mitigate climate change and improve air quality. A more ambitious target date would help to ensure that petrol and diesel vehicle stock is retired by 2050, and would align the goal for England, Wales and Northern Ireland with the Scottish Government’s ambition to phase out petrol and diesel cars and vans by 2032. Zero should mean zero. We recommend that the Government prioritise overarching policy goals on climate change and air quality over sectoral interests, and bring forwards a clear, precise target for new sales of cars and vans to be truly zero emission by 2032. This would put the UK in the ‘first tier’ league of nations leading the EV transition, and help to harmonise objectives across the UK.

25. Interim milestones towards the new target date could help to further improve investor confidence, creating checkpoints to monitor progress and adjust policies if necessary—similar to the cycle of 5-yearly carbon budgets.44 We welcome the Government’s willingness to set interim targets, with the adoption in the Road to Zero Strategy of an ambition for “at least 50%, and as many as 70%, of new car sales and up to 40% of new van sales being ultra low emission by 2030”. We recommend that the principle of interim targets is maintained, with the interim targets themselves strengthened and updated to reflect the increase in ambitions to bring forward the phase out of ICE vehicles to 2032.

26. Unite, SMMT, Toyota and BMW raised concerns about bringing the target date forwards, noting the potential detrimental impacts of the EV transition on the ICE industry and workers.45 Whilst we recognise their concerns, to remain globally competitive the UK automotive sector should seek to lead, rather than follow, as the world transitions from ICES to EVs, and as we depart the EU. It is imperative that Government supports

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41 The Times, Mayors want ban on diesels brought in a decade earlier, (18 June 2018); The Guardian, Ban new petrol and diesels cars in 2030, not 2040, says thinktank (18 March 2018); Pod Point, The UK cannot lead from behind: why we need a 2030 ICE ban (5 July 2018); Energy UK, Energy UK responds to launch of Road to Zero Strategy (9 July 2018); E ON [ELV0048], Greenpeace [ELV0042], WWF-UK [ELV0056], Green Alliance [EVD0041]; Qq 154–156 [National Grid]


43 Q84 [Unite], Q97 [SMMT]; Qq 288–90 [Toyota], Qq 292–4 [BMW]

44 UK EVSE [EVD0044], Chargemaster [EVD0038], Q287 [Nissan]

45 Q84 [Unite], Q97 [SMMT]; Qq 288–90 [Toyota], Qq 292–4 [BMW]
domestic industry and workers through the EV and EU exit transitions by creating an attractive domestic environment for investment. We discuss options for this in Chapter 6.
3 EV purchase support

Consumer barriers to EVs

27. Vehicle costs remain a major barrier to EV uptake in the UK. The upfront costs of most electric vehicles are substantially higher than their internal combustion engine (ICE) equivalents, even after Government support. For example, the list price of a VW Golf starts at £18,340, whilst the price for an e-Golf starts at £32,730, falling to £28,230 after the Government’s Plug-in Grant at current levels (discussed further below). The price gap is understood to be a particularly strong deterrent for individuals, who have less flexibility to offset upfront costs against longer term savings than commercial buyers.

28. Market projections suggest that EVs could reach price equivalency with ICEs by the mid-2020s. In the meantime, however, financial incentives will be required to help bridge the gap if the Government is to deliver on its ambition to grow the EV market. At present support is provided through grants and fiscal incentives, which we discuss later in this chapter.

29. Additional challenges for vehicle technology include battery capacity—a concern exacerbated by patchy provision of charging infrastructure—and the limited choice of EV models. Although EVs cannot yet match ICEs on range per single charge, battery technology is improving, with many vehicles now having a range in the region of 200 miles. Plug-in hybrids can alleviate range anxiety, as they combine a plug-in battery with a petrol or diesel fuelled internal combustion engine, which can be used when the battery is depleted.

30. Lack of vehicle choice is also a problem. The range of models has grown considerably during our inquiry, with 77 plug-in cars and vans available in August 2018. However the range of pure electric models and commercial vehicles remains limited. We return to this issue in Chapter 4.

46 Q4 [NFDA]; Anglian Water Services [EVD0011], Automobile Association [EVD0021], Broadspeed Ltd [ELV0023], Centre for Business in Society [ELV0020], Ecotricity Group Ltd [EVD0004], Ecotricity Group Ltd [EVD0086], Energy Saving Trust [ELV0046], ENGIE [ELV0053], Energy Technologies Institute [ELV0022], Greenpeace UK [ELV0042], Greenwatt Technology [EVD0008], Innovate UK [EVD0027], Innovate UK [EVD0085], MAL [Research & Development] Ltd [ELV0034], Mark Clemence [ELV0019], National Franchised Dealers Association [ELV0038], National Grid [ELV0065], Office for Low Emission Vehicles (OLEV) [ELV0064], Petrol Retailers Association [EVD0050], Mr Philip Allen [EVD0014], POD Point Ltd [ELV0059], RAC [ELV0014], RAC Foundation [ELV0029], Renewable Energy Association [EVD0049], SPACE for Gosforth [ELV0039], CDT Energy Storage [ELV0040], Tesla [EVD0032], BluePointLondon [ELV0051], UK Petroleum Industry Association [ELV0036], UKEVSE [ELV0055], Unite the Union [EVD0024], University of Southampton [EVD0046]


48 Q9 [Tesla]


50 Tesla [EVD0032], Energy Saving Trust [EVD0056], Q13 NFDA, Q53 Tesla.

51 Next Green Car, EV price vs range comparison (August 2018)

52 Innovate UK [EVD0085], Anglian Water [EVD0011], BD Auto [ELV0010], London Taxi Company [ELV0047], Licensed Taxi Drivers Association [EVD0060], Octopus Energy Group [ELV0066], RAC Foundation [ELV0029], Q5 NFDA, Q47 NFDA

53 Innovate UK [EVD0085]; OLEV [ELV0064]; Next Green Car, Electric car market statistics (2018)
Grants

31. The Government’s Plug-In grant scheme provides direct support towards the cost of buying an electric vehicle. The grant currently covers: 35% of the cost of a car, up to a maximum of £2,500 (for plug-in hybrids) or £4,500 (for fully electric cars); 20% of the cost of a van, up to a maximum of £8,000; 20% of the cost of a motorcycle, up to a maximum of £1,500, or 20% of the cost of a purpose-built taxi, up to a maximum of £7,500. Separate grant schemes provide help for motorists and employers with the costs of installing a charge point at their home or workplace (maximum 75% of installation costs, capped at £500).

32. The Government has confirmed that the plug-in grants will continue in some form until at least 2020. However on 11 October 2018 it announced that the grants for cars would be cut from 9 November. The maximum grant for fully electric cars will reduce to £3,500, and the grant for plug-in hybrid cars will be removed entirely.

33. This decision risks undermining the UK’s burgeoning EV market. Not one witness to our inquiry suggested that EVs would be able to compete without grants in the near term. Energy UK, UKEMVSE and BMW specifically warned against the sudden removal of support, which has recently caused the collapse of EV markets in Denmark and the Netherlands, and led to the breakdown of the UK’s liquid petroleum gas (LPG) vehicle market in the early 2000s. The complete removal of support for plug-in hybrids is a particular concern; whilst we do not believe that these vehicles should be part of the UK’s long-term decarbonisation strategy, they could play an important role in the near-term, as we explained in Chapter 2. Further, the decision runs counter to advice published by the Committee on Climate Change (CCC) on the day of the decision’s announcement, as part of its technical assessment of the Road to Zero Strategy. This stated that:

“[Plug-in car and van grants] are not high enough to achieve full cost parity with conventional vehicles… It is important that government commits to extend support for EVs until they become cost-competitive with conventional vehicles, and that the level of the grant is sufficient to provide an effective incentive for prospective EV customers.”

34. It is likely that the impact of the grant cuts will be felt beyond new car sales. Indirectly the plug-in grant is an important support mechanism for charge point operators and

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54 The Plug-in Grant Scheme is administered the Office for Low Emission Vehicles (OLEV). OLEV is jointly hosted by the Department for Transport and the Department for Business, Energy and Industrial Strategy.
55 GOV.UK, Low-emission vehicles eligible for a plug-in grant
56 Office for Low Emission Vehicles, Electric Vehicle Homecharge: Scheme Guidance for customers (May 2018); Office for Low Emission Vehicles, Workplace Charging Scheme — Guidance Document for Applicants, Chargepoint Installers and Manufacturers (July 2018)
57 Department for Transport, The Road to Zero: Next steps towards cleaner road transport and delivering our Industrial Strategy (July 2018)
58 GOV.UK, Reformed Plug-in Car Grant extended into next decade (October 2018)
59 Q303 [BMW], Clean Technica, Denmark Rethinks EV Incentives After Market Collapses (May 2018); UKEMVSE [ELV0055], Energy UK [EVD0018], Autovista Group, Denmark open to further incentives as it looks to boost EV market (April 2018)
60 Committee on Climate Change, Letter to Chris Grayling and Greg Clark (11 October 2018)
61 Ibid.
vehicle manufacturers, as it provides confidence that demand for their products will continue. The resulting lower purchase costs of new EVs are also understood to trickle through to the second-hand EV market.\(^{62}\)

35. Rather than sudden cuts - such as those recently announced—witnesses to our inquiry suggested that the plug-in grants should be gradually phased out as EVs reach price parity with ICES—a position shared by the CCC.\(^{63}\) Tesla, Greenpeace and the NFDA called on the Government to set out clear and predictable conditions for phasing out the grants, for example by linking support levels to the number of EVs sold.\(^{64}\) The Minister did not share these concerns, arguing that the “sector is unreasonable” to request clarity on future support, and that “it is not fair to give longer term targets than that because … costs are going to come down”.\(^{65}\) While we welcome ongoing cost reductions in EVs, we do not agree that it is “unreasonable” for the EV sector to call for more than two years’ notice on the future of policy support. The newly announced, very substantial cuts provide only four weeks’ notice, an unreasonable and unrealistic period in which to expect businesses to adapt.

36. The Government’s decision to cut substantially grants for pure electric vehicles, and to remove entirely those for plug-in hybrid vehicles, has been made too soon and too suddenly. We recommend that purchase support for EVs should be maintained at October 2018 levels for the time and more generally until the cost of EVs nears price parity with conventional ICE vehicles. We further recommend that the Government sets out its intentions for the future of plug-in grants for the next five years. If the Government is unable to commit to ongoing support, it should at least set out the terms under which grants will be phased out, well in advance of the implementation of any reductions.

### Fiscal incentives

37. Fiscal incentives have been effective in driving historical transitions in vehicle technology. The UK’s switch from petrol to diesel cars during the 2000s was largely driven by fiscal policy, particularly the linking of Vehicle Excise Duty (VED) and company car tax to the carbon dioxide emissions of vehicles,\(^{66}\) and Norway’s world-leading 39% EV market share has been achieved almost entirely through fiscal measures.\(^{67}\)

38. The Norwegian approach combines bonus and malus measures,\(^{68}\) which minimise the cost of EV support to the Treasury by offsetting the costs of EV incentives against

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62 Q319 [Nissan], Q320 [BYD], Toyota [ELV0025]
63 Anglo American plc (ELV0044) (EVD0073), BD Auto (ELV0010), Broadspeed Ltd (ELV0023), BYD UK Ltd (ELV0009), Energy Saving Trust (ELV0046) (EVD0056), Greenpeace UK (ELV0042), Mark Clemence (ELV0019), National Franchised Dealers Association (NFDA) (ELV0039) (EVD0055), POD Point Ltd (ELV0059) (EVD0040), RAC (ELV0014), Renewable Energy Association (ELV0049), Society of Motor Manufacturers and Traders (SMMT) (ELV0050), CDT Energy Storage (ELV0040), WWF-UK (ELV0056), Green Alliance (EVD0041), Nissan (EVD0083), RAC Foundation (EVD0067), Tesla (EVD0032), UK Hydrogen and Fuel Cell Association (EVD0043), Committee on Climate Change, An independent assessment of the UK’s Clean Growth Strategy: From ambition to action (January 2018)
64 Q18 [Tesla]; Tesla [EVD0032]; Greenpeace [ELV0042], NFDA [ELV0038]
65 Q423 [Harrington]
66 Although ultimately misguided (due to the carbon benefits of diesel being offset by its effect on air quality), this initiative was highly successful: in 2000 petrol cars accounted for 85% of new car registrations, but by 2011 sales of diesel cars had gained a 50.3% market share
67 Annex 2
68 A bonus-malus system is one which alternately reward (bonus) desired behaviours, and penalise (malus) undesired ones. In this, the Norwegian Government offers bonuses to motorists choosing to purchase EVs, and penalises those choosing a petrol or diesel vehicle.
revenues gathered from ICE disincentives. Benefits currently afforded to EVs include exemption from import tax, VAT, annual road tax and re-registration tax, and reduced company car tax. To pay for this, ICE vehicles are charged an additional tax for the first three years after registration, with the specific rate of tax depending on the vehicle’s emissions. Norway has historically levied high rates of tax on new vehicle registrations, giving scope to provide substantial discounts for EVs - which it has implemented. Norway has also adopted a “50% rule” under which fees for parking, ferries and toll roads paid by EVs are at most half the level of fees paid by ICES. **We recommend that the Government follows the example of EV world leaders, and provides support to make EV prices more competitive with conventional cars and vans.**

### Box 3 Fiscal incentives for EVs

#### Vehicle Excise Duty

Since 2003 Vehicle Excise Duty (VED) rates have been linked to the carbon dioxide emissions of vehicles. From 2003 to 2017 cars that emitted less than 100g/km of carbon dioxide were exempt from VED. Rates for other vehicles were on a sliding scale, with the most polluting paying the highest levels of tax. VED rates were reformed in April 2017. Cars that emit less than 50g/km of carbon dioxide continue to be exempt, but all other vehicles now pay the same standard rate (the rate after the first year of registration). Cars with a list price greater than £40,000 also pay a supplement of £310 for the first five years in which a standard rate is paid. In practice the strict 50g/km limit means that only fully-electric vehicles qualify for the exemption, and the flat rate for other vehicles has removed the incentive to purchase alternative ultra-low emissions vehicles, such as plug-in hybrid EVs or hydrogen fuel cell cars. Further, as electric vehicles are more expensive than equivalent conventional models, they are disproportionately affected by the VED supplement.

#### Benefit-in-Kind for Company Cars

Benefit-in-Kind rates for EVs are currently set at 13%. They are due to reduce to 2% in 2020–21, but will first rise to 16% over 2019–20. This is effectively encouraging company car purchasers to wait until 2021 before they invest in an EV.

39. Unlike Norway, the fiscal landscape in the UK does not provide such clear policy signals. Changes to Vehicle Excise Duty (VED) introduced in 2017 have reduced incentives for all but the cleanest EVs, whilst company car tax is set to increasingly weaken incentives for EVs until 2020–21 (see Box 3). British motorists are being told that—in the short term at least—the case for buying an EV is weakening. When we raised this issue with the Minister, he told us he would be willing to disincentivise motorists from using ICES, provided that any measures were “reasonable … but not draconian”. We welcome this pragmatic approach. While the Government may, understandably, have reservations...
about increasing taxes on motorists, it is likely that a review of vehicle-related taxation and spending will be necessary over the coming years to assess and mitigate the impacts of reduced revenues from fuel duty as use of ICEs declines: estimates by Policy Exchange suggest this reduction in tax receipts could total £170 billion by 2030. Fiscal signals should send a clear and consistent message about the Government’s ambition to move to a zero emission vehicle fleet. There is little sense in introducing changes which reduce incentives to purchase an EV, or which encourage consumers to delay, when the Government has clearly set out its ambition to increase EV uptake. We recommend that the Government aligns new fiscal changes with the zero emissions target. It should bring forward the introduction of preferential rates on company car tax without delay, or at least hold company car tax on EVs level until the preferential rates come into effect.

### Accessibility of EVs and support mechanisms

40. Consumers are deterred not only by the high upfront costs of EVs, but also by concerns and perceptions about costs over the lifetime of the vehicle. These include the cost of replacement batteries, more expensive insurance, and low residual values. Paradoxically, the real lifetime costs of an EV are often lower than those of an ICE, due to lower fuelling and maintenance costs. It is therefore essential that EVs are made more accessible to motorists from all socioeconomic backgrounds, particularly the less affluent and the 63% of UK workers who commute by car or van. Tesla and Engie also noted the need to improve communications around EVs, to help consumers compare not just retail prices but also lifetime costs.

41. Currently grants towards the purchase of EVs are available only to individuals with sufficient capital to buy a new car (or those with a company car), whilst support for charge points is available only to motorists with off-street parking. The Scottish Government has introduced interest-free loans to cover the full cost of purchasing a new EV (up to £35,000), which are understood to have had a substantial impact on motorists’ vehicle choices.

42. It will be essential to develop a buoyant second-hand market for EVs. This would make EVs more affordable to consumers who typically do not purchase new vehicles, and also support the growth of the wider national EV fleet by improving residual values and so bolstering the economic case for new EVs. We welcome the Government’s recent commitment, in the Road to Zero Strategy, to revise vehicle log books to include specifications on battery size and electricity consumption; this should help to address concerns that the lack of EV-relevant information in the current documentation is

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76 Policy Exchange, Driving Down Emissions; How to clean up road transport? (June 2017)
77 Qq 4–7 [NFDA], Q7 [RAC Foundation], Qq 28–29 [RAC Foundation], Q133 [SMMT], Petrol Retailers Association [EVD0050]
78 The Guardian, Electric cars already cheaper to own and run than petrol or diesel – study (December 2017); Science Direct; Total cost of ownership and market share for hybrid and electric vehicles in the UK, US and Japan (January 2018)
79 Q9 [RAC Foundation], Energy Saving Trust [EVD0056], NFDA [ELV0038]
80 Tesla [EVD0032], ENGIE [ELV0053]
81 Survey data from the Energy Saving Trust indicates that the loans have been an important factor in purchasing decisions, with 35% of respondents indicating they would not have bought an ultra low emissions vehicle without the loan, while 29% would have bought an ultra low emissions vehicle, but less quickly. Energy Saving Trust [EVD0056].
82 Qq 32–25 [RAC Foundation]; Q135 [Unite]; SMMT [ELV0050], RAC Foundation [ELV0029], Unite [EVD0024], BVRLA [EVD0037], ENGIE [ELV0053]
holding back growth of the second hand market.\textsuperscript{83} Increased support for leasing schemes (which mitigate the depreciation risk carried by motorists) and car clubs would further the accessibility and affordability of both new and second-hand EVs.\textsuperscript{84} EVs should not be the sole preserve of the relatively affluent. We recommend that the Government introduces more creative support mechanisms to ensure that all motorists are able to benefit from EVs. This could include public car clubs, and improved communications and documentation to enable consumers to better assess the real world financial and environmental performance of both new and second-hand EVs.

\textsuperscript{83} Q75 [NFDA]; Q131 [SMMT];
\textsuperscript{84} Energy Saving Trust [EVD0056], NFDA [ELV0038], RAC Foundation [ELV0029]
4 Commercial vehicles

43. The term ‘commercial vehicles’ is used to describe a diverse group of vehicles, ranging from the ubiquitous white van to taxis, buses and heavy goods vehicles (HGVs). A variety of technologies will be required to decarbonise commercial road transport segments, with solutions varying according to the type, size and usage of vehicles, as well as the size and purpose of fleets.\(^\text{85}\) While electrification is expected to play a role for some vehicle types (e.g. taxis), no technologies have yet emerged as clear market winners. Battery weight is expected to limit the role of electrification in heavier and long-distance vehicles, at least in the near term.\(^\text{86}\) Alternative technologies such as natural gas, biomethane, liquid biofuels and hydrogen fuel cells are lighter and already in use, for example in buses.\(^\text{87}\)

44. In general, commercial vehicles remain a nascent and relatively undeveloped sector of the EV market.\(^\text{88}\) Witnesses highlighted a general lack of commercial EV products, with many manufacturers currently working on prototype models.\(^\text{89}\) We heard, for example, that there is no electric equivalent to the white van available for sale to tradesmen and for last mile deliveries—although Royal Mail is developing its own vehicle - nor are there electric people-carriers suitable for private hire.\(^\text{90}\) In addition, risk-aversion was noted as a significant barrier amongst both fleet operators and independent commercial drivers, e.g. taxis.\(^\text{91}\) The Committee visited the London EV Company near Rugby to see the new self-charging electric taxi being manufactured.\(^\text{92}\)

45. One segment of the commercial sector that may be well-suited to electrification is fleet vehicles that operate from a central hub. These typically operate fixed routes and have predictable schedules and recharging times. As such they can avoid the ‘chicken and egg’ challenge faced by private vehicles dependent on the development of third-party charging infrastructure, instead using charge points installed at the fleet depot.\(^\text{93}\) BD Auto and BYD argued that this, combined with the high emissions of diesel fuelled commercial vehicles, means that the sector should be viewed as ‘low hanging fruit’—an area where the EV transition should be relatively easy to implement and have strong benefits for carbon emissions and air quality.\(^\text{94}\)

46. During our inquiry we heard that the decarbonisation—and where appropriate, electrification—of commercial vehicles has received little policy attention in the UK.\(^\text{95}\) The Road to Zero Strategy partially addresses these concerns, setting out the Government’s

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85 Q43 [Energy Saving Trust]; Q44 [RAC Foundation], Gasrec [ELV0041], Gas Alliance Group [ELV0012], Anglo American [ELV0044] [EVD0073], ITM Power [EVD0028], UK Hydrogen and Fuel Cell Association [EVD0043], Calor Gas [ELV0058], Freight Transport Association [EVD0015], BYD [ELV0009], Cross River Partnership [EVD0036], SSE Enterprise [EVD0054]

86 Qq 357–359 [BYD UK Ltd]

87 Q43 [Energy Saving Trust]; Q44 [RAC Foundation], Gasrec [ELV0041], Gas Alliance Group [ELV0012], Anglo American [ELV0044] [EVD0073], ITM Power [EVD0028], UK HCFCA [EVD0043], BYD [ELV0009], Energy UK [EVD0018]

88 Q357–359 [BYD UK Ltd.], London EV Company [EVD0016]

89 BYD [ELV0009], London EV Company [EVD0016]; BD Auto [ELV0010], Department for Transport, Freight Carbon Review 2017 (10 February 2017)

90 Q1 [Energy Saving Trust], Q10 [Energy Saving Trust]

91 BYD [ELV0009], BD Auto [ELV0010], London Electric Vehicle Company [EVD0016].

92 Annex 1

93 BYD [ELV0009], BD Auto [ELV0010], Freight Transport Association [EVD0015], SSEN [EVD0057]

94 BD Auto [ELV0010], Qq 357–359 BYD

95 Addison Lee [ELV0063], Gasrec Ltd [ELV0041], National Franchised Dealers Association (NFDA) [ELV0038], Freight Transport Association [EVD0015]
first strong commitments to support the decarbonisation of HGVs, with a voluntary target to reduce tailpipe emissions by 15% from 2015 levels by 2025; to support R&D on the suitability of zero emissions technologies for HGV traffic, and; to develop an ultra-low emissions standard for trucks.\textsuperscript{96} It also commits to continue funding for ultra low emission buses and to provide additional funding for local authorities to develop taxi charging infrastructure.

47. We welcome these developments, but while the Strategy provides a starting point for the decarbonisation of commercial vehicles, it does not fully address concerns we heard about the lack of clear policy direction to promote low emission buses and heavier electric vans,\textsuperscript{97} nor does the voluntary target provide any guarantee that targeted emissions reductions for HGVs will be met. \textbf{Commercial vehicles have been largely overlooked by emissions reduction policies to date.} Whilst we welcome the Road to Zero Strategy, it does not go far enough in setting a clear direction for the decarbonisation of the vehicle sector. \textit{We recommend that the Government sets firm targets for deployment of ultra low emission commercial vehicles, provides support to expedite uptake amongst hub-based operations, and supports the development of low carbon solutions for heavy, long-distance vehicles. The voluntary target for HGVs should be monitored, as the Committee on Climate Change has advised, with an option to introduce a firmer target, as for cars, should progress fall off track.}\textsuperscript{98}

\textsuperscript{96} Department for Transport, \textit{The Road to Zero: Next steps towards cleaner road transport and delivering our Industrial Strategy} (July 2018)

\textsuperscript{97} BYD UK Ltd \[ELV0009\]

\textsuperscript{98} Committee on Climate Change, \textit{Government’s Road to Zero Strategy falls short, CCC says} (10 July 2018)
5 Charging infrastructure

48. Poor provision of charging infrastructure in the UK is one of the greatest barriers to growth of the domestic EV market, and the challenge raised most frequently by witnesses to our inquiry.99 The existing charging network is lacking both in size and geographic coverage, with the fastest (‘rapid’) charge points being particularly scarce. Analyses by the Energy Saving Trust (Figure 4) and HSBC (Table 3) indicate that there are substantial disparities in the provision of public charge points across the country, with wide regional variations in both the average distance to a public charge point, and the ratio of public charge points to people. Such challenges are not unique to the UK: the need to improve charging infrastructure has been identified as one of the most significant barriers to EV development globally.100

Table 3: Publicly funded charge points

<table>
<thead>
<tr>
<th>Region</th>
<th>Number of charge points by region</th>
<th>People per charge point</th>
</tr>
</thead>
<tbody>
<tr>
<td>North East</td>
<td>664</td>
<td>3,931</td>
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<tr>
<td>Scotland</td>
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<tr>
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<td>9,789</td>
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</table>

Source: HSBC survey data, published in "Lack of chargers delays switch to electric cars", The Times, 26 March 2018

99 ABB [ELV0027], Addison Lee [ELV0063] [EVD0023], Andrew Braithwaite [ELV0002], Association of Convenience Stores [ELV0062] [EVD0019], Asynt [EVD0001], Beemcar [ELV0061], British Parking Association [ELV0024], Broadspeed [ELV0023], BVRLA [EVD0037], BYD [ELV0009], Centre for Business in Society [ELV0020], Electric Blue [EVD0047], Energy Saving Trust [ELV0046] [EVD0058], ETI [ELV0022], Greenpeace [ELV0042], Greenwatt Technology [EVD0008], Innovate UK [EVD0085], London Forum [ELV0033], MAL R&D [ELV0034], Mark Clemence [ELV0019], NFDA [ELV0038], National Grid [ELV0065] [EVD0063], Octopus Energy Group [ELV0046], OLEV [ELV0064], Petrol Retailers Association [EVD0050], Philip Allen [EVD0014], POD Point [ELV0059], RAC [ELV0014], RAC Foundation [ELV0029], Renewable Energy Association [ELV0049], Rolls Royce [EVD0006], Stephen Clarke [ELV0028], EPSRC CDT Storage [EVD0040], UKEVSE [ELV0055], Unite [EVD0024], University of Southampton [EVD0046], Zero Carbon Futures [ELV0005]

Figure 4 Average distance to nearest public electric vehicle charge point. Image provided by the Energy Saving Trust.
49. A visible and wide-reaching public charging network is essential to mitigate ‘range anxiety’ amongst would-be EV motorists.\(^{101}\) It will need to cater to the various travel needs of individual and commercial motorists, as well as to motorists with different levels of access to private charging facilities.\(^{102}\) Most EV users charge their vehicle at home overnight, and are expected to continue doing so, although workplace charging could also play an important role.\(^{103}\) Public charge points will be required in residential areas for the 40–50% of homes in the UK that do not have off-street parking, as well as at destinations such as town centres and retail parks, and at service stations to allow the completion of longer journeys. Destination and en-route charge points will need to be ‘rapid’ (taking 30 minutes to charge) or ‘fast’ (3–4 hours) to be useful and convenient.\(^{104}\) Charging infrastructure must also be readily accessible to motorists. The existing proliferation of multiple types of plugs and sockets, open access and subscription networks, payment systems and pricing regimes has meant that it has not always been easy for motorists to locate available charge points, to compare charge speeds and costs, and to equip themselves to pay for charging services across the country.\(^{105}\)

50. The Road to Zero Strategy sets out the Government’s aim to create “one of the best EV infrastructure networks in the world”.\(^{106}\) However, the development of a national charging infrastructure that is sufficient, accessible and convenient for motorists will not be straightforward. In particular, we heard concerns about: the challenges of mitigating adverse impacts on the electricity grid and the need for standardisation in infrastructure; the poor business case for charge points in rural areas; the insufficiency of support for local authorities; the widespread lack of coordination amongst actors across the charging arena, and; the dichotomy between national aspirations and the Government’s reliance on local actors for delivery. We discuss each in turn.

**Technological issues**

**Electricity grid impacts**

51. The potential impacts of EVs on the electricity grid have received considerable attention in media and policy circles, with a particular focus on the increase in generation capacity that will be needed to meet demand from EVs. For example, the Times and the Daily Mail reported last year that the UK would need 20 new nuclear power stations, whilst a Financial Times article claimed that the UK’s generation capacity would need...
to increase by 70%. During our inquiry it has become clear that such concerns are overblown. As discussed in Chapter 2, we heard that the system operator National Grid would welcome an increase in the national ambition on EV deployment. They are confident that sufficient new generation capacity, as well as necessary grid reinforcements and demand management technologies, can be brought online, on time to meet the increase in demand. Further, it is evident that much of the media hype around potential increases is misplaced.

52. Several newspapers reported last summer that EV could increase peak demand by 18 GW by 2050 - equivalent to six new Hinkley Point C power stations. These quoted an estimate by National Grid that had been modelled to illustrate an extreme ‘worst case’ scenario, in which all cars in the UK were electric, and they were all charged at the same time. These stories have been convincingly exposed as misinterpretations. We heard from Graeme Cooper, Director of EVs at National Grid, that the probability of such a situation occurring is “close on zero”. More realistically, National Grid projects that the increase in peak demand from EVs is likely to be in the region of 8 to 11 GW, with the lower range being achievable if smart charging technologies, vehicle to grid technology and incentives to charge vehicles at off-peak times are used to shift and lower electricity demand.

53. Whatever the level of new capacity required to supply EVs, it is essential that any new power stations constructed are low carbon; otherwise the EV transition will fail its core aim of reducing greenhouse gas emissions from transport. The UK has made substantial progress in reducing emissions from power, which are now 65% lower than 1990 levels, but more is needed to ensure that decarbonisation of this sector remains on track to meet the UK's 2050 climate change targets. In their 2018 progress report, the Committee on Climate Change warned that there is a significant risk that insufficient low carbon power will be delivered by 2030. Opportunities to install low carbon power at least cost are being missed due to the lack of route-to-market for onshore wind and solar—the cheapest low carbon renewables—whilst there is no strategy for developing carbon capture usage and storage, which is crucial to meet our 2050 climate change targets at least cost. We welcome assessments by National Grid, and others, that the EV transition is unlikely to present a risk to the security of national electricity supply. Nonetheless,
the increased electricity demand will necessitate investment in new generation capacity. The EV transition therefore strengthens the case for Government to review its support for new generation plant and to ensure that all support is consistent with the Government’s overarching aim of least-cost decarbonisation. We will continue to follow the Government’s progress in the decarbonisation of power closely, for example through our ongoing inquiry into carbon capture usage and storage.\(^{117}\)

Rather than increases to peak demand, the most problematic impacts of EVs on the electricity grid are likely to be experienced on distribution networks,\(^ {118}\) where the majority of charge points are expected to be connected.\(^ {119}\) If clusters of EV charge points emerge without sufficient planning and mitigation measures, then charging could overload local, low voltage networks, leading to power outages or ‘brown-outs’.\(^ {120}\) The ‘My Electric Avenue’ EV trials found that that over 300,000 UK networks could be at risk of overloading from EV charging, with some local networks overloading when as little as 30–40% of customers charge their vehicle.\(^ {121}\) Separate analysis by the Green Alliance has found that “as few as 6–8 cars charging in a small cluster, at peak time through dumb chargers, could result in significant disruptions to the local electricity distribution system.”\(^ {122}\) The risk of overloading will vary according to local conditions—particularly the amount of ‘spare capacity’ that is available to deal with additional loads.\(^ {123}\) Rural networks may be particularly at risk, since they typically have lower resilience (being connected to fewer neighbouring networks), and because motorists in rural areas are likely to rely heavily on home charging.\(^ {124}\)

Mitigation of these impacts is expected to be achieved through a combination of physical grid reinforcements and ‘smart charging’ (which allows charging loads to be adjusted throughout the day), with innovative ‘vehicle-to-grid’ technologies potentially playing a role in the future.\(^ {125}\) Witnesses agreed that opportunities to utilise smart charging should be prioritised as the technology offers substantial cost savings.\(^ {126}\) The My Electric Avenue trial has estimated that smart charging could defer or avoid network

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\(^{117}\) Business, Energy and Industrial Strategy Committee, Carbon capture, usage and storage (CCUS) inquiry (May 2018)

\(^{118}\) Electricity distribution networks carry electricity from the high voltage transmission grid to industrial, commercial and domestic users.

\(^{119}\) Northern Powergrid [EVD0058], SSE [EVD0057], SP Energy Networks [EVD0052], Western Power Distribution [EVD0013], UK Power Networks [EVD0049], Energy Networks Association [EVD0051]

\(^{120}\) Brown outs are fluctuations in voltage which can damage appliances and even cause fires in extreme cases.

\(^{121}\) Energy Networks Association [EVD0051], Freight Transport Association [EVD0015], Ofgem [EVD0065], Anglo American [ELV0044] [EVD0073], Lancaster University students [EVD0071] [EVD0076] [EVD0077] [EVD0078] [EVD0079] [EVD0080] [EVD0081], EA Technology [EVD0048], Petrol Retailers Association [EVD0050], UK Hydrogen and Fuel Cell Association [EVD0043], Green Alliance [EVD0041], Stephen Broderick [EVD0062], SSEN [EVD0057], WSP [EVD0007], EV HUB [EVD0002], Western Power Distribution [ELV0008] [EVD0013]

\(^{122}\) Green Alliance [EVD0041]

\(^{123}\) Energy Networks Association [EVD0051], Ofgem [EVD0065], Energy Networks Association [EVD0051]

\(^{124}\) Energy Networks Association [EVD0051]

\(^{125}\) Lancaster University students [EVD0071] [EVD0076], Chargemaster [EVD0038], Cross River Partnership [EVD0036], Ecotricity [EVD0086], Energy Networks Association [EVD0051], Energy UK [EVD0018], Harold Dermot and Associates [EVD0030], Innovate UK [EVD0027], Innovate UK [EVD0085], Northern Powergrid [EVD0058], OVO Energy [EVD0045], POD Point [ELV0059], SSE [EVD0057], UK Power Networks [EVD0049], WWF-UK [ELV0056]

\(^{126}\) SSE [EVD0057], Energy Networks Association [EVD0051], Aldersgate Group [EVD0039], Anglo American [EVD0073], Centrica [EVD0033], CIBSE [EVD0031], EA Technology [EVD0048], Eaton [EVD0069], Energy Saving Trust [EVD0056], National Grid [ELV0065] [EVD0063], Octopus Energy Group [ELV0066], Department for Business, Energy and Industrial Strategy [EVD0070], RAC Foundation [ELV0029], SMMT [ELV0050], Tesla [EVD0032], UK Petroleum Industry Association [EVD0029]
reinforcement costs relating to EVs worth £2.2 billion; whilst the National Infrastructure Commission estimates that EV-related reinforcement costs could exceed £16 billion by 2050 if left unmanaged.127

56. Concerns have however been raised about the potential impacts of smart charging on consumers, notably potential charging delays and the sharing of electricity consumption data, although early industry trials indicate that with appropriate communication the technology is acceptable to consumers.128 It can further be made desirable through the use of preferential tariffs. Some witnesses called for smart charging to be made an opt-out service to maximise participation, and thereby minimise the extent and cost of grid reinforcements.129 **We welcome the introduction of powers in the Automated and Electric Vehicles Act 2018 for the Secretary of State to make regulations prohibiting the sale or installation of charge points unless they meet certain smart functionality requirements.**

57. Even with widespread uptake of smart charging, network reinforcements will be needed in some locations—for example where user uptake of EVs is high, where the existing network is already weak, or at sites where rapid or high-power charging is required (such as charging hubs and fleet depots).130 Reinforcements needs could be reduced by co-locating on-site electricity generation and energy storage, or by planning for charge point sharing amongst fleets.131 In the future vehicle-to-grid technologies could harness the potential of EVs themselves to serve as storage assets on the electricity grid, charging and discharging the batteries of connected vehicles to alleviate grid constraints and allowing motorists to earn revenues from their vehicles. The desirability and implications of these services for motorists are not yet clear however, and further R&D and field trials are required.132 Challenges to address include the impacts on battery life, interactions with battery warranties, and how to ensure there is always a sufficient reserve of power in the battery in case the vehicle is needed in an emergency.133 **We welcome the Government’s recent £30 million investment in Vehicle-to-Grid R&D to explore the potential of this technology.**

**Standardisation of charging infrastructure**

58. During the early phases of our inquiry witnesses involved in the energy sector and charge point technology raised concerns about the lack of standardisation and data sharing across charging infrastructure.134 This lack of standardisation was blamed for poor interoperability, with variations in physical charging connections, network memberships...
and payment methods preventing EV motorists from accessing the full range of UK charge points.\textsuperscript{135} Innovate UK and Zero Carbon Futures also emphasised the need for improved provision of information to motorists on the location, capacity, availability and pricing of public charge points.\textsuperscript{136} Alongside this, there is a need for charge points to have a common and recognisable design, so that they can be easily identified by motorists.

59. The Automated and Electric Vehicles Bill progressed through Parliament and received Royal Assent during the course of our inquiry.\textsuperscript{137} The Act introduces enabling provisions for electric vehicle charging, which allow the Government to regulate to: improve the consumer experience of charging infrastructure (with a uniform method of charge point access, requirements for charge point availability and maintenance, and publicly available information on charge points); ensure provision at key strategic locations such as motorway service areas; require that charge points have ‘smart’ capability; and ensure that certain charge point data (such as energy consumption and geographical location) can be transmitted to specified persons (e.g. National Grid or the DNOs). These provisions address many of the concerns about charging infrastructure that we heard, and in general were welcomed by witnesses.\textsuperscript{138}

60. \textbf{We welcome the provisions of the Automated and Electric Vehicle Act 2018 to allow Government to set and enforce regulations that: standardise and ensure interoperability of public charge points, including payment systems; ensure provision and standardisation of information about public charge points; mandate charge points at large fuel retailers; and require smart charging capabilities. We very strongly recommend that the Government make full use of these powers by setting and enforcing new regulations to promote the development of convenient, accessible charging infrastructure.}

Rural areas

61. The Road to Zero Strategy states the Government’s expectation that the transition to zero emission vehicles will be industry and consumer led.\textsuperscript{139} While this may be true for the uptake of vehicles, and for the installation of charge points in locations where there is a strong business case,\textsuperscript{140} it is unlikely that market forces alone will lead to the installation of charge points in rural areas, where the potential near-term customer base may be small, and where the costs of electricity grid connections can be very high.\textsuperscript{141} Rural areas

\begin{footnotesize}
\begin{itemize}
\item[\textsuperscript{135}] National Grid [ELV0065] [EVD0063], Octopus Energy Group [ELV0066]
\item[\textsuperscript{136}] Innovate UK [EVD0027] [EVD0085], Zero Carbon Futures [ELV0005]
\item[\textsuperscript{137}] Parliament, Automated and Electric Vehicles Act 2018 (July 2018)
\item[\textsuperscript{138}] National Grid [EVD0006], Octopus Energy Group [ELV0066], E.ON [ELV0053], National Grid [ELV0065] [EVD0020], Association of Convenience Stores [ELV0062], POD Point [ELV0059], Centre for Business in Society [ELV0020], National Franchised Dealers Association [ELV0038]
\item[\textsuperscript{139}] Department for Transport, The Road to Zero: Next steps towards cleaner road transport and delivering our Industrial Strategy (July 2018)
\item[\textsuperscript{140}] Addison Lee [EVD0023], Association of Convenience Stores [EVD0019], Renewable Energy Association [ELV0049], Department for Business, Energy and Industrial Strategy [EVD0070], National Grid [ELV0065] [EVD0020], UKEVSE [ELV0055]; Q224 [Nottingham City Council]; Q248 [UKEVSE]; Qq 361–2 [BMM]; Q357–9 [BYD UK Ltd]; Q228 [Nottingham City Council]; Q259 [Nissan]; Q360 [Toyota]; ABB [EVD0022], Aldersgate Group [EVD0039], Chargemaster [EVD0038], EV HUB [EVD0002]
\item[\textsuperscript{141}] For example: the presence of EV customers in the case of privately-owned charge points, or the availability of grant funding where the charge point will be publicly-owned.
\end{itemize}
\end{footnotesize}
are expected to be critical to the alleviation of so-called ‘range anxiety’, since they are home to the majority of motorway service areas, where rapid charge points would provide drivers with a means to refuel and complete long journeys. Access to convenient charge points will also be essential to ensure that remote communities do not become further isolated, either because they become unreachable for other EV motorists, or because they themselves are unable to utilise new EV technology. The Government has announced its intention to oblige large fuel retailers and motorway service areas to provide charge points in their forecourts. The National Infrastructure Commission, however, has suggested that support should go further: in the recent National Infrastructure Assessment, the Commission recommended that the Government should subsidise the provision of rapid charge points in rural and remote areas by 2022, since the market will not deliver these in the short term. The Commission estimated that the cost of installing chargers at 200 currently unserved locations would be around £10 million. National Grid has emphasised the importance of learning from the mistakes of mobile phone and broadband rollout, which remains incomplete.

62. We welcome the commitment in the Road to Zero Strategy to monitor whether any significant gaps in EV or infrastructure provision emerge in the medium term, and to consider the case for direct government support in areas where there is a market failure in the future. However, it is already apparent that the market is not delivering rapid public charge points in certain strategically important locations, notably rural areas. Delaying support for rural charge points will only prolong range anxiety amongst potential EV motorists, impeding development of the market. We recommend that the Government should not wait for additional evidence of the need to support the business case for rapid charge points in rural and remote areas, but instead subsidise the provision without delay and by 2022 as recommended by the National Infrastructure Commission.

Support for local authorities

63. Local authorities (LAs) are pivotal to the development of EV charging infrastructure: they have been the promoters and coordinators of exemplar EV cities and regions using competitively awarded central Government funds such as the Go Ultra Low Cities, Ultra Low Emission Taxis and Low Emission Buses schemes; they are responsible for setting local planning policy requirements, which can include provision for charge points in new developments and car parks; and most recently they have been targeted by central Government to deliver on-street charge points, albeit with financial support. However, the increasing resource pressures of recent years have made it difficult for many LAs to prioritise EVs as an additional, non-statutory agenda - a point illustrated by the fact

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142 Q197 [National Grid]
143 Q71 [Energy Saving Trust]
144 Department for Transport, Proposed ultra low emission vehicles measures for inclusion in the Modern Transport Bill: government response (February 2017); Automated and Electric Vehicles Act 2018, Part 2
145 National Infrastructure Commission, National Infrastructure Assessment 2018 (July 2018)
146 Q200 [National Grid]; Q224 [Nottingham City Council]; Q225 [Energy Saving Trust]
147 Department for Transport, The Road to Zero: Next steps towards cleaner road transport and delivering our Industrial Strategy (July 2018)
149 Renewable Energy Association [ELV0049], Renault Zoe & ZE Owners Club [ELV0004]; Q431 [Harrington]
150 Country Council Network, Risk that basic ‘core offer’ of local services could be become the norm without additional resources, Counties warns (August 2018)
that we received no spontaneous responses from LAs to our open call for evidence.\textsuperscript{151} We heard that LAs are facing significant challenges related to three key areas—funding, technical expertise, and coordination with network companies—all of which could be alleviated with improved and more proactive engagement from central Government.

\textbf{Funding}

64. Most historical financial support for LAs to develop charging infrastructure has been awarded competitively, with a focus on developing best practice through model EV cities and regions. Whilst this has helped drive innovation, it has also led to a proliferation in the range of solutions adopted, and patchy provision across the country.\textsuperscript{152} Several witnesses stated that geographical variation in charge point coverage can be traced to the relative success of different LAs in securing these funds.\textsuperscript{153} Rasita Chudasama, Principal Transport Planner at Nottingham City Council supported this view, explaining that Nottingham—one of the Government’s flagship ‘Go Ultra Low’ cities—would “absolutely not” have been able to develop its leading charge point network in the absence of funding, which has been crucial to leverage private sector investment.\textsuperscript{154}

65. Local authorities, consumer organisations and the UKEVSE suggested that a more systematic approach to funding for LAs would help to address existing disparities and grow a more consistent network of charge points around the UK.\textsuperscript{155} This could follow the example of the Scottish Government, which awards charge point funding based on the population of LAs.\textsuperscript{156} However, the UKEVSE also warned that in the absence of competition funds may be awarded without necessary management buy-in and expertise.\textsuperscript{157} Nissan suggested that rather than systematising funds, the Go Ultra Low Cities scheme should be expanded to benefit more cities.\textsuperscript{158} The Minister explained that the Government faces a “dilemma” over whether to support a few LAs in demonstrating the benefits of EVs, or divide an equivalent funding pot more evenly but thinly.\textsuperscript{159} He suggested that the Government would review funding approaches in the future if specific parts of the country are still struggling to develop charging infrastructure.\textsuperscript{160} \textit{We welcome the Government’s investment in EV showcase initiatives such as the Go Ultra Low Cities scheme, which have been central to testing and demonstrating innovative deployment approaches. Now that EVs are becoming mainstream, an alternative approach is needed to promote deployment more evenly across regions. The Government should introduce a strategy...}

\textsuperscript{151} To address this lack of representation we invited the LAs situated in our own constituencies to submit evidence. We also invited a small number of LAs recommended to us by the Energy Saving Trust for having shown interest, but faced barriers, in advancing the EV agenda.

\textsuperscript{152} Q223 [Chargemaster]; Q228 [Nottingham City Council]; Q254 [UKEVSE]

\textsuperscript{153} Q223 [Chargemaster]; Q228 [Nottingham City Council]; Q254 [UKEVSE]; Leeds City Council, Letter to BEIS Committee (11 April 2018); Cheshire West and Chester Council, Letter to BEIS Committee (June 2018); UKEVSE [ELV0055], Renewable Energy Association [ELV0049], Zero Carbon Futures [ELV0005], Renault Zoe & ZE Owners Club [ELV0004]

\textsuperscript{154} Q241 [Nottingham City Council]

\textsuperscript{155} Q241 [Nottingham City Council]; Q248 [Energy Saving Trust]; Cheshire West and Chester Council, Letter to BEIS Committee (June 2018), Renault Zoe & ZE Owners Club [ELV0004], UKEVSE [ELV0055]

\textsuperscript{156} Q248 [Energy Saving Trust]

\textsuperscript{157} Q254 [UKEVSE]

\textsuperscript{158} Q309 [Nissan]

\textsuperscript{159} Q431 [Harrington, Bruce]

\textsuperscript{160} Q426 [Harrington]; Q443 [Harrington]
to support local authorities that have been less successful in accessing funding so far by 2021, for example by replicating Go Ultra Cities in regions which have poor charging provision, or by allocating funds on a more systematic basis.

66. LAs also raised concerns about the mismatch between the targeting of central Government funds towards particular solutions and local policy priorities. The On-Street Residential Chargepoint Scheme, a non-competitive grant, was launched in December 2016. It offers support to LAs worth up to 75% of the capital costs of installing on-street charge points. In the Scheme’s first year only two grants were awarded, worth a combined total of £76,500. The lack of interest prompted Ministers to write to LAs in January 2018, with the result that by July 2018 13 grants—worth around £1 million—had been awarded.

67. We heard from LAs that the Scheme’s initial low uptake has been due to its failure to take account of local policy pressures and limits on council resources. Councils are hesitant to install on-street parking charging—and in turn reserve parking spaces for EVs—in areas where competition for parking spaces is already high, while the installation of on-street charge points can conflict with local policy aims to construct cycle lanes, or to improve the accessibility of pavements for pedestrians. Further, the requirement to source 25% match funding, and cover full operational costs, means that even with the grant these charge points remain difficult for councils to afford.

68. These objections do not imply, however, that LAs are not aware of the importance of charge points for motorists without off-street parking. Nottingham City Council is exploring options to develop charging hubs at council-owned facilities such as libraries and car parks, while Leeds City Council suggested that the grants should be extended to allow installation at privately-owned sites, and Wolverhampton City Council argued that the Government could better support councils in developing locally-appropriate charging solutions by providing more flexible grant funding. Warwickshire County Council highlighted a lack of proactive engagement from central Government, noting “it would be useful if LAs were consulted with on how best to deliver EV infrastructure prior to any new funding schemes being announced”. Rather than dictating the precise solutions to be used, we recommend that the Government increase the flexibility of funding for public charge points, providing local authorities with the autonomy to assess and install charging infrastructure that fits in with local needs and priorities. Future funding

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161 Warwickshire County Council, Letter to BEIS Committee (June 2018); Leeds City Council, Letter to BEIS Committee (11 April 2018); City of Wolverhampton Council, Letter to BEIS Committee (4 May 2018), Chichester District Council, Letter to BEIS Committee (4 May 2018); Q249 [UKEVSE]; Q252 [Nottingham City Council]

162 GOV.UK, On-street Residential Chargepoint Scheme guidance for local authorities (December 2016)


164 GOV.UK, Funding for thousands of electric car charge points unused by councils, (January 2018); Department for Business, Energy and Industrial Strategy, Letter to Rachel Reeves MP (4 July 2018)

165 Warwickshire County Council, Letter to BEIS Committee (June 2018); Leeds City Council, Letter to BEIS Committee (11 April 2018); City of Wolverhampton Council, Letter to BEIS Committee (4 May 2018), Chichester District Council, Letter to BEIS Committee (4 May 2018); Q249 [UKEVSE]; Q252 [Nottingham City Council]

166 Warwickshire County Council, Letter to BEIS Committee (June 2018); Cheshire West and Chester Council, Letter to BEIS Committee (June 2018); Leeds City Council, Letter to BEIS Committee (11 April 2018); Q250 [Chargemaster]; Q252 [Nottingham City Council];

167 City of Wolverhampton Council, Letter to BEIS Committee (4 May 2018), Leeds City Council, Letter to BEIS Committee (11 April 2018), Warwickshire County Council, Letter to BEIS Committee (June 2018), Q252 [Nottingham City Council]

168 Warwickshire County Council, Letter to BEIS Committee (June 2018)
schemes that seek to target specific solutions should be considered only if consultation with local authorities indicates that there is a clear appetite for these solutions, and that proposed levels of funding will be sufficient to enable their development.

69. LAs often fall responsible not only for the installation of public charge points, but also their maintenance. Many struggle to fund this - with potentially severe consequences for the usability of new charging resources. Research by the RAC Foundation in June 2017 found that 13% of public charge points were out of service. Given the relative scarcity of charge points, this failure rate serves only to reinforce motorists concerns about the ‘risks’ of EVs. Support is needed to ensure that LA-owned charge points are kept in good working order; their functionality for motorists should be at least as reliable as petrol pumping stations.

70. Central Government’s focus on promoting on-street charge points is in conflict with local policy priorities and is not working. Support is needed for alternative solutions such as local charging hubs. The Government should proactively engage with local authorities, motorist organisations, charge point providers and distribution network operators to identify mutually agreeable solutions—including maintenance plans—so that motorists without off-street parking do not remain at a disadvantage. We have seen no evidence that Government has adequately involved local authorities in such discussions so far, and our evidence suggests that it is not realistic to expect local authorities to act spontaneously; proactive engagement from Government is required.

Technical expertise

71. EVs are a rapidly evolving technological field, making it hard to maintain up-to-date expertise, which is itself essential to assess demand, procurement and ongoing management options for charge points, as well as to compile competitive applications for funding. In the absence of impartial and reliable technical support, councils are nervous of investing in costly charging equipment that may be under-utilised or later become obsolete. We heard calls for central Government to facilitate information sharing between councils, to provide guidance on charge point technology, to set specific guidelines for new developments, and to develop clearer, more coordinated policy to assist the development of a national network. In addition, the inconsistency of low emission vehicle definitions used by different central Government departments has meant that LAs have had to individually set their own to be used in local policies, leading to a proliferation of different standards around the country.

72. The Government’s revised National Planning Policy Framework (NPPF), published in July 2018, advises that new development applications should be designed to enable EV charging, and that new local parking standards should take account of the need for

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169 Q19 [RAC Foundation]; Q24 [Tesla]; Q218 [UKEVSE]; Cheshire West and Chester Council, Letter to BEIS Committee (June 2018); Q223 [Chargemaster] Q19 [RAC Foundation]
170 Q19 [RAC Foundation]; RAC Foundation, Ultra-Low-Emission Vehicle Infrastructure –What Can Be Done (September 2017)
171 Q218 [Nottingham City Council], Q218 [UKEVSE], British Parking Association [ELV0024] Chichester District Council, Letter to BEIS Committee (4 May 2018), Cheshire West and Chester Council, Letter to BEIS Committee (June 2018); Letter to BEIS Committee (June 2018), City of Wolverhampton Council, Letter to BEIS Committee (4 May 2018)
172 Cheshire West and Chester Council, Letter to BEIS Committee (June 2018); City of Wolverhampton Council, Letter to BEIS Committee (4 May 2018); Leeds City Council, Response to electric vehicles inquiry
173 Q228 [Nottingham City Council]
charge points.174 While we welcome the Government’s intention to align local planning policies more closely with national EV aims, we note the concerns of witnesses that these new revisions are too weak. UKEVSE suggested that rather than require charging to be enabled, the NPPF could specify minimum standards e.g. the number of parking spaces that should be equipped with a charger, an approach already adopted locally in London.175 We also heard that more specific guidance at the national level would be beneficial as it can be difficult for LAs to determine individually the ‘right’ level of charge point requirements for different types of development.176 We welcome the amendments to the National Policy Planning Framework to encourage the consideration of charge points at new developments and in local parking standards. We recommend that these be made more specific, to set a minimum number of charge points that should be included in both residential and non-residential developments. The number of charge points required should be linked to the expected use and occupancy of the development.

Coordination with distribution network operators

73. Both local authorities and charge point operators highlighted the difficulties of getting agreement from all stakeholders on the location of new public charge points, and in particular from distribution network operators177 (DNOs), which can ultimately reject the proposal if it would unduly constrain the local electricity grid.178 It was suggested that the lack of incentives for DNOs to invest in grid reinforcements to promote charge point installations, or even to share data on suitable sites, has substantially delayed installations in some areas and put funding at risk.179 Chargemaster suggested that DNOs should be sanctioned to reinforce low voltage substations, and to publish information showing the capacity available on low voltage networks so that businesses are better able to identify suitable charge point locations.180 In turn, we heard that poor visibility on the location of ‘behind the meter’ charge points has made it difficult for DNOs to anticipate and plan for the network impacts of associated increases in electricity demand.181 Distribution network operators have the right to reject applications for larger charge point installations. Whilst this is important to maintain secure and reliable local electricity supplies, there are concerns that network companies have sometimes obstructed the development of charging infrastructure and that they have little commercial incentive to promote EVs. We recommend that the Government investigates options to either incentivise or require electricity network companies to facilitate the development of charging infrastructure.
Cross-departmental coordination

74. The inadequacy of efforts to coordinate EV stakeholders at the local level is unfortunately mirrored in the relationship between relevant central Government departments. The Office for Low Emission Vehicles (OLEV), co-hosted by BEIS and DfT, holds responsibility for promoting EVs across Government. In general, witnesses considered that OLEV has forged effective links between its host departments, and that it provides helpful advice, on demand, to local stakeholders. However, it is clear that cross-departmental coordination on EVs can—and should—be further strengthened. Many witnesses highlighted inconsistent, unambitious and poorly-coordinated Government policy as a barrier to EV uptake. In addition to concerns surrounding the 2040 targets, we heard about discrepancies between clean air, transport, planning and fiscal policy. Examples include how changes to Vehicle Excise Duty and Benefits-in-Kind have, albeit inadvertently, served to delay EV uptake (see Chapter 3), and how the push for on-street charging is at odds with aims to improve the accessibility of streets for pedestrians and cyclists.

75. Witnesses called for greater clarity, stability and direction across EV-relevant Government policies, stronger interventions to phase out ICE vehicles, and stronger support for the development of charging infrastructure and the post-manufacture EV supply chain. UKEVSE and BYD suggested that cross-Government challenges such as air quality could be harnessed to galvanise a better-coordinated approach to EV deployment across all departments. National Grid further suggested that cross regulation, linking the concerns of multiple sectors, could enhance existing consumer protections and help to minimise the costs of the EV transition. This would allow the impacts of potential charging solutions to be considered holistically, rather than considering only impacts related to a single sector, for example energy, in any given assessment.

76. Metrics used to encourage the use of alternative vehicles are also confusing; as well as the lack of clarity on the meanings of “effectively zero” and “conventional” petrol and diesel (discussed in Chapter 2), we heard that the emissions performance criteria for EV incentives vary between different central departments and local authorities. For example, the vehicle emissions performance requirements of the plug-in grant scheme, the exemption from standard rate Vehicle Excise Duty, the definition of ultra low emission vehicles under the Clean Air Zone Framework, and the exemption from the London Ultra Low Emission Zone charge, are all subtly different (Table 4). This lack of central, widely-used standards has made it difficult for would-be EV motorists to identify and compare the incentives they would receive if they adopt a particular EV model, and has left LAs to determine their own standards for local policy individually.
our definitions of ultra low and zero emission vehicles that local areas may adopt”. We recommend that these definitions must be unambiguous, and that the emissions performance criteria used across different departmental policies and incentives should be made consistent to reflect the definitions adopted.

Table 4: Illustrative examples of variation in eligibility requirements amongst policy incentives for low emission cars and vans.

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<thead>
<tr>
<th>Body</th>
<th>Incentive</th>
<th>Eligibility requirements</th>
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<tr>
<td>Office for Low Emission Vehicles</td>
<td>Plug-in Grant</td>
<td>Cars: Carbon dioxide (CO₂) emissions &lt;50g/km and can travel ≥112km (70 miles) with zero CO₂ emissions (category 1), or; CO₂ emissions &lt;50g/km, can travel ≥16km (10 miles) with zero CO₂ emissions and full purchase price &lt;£60,000 (category 2)<em>, or; CO₂ emissions 50≤75g/km, can travel ≥32km (20 miles) with zero CO₂ emissions and full purchase price &lt;£60,000 (category 3)</em>.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>*Note that category 2 and 3 vehicles will only be eligible for a grant until 9 November 2018.</td>
</tr>
<tr>
<td>Department for Environment Food &amp; Rural Affairs; Department for Transport</td>
<td>Exemption from Clean Air Zone charges</td>
<td>New cars or vans that emit less than 75 grams of CO₂ from the tailpipe per kilometre driven</td>
</tr>
<tr>
<td>Treasury</td>
<td>Vehicle Excise Duty - Standard Rate Exemption</td>
<td>Cars registered since 1 April 2017: zero CO₂ emissions</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cars registered 1 March 2001 to 31 March 2017: ≤100g/km CO₂ emissions.</td>
</tr>
<tr>
<td>Treasury</td>
<td>Preferential rate for company car tax</td>
<td>Preferential rate of 13% (compared with 16% standard rate) for cars with CO₂ emissions ≤50g/km in 2018–19.</td>
</tr>
<tr>
<td>Treasury</td>
<td>Enhanced capital allowances</td>
<td>100% first year allowance for new cars with CO₂ emission ≤50g/km Writing down allowance at 18% per year for new cars with CO₂ emissions &lt;110g/km</td>
</tr>
</tbody>
</table>
Body | Incentive | Eligibility requirements
--- | --- | ---
Greater London Authority | Exemption from London Ultra Low Emission Zone charge | Based on Euro standards. These set limits for nitrogen oxides and particulate matter:
Euro 3 for motorcycles, mopeds, motorised tricycles and quadricycles (L category)
Euro 4 (NOx) for petrol cars, vans, minibuses and other specialist vehicles
Euro 6 (NOx and PM) for diesel cars, vans and minibuses and other specialist vehicles
Euro VI (NOx and PM) for lorries, buses and coaches and other specialist heavy vehicles (NOx and PM)


A shared strategic plan

77. It has become clear during our inquiry that there is a discrepancy between the Government’s aspiration to develop rapidly a nationwide charging infrastructure, and its decision to leave delivery of charge points largely to local authorities. Development of consistent charging infrastructure will require coordination of actors at both the local and national levels, and across multiple sectors. It will also demand the availability of accessible funding solutions for installations where the business case for specific charge points is weak.

78. Vehicle manufacturers, electricity networks, councils and consumer organisations argued that central guidance and support are needed to provide businesses and investors with clear signals about the intended direction of development, and to support the creation of a nationwide charging network that would mitigate range anxiety and so support EV uptake in line with the Government’s sales targets. It was further suggested that a strategic plan, tackling both charging and electricity grid challenges simultaneously, could help to reduce the overall cost of constructing a national charging infrastructure. EA Technology also argued that deployment could be accelerated, and costs reduced, by allowing for investment in electricity grid reinforcements ahead of need. This position is shared by the National Infrastructure Commission, which recommended that Ofgem commission network operators to work with charge point providers to identify potential “anticipatory investments” in their recent Assessment.

189 Q431 [Harrington]
190 BYD UK Ltd [ELV0009], Nissan [EVD0083]; Northern Powergrid [EVD0058]; Q259 [Nissan]; Qq 361–2 [BMW], Qq 357–9 [BYD UK Ltd], Q51 [RAC Foundation], Qq66–69 [Energy Saving Trust], Q195 [ENA; National Grid] Qq 200–3 [National Grid] Qq 171–4 [National Grid] Qq 237–40 [UKEVSE]
191 Cheshire West and Chester Council, Letter to BEIS Committee (June 2018); E ON [EVD0020], Renault Zoe & ZE Owners Club [ELV0004]; Association of Convenience Stores [EVD0019]; Energy Networks Association [EVD0051], Northern Powergrid [EVD0058]
192 Q199 [Energy Networks Association]; EA Technology [EVD0048], Ofgem [EVD0065].
79. There is a mismatch between the Government’s ambition to develop national charging infrastructure and its decision to leave delivery largely to local authorities and private actors. A whole systems perspective is needed to identify solutions that will deliver required functionality at least overall cost, and which will ensure adequate provision of charge points nationwide. We recommend the Government recognise its responsibility in this role and coordinate a shared approach to planning national charging infrastructure at least cost by December 2019. This should ensure sufficient provision of charge points in all regions, including remote areas. It should also take into account electricity grid impacts, including potential interactions with a more widespread move to electrification in heating. We further recommend that the Government and Ofgem work with charge point providers and electricity network companies to assess, by June 2019, the potential for investments ahead of need which could hasten the growth of charging infrastructure and reduce the cost of its implementation.

80. Any strategic plan will need to recognise that charging requirements will differ between regions, with the appropriateness of alternative solutions determined by factors such as local parking arrangements, commuting distances, expected use of chargers and existing electricity grid capacity. For example, the scarcity of off-street parking means that cities will likely depend on public charging, whilst public charge point demand will likely be lower in areas where motorists can charge at home, effectively waking up to a ‘full tank’ every morning. The plan should also consider other anticipated developments that might interact with charging and electricity infrastructure needs, for example the introduction of autonomous vehicles and the potential electrification of heating.

81. The nature of ‘sufficient provision’ will differ between areas according to population density, parking arrangements, the road network and local amenities. In some areas it will require the installation of charge points and electricity grid upgrades which are not commercially viable, but which are necessary to make EVs accessible to residents and to ensure accessibility of the region to other EV motorists. We recommend that the Government sets out a strategy by June 2019 that allows for the nature of local provision to be determined locally, and to deliver charging infrastructure to ‘difficult’ and remote localities, so that these are not further isolated by the EV transition. Care should be taken to ensure that investments in the charging network are future-proofed, taking account of possible changes in technology and use, to minimise the risk of constructing infrastructure that later becomes redundant.

194 Q195 [Energy Networks Association]; Q69 [Tesla]; Q225 [UKEVSE]
195 CIBSE [EVD0031], E.ON [EVD0020], Energy Networks Association [EVD0051], Green Alliance [EVD0041]; POD Point [ELV0059], Innovate UK [EVD0027]
6  EVs and Industrial Strategy

EVs, batteries and Industrial Strategy

82. The international EV market is growing rapidly. Sales of new EVs tripled between 2015 and 2017 and are expected to overtake ICEs during the late 2030s.196 This is a radical transition for a sector that has been dominated by ICEs since the late nineteenth century, and will be a significant challenge for incumbent manufacturers who must either adapt to new EV technology or lose market share. The implications are particularly important for the UK’s substantial automotive sector, which has built up world-class expertise in ICEs over many years, and which must overcome additional Brexit-related challenges to secure future inward investment.

83. In 2017 motor vehicle manufacturing contributed close to 1% of the UK’s economic output and 8.1% of UK manufacturing output (£15.2 billion).197 It also accounted for 13% (£44 billion) of the UK’s total goods exports.198 186,000 people are employed directly in automotive manufacturing, and 856,000 across the wider industry.199 When questioned on prospects to accelerate the UK’s ambitions for EVs, the Minister explained to us that since “the British car industry is invested in existing technologies … We [the Government] do not want a revolution”.200 However the evidence we have heard, and the market projections we have seen, suggest that a revolution is already underway at the global level. Remembering that 80% of vehicles produced in the UK are exported, domestic ICE manufacturers must adapt if we are to protect jobs and retain UK share in the worldwide automotive market.201

84. Although UK EV production remains in its infancy, it has already demonstrated the potential to be a major player: in 2016 the Sunderland-manufactured Nissan Leaf represented 20% of all battery electric vehicles sold in the EU, while exports of low emissions vehicles more broadly were worth £2.2 billion.202 Other EVs produced in the UK include the London EV Company’s TX black cab – the only purpose-built electric taxi worldwide - and inner-city transit buses made by Alexander Dennis and Wright Bus.203 Domestic production is set to increase further in the near future: BMW will start manufacturing a fully electric Mini in Oxford in 2019 and Toyota has recently announced plans to build a plug-in Auris in Derbyshire.204 However, as we heard during our previous inquiry into the impacts of Brexit on the automotive sector, there are real risks that increased policy uncertainties could undermine the case for future investment in the UK, especially in the event of a ‘no deal’ scenario.205

196 Bloomberg, The Battery Will Kill Fossil Fuels—It’s Only a Matter of Time (March 2018)
198 SMMT, SMMT Motor Industry Facts 2018 (June 2018)
199 Ibid.
200 Q368 [Harrington]
201 SMMT, Key Exports Data (October 2018)
203 London Taxi Company [ELV0047], LEVC [EVD0016], BYD UK Ltd [ELV0009]
204 Unite the Union [EVD0024]; ‘Toyota to build next-generation car in Brexit Britain’ Financial Times, 28 February 2018
The rapid growth in EV demand internationally is largely credited to dramatic reductions in battery costs. These have occurred as a result of technological improvements and economies of scale that have been realised due to increased demand from stationary storage, as well as from EVs themselves. Lithium-ion battery prices dropped from $1,000/kWh in 2010 to $209/kWh in 2017, and are projected to fall to below $100/kWh in the mid-2020s (Figure 5). Batteries currently account for around half the price of new EVs, and represent a significant industrial opportunity in their own right. The global lithium ion battery market was worth $17.4 billion (£12 billion) in 2017, and is expected to reach around $95 billion by 2025. The Government estimates that the UK and European battery markets could be worth £5 billion and £50 billion by the same date. Japan, South Korea and China currently dominate the battery market, respectively representing 48%, 27% and 25% of global supply in 2016. China also leads on EV production, with 43% of supply, followed by Germany (23%) and the US (17%).

There is widespread interest in developing battery-related production lines and services in the UK. The Government intends to set a UK content target for ultra low emission vehicles that is at least as ambitious as that for automotive more broadly (50% by 2025).

Figure 5 Historical and projected lithium-ion battery prices

Source: Bloomberg New Energy Finance

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206 Clean Technica, Batteries Keep On Getting Cheaper (December 2017)
208 Cision PR Newswire, Automotive Battery Market Size Worth $95.57 Billion by 2025: Grand View Research (March 2018); Grand View Research, Lithium-Ion Battery Market Worth $93.1 Billion By 2025 | CAGR: 17.0% (August 2017)
210 Ibid.
211 Ibid.
212 Financial Times, Electric Mini’s reliance on German batteries highlights UK weakness (July 2017); Financial Times, Dyson bets on electric cars to shake up industry (February 2018); Nissan [EVD0083], Innovate UK [EVD0085], Zero Carbon Futures [ELV0005] Centre for Business in Society [ELV0020], MAL (Research & Development) Ltd [ELV0034], Professor Ali Eftekhari [EVD0026], SMMT [ELV0050], CDT Energy Storage [ELV0040], Unite the Union [EVD0024]
Electric vehicles: driving the transition

2022), with a view to securing battery manufacturing in the UK. The Faraday Battery Challenge seeks to enable this, by developing UK battery expertise and attracting inward investment, in order to deliver on the Industrial Strategy aim of making the UK a world leader in both EVs and EV batteries. The Challenge will provide £246m of Government support over the course of four years, part-matched by industry, to set up: the Faraday Institution (an independent battery research, science and training centre); the UK Battery Industrialisation Centre (to enable companies to rapidly develop manufacturing capabilities for their battery technologies to get them to market quickly); and the Faraday Battery Challenge Innovate UK programme. The Government has also committed £500m over 10 years for the Advanced Propulsion Centre, to be match-funded by industry. This will research, develop and industrialise new low-carbon automotive technologies.

87. While we welcome the Government’s proposals to support the growth of the EV and battery industries through the Automotive Sector Deal and the Faraday Challenge, it is not clear that the scale, duration and focus of support will be sufficient for the UK to overtake competitors that have adopted much stronger policy signals. EVs are proving a disruptive force in the global automotive sector, with battery expertise providing a springboard for new entrants, particularly in Asian countries which have not historically played a major role in car manufacture. We heard from BYD that the EV transition could plausibly lead China to dominate global car manufacturing in the longer term.

88. The UK will need to establish a strong policy position to counter these trends, with an attractive domestic market for EVs. We heard that the Faraday Battery Challenge should be extended from four to ten years, to reflect the scale of transformation required across the sector, and that the UK should seek to develop niche expertise in high-value aspects of the EV supply chain where we already hold a comparative advantage, rather than competing with established leaders in battery manufacture. Potential focus areas include battery design and development, electrolyte manufacturing, traction motors, lightweight materials, and power electronics.

89. We welcome the Government’s ambitions on EV and battery technologies, and its investments so far through schemes such as the four-year Faraday Challenge. However, more support is needed to ensure we retain our status as an international automotive leader, and to minimise the economic impacts of declining ICE trade through the 2020s. It is important that as any jobs in ICE production are lost, so new ones are created in EVs, batteries and associated technologies. We recommend that the Government set out a longer-term, 10-year strategy for batteries to help the UK to take a lead in this technology. If we do not act other countries will go first, and

213 Department for Transport, The Road to Zero: Next steps towards cleaner road transport and delivering our Industrial Strategy (July 2018)
217 Japan Times, Control of battery resources is key to EV leadership (April 2018); International Energy Agency, Global EV Outlook 2018 (May 2018); Financial Times, Electric cars: China’s battle for the battery market (March 2017); Zero Carbon Futures [ELV0005], Unite the Union [EVD0024], Addison Lee [ELV0033] [EVD0023], Anglo American [ELV0044] [EVD0073], Axion Recycling [ELV0043], WWF-UK [ELV0056]; Q282 Toyota
218 International Energy Agency, Global EV Outlook 2018 (May 2018);
219 Q332 [BYD UK Ltd.]
220 Innovate UK [EVD0027] [EVD0085],
221 Zero Carbon Futures [ELV0005]
222 Q339 [BMW]; Q85 & Q115 [SMMT]; Q118 [Unite]
there is a risk that part of the UK automotive sector’s market share could be lost to emerging EV leaders. Funding for R&D should focus on areas where UK has existing strengths and so a realistic chance of taking a lead, for example in battery design and development, electrolyte manufacturing, traction motors, lightweight materials, and power electronics.

**Battery disposal and second life applications**

90. When a vehicle reaches the end of its life, it must be disposed of through an Authorised Treatment Facility. Under the EU End of Life Vehicles Directive, vehicle manufacturers have an obligation to provide free take-back for cars and light commercial vehicles; these obligations are met through partnerships with companies which take back vehicles and issue a ‘certificate of destruction’. Vehicles are then disposed of and parts are either re-used, recycled or used for energy recovery. Unite, SMMT and Axion Recycling, amongst others, identified potential for the UK to take a lead in end-of-life EV services, which remain less developed than those for ICE vehicles. This could include second life applications for batteries that are no longer suitable for in-vehicle use, disposal and recycling of entire vehicles—for which EU legislation will guarantee demand—or more specifically the recycling of batteries.

91. Vehicle manufacturers are already actively exploring and piloting second-life applications for batteries, which must be replaced in cars once their capacity degrades beyond around 70%. Potential applications include electricity storage for on and off-grid sites, in combination with renewables, to provide commercial grid-balancing services, and to support vehicle charging in remote locations. HSSMI, a manufacturing innovation institute, is exploring additional uses such as storage for rail and marine applications. We heard that second-life applications should be prioritised over recycling in the first instance, as processes to extract core materials from batteries are currently expensive.

92. Materials recycling may be important in the longer term, as the stockpile of batteries requiring disposal increases and particularly if anticipated materials shortages come to fruition. The risk of cobalt shortages has been identified as a major threat to global EV growth over the 2020s; according to the IEA, cobalt demand for EV batteries could increase by between 10 and 25 times by 2030. There are currently no UK treatment plants for disposal of batteries and only a single plant for processing lithium-ion batteries in continental Europe. The plant owners, Umicore, have invested £25 million in the plant and are piloting a process for the recycling of electric vehicle batteries in anticipation of a sizable market by 2025. Further facilities will be required as the number of EVs being retired increases. Witnesses agreed that disposal options for batteries needed to be addressed by policy, but had mixed views on whether the Government should seek to gain

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224 Q125 [Unite]; SMMT [ELV0050], Axion Recycling [ELV0043], CDT Energy Storage [ELV0040], E.ON [EVD0020], Unite the Union [EVD0024],
226 Harold Dermott and Associates [EVD0030], Innovate UK [EVD0085], CDT Energy Storage [ELV0040]
227 GOV.UK, *Future electric vehicle batteries: long-lasting, cleaner, better*, November 2017
228 Axion Recycling [ELV0043]
230 Axion Recycling [ELV0043]; *Financial Times, Rise of electric cars poses battery recycling challenge* (September 2017)
a lead in the development of second-life and battery recycling industries in the near-term.\textsuperscript{231} Nissan cautioned that timing would be important, to avoid scaling-up new industries before a steady supply of retired batteries is available.\textsuperscript{232}

93. Second life battery applications, EV end of life disposal and battery recycling are nascent areas that could offer significant industrial opportunities. We recommend that the Government explores the potential value of these to the UK and take a lead in developing those that are promising, before other countries gain a competitive edge.

The ICE-EV transition and skills

94. We welcome the provisions of the Automotive Sector Deal, published in January 2018, which provides a framework to develop new EV manufacturing and in particular battery technology.\textsuperscript{233} However, we heard from industry that the deal gives insufficient consideration to changes needed across the whole automotive supply chain—from R&D through to after sales and disposal—as well as how the transition away from ICE vehicle production can be supported in a way that is not disruptive to the workers and communities that depend on it.\textsuperscript{234} In particular, witnesses emphasised the current shortage of personnel qualified to work on EVs, and the need to help the existing ICE workforce to reskill, both to make up the existing shortfall and to facilitate the longer-term EV transition.\textsuperscript{235}

95. There are substantial technological differences between EVs and conventional petrol and diesel vehicles. The advanced transportation consortium CALSTART has estimated that up to 70\% of an electric vehicle’s components may be different from a petrol-powered vehicle,\textsuperscript{236} and future vehicles are expected to have increasingly sophisticated software, electrical and electronic systems. Witnesses from across the automotive sector identified a shortage of personnel with the necessary skills to develop, produce and maintain EVs.\textsuperscript{237}

96. A 2016 assessment by the Automotive Industrial Partnership identified in particular a shortage of maintenance technicians, “specifically those who are multi-skilled in all three areas of mechanical, electrical and electronics”.\textsuperscript{238} At present only 1,600 technicians nationwide are qualified in electric vehicle and hybrid maintenance, and they are almost exclusively employed within manufacturers’ franchised dealer networks.\textsuperscript{239} This has ramifications for the cost and convenience of repairs, insurance and—most concerning—the safety of untrained mechanics who may unwittingly risk their lives whilst attempting to repair electric vehicles.\textsuperscript{240} We heard that the lack of skilled personnel means that many dealerships around the country are reluctant to sell EVs, and that even those that do are often unable to service them.\textsuperscript{241}

\textsuperscript{231} Q127 [Unite]; Q351 [BYD UK Ltd.]; Q349 [BMW]; Qq354–5 [BMW]
\textsuperscript{232} Qq354–5 [Nissan]
\textsuperscript{233} HM Government, \textit{Industrial Strategy Automotive Sector Deal} (2018)
\textsuperscript{234} Q77 [SMMT], Qq79–83 [SMMT]; Q99 [Unite]
\textsuperscript{235} Annex 1, Institute of the Motor Industry [ELV0030], Energy Saving Trust [EVD0056], Zero Carbon Futures [ELV0005]
\textsuperscript{236} Unite the Union [EVD0024]
\textsuperscript{237} Annex 1, Institute of the Motor Industry [ELV0030], Energy Saving Trust [EVD0056], Zero Carbon Futures [ELV0005]
\textsuperscript{238} Automotive Council UK, \textit{Employers’ Views of the Jobs and Skills Required for the UK} (February 2016)
\textsuperscript{239} Institute of the Motor Industry, \textit{IMI RAISES SKILLS AND REGULATION CONCERNS AS DEMAND FOR ELECTRIC AND HYBRID VEHICLE SURGES} (February 2017)
\textsuperscript{240} Q111 [Unite]; Q326 [BMW]
\textsuperscript{241} Zero Carbon Futures [ELV0005]; Annex 1
97. In addition, Unite and the UK Petroleum Industry Association highlighted the need to protect workers and communities dependent on the ICE supply chain. They called for support both to reskill the workforce, and preferential fiscal and/or credit rates to encourage manufacturers to repurpose existing ICE factories rather than moving production abroad.\(^{242}\)

98. Vehicle manufacturers and EV consortia have made some headway in skilling-up the existing ICE workforce. Initiatives include: manufacturer-specific training (Nissan); a dedicated EV breakdown service (Nissan), a central knowledge hub to which dealers can address inquiries (Jaguar); brand-neutral advice for dealers (EV Experience Centre).\(^{243}\) However, the availability of support varies both regionally and by manufacturer. Motoring institutions, the Energy Saving Trust and Nissan suggested that the UK would benefit from a more coordinated approach, for example a national skills strategy to ensure that market opportunities are fully realised and that best practice advice and support is made available to motorists.\(^{244}\) This could even seek to develop a surplus EV skills bank to increase the UK's competitive edge in manufacturing, in anticipation of demand taking off as prices fall - Germany is currently taking this approach.\(^{245}\)

99. The Institute of the Motor Industry, Unite and BMW emphasised the need to develop new qualifications/regulations for EV technicians, suggesting that formal accreditation or a 'license to practice' would provide confidence to drivers and help to protect both employers and workers.\(^{246}\) We welcome the Road to Zero Strategy's acknowledgement of these concerns and the commitments to review the adequacy of existing regulation to protect mechanics and to work alongside the IMI to ensure mechanics are well trained; we recommend the Government further develops EV-specific qualifications for mechanics and engineers. The intentions of the Automotive Sector Deal to develop EV and battery manufacturing are also helpful, but the Deal does not go far enough in providing support for actors across the supply chain to transition from ICE to EVs. We recommend Government and business work together to develop a clearer joint plan to help companies repurpose ICE manufacturing facilities, to help workers develop new EV skills, and to ensure that independent dealerships and mechanics are equipped to advise on buyers on EV options and to conduct repairs safely. This will be essential to help the UK automotive sector retain top-level expertise and relevance as global demand moves from ICEs to EVs.

\(^{242}\) Unite the Union [EVD0024]; UK Petroleum Industry Association [ELV0036]  
\(^{243}\) Annex 1  
\(^{244}\) Energy Saving Trust [EVD0056]; Institute of the Motor Industry [ELV0030]; SMMT [ELV0050]; Nissan [EVD0083]  
\(^{245}\) Q86–87 [Unite]  
\(^{246}\) Institute of the Motor Industry [ELV0030]; Q111–112 [Unite]; Q328 [BMW]
7 Conclusions

100. Transport is the next major challenge in the UK’s decarbonisation journey. Recent developments in electric vehicles (EVs) worldwide mean that this technology is optimally placed to help lower emissions from road transport, particularly in smaller vehicle segments. The Government’s aims to make the UK a world leader in both zero emission vehicles and batteries are laudable, but policy targets reflect neither the relative maturity of EV technology, nor expectations for the market’s global development over the coming years. The Government’s existing 2040 targets do not even lead within the UK—Scotland has set a greater ambition—and the government’s aims are ambiguous at best. On top of this, there is a lack of coordination across the policies and incentives set by different departments. There has also been insufficient consideration of the support needed to empower local authorities to perform as key delivery partners for charging infrastructure. Clearer and more consistent policies are required to provide reliable, coherent signals to investors and consumers. If the Government is genuinely committed to leading the EV transition and meeting its decarbonisation targets, it needs to clarify and expand its ambitions, preferably by June 2019.

101. The development of charging infrastructure is essential to give motorists the confidence to switch to EVs. The network must be far-reaching and convenient if drivers are to be convinced that EVs provide a serviceable alternative to petrol and diesel vehicles; drivers will not switch to EVs, even when price parity with petrol and diesel is reached, if they are not confident that they can charge their vehicle in local areas and on major roads. Developments are however hampered by the disconnect between the Government’s ambition for a nationwide charging infrastructure, and its reliance on local authorities and private companies to deliver this national aim. A more strategic approach, taking a UK-wide whole-systems view, would be better equipped to deliver a fit-for-purpose public charging network. This is especially important to deliver charge points in the many locations where local public resources are limited, and where the business case for charge points remains uncertain.

102. As with all disruptive technological transitions, the global move from internal combustion engines (ICEs) to EVs bears risks—but also opportunities—for incumbent industry players. Government and business should work together to develop an intelligent approach that can enable the UK automotive sector to remain a global heavyweight for decades to come. Other countries have already taken a substantial lead in battery production; seeking to catch-up on this activity would leave the UK on a back foot. The UK can better capitalise on industrial opportunities if we instead aggressively target high-value aspects of the EV supply chain where we already hold comparative strengths, and reskill our ICE workforce so as to be trailblazers in the EV revolution.
Conclusions and recommendations

Targets

1. The Government’s lack of clarity on the meaning of the 2040 targets is unacceptable. Industry cannot be expected to make supportive investment decisions when Ministers and officials themselves cannot say how the target should be interpreted. This means that car manufacturers do not have certainty about the types of vehicles they will be able to market in the UK in the near future, and charging infrastructure providers are less able to make assessment about future demand for their product. The unclear messaging from Government is damaging and unfair to those companies wishing to drive the transition to EVs. The Government cannot rely on expectations alone to deliver desired policy outcomes. (Paragraph 16)

2. Plug-in hybrids could have a role to play during the EV transition, at least in the near term—but non-plug-in hybrids are not compatible with the Government’s long-term climate change commitments. Whilst we support the principle of technology neutrality, the Government should recognise that by allowing the ongoing sale of conventional hybrids, and short-range plug-in hybrids, the current ‘ban’ fails to ensure that only the cleanest new vehicles will be available for sale from 2040. We recommend that the Government either acknowledge that petrol and diesel will ultimately need to be fully phased out from cars and vans, or admit that it is not seeking a zero emissions fleet. It cannot have both. We recommend that the Government aim for zero emissions, in line with its longstanding 2050 target, and phase out non-plug-in and all but the cleanest plug-in hybrid vehicles. This should include more stringent zero emission range requirements for plug-in hybrids to ensure that vehicles deliver on targeted emissions reductions. (Paragraph 19)

3. The transition to EVs is set to accelerate over the coming decades; the UK will need to match, or better, international commitments if we are to be a ‘world leader’. A leadership position would enable the UK to develop sought-after expertise in EV technology, manufacturing and charging infrastructure, with substantial potential export opportunities. The current 2040 target for ‘effectively zero emissions’ vehicles places the UK in the passenger seat, leaving us to accept vehicle emission standards set by more ambitious international regulations. Stronger ambitions are also needed to ensure that the Government delivers on its goals to mitigate climate change and improve air quality. A more ambitious target date would help to ensure that petrol and diesel vehicle stock is retired by 2050, and would align the goal for England, Wales and Northern Ireland with the Scottish Government’s ambition to phase out petrol and diesel cars and vans by 2032. Zero should mean zero. We recommend that the Government prioritise overarching policy goals on climate change and air quality over sectoral interests, and bring forwards a clear, precise target for new sales of cars and vans to be truly zero emission by 2032. This would put the UK in the ‘first tier’ league of nations leading the EV transition, and help to harmonise objectives across the UK. (Paragraph 24)

4. We welcome the Government’s willingness to set interim targets, with the adoption in the Road to Zero Strategy of an ambition for “at least 50%, and as many as 70%, of new car sales and up to 40% of new van sales being ultra low emission by 2030”.


We recommend that the principle of interim targets is maintained, with the interim targets themselves strengthened and updated to reflect the increase in ambitions to bring forward the phase out of ICE vehicles to 2032. (Paragraph 25)

5. It is imperative that Government supports domestic industry and workers through the EV and EU exit transitions by creating an attractive domestic environment for investment. (Paragraph 26)

**EV purchase support**

6. The Government’s decision to cut substantially grants for pure electric vehicles, and to remove entirely those for plug-in hybrid vehicles, has been made too soon and too suddenly. We recommend that purchase support for EVs should be maintained at October 2018 levels for the time and more generally until the cost of EVs nears price parity with conventional ICE vehicles. We further recommend that the Government sets out its intentions for the future of plug-in grants for the next five years. If the Government is unable to commit to ongoing support, it should at least set out the terms under which grants will be phased out, well in advance of the implementation of any reductions. (Paragraph 36)

7. We recommend that the Government follows the example of EV world leaders, and provides support to make EV prices more competitive with conventional cars and vans. (Paragraph 38)

8. Fiscal signals should send a clear and consistent message about the Government’s ambition to move to a zero emission vehicle fleet. There is little sense in introducing changes which reduce incentives to purchase an EV, or which encourage consumers to delay, when the Government has clearly set out its ambition to increase EV uptake. We recommend that the Government aligns new fiscal changes with the zero emissions target. It should bring forward the introduction of preferential rates on company car tax without delay, or at least hold company car tax on EVs level until the preferential rates come into effect. (Paragraph 39)

9. EVs should not be the sole preserve of the relatively affluent. We recommend that the Government introduces more creative support mechanisms to ensure that all motorists are able to benefit from EVs. This could include public car clubs, and improved communications and documentation to enable consumers to better assess the real world financial and environmental performance of both new and second-hand EVs. (Paragraph 42)

**Commercial vehicles**

10. Commercial vehicles have been largely overlooked by emissions reduction policies to date. Whilst we welcome the Road to Zero Strategy, it does not go far enough in setting a clear direction for the decarbonisation of the vehicle sector. We recommend that the Government sets firm targets for deployment of ultra low emission commercial vehicles, provides support to expedite uptake amongst hub-based operations, and supports the development of low carbon solutions for heavy, long-distance vehicles.
The voluntary target for HGVs should be monitored, as the Committee on Climate Change has advised, with an option to introduce a firmer target, as for cars, should progress fall off track. (Paragraph 47)

**Charging infrastructure**

11. We welcome assessments by National Grid, and others, that the EV transition is unlikely to present a risk to the security of national electricity supply. Nonetheless, the increased electricity demand will necessitate investment in new generation capacity. The EV transition therefore strengthens the case for Government to review its support for new generation plant and to ensure that all support is consistent with the Government’s overarching aim of least-cost decarbonisation. (Paragraph 53)

12. We welcome the introduction of powers in the Automated and Electric Vehicles Act 2018 for the Secretary of State to make regulations prohibiting the sale or installation of charge points unless they meet certain smart functionality requirements. (Paragraph 56)

13. We welcome the Government’s recent £30 million investment in Vehicle-to-Grid R&D to explore the potential of this technology. (Paragraph 57)

14. We welcome the provisions of the Automated and Electric Vehicle Act 2018 to allow Government to set and enforce regulations that: standardise and ensure interoperability of public charge points, including payment systems; ensure provision and standardisation of information about public charge points; mandate charge points at large fuel retailers; and require smart charging capabilities. **We very strongly recommend that the Government make full use of these powers by setting and enforcing new regulations to promote the development of convenient, accessible charging infrastructure.** (Paragraph 60)

15. Delaying support for rural charge points will only prolong range anxiety amongst potential EV motorists, impeding development of the market. **We recommend that the Government should not wait for additional evidence of the need to support the business case for rapid charge points in rural and remote areas, but instead subsidise the provision without delay and by 2022 as recommended by the National Infrastructure Commission.** (Paragraph 62)

16. We welcome the Government’s investment in EV showcase initiatives such as the Go Ultra Low Cities scheme, which have been central to testing and demonstrating innovative deployment approaches. Now that EVs are becoming mainstream, an alternative approach is needed to promote deployment more evenly across regions. **The Government should introduce a strategy to support local authorities that have been less successful in accessing funding so far by 2021, for example by replicating Go Ultra Cities in regions which have poor charging provision, or by allocating funds on a more systematic basis.** (Paragraph 65)

17. **Rather than dictating the precise solutions to be used, we recommend that the Government increase the flexibility of funding for public charge points, providing local authorities with the autonomy to assess and install charging infrastructure that fits in with local needs and priorities. Future funding schemes that seek to target specific**
solutions should be considered only if consultation with local authorities indicates that there is a clear appetite for these solutions, and that proposed levels of funding will be sufficient to enable their development. (Paragraph 68)

18. Central Government’s focus on promoting on-street charge points is in conflict with local policy priorities and is not working. Support is needed for alternative solutions such as local charging hubs. The Government should proactively engage with local authorities, motorist organisations, charge point providers and distribution network operators to identify mutually agreeable solutions—including maintenance plans—so that motorists without off-street parking do not remain at a disadvantage. We have seen no evidence that Government has adequately involved local authorities in such discussions so far, and our evidence suggests that it is not realistic to expect local authorities to act spontaneously: proactive engagement from Government is required. (Paragraph 70)

19. We welcome the amendments to the National Policy Planning Framework to encourage the consideration of charge points at new developments and in local parking standards. We recommend that these be made more specific, to set a minimum number of charge points that should be included in both residential and non-residential developments. The number of charge points required should be linked to the expected use and occupancy of the development. (Paragraph 72)

20. Distribution network operators have the right to reject applications for larger charge point installations. Whilst this is important to maintain secure and reliable local electricity supplies, there are concerns that network companies have sometimes obstructed the development of charging infrastructure and that they have little commercial incentive to promote EVs. We recommend that the Government investigates options to either incentivise or require electricity network companies to facilitate the development of charging infrastructure. (Paragraph 73)

21. We welcome the Government’s recent commitment, in the Road to Zero Strategy, to “set [...] our definitions of ultra low and zero emission vehicles that local areas may adopt”. We recommend that these definitions must be unambiguous, and that the emissions performance criteria used across different departmental policies and incentives should be made consistent to reflect the definitions adopted. (Paragraph 76)

22. There is a mismatch between the Government’s ambition to develop national charging infrastructure and its decision to leave delivery largely to local authorities and private actors. A whole systems perspective is needed to identify solutions that will deliver required functionality at least overall cost, and which will ensure adequate provision of charge points nationwide. We recommend the Government recognise its responsibility in this role and coordinate a shared approach to planning national charging infrastructure at least cost by December 2019. This should ensure sufficient provision of charge points in all regions, including remote areas. It should also take into account electricity grid impacts, including potential interactions with a more widespread move to electrification in heating. We further recommend that the Government and Ofgem work with charge point providers and electricity network companies to assess, by June 2019, the potential for investments ahead of need which could hasten the growth of charging infrastructure and reduce the cost of its implementation. (Paragraph 79)
23. The nature of ‘sufficient provision’ will differ between areas according to population density, parking arrangements, the road network and local amenities. In some areas it will require the installation of charge points and electricity grid upgrades which are not commercially viable, but which are necessary to make EVs accessible to residents and to ensure accessibility of the region to other EV motorists. We recommend that the Government sets out a strategy by June 2019 that allows for the nature of local provision to be determined locally, and to deliver charging infrastructure to ‘difficult’ and remote localities, so that these are not further isolated by the EV transition. Care should be taken to ensure that investments in the charging network are future-proofed, taking account of possible changes in technology and use, to minimise the risk of constructing infrastructure that later becomes redundant. (Paragraph 81)

**EVs and Industrial Strategy**

24. We welcome the Government’s ambitions on EV and battery technologies, and its investments so far through schemes such as the four-year Faraday Challenge. However, more support is needed to ensure we retain our status as an international automotive leader, and to minimise the economic impacts of declining ICE trade through the 2020s. It is important that as any jobs in ICE production are lost, so new ones are created in EVs, batteries and associated technologies. We recommend that the Government set out a longer-term, 10-year strategy for batteries to help the UK to take a lead in this technology. If we do not act other countries will go first, and there is a risk that part of the UK automotive sector’s market share could be lost to emerging EV leaders. Funding for R&D should focus on areas where UK has existing strengths and so a realistic chance of taking a lead, for example in battery design and development, electrolyte manufacturing, traction motors, lightweight materials, and power electronics. (Paragraph 89)

25. Second life battery applications, EV end of life disposal and battery recycling are nascent areas that could offer significant industrial opportunities. We recommend that the Government explores the potential value of these to the UK and take a lead in developing those that are promising, before other countries gain a competitive edge. (Paragraph 93)

26. We welcome the Road to Zero Strategy’s acknowledgement of these concerns and the commitments to review the adequacy of existing regulation to protect mechanics and to work alongside the IMI to ensure mechanics are well trained; we recommend the Government further develops EV-specific qualifications for mechanics and engineers. The intentions of the Automotive Sector Deal to develop EV and battery manufacturing are also helpful, but the Deal does not go far enough in providing support for actors across the supply chain to transition from ICE to EVs. We recommend Government and business work together to develop a clearer joint plan to help companies repurpose ICE manufacturing facilities, to help workers develop new EV skills, and to ensure that independent dealerships and mechanics are equipped to advise on buyers on EV options and to conduct repairs safely. This will be essential to help the UK automotive sector retain top-level expertise and relevance as global demand moves from ICES to EVs. We recommend the Government further develops EV-specific qualifications for mechanics and engineers. The intentions of the Automotive Sector Deal to develop EV and battery manufacturing are also
helpful, but the Deal does not go far enough in providing support for actors across the supply chain to transition from ICE to EVs. We recommend Government and business work together to develop a clearer joint plan to help companies repurpose ICE manufacturing facilities, to help workers develop new EV skills, and to ensure that independent dealerships and mechanics are equipped to advise on buyers on EV options and to conduct repairs safely. This will be essential to help the UK automotive sector retain top-level expertise and relevance as global demand moves from ICEs to EVs. (Paragraph 99)
Annex 1: Notes from visit to the EV Experience Centre, Milton Keynes, and London EV Company factory, Coventry

EV Experience Centre

The EV Experience Centre is the UK’s first brand-neutral electric vehicle advice centre. We viewed and test drove EVs at the Centre, before meeting with representatives from the Centre and stakeholders of the Milton Keynes Go Ultra Low City initiative. These included: Milton Keynes Council; the Transport Systems Catapult; the Low Carbon Vehicle Partnership; Brayleys Renault and Glyn Hopkin Nissan (local car dealerships); Intertek, Murata and Carlton Packaging (local beneficiary organisations).

Subjects discussed: the EV driving experience; the Milton Keynes Go Ultra Low City scheme; the role of local authorities in promoting EVs; consumer perceptions of EVs and barriers to purchase; approaches to the delivery of charging infrastructure; innovation in EV technologies and services; skills shortages in EV sales and after-sales services.

London EV Company factory

The London EV Company (LEVC) factory is the UK’s first dedicated electric vehicle factory. It produces the world’s only purpose-built, mass-market range extended electric taxi. We took a tour of the factory to learn about the EV manufacturing process and the opportunities this presents for British industry and workers.

Subjects discussed: LEVC’s decision to switch production from diesel to electric taxis; future plans for the electric taxi; challenges facing taxi drivers in the EV transition; electric taxis and national policy; skills shortages for EV manufacture.

12 March 2018
Annex 2: Notes from Oslo visit

Norway is the world leader in EV uptake by market share. We visited Oslo to learn about the policies that have enabled Norway to drive such a rapid EV transition. During the visit we met with Ministers, officials from central and local government, businesses, research institutions and motorist organisations. We also visited the Vulkan EV Charging House, a large-scale state of the art public EV charging facility. The following provides a summary of the meetings held.

**Ministry of Petroleum and Energy & Ministry of Transport and Communications**

The Ministry of Petroleum and Energy is responsible for the management of domestic energy resources. The Ministry of Transport and Communications is responsible for energy use in transport.

Subjects discussed: history and trends in Norway’s EV transition; Norway’s 2025 target; EVs and climate change targets; policies and incentives for EVs; role of local authorities in promoting EVs; impact of reduced fiscal revenues from petrol and diesel; consumer attitudes to EVs; impacts of EVs on electricity grid; approaches to deployment of charging infrastructure.

**Oslo City Hall**

As a city, Oslo has set ambitious targets to halve its greenhouse gas emissions by 2030, to become climate neutral by 2050. EVs are key to the city’s emissions reduction strategy. Oslo promotes itself as the EV capital of the world.

Subjects discussed: barriers to EV adoption; local incentives and policies for EVs; consumer attitudes to EVs; local approaches to the deployment of charging infrastructure; EV equity issues; second hand market for EVs; approaches to EV promotion adopted by other local authorities.

**Vulkan EV Charging House**

The Vulkan EV Charging House is the largest EV charging facility of the world, with 102 chargers housed inside a multi-storey carpark. We visited the facility to learn about new technologies and approaches to delivering public EV charge points.

Subjects discussed: motorists’ views on the facility; use of the facility by different motorist groups; costs and payment systems for EV charging; relative benefits of slow, fast and rapid chargers; research outputs from the facility; services provided to the electricity grid; charging facilities elsewhere in Norway.

**Ministry of Finance**

The Ministry of Finance is responsible for Norway’s economic policy, the state budget, fiscal policy and the management of the Government Pension Fund Global (also known as the Norwegian Oil Fund).
103. Subjects discussed: revenues from vehicle and fuel taxation; fiscal incentives for EVs; uptake of EVs and the impact on fiscal revenues; future plans for EV fiscal incentives.

**Norwegian Electric Vehicles Association**

The Norwegian EV Association is a not-for profit motoring organisation, that represents the majority of EV owners in Norway.

Subjects discussed: consumer attitudes and satisfaction with EVs; historic and regional trends in EV adoption and future projections; impact of central and local government incentives for EVs; policies and incentives adopted elsewhere in Scandinavia; statistics on the use of charge points; motorist concerns about charge points; new and anticipated technological developments; waiting lists and lead times for EV purchases; the Government’s approach to deployment of charging infrastructure.

**Ministry of Climate and Environment**

The Ministry of Climate and Environment has overarching cross-sectoral responsibility for the co-ordination and implementation of Norwegian climate change policy. This includes responsibility for meeting the climate change targets set by the European Union, and for Norway’s contributions to the Paris Agreement. Other ministries are responsible for implementation in their respective sectors.

Subjects discussed: national and international climate change targets, progress in emissions reductions and the role of EVs; emissions from EV manufacturing and lifetime EV emissions; policy approaches to promote EVs and public transport; future plans for fiscal EV incentives; Norway’s approach to the deployment of charging infrastructure; innovation in EVs and charging infrastructure; other forms of electric transport.

**Norwegian EV Companies**

We held two round-table meetings with businesses, research institutes, public authorities, NGOs and organisations active in the Norwegian EV sector. In combination these included: Hafslund (energy and infrastructure company owned by Oslo municipality); Statnett (transmission system operator); Ruter (Oslo transport authority); Schneider Electric Norway (smart tech company); ZapTec (smart charging provider); Fortum Charge and Drive (charge point provider); Nissan; Jaguar Land Rover; BMW; Volkswagen; Electric Mobility Norway (industry cluster of EV businesses); the Institute of Transport Economics; ZERO (environmental NGO); Bellona (environmental NGO); Statkraft (state owned energy generator); Norwegian Postal Service; Inspire Invest (advisory group specialising in responsible investments).

Subjects discussed: impact of EVs on electricity demand, the electricity grid and electricity prices; trends in EV charging; smart meters, smart chargers and vehicle-to-grid technologies; charging options for motorists without private or off-street parking; electrification of other forms of transport; competition and challenges in the charge point market; consumer preferences and trends in the purchase of EV models; autonomous vehicles; international trends in EV adoption and manufacturing; hydrogen vehicles; charging payment options; innovative business models for EVs and charging; skills and training across the EV supply chain.
Norwegian Energy & Environment and Transport & Communications Standing Committees

The Transport & Communications Committee and the Energy & Environment Committee hold roles similar to Select Committees in the House of Commons.

Subjects discussed: consumer attitudes to EVs; innovation in EVs; impact and equity of policies and incentives for EVs; electricity grid impacts; impacts of EFTA membership on standardisation of EV infrastructure; subsidisation of EVs; role of central and local government in promoting EVs; electrification of other modes of transport; EVs and climate change targets.

8–10 April 2018
Formal minutes

Tuesday 16 October 2018

Members present:

Rachel Reeves, in the Chair

Vernon Coaker
Peter Kyle
Sir Patrick McLoughlin
Stephen Kerr

Mark Pawsey
Antoinette Sandbach
Drew Hendry

Draft Report (*Electric vehicles: driving the transition*), proposed by the Chair, brought up and read.

*Ordered*, That the draft Report be read a second time, paragraph by paragraph.

Paragraphs 1 to 102 read and agreed to.

Summary agreed to.

Annexes agreed to.

*Resolved*, That the Report be the Fourteenth Report of the Committee to the House.

*Ordered*, That the Chair make the Report to the House.

*Ordered*, That embargoed copies of the Report be made available, in accordance with the provisions of Standing Order No. 134.

[Adjourned till Wednesday 17 October at 9.45 am]
Witnesses

The following witnesses gave evidence. Transcripts can be viewed on the inquiry publications page of the Committee’s website.

Tuesday 27 February 2018

Mark Squires, Chairman, National Franchised Dealers Association; Steve Gooding, Director, RAC Foundation; Andrew Benfield, Group Director of Transport, Energy Saving Trust; Georg Ell, Director, Western Europe, Tesla

Wednesday 14 March 2018

Des Quinn, National Officer, Unite the Union; David Wong, Senior Technology and Innovation Manager, SMMT

Tuesday 27 March 2018

Andrew Burgess, Associate Partner, Energy Systems Integration, Ofgem; Graeme Cooper, Director for Electric Vehicles, National Grid; Stewart Reid, Chair, Energy Networks Association Low Carbon Technologies Working Group

Tuesday 8 May 2018

Robert Evans, Chair, UK Electric Vehicle Supply Equipment Association; Rasita Chudasama, Principal Transport Planner, Nottingham City Council; David Martell, CEO, Chargemaster; Matthew Eastwood, Head of Transport, Scotland, Energy Saving Trust

Tuesday 22 May 2018

Gareth Dunsmore, Electric Vehicle Director, Nissan Europe; Ian Robertson, Member of the Board of Management, BMW AG, BMW; Mike Kerslake, Technical Manager, BYD UK; Tony Walker, Managing Director, Toyota Motor Europe

Wednesday 13 June 2018

Richard Harrington MP, Parliamentary Under Secretary of State, Minister for Business and Industry, Department for Business, Energy and Industrial Strategy; Richard Bruce, Director of Energy, Technology and Innovation, Department for Transport
Published written evidence

Session 2016–17

The following written evidence was received and can be viewed on the 2016–17 inquiry publications page of the Committee’s website.

ELV numbers are generated by the evidence processing system and so may not be complete.

1. ABB (ELV0027)
2. Addison Lee (ELV0063)
3. Andrew Braithwaite (ELV0002)
4. Anglo American plc (ELV0044)
5. Association of Convenience Stores (ELV0062)
6. Auto You (ELV0037)
7. Axion Recycling (ELV0043)
8. BD Auto (ELV0010)
9. BeemCar Ltd (ELV0061)
10. BluePointLondon (ELV0051)
11. British Parking Association (ELV0024)
12. Broadspeed Ltd (ELV0023)
13. BYD UK Ltd (ELV0009)
14. Calor Gas Limited (ELV0058)
15. CDT Energy Storage (ELV0040)
16. Centre for Business in Society (ELV0020)
17. Citizens’ Climate Lobby UK (ELV0035)
18. Dr Esmond Tresidder (ELV0003)
19. Durham University (ELV0057)
20. Dynium Robot (ELV0032)
21. E.ON (ELV0048)
22. Energy Saving Trust (ELV0046)
23. Energy Technologies Institute (ELV0022)
24. Enertechnos (ELV0021)
25. ENGIE (ELV0053)
26. Gas Alliance Group (ELV0012)
27. Gasrec Ltd (ELV0041)
28. Greenpeace UK (ELV0042)
29. Institute of the Motor Industry (ELV0030)
30. London Forum of Amenity and Civic Societies (ELV0033)
31. London Taxi Company (ELV0047)
32. MAL(Research&Development) Ltd (ELV0034)
Session 2017–19

The following written evidence was received and can be viewed on the 2017–19 inquiry publications page of the Committee’s website.

EVD numbers are generated by the evidence processing system and so may not be complete.

59 ABB (EVD0022)
60 Addison Lee (EVD0023)
61 Aldersgate Group (EVD0039)
62 Anglian Water Services (EVD0011)
63 Anglo American Platinum (EVD0073)
64 Association of Convenience Stores (EVD0019)
65 Asynt Ltd (EVD0001)
Electric vehicles: driving the transition

66 Automobile Association (EVD0021)
67 BVRLA (EVD0037)
68 Centrica (EVD0033)
69 Chargemaster Plc (EVD0038)
70 ChargePoint (EVD0082)
71 CIBSE (EVD0031)
72 Cross River Partnership (EVD0036)
73 Department for Business, Energy and Industrial Strategy (EVD0070)
74 E.ON UK (EVD0020)
75 EA Technology Ltd. (EVD0048)
76 Eaton (EVD0069)
77 Ecotricity Group Ltd (EVD0004)
78 Ecotricity Group Ltd (EVD0086)
79 Electric Blue (EVD0047)
80 Energy Networks Association (EVD0051)
81 Energy Saving Trust (EVD0056)
82 Energy UK (EVD0018)
83 Enertechnos (EVD0035)
84 EV HUB (EVD0002)
85 Fastned (EVD0061)
86 Freight Transport Association (EVD0015)
87 Green Alliance (EVD0041)
88 Greenwatt Technology (EVD0008)
89 Groupe PSA (EVD0088)
90 Harold Dermott and Associates (EVD0030)
91 INEOS Group (EVD0064)
92 Innovate UK (EVD0027)
93 Innovate UK (EVD0085)
94 ITM Power (EVD0028)
95 Lancaster University students (1) (EVD0071)
96 Lancaster University students (2) (EVD0076)
97 Lancaster University students (3) (EVD0077)
98 Lancaster University students (4) (EVD0078)
99 Lancaster University students (5) (EVD0079)
100 Lancaster University students (6) (EVD0080)
101 Lancaster University students (7) (EVD0081)
102 LEVC (EVD0016)
103 Motorcycle Industry Association (EVD0072)
Electric vehicles: driving the transition

104 Mr Martin Evans (EVD0009)
105 Mr Philip Allen (EVD0014)
106 Nathan Child (EVD0010)
107 National Franchised Dealers Association (NFDA) (EVD0055)
108 National Grid (EVD0063)
109 Nissan (EVD0083)
110 Northern Powergrid (EVD0058)
111 Nuclear Industry Association (EVD0042)
112 Octopus Investments (EVD0059)
113 Ofgem (EVD0065)
114 OVO Energy (EVD0045)
115 Petrol Retailers Association (EVD0050)
116 Pod Point Ltd (EVD0040)
117 Professor Ali Eftekhari (EVD0026)
118 RAC Foundation (EVD0067)
119 RAC Motoring Services (EVD0012)
120 Riversimple Movement Ltd (EVD0053)
121 Rolls-Royce plc (EVD0006)
122 Scottish and Southern Electricity Networks (SSEN) (EVD0057)
123 SP Energy Networks (EVD0052)
124 SPACE for Gosforth (EVD0089)
125 SSE Enterprise (EVD0054)
126 Stephen Broderick (EVD0062)
127 Street Works UK (EVD0066)
128 Tesla (EVD0032)
129 The Institution of Engineering and Technology (EVD0017)
130 The Licensed Taxi Drivers’ Association (EVD0060)
131 The Motor Schools Association of Great Britain (EVD0025)
132 UK Hydrogen and Fuel Cell Association (EVD0043)
133 UK Petroleum Industry Association (EVD0029)
134 UK Power Networks (EVD0049)
135 UK EVSE (EVD0044)
136 Unite the Union (EVD0024)
137 University of Southampton (EVD0046)
138 Western Power Distribution (EVD0013)
139 WSP (EVD0007)
140 WWF (EVD0034)
141 Zipcar UK (EVD0087)
Published correspondence

The following written evidence was received and can be viewed on the [inquiry publications page](#) of the Committee’s website.

1. Letter from City of Wolverhampton Council on electric vehicles, 4 May 2018
2. Response from Warwickshire County Council to electric vehicles inquiry
3. Response from Leeds City Council to electric vehicles inquiry
4. Letter from Leeds City Council on electric vehicles, 11 April 2018
5. Letter from Chichester District Council on electric vehicle, 4 May 2018
6. Response from Cheshire West and Chester Council to electric vehicles inquiry
7. Letter from Richard Harrington MP, Minister for Business and Industry, regarding electric vehicles, 4 July 2018
List of Reports from the Committee during the current Parliament

All publications from the Committee are available on the [publications page](#) of the Committee’s website. The reference number of the Government’s response to each Report is printed in brackets after the HC printing number.

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