

Together in electric dreams?

Addressing the challenges of rolling out electric vehicles (EVs) and charging infrastructure efficiently and fairly

Amy Norman

SMF

Social Market
Foundation

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CONTENTS

Acknowledgements	3
About the author	3
About the report	3
Executive Summary	4
Chapter One - Introduction	9
Chapter Two - Public attitudes	11
Chapter Three - Efficient charging infrastructure	17
Chapter Four - Charing access for all	20
Chapter Five - Governance, regulation and funding	27
Endnotes	33

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ABOUT THIS REPORT

This report is based on a private roundtable event hosted by the Social Market Foundation in Autumn 2020, as part of its Net Zero project, undertaken in partnership with ScottishPower. These events, held under the Chatham House rule, bring together senior policymakers and politicians from all parties, and experts and stakeholders in climate policy and other sectors. The names of those attending are private, but attendees included members of the Government and parliamentarians from multiple parties. While this paper reports some of the views expressed at the event by attendees, the conclusions and recommendations made here are those of the SMF alone. This report also draws on desk research and a consumer survey commissioned from Opinium as part of this project.

EXECUTIVE SUMMARY

Reaching net zero emissions by 2050 is a significant policy challenge that will require substantial and urgent interventions. While there is currently broad support for the principle of reducing carbon use, public understanding of the practical impacts of doing so is limited. Research from our previous report in this series indicates that the majority of the public are not aware of or prepared for the changes to the way they live, drive, eat, and heat their home. This is particularly true for decarbonising the surface transport sector, which is now the highest-emitting sector in the UK economy.

While the electric vehicle (EV) market has seen significant growth over the last decade, the market is still young and small, with current market share at around just 1% of all vehicles on the road and 11% of new vehicle registrations. The urgency of this challenge has been further accelerated by the Prime Minister's announcement, in November 2020, that the ban on the sale of new petrol and diesel cars and vans will be brought forward from 2040 to 2030. This means the near 400,000 plug-in EVs currently on the road will need to rise to around 9 million before the end of the decade. Market forces alone are unlikely to achieve this while also meeting the needs of all drivers in a way that is seen to be fair and thus politically sustainable. The success of this policy and the broader Net Zero agenda will therefore depend on the ability of government to incentivise individuals in the early years and provide targeted support for charging infrastructure, where the market will not deliver, to encourage widespread adoption of EVs during the 2020s.

This report has been informed by an SMF expert roundtable, held in September 2020, and polling conducted by Opinium.ⁱ The aim of this research is to address the challenges of rolling out EVs and charging infrastructure efficiently and fairly, including public attitudes to a mandated ban on the sale of petrol-diesel cars, barriers to uptake (both cost and access to charging), and distributional issues.

Public attitudes

SMF-commissioned polling from Opinium to assess people's attitudes and understanding of Net Zero, including specific consumer issues such as EVs, found that:

- **Public understanding of Net Zero is limited.** While three in five of the public are aware of the term Net Zero, less than a third of respondents were able to select the most accurate explanation of the term from a list of options.
- **The argument for a petrol-diesel ban is far from won, particularly among those from lower socio-economic grades (C2DE).** While over half (51%) of the general public said they would respond positively to a prohibition on petrol-diesel sales (from 2035), a majority (28%) indicated that acceptance would be reluctant. Support or reluctant acceptance was notably higher among those from higher socio-economic grades (ABC1) at 57%, compared to their more disadvantaged peers (C2DE) at 43%. Negative experiences of EVs or EV charging, particularly among those on lower incomes, could conceivably damage support for the overall Net Zero agenda.

ⁱ While this polling is based on a ban on the sale of new petrol-diesel cars from 2035, conceivably public attitudes towards the new 2030 ban would be similar, if not more strongly opposed.

- **Expense and charging access are the most significant barriers to EV uptake.** Over half (56%) of respondents indicated that expense prevents them from switching their petrol-diesel car to an EV. Around two in five said that a lack of chargepoints and range limitations (often referred to as ‘range anxiety’) were also key barriers to switching. Similar findings were reported in the Climate Assembly’s report.
- **Access to home charging is significantly lower among renters than homeowners.** Over a third of renters (35%) reported it was not possible to install a chargepoint near their home, compared to half as many (17%) homeowners. Among renters, same street parking (28%) was the most prevalent charging location followed by their workplace (14%).
- **Awareness of how to engage with the EV market is limited, but transparent pricing is most relevant to consumers.** Over two in five respondents said that they do not know enough to even identify what types of information would be helpful from a list of options, indicating that consumers are unsure of how to make a first step in learning more. However, among those who did identify what information would encourage their engagement with the market, over one in five said transparent pricing.
- **Opposition to obligation-based costs for building more EV charging stations and expansion of the National Grid is higher than support, particularly among lower socio-economic grades (C2DE).** Nearly half of respondents from socio-economic grades C2DE say they would oppose paying more for charging infrastructure costs (47%) and grid expansion costs (44%). In comparison, better-off people are more open to paying: opposition to these measures stands at about a third (35% and 32% respectively) among those from socio-economic grades ABC1.

Efficient charging infrastructure

As the UK transitions towards decarbonising its economy and the EV market grows, the demand for electricity and the strain that places on the energy system’s distribution networks is increasing. Capital Economics, commissioned by ScottishPower, estimate that in order to reach Net Zero, network reinforcement costs could reach £48.5 billion by 2050. Ensuring that the rollout of charging infrastructure is efficient will be critical to protecting the grid whilst minimising upward pressure on consumers’ wallets (through either the cost of government support or upward pressure on energy bills).

Despite government and industry focus to date on rapid charging on the strategic road network, views from our roundtable discussion indicate that further investigation should be conducted to identify the most energy and cost-efficient infrastructure mix of charging speeds that and locations that best meet drivers’ needs. Given the energy demands of rapid charging and cost issues, roundtable contributors agreed this was unlikely to be a suitable or efficient charging model for all parts of the UK. Instead, policy should place a greater emphasis on slower, residential and public charging in local communities which could provide convenient charging options and help to address range anxiety while also protecting the grid and consumers from high costs. Indeed, given that nearly a quarter (23%) of the public said they could not install chargepoints at home, without intervention, a notable part of the population could be locked out of the market without widespread, affordable on-street charging options in their local community.

Charging access for all

The policy agenda for electric vehicles, and decarbonising private transport more broadly, is unlikely to be successful without sufficient and fair access to charging for all. Charging infrastructure is not only critical for meeting the needs of existing EV drivers' but also addressing the concerns of potential future EV owners and encouraging uptake.

Those who are unable to install their own chargepoint at home (off-street) will likely be reliant on public charging infrastructure or destination chargepoints at work, supermarkets etc. to charge their EV conveniently and affordably, and thus access the market.

However, in those locations, where there is less of a business case for a commercial return, the market is unlikely to provide public chargepoints. This is likely to be most apparent where installing and running chargepoints is complex and/or costly, impacting those without access to off-street parking (often living in dense urban areas and/or high occupancy buildings), renters, or people in rural areas where charging and associated network capacity might require significant investment.

The Government itself described the UK's provision of public charging infrastructure as "patchy" in 2018, noting wide variances between different local authorities. Further data from the International Council for Clean Transport (ICCT) reveal that these variances are most notable between rural and different urban local authorities, where 'metropolitan areas' are closer to meeting their 2030 public charging needs than 'non-metropolitan areas'.

Disparities in the rollout of broadband left many rural areas with lower broadband speeds and connectivity issues; learning from these mistakes will be critical to the success of EVs in rural areas. We also note the French experience of the gilet jaunes, a popular protest movement expressing the opposition of some voters in peripheral areas to - among other things - carbon-linked fuel taxes that were seen to unfairly hit low-income drivers.

While this report contrasts rural and urban areas at an aggregate level, challenges of delivering fair and efficient charging infrastructure also exist within urban areas. Where drivers do not have access to off-street parking for EV charging, and demand for on-street parking is high (such as in urban areas and/or near high-occupancy buildings), it is likely that they will face greater inconvenience and higher costs associated with charging. This is because their ability to benefit from lower-cost tariffs, by charging at off-peak times and slower speeds, is limited by the location of their most convenient chargepoint.

Within rural and urban areas, without well-targeted government intervention and investment, unequal access to charging could create winners and losers, locking many people and places out of the EV market. If 'loser' status intersects with existing inequalities and economic disadvantage, transitioning to EVs could bring about significant social divisions between those who can purchase an EV and access charging, and those who cannot. Couple this with not being able to buy a new petrol-diesel car from 2030 and some drivers will likely be forced to stay in their older, more expensive to run and more polluting cars for longer, which could exacerbate existing economic, social and health inequalities as well as issues of mobility and social exclusion.

In our previous report in this series, we identify similar distributional challenges to decarbonising home-heat, particularly for renters. The lack of agency or control that private renters and those in social housing have over their home means they will be largely reliant on landlords and, in the case of EVs, potentially local authorities to facilitate and install the low-carbon technology (electric heat pumps and EV charging infrastructure) needed to reduce emissions in their daily lives. Where renters are also more likely to be on lower incomes than homeowners, there is a risk that transitioning to Net Zero becomes a reality for those at the top end of the income distribution (who have low carbon-homes and access to EVs), but out of reach for those of lesser means, even though they may be paying towards such changes either in taxes or charges on bills.

Recommendations

Given the findings we have presented in this report, policymakers should consider:

1. **Supporting consumers who cannot afford to switch to an EV by scrapping VAT on EVs and consulting on extending subsidies for low-income groups until, at most, 2030.** Expense is still by far the biggest barrier to EV uptake reported by our survey respondents, despite current subsidies and tax incentives. The 2030 ban of the sale of new petrol-diesel cars and vans places great urgency on incentivising the uptake of EVs. Scrapping the 20% VAT would provide an incentive worth double the maximum government incentive currently available on a typical EVⁱⁱ – similar VAT exemptions have been used successfully in Norway. In November 2020, the Prime Minister extended subsidies until 2022/23, however the up-front price of EVs is not expected to be comparable with conventional vehicles until late 2020s. Policymakers should evaluate uptake of current subsidies by low-income groups and consult on whether to extend these to, at most, 2030 to support widespread adoption of EVs.
2. **Developing a strategic and coordinated delivery plan between national, regional and local actors to promote public charging infrastructure in communities across the country. Where the market is unlikely to provide public chargepoints, local authorities should lead the delivery of these plans.** Charging needs and solutions will differ based on numerous factors such as network capacity, local energy and mobility strategies, drivers' journey requirements, access to home charging and more. Local authorities – working with local network companies – are well-placed to understand these needs and deliver solutions for their local communities. Regional and national oversight will help to promote standardisation, interoperability and long-distance traveling. However, thus far, rollout of EV charging infrastructure has varied between the different types of urban-based and rural-based local authorities. Further support is needed to enable local authorities to deliver this through:
 - **Increased funding to cover 100% of public chargepoint installation costs.** Evidence shows that existing grants of 75% from the Office for Zero Emission Vehicles (OZEV) are not enough for resource-tight local authorities that cannot afford the additional 25% for non-statutory costs.

ⁱⁱ The maximum government incentive is £3,000. Reducing VAT from 20% to 0% on a typical EV costing £30,000 would create an £6,000 incentive.

- **Shared expertise and best practice between central government and local authorities.** Research by the Department for Business, Energy and Industrial Strategy (BEIS) found that local authorities face significant challenges in technical expertise, as was echoed by our roundtable contributors. Central government should provide clear and detailed guidance to local authorities and facilitate the sharing of best practice between councils across the UK.
 - **Improved coordination between District Network Operators (DNOs) and local authorities to identify and take forward optimal investment in the grid network, including where distribution network needs strengthening.** The areas that require the greatest support from local authorities are where market deployment of infrastructure is low, due to network capacity limitations. It is suggested that the current lack of incentives for DNOs to invest in the network or share data with local authorities is a significant roadblock to developing an accessible charging system. Policymakers in government and the regulator should consider how they could fairly and transparently incentivise DNOs to coordinate with local authorities.
- 3. Allocating charging infrastructure and grid reinforcement costs fairly and transparently through general taxation and the Regulated Asset Base (RAB) model.** The Treasury should consider how best to allocate costs with fairness and transparency by balancing private financing from RAB models (with costs recovered fairly through energy bills) with general taxation to avoid placing disproportionate costs on those on low incomes. Given public understanding of Net Zero is limited, politicians should clearly communicate the rationale for any costly and disruptive decarbonisation measures, and the collective benefits of EV policies to build public support for Net Zero over the long-term. Policymakers should also recognise that widespread consent for funding via general spending and taxation should be predicated on the removal of barriers to accessing the market for all.

CHAPTER ONE – INTRODUCTION

The UK Government has legally committed to reducing UK carbon emissions to net zero by 2050. Decarbonising the economy has largely followed a sectoral approach, of which power and industry have led the way in emission reductions.¹ In comparison, the surface transport sector has a long way to go – it is now the highest-emitting sector and is currently off-track for meeting Net Zero targets.²

Doing so will require the 37 million cars and vans on British roads today to switch to low-carbon electricity through electric vehicles (EVs) by 2050. These EVs will also need to be supported by a comprehensive system of public and private charging infrastructure that is accessible for all drivers so that EV ownership is practical.³ In November 2020, the Prime Minister announced a range of largely new policies across various sectors as part of his 10-point plan for a “green industrial revolution”.⁴ Included in this, the ban on the sale of new petrol and diesel cars or vans was brought forward from 2040 to 2030, making the need for action more urgent.

After slow development over the 2010s, the EV market has seen an acceleration in uptake over recent years. The latest figures place EVs at almost 11% of the market share for new car registrations in 2020ⁱⁱⁱ, up from just 0.1% in 2010.^{5 6} While there are nearly 400,000 plug-in cars currently on the road, we estimate that this will rise to around 9 million by 2030^{iv} to be in line with the Government’s updated ban.⁷

The development of the market has laid a foundation from which more rapid progress may be possible. However, in order to decarbonise road transport, drivers must be able to charge their EVs practically and affordably. Balancing EV uptake with chargepoint deployment has often been described as a chicken or egg situation, arguing that over- or under-investing in either component can leave stranded assets or hinder market growth. Significant new charging infrastructure will need to be developed carefully and in tandem with EV adoption to support decarbonising road transport. Ensuring that all current and future EV drivers can access affordable and convenient chargepoints in their local communities will be necessary for maintaining public support for Net Zero.

There is currently some uncertainty around the number of public EV chargepoints needed to power this new fleet of EVs. While a number of research organisations have attempted to quantify this figure, each estimate varies in their assumptions and timelines, which makes comparisons unsuitable. Some of the key estimates are listed below:

- Cambridge Econometrics, commissioned by Greenpeace, calculates that 13 million home, 1.2 million work, 240,000 slow public (3-22kW) and 62,000 rapid public (>50kW) chargepoints will be needed under a 2030 phaseout of internal-combustion engine (ICE) vehicles.⁸

ⁱⁱⁱ Figures put plug-in market share at 10.7% year-to-date in 2020 – this comprises 6.6% Battery Electric Vehicle (BEV) and 4.1% Plug-in Hybrid Electric Vehicle (PHEV).

^{iv} SMF calculation based on the International Council on Clean Transport (ICCT) estimates for a scenario in which EV share 70% of new car registrations by 2030.

- Under the International Council on Clean Transport's (ICCT) most relevant scenario (in which EVs comprise 70% of new passenger car sales in 2030) up to 430,000 workplace, public and fast chargers^v would be needed across the UK by 2030.⁹
- Based on the ICCT's estimates, the SMF calculates that, under the same assumptions, around 600,000 public, workplace and rapid chargers would be required by 2030 for the updated ban on new petrol-diesel cars (100% of new registrations).¹⁰
- Capital Economics, commissioned by ScottishPower, estimates that over 25 million chargepoints will be needed across the UK by 2050, including over 2.6 million to be installed in non-residential, public areas.¹¹

Despite the variations between estimates, it is clear that the UK's charging infrastructural needs significantly exceed the near 36,000 public chargepoints that currently exist.¹² The cost of expanding charging infrastructure is significant; Capital Economics estimates that installing sufficient chargepoints by 2050 will reach a total cost of around £46 billion. In addition, a further £48.5 billion will be required for network investment due to the increased demand for electricity.¹³ Consequently, ensuring that the deployment of charging infrastructure is efficient and fair presents a notable challenge to policymakers; if left to market forces, an inequitable system of private transport may arise, which this report investigates.

While the scope of this report is focused primarily on the challenges of EVs and charging infrastructure, it is also important to note that reaching Net Zero will require wider clean transport agendas. We recognise that the uptake of EVs should not blindly replicate current patterns of car ownership but be considered alongside transportation policy that encourages active travel, such as walking and cycling, to reduce emissions.¹⁴ This most appropriately falls under a local authority's transportation and planning strategies, discussed further in Chapter Five.

In September 2020, the Social Market Foundation hosted a roundtable with politicians, policymakers, green energy experts and industry professionals to discuss the retail politics and challenges facing the rollout of EVs and the relevant charging infrastructure in the UK. A consumer survey was also commissioned from Opinium as part of this study, using a nationally representative sample of 2,004 UK adults from 10th to 24th March 2020. This report summarises the key themes that emerged from the SMF roundtable in the following chapters.

- **Chapter two** – presents the current state of public understanding and attitudes towards EVs and charging.
- **Chapter three** – makes the case for planning an efficient system of charging infrastructure that is cost-effective and meets drivers' needs.
- **Chapter four** – identifies the challenges facing equality of access to EV charging infrastructure.
- **Chapter five** – explores how EVs and EV charging infrastructure should be planned, coordinated and paid for.

^v Multi-standard charger is counted as one – at the end of 2019, the UK had an estimated 2.2 outlets per fast charger.

CHAPTER TWO – PUBLIC ATTITUDES

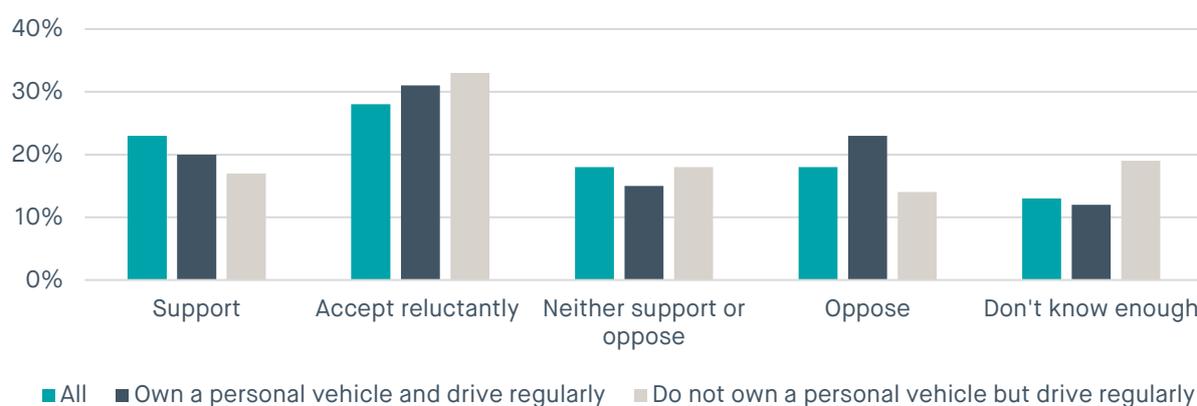
Delivering the Government’s Net Zero policy objective by 2050 will require a significant transformation of the UK economy with implications for how people live, drive, heat their home and more. While there are many operational challenges to decarbonising our economy, winning and maintaining public support for Net Zero will be critical to determining its long-term political success.

Research conducted as part of the SMF’s previous report in this series, *Boiler Alert*, found that public understanding of Net Zero is limited.¹⁵ While three in five of the public are aware of the term Net Zero, recognition does not always translate into a clear understanding of what it means both in definitive terms and in practice.¹⁶ Less than a third of respondents were able to select the most accurate explanation of Net Zero from a list of options.¹⁷ Conceivably, it is highly likely that the public are not prepared for the disruptive and costly measures required to deliver this policy objective, such as a mandated changes to private transport.

Public support for a petrol-diesel ban

SMF-commissioned polling shows that existing support for a mandated prohibition date for purchasing new petrol-diesel vehicles is far from clear – as seen in Figure 1. While over half (51%) of the general public say they would either support or accept such a measure, a majority (28%) indicate that acceptance would be reluctant. Comparatively, among car-owning regular drivers, reluctant acceptance rises to nearly a third (31%) and outright support falls to just a fifth (20%). Opposition to a prohibition date is relatively in line with outright support, whereby nearly a fifth (18%) of the general public and a quarter (23%) of car-owning, regular drivers report opposing the measure. The polling was conducted prior to the Prime Minister’s announcement on the updated petrol-diesel ban and asks respondents to consider a ban on the sale of new petrol-diesel cars from 2035; however, conceivably public attitudes towards the new 2030 ban would be similar, if not more strongly opposed.

Figure 1: Public attitudes towards the prohibition of the sale of new petrol and diesel cars from 2035 onwards, by car ownership (%)



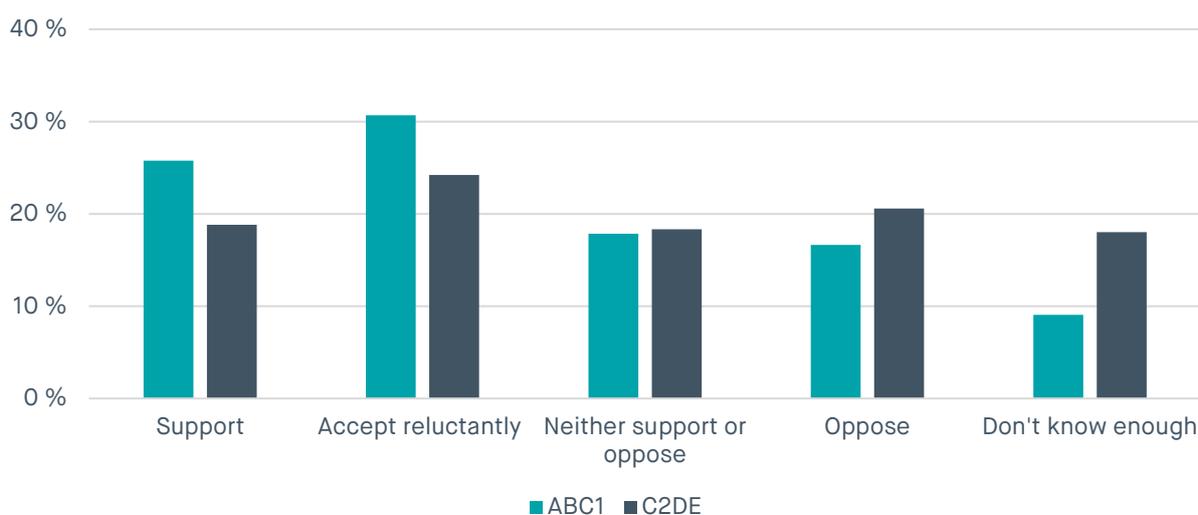
Source: SMF analysis, Opinium

Note: At the time of conducting, polling questions were informed by the Government’s consultation to bring the ban on the sale of new petrol-diesel cars forward from 2040 to 2035 or earlier. As of November 2020, the consultation concluded the policy will be in effect from 2030.

Public support for a ban on the sale of new petrol-diesel cars varies based on an individual’s socio-economic positioning. Figure 2 indicates that those in a higher socio-economic grade (ABC1) are more likely to support or reluctantly accept the measure (57%), compared to those from a lower socio-economic grade (C2DE) (43%). Additionally, there is an apparent information gap between individuals from different socio-economic grades, whereby those who are more disadvantaged report that they “do not know enough” at a higher rate (9 percentage points) than their more affluent counterparts. There is a risk that regressive or unequal policies, which place disproportionate costs on those more disadvantaged or perpetuate unequal access to the market, could create social divisions that would damage the social and political case for Net Zero.

The Government has already announced a ban on the sale of new petrol-diesel cars by 2030 and is unlikely to revise this. However, policymakers still need to win and keep public support for decarbonising transport over the long term if they wish to achieve Net Zero. Our polling suggests that support for such an intervention is limited and rests on highly reluctant foundations. It is likely that negative experiences of EVs or EV charging, particularly among lower-income, vulnerable individuals, could give rise to public discontent for the overall Net Zero agenda.

Figure 2: Public attitudes towards the prohibition of the sale of new petrol and diesel cars from 2035 onwards, by socio-economic grade (%)



Source: SMF analysis, Opinium

Note: ABC1 = higher socio-economic positioning; C2DE = lower socio-economic positioning.

Note: At the time of conducting, polling questions were informed by the Government’s consultation to bring the ban on the sale of new petrol-diesel cars forward from 2040 to 2035 or earlier. As of November 2020, the consultation concluded the policy will be in effect from 2030.

Barriers to switching

The EV market has seen promising development over the last decade; however, there are still a number of barriers preventing drivers from switching to an electric alternative. Among those polled, the cost of EVs is the most significant barrier to entering the EV market.

Expense

Over half (56%) of respondents indicate that expense prevents them from switching their petrol-diesel vehicle to an EV – as seen in Figure 3. This reflects findings from the Climate Assembly’s recent report, in which participants expressed concerns over the price of EVs:

“price[s] [of electric cars] would need to be more realistic than they are now.”¹⁸

The up-front price of EVs are estimated to be comparable with conventional vehicles by 2030 if not sooner, without the need for subsidy.¹⁹ As a result, the Government has extended grants for purchasing an EV until just 2022-23.²⁰ However, while the sticker price of EVs is falling, additional support may be necessary to mitigate cost-related barriers for over half of consumers. This support may be financial, to help low-income drivers meet unaffordable costs, or educational, to raise awareness of the cheaper running costs and falling sticker price of EVs.

Currently, EV drivers also benefit from tax incentives, such as exemption from vehicle excise duty (VED), fuel duty and congestion charge in London, compared to petrol-diesel drivers.²¹ ICCT’s comparative study of EV incentives across market-leading countries found that upfront, simple incentive programmes that are available to the full market and run for at least several years are the defining design principles of optimal EV incentives, in order to encourage uptake and reduce cost barriers.²² One-time tax reductions are most likely to be upfront at the point-of-sale and therefore more attractive and financially valuable to consumers, rather than a rebate or income tax credit for which the benefit comes months, if not a year, later.²³ Conceivably, upfront tax breaks would also be more beneficial to low-income households who may not be able to afford the wait to recoup rebated costs.

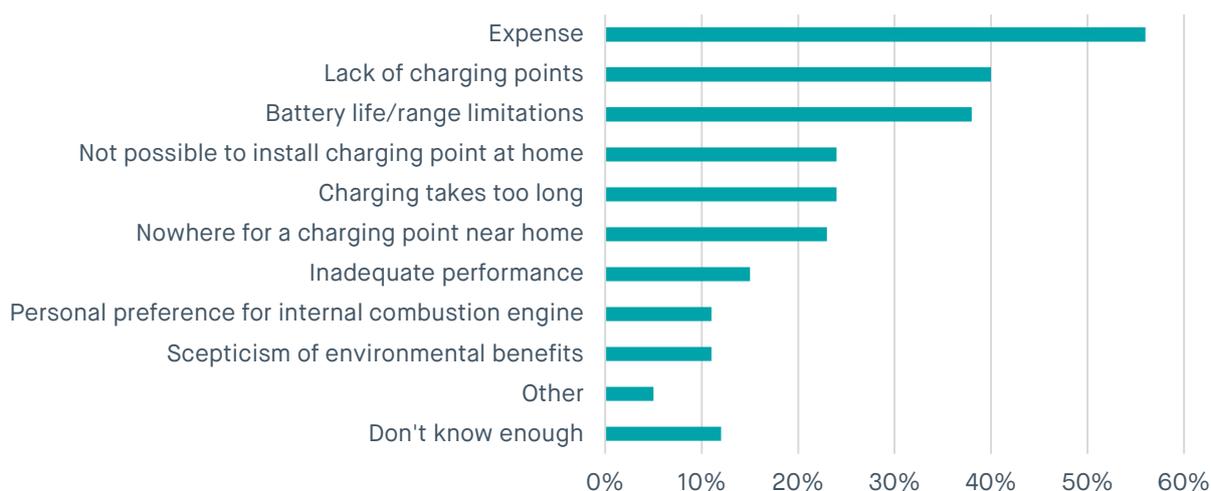
The Government could go further to encourage the uptake of EVs by removing the upfront tax cost of VAT. From the early 2000s, the Norwegian government used a combined approach of significant tax incentives (including 0% VAT) with public investment in charging infrastructure to encourage EV uptake.²⁴ Norway has long been considered the world leader in EV adoption, where EVs now comprise the majority market share.²⁵ SMMT Chief Executive Mike Hawes has also called for removing the 20% of VAT from EV purchases in the UK.²⁶ On a typical £30,000 EV, this incentive would be worth double (£6,000) the maximum government incentive currently available (£3,000).²⁷ Hawes notes that during the Coronavirus pandemic, both France and Germany have introduced substantial incentives for EVs worth up to €9,000 (c. £8,000).²⁸

Access to charging and range anxiety

A significant proportion of respondents also cite concerns over the access, proximity, and duration of charging. Around two in five said that a lack of charging points and range limitations (often referred to as ‘range anxiety’) prevented them from switching to an EV, while nearly a quarter indicated that charging would take too long or that home charging was not possible. Ensuring drivers have convenient and reliable access to charging infrastructure is critical to encouraging the uptake of EVs. Similarly, this was evident in the Climate Assembly’s report, where concerns were raised about whether charging infrastructure will be ready to support a ban of petrol-diesel cars:

“support was conditional on “charging infrastructure... [being] in place.”²⁹

Figure 3: Barriers to ‘switching’ to an EV (%)

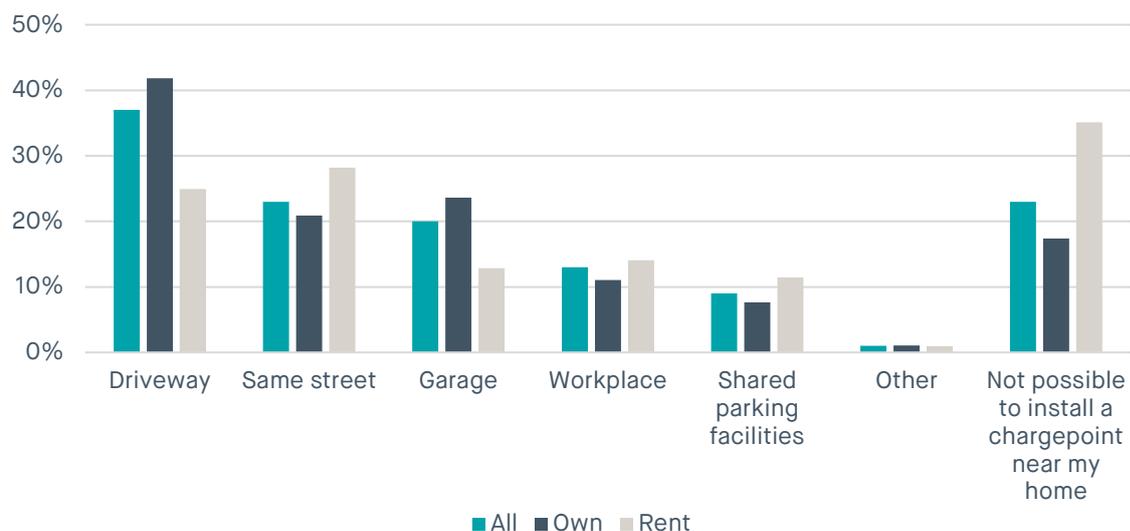


Source: SMF analysis, Opinium

Preferred siting of EV chargepoints

Access to home charging evidently plays a significant role in barring some from entering the EV market. Figure 4, below, shows drivers’ preferred location for installing a chargepoint if they had an EV. Among the general public, at-home, off-street charging is most preferred, such as on their driveway (37%) or in their garage (20%), followed by at-home, on-street charging (23%). However, around a quarter (23%) of the public said that it was not possible to install a chargepoint near their home. This is particularly significant among renters, whereby over a third (35%) do not have access to charging near their home compared to half as many (17%) homeowners. Although charging at work (13%) or in shared parking facilities (9%) is less preferred, those without other options will be reliant on charging at these destinations. Installing sufficient chargepoints at workplaces, public car parks and other destinations will be critical to ensuring every driver has access to a chargepoint.

Figure 4: Preferred siting of EV charging infrastructure, by tenure type (%)



Source: SMF analysis, Opinium

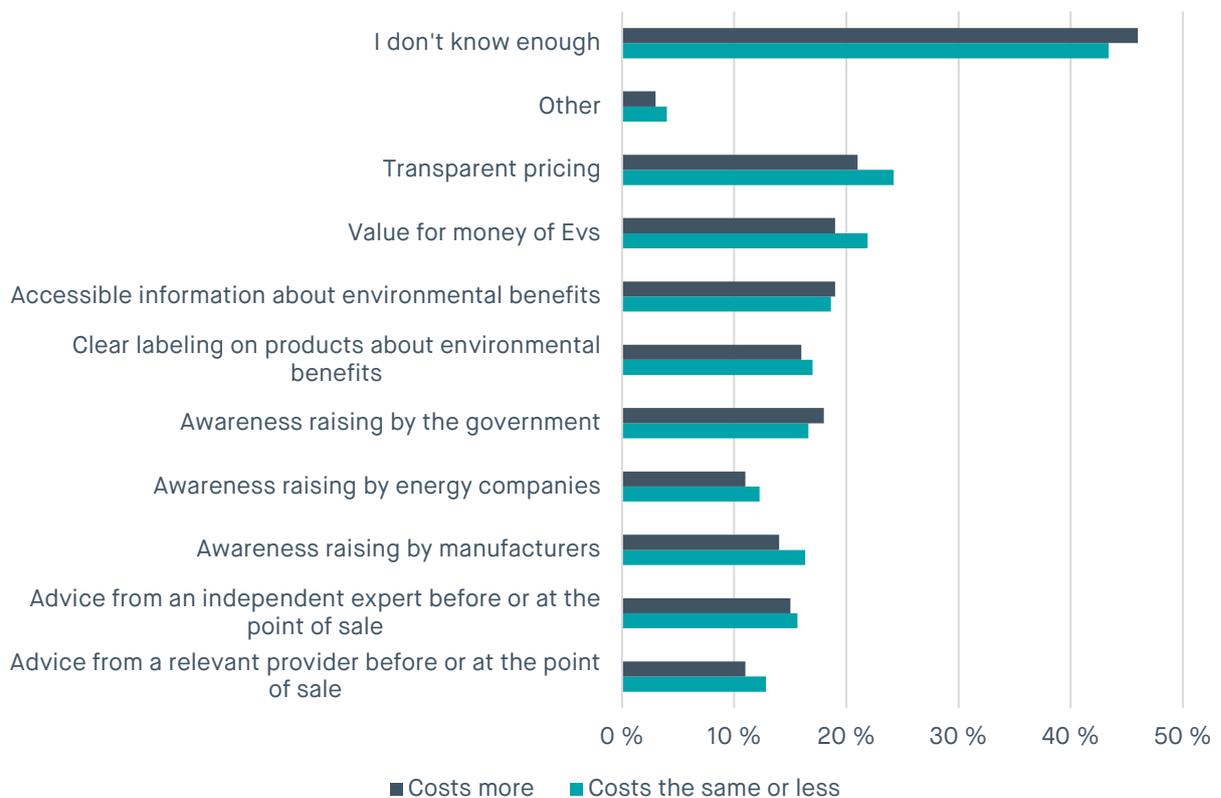
Information gap

If the uptake of EVs is going to reach 100% of new vehicle registrations by 2030, greater understanding of the vehicles and their benefits will be necessary to encourage consumers to enter the market. Figure 5, below, shows what types of information are needed to encourage the public to switch from a petrol-diesel vehicle to an EV. Over two in five respondents said that they do not know enough to even identify what types of information would be helpful. This indicates that public knowledge of EVs is significantly limited and consumers are unsure of how to make a first step in learning more.

Among those who identified what types of information would be helpful, transparent pricing and the value for money of EVs were cited most frequently (around one in five). This reflects our finding that for a majority (56%), expense is a primary barrier to entering the market. Respondents indicated a stronger desire for information on pricing (21%) and value for money (19%) given an EV costs the same or less than their petrol-diesel vehicle, as opposed to more. Conceivably, greater information on the pricing of EVs could contribute to reducing some expense concerns, as well as stimulating uptake, without significantly increasing public funding for grants and/or subsidies.

Respondents were also interested in information on the environmental benefits of EVs (around one in five) and greater awareness raising by the Government and industry leaders. Given the pace of development of the market, this is likely a role which EV manufacturers and sellers will play, rather than the Government.

Figure 5: Types of information needed to encourage active engagement with the EV market, by cost of EV compared to petrol-diesel vehicle (%)



Source: SMF analysis, Opinium

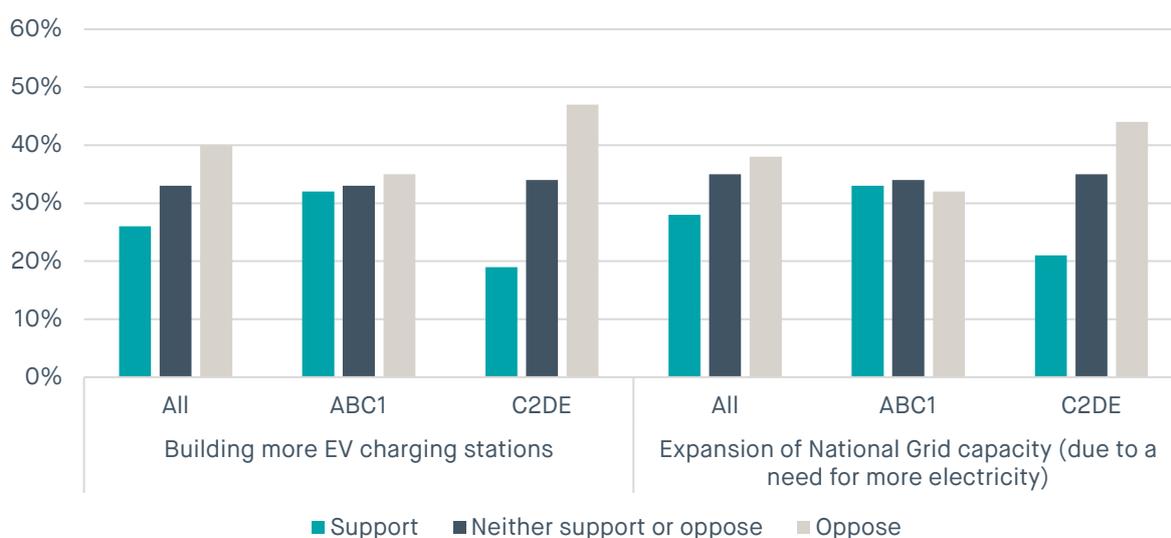
Funding the cost of EV charging infrastructure

Expanding the EV market will need to be supported by an urgent rollout of charging infrastructure, which will require greater investment in the energy grid and the distribution network.³⁰ How these costs will be allocated has yet to be decided by the Treasury. Our polling explored public attitudes towards paying more to cover the cost of building EV charging stations and expanding the capacity of the grid.

Figure 6, below, shows that across the general public, around two in five oppose such measures with a slightly greater proportion of the public opposing paying for charging infrastructure (40%) than grid expansion (38%). Opposition to mandatory costs is significantly higher among those of lower socio-economic grades (C2DE), compared to their more advantaged peers (ABC1). Nearly half (47%) of respondents from socio-economic grades C2DE oppose being obliged to pay more for charging infrastructure costs, while 44% would oppose doing so for grid expansion costs. In comparison, opposition for these measures stands at about a third (35% and 32% respectively) among those from socio-economic grades ABC1. Given that early adopters of EVs are more likely to be wealthier homeowners, it is conceivable that opposition among those from lower socio-economic grades is related to beliefs that they may not own an EV or benefit from the charging infrastructure.³¹ Indifference to such measures is also considerable and consistent across the population, with around a third reporting they are neither in support nor opposition.

Given support for a mandatory shift to EVs is already lower among the more disadvantaged (see Figure 2), policies which are perceived to allocate costs unfairly could face strong opposition from those from lower-income groupings. While it is unlikely that the government would devise such a crude or mandated funding policy for EV charging and grid infrastructure, policymakers looking to maintain support for Net Zero should consider the risk of placing undue cost burdens on those with low incomes.

Figure 6: Public attitudes towards being obliged to pay more to cover the cost of transitioning to Net Zero, by socio-economic grade



Source: SMF analysis, Opinium

Note: ABC1 = higher socio-economic positioning; C2DE = lower socio-economic positioning.

CHAPTER THREE – EFFICIENT CHARGING INFRASTRUCTURE

As the UK decarbonises its economy, demand for electricity is increasing.³² Over the coming decades, electricity will likely be used as a low-carbon alternative to power more vehicles and heat more homes, which will have an impact on the grid's capacity for distribution.³³ Ensuring that the rollout of charging infrastructure is economic and efficient will be critical to protecting the grid whilst maintaining upward pressure on consumers' wallets through – either the cost of government support or upward pressure on energy bills.

Capital Economics estimate that in order to reach Net Zero, overall network reinforcement would cost £48.5 billion by 2050, which could be reduced by 30-40% with strategic planning, including smart charging.³⁴ While reinforcement of the distribution network is inevitable to support decarbonisation, the energy demands of the charging infrastructure will impact the level of investment that is required.³⁵ As a result, the infrastructural mix that is deployed across the country will have direct implications on the cost that is passed onto energy consumers or taxpayers. Our polling indicates that around two in five would oppose facing higher costs to cover grid expansion; consequently, policymakers should consider the economic efficiency of charging infrastructure. One contributor echoed this point:

“Net Zero at the lowest cost for consumers is what we should be aiming for – we need to ensure we don't pile on unnecessary costs to get to Net Zero.”

Balancing the need for speed

Range anxiety is a key barrier to the uptake of EVs, as highlighted in our polling. In part, this will likely ease over time as the market grows and the battery range of EVs improves.³⁶ However, roundtable contributors discussed whether the market and policy focus to date on rapid charging (50kW and above) on the strategic road network is the most economical solution to mitigate range anxiety.

Grid implications

Roundtable contributors noted the important role that publicly accessible, en-route rapid and ultra-rapid (50kW and above) charging infrastructure will play on the strategic road network to enable drivers to travel longer distances and reduce their range concerns. One contributor noted:

“En-route charging is vital. [...] We will need en-route, high speed, reliable charging with many available so that people can continue their journey.”

The government is committed to ensuring that drivers across the country are never more than 30 miles from a rapid charging station.³⁷ To date, on average there are two rapid chargepoints (50 kW) per motorway service, with an ambition of raising this to at least six high-powered chargepoints (150-350 kW) by 2023.³⁸ This ambition has been supported by a commitment to £500 million of funding, through the Rapid Charging Fund.

Over recent years, charging infrastructure of all speeds has increased significantly but rapid and ultra-rapid charging has seen a faster growth rate. Between 2017 and 2019 the number of rapid and ultra-rapid chargepoints nearly tripled from over 2,500 to over 7,000,

compared to total chargepoints which has doubled in this time.³⁹ In 2020, the Department for Transport reported supporting the installation of over 2,600 rapid chargepoints.⁴⁰

Roundtable contributors debated the extent to which a mass-deployment of en-route rapid charging is the most efficient charging solution, due to the strain it places on the distribution system and cost issues. One contributor noted that:

“If you put a bank of eight rapid chargepoints at the start of the A9 where there’s currently a big service station, and you look at normal usage patterns, you would need to build a £15-20 million sub-station next door. Rapid chargepoints suck phenomenal volumes of electricity off of the distribution system.”

In response to the updated 2030 ban on petrol-diesel cars and vans, National Grid stated that there is enough energy to support the uptake of EVs and that the grid “can cope easily”.⁴¹ While our roundtable took place prior to this announcement, one contributor, an expert from the energy sector, indicated that distribution networks would not easily handle a mass-deployment of rapid charging in future.

“The concern with rapid charging is around capacity in the system. One rapid chargepoint creates a fluctuation in the system equivalent to 40-50 houses. It’s not the overall level of power, it’s the spikes that the system can’t cope with.”

The contributor went on to explain that the distribution system would need significant investment and reinforcement to manage the high peaks of energy demand. However, due to the fast nature of rapid charging, these peaks are not sustained for much longer than half an hour per EV. Given the significant cost implications that are associated with this level of network reinforcement, policymakers should consider balancing the speeds of public charging infrastructure to reach an efficient system. While rapid will play a critical role in the charging infrastructure, our contributors agreed that it is not a solution everywhere. One contributor emphasised this:

“There are pinch points across the entire electricity distribution right now that do not have the capacity particularly for rapid charging or every street, town and village installed. [...] We need to think about the economic efficiency of [rapid charging] and make sure it’s only being done in the places where it’s absolutely essential.”

While there is significant research and literature on the need for rapid charging, our findings indicate that further investigation should be conducted to identify the most energy and cost-efficient infrastructural mix of charging speeds that meets drivers’ needs.

Charging behaviour

Given cost is a considerable concern for potential future EV drivers, keeping and winning public consent for Net Zero will require low-cost, convenient solutions for consumers. A greater emphasis on slower, residential and public charging in local communities could provide convenient local charging options and help to address range anxiety, while also protecting the grid and consumers from high costs.

The National Travel Survey shows that the vast majority of daily cumulative mileages are below 40 miles a day. In comparison, the range of current market EVs sits between 150

and 290 miles per charge.⁴² While long-distance trips are still a reality for some, they are likely infrequent for many. Additionally, on average, cars spend 96% of their lifetime parked, suggesting that charging at these times makes greater economic sense than replicating en-route petrol-diesel fueling behavior with EVs.⁴³ One contributor said:

“You don’t need a rapid charger all the time – you want one if you’re going on a motorway and driving 300 miles but actually, most of the time you only need to top up 50 miles at a time.”

Another contributor concurred:

“There’s a lot of evidence that shows that there’s a huge amount more charging at home than people anticipated.”

Conceivably, this behaviour could be influenced by the demographics of early adopters, who are more likely to have access to off-street parking than those who have not yet entered the market.⁴⁴ ⁴⁵ However, trials among the general public also found a preference for home charging over free, public charging, despite having to pay for at home charging.⁴⁶

Consequently, roundtable contributors agreed that an efficient model of charging infrastructure should balance the need for rapid charging on the strategic road network, where appropriate, with flexible, smart options for slower charging at home or public destinations. The consumer experience of EVs and EV charging will also depend on fair access to smart charging options, particularly for those who are unable to take advantage of lower-cost tariffs at non-peak times due to parking availability as well as work schedules and caring responsibilities.⁴⁷ Those with off-street parking will largely be better able to access lower-cost, off-peak tariffs by charging their EVs slowly overnight, in comparison to those who may rely on on-street or destination public charging at peak times or faster speeds, which are more costly. While there are many challenges facing the rollout of smart charging options, this was outside the scope of this report.⁴⁸

CHAPTER FOUR – CHARGING ACCESS FOR ALL

The policy agenda for EVs and decarbonising private transport more broadly is unlikely to be successful without sufficient and fair access to charging for all. The deployment of charging infrastructure must not only meet the needs of existing EV drivers' but also address the concerns of potential future EV owners. Our polling shows that two in five (40%) of the public said that “not enough chargepoints available” was preventing them from owning an EV, and around a quarter (23%) said they could not install chargepoints at home. One roundtable contributor emphasised the need for equal access:

“it's about having a charger wherever you go, no matter who or where you are.”

Across the UK, the total number of chargepoints has more than doubled (108%) between 2017 and 2019.⁴⁹ While the market has delivered significant growth in charging infrastructure, there is a risk that where there is less of a business case, people and places could be left behind. One contributor noted:

“Chargepoints are currently rolled out, likely where it is commercially viable [...] Where people think there's enough [demand and capacity] to generate a commercial return.”

This is likely to be most apparent in places where installing chargepoints is complex and/or costly and thus unattractive to private providers, such as for those without access to off-street parking, renters, or in rural areas where charging and associated network capacity might require significant investment. Given that these groups are also more likely to experience intersecting disadvantages, such as low-income for renters (both social and private) and social exclusion for those in rural areas, the negative impact on individuals and communities could be significant.

Without government intervention, unequal access to and cost of charging could create ‘winners’ and ‘losers’, locking many out of the EV market. Couple this with not being able to buy a new petrol-diesel car from 2030 and some drivers will likely be forced to stay in older, more expensive to run and more polluting cars for longer, which could exacerbate existing inequalities as well as issues of mobility and social exclusion. One roundtable contributor also suggested that communities with higher levels of deprivation that struggle to make the switch, due to upfront costs or network capacity issues, may suffer from worse air quality and subsequent health implications, compared to EV-driving, wealthier neighbourhoods.

Already UK petrol-diesel drivers face higher vehicle taxes in addition to emissions-related charges in some cities, such as London, and soon to be Bristol and Birmingham. As the government pushes on with their decarbonisation agenda, it is possible that further polluter-pays-style carbon charges could be introduced.⁵⁰ As the running costs of EVs falls over time, petrol-diesel drivers in comparison will likely face increased costs. If these costs are seen to fall disproportionately or unfairly on the more vulnerable, public discontent for the Net Zero agenda may rise, as seen in France with the ‘gilets jaunes’ movement.⁵¹

Barriers to home charging

Home charging is the primary charging solution for current EV drivers.⁵² However, this is in part shaped by the demographics of current EV owners and their living circumstances.⁵³ Research shows that early adopters are more likely to live in single-dwelling buildings^{vi} where home charging is typically more available, in part due to the availability of off-street parking.⁵⁴ Over time, a higher proportion of potential EV owners will likely live in more concentrated housing where charging solutions are more complicated due to limited parking availability.⁵⁵ If the EV market is to grow successfully, barriers to such home charging will need to be addressed.

Access to parking

One significant challenge to home charging for many will depend on where they are able to park their car. More than a third of households in England do not have access to off-street parking and around a quarter of cars are parked on streets overnight.⁵⁶ This is in line with our polling, which shows that around a quarter (23%) would use on-street charging if they had an EV. Roundtable contributors echoed similar concerns. One said:

“If we accept that rapid charging will be problematic or constrained, the implication of that is that we need better provision for home charging, which means you then run into the issue of those who can’t have driveway charging as they don’t have [off-street parking].”

While installation grants are available to drivers with “dedicated off-street parking”⁵⁷, those without driveways or garages will be largely reliant the installation of on-street public charging in their neighbourhood. Where the market is unlikely to provide these public chargepoints, local authorities have delivered this infrastructure, to varying degrees. There is notable geographical variation of publicly available charging infrastructure across different local authorities, creating what BEIS has described as “patchy provision”.⁵⁸ This reduces the reliability and accessibility of chargepoints for constituents without off-street parking.

In dense urban areas where on-street parking is limited and often in high demand, such as around high-occupancy buildings, the challenge of ensuring that local, convenient, on-street public chargepoints are available will be significant. As a result, for many drivers, alternative, charging solutions will be critical, such as workplace and destination charging (at supermarkets, gyms, cinemas etc). Additionally, it is likely that those without off-street parking will not only face access and convenience issues with public chargepoints, but also cost issues. This is because EV drivers with off-street parking can take advantage of cheaper tariffs by charging slowly at off-peak times, compared to those without off-street parking who may have limited charging options and rely on destination charging during peak times at faster speeds, which cost more. Indeed, overcoming these challenges will require greater sustained and targeted government support alongside market deployment – without doing so sufficiently, there is a risk that public discontent may arise among those without off-street parking (typically those on lower-incomes and/or renters in urban areas).

^{vi} Single-dwelling buildings are defined as having a private entrance at ground level.

Homeowners vs. renters

Another challenge to home charging is whether you own your home. Our polling shows that over a third of renters (35%) say it would not be possible to install a chargepoint near their home, compared to half as many (17%) homeowners. Renters also say they are more likely to use same street charging (28%) than their homeowners counterparts (21%), if they were to own an EV.

Not only are renters less likely to have off-street parking than homeowners, but they also do not have the same decision-making power over the properties they occupy.⁵⁹ This is likely to be a significant barrier to growing the EV market as private and social renters comprise a large proportion of the population (two in five UK households).⁶⁰ One contributor emphasised this point:

“We also need to consider the housing market – 4.5 million households in private rented sector and don’t have same agency to make the decision to adopt charging.”

Currently, market incentives for landlords are limited as, to date, renter demand for chargepoints has been low due to the size of the EV market. Conceivably, as the market grows, a property’s proximity to chargepoints may influence its value, similar to the effect of transport networks (public transport or motorway networks etc.).⁶¹ However, it is unlikely that this will develop as a strong enough incentive to significantly increase chargepoints by 2030.

Government legislation and incentives are also not substantial for landlords. Access to charging or parking are not included in landlords’ duties and current funding schemes are predominantly targeted at owner-occupiers. Landlords can apply for grant funding for three quarters of chargepoint installation costs via the Electric Vehicle Homecharge Scheme (EVHS) on behalf of EV-owning tenants. However, the process can require additional permissions and, in some cases, legally-binding agreements to approve.⁶² Rental occupancy is often transient and EV ownership is still a small proportion (around 1%) of all cars on the road, meaning that this is extremely onerous process for both tenants and landlords, relative to the benefit that either party would likely gain. The Department for Transport announced in February 2021 that the EVHS would be expanded to target people in rented and leasehold accommodation; however, at this stage, limited available details mean that it is unclear how the scheme will work for renters in practice.⁶³

Consequently, if EV renters want to charge at home, they will be largely reliant on their landlord’s interests or on local authority-deployed on-street chargepoints – neither of which are substantially incentivised. Without support for renters, uptake of EVs may slow and inequalities between wealthier homeowners and renters on low incomes could be exacerbated.

Depending on the property type, coordination is also likely to be a significant challenge to both landlords and owner-occupiers. Installing chargepoints at properties with private driveways or garages will likely be easier to coordinate, compared to multi-occupancy buildings where off-street parking may be unavailable and ownership can differ between leaseholders and freeholders.⁶⁴ In these instances, it is currently unclear who will be responsible for the planning, installing and funding of chargepoints. It may also be difficult

to isolate the electricity used for charging and bill the appropriate residents in buildings.⁶⁵ In this instance, roundtable contributors suggested shared models of ownership for both EVs and the charging infrastructure might be a solution. However, as highlighted, the current grant scheme does allow for such flexibility or incentivise such models.

Destination charging

Our polling shows that nearly a quarter (23%) of the public would not be able to install a chargepoint near their home and over one in ten (13%) will likely rely on workplace charging. Research shows that those who rely on workplace or public charging are expected to face greater inconvenience with EV charging, relative to fuelling a petrol-diesel car, compared to those who can charge at home.⁶⁶ Without intervention to ensure the widespread availability of chargepoints, the gap of convenience between those who can charge at home and those who cannot, could negatively impact EV uptake.

Deploying chargepoints at supermarkets, hotels and other leisure destinations will be essential for EV drivers and could become attractive to businesses over time. As the market develops, businesses could make a commercial case for chargepoints, such as increased footfall and revenue from billing customers for their electricity usage.⁶⁷ In some cases, landlord-operator partnership agreements between private entities may be an attractive solution, as offered by the chargepoint company InstaVolt. Under such an agreement, the chargepoint company pays a rental fee to locate a charging station on the landlord's site. The chargepoint company operates and maintains the technology, and obtains revenue from electricity sales, while the landlords benefit from increased footfall.⁶⁸ However, current activity of this sort is low and the commercial imperative is more complex, as noted by multiple roundtable contributors.

The government grant funding available to businesses under the Workplace Charging Scheme covers installation costs only.⁶⁹ However, installing enough chargepoints for a viable business case could require investment in the network infrastructure, which businesses may not feel responsible for. One contributor questioned the commercial incentive in this decision:

“There is support for workplace charging but what about hotels, for example? There's a motive but who decides if that's going to happen - the hotel company? Should there be some guidance or added investment? The company may be happy to put in a charge point but are they going to do the grid upgrade as well?”

Over time, as the market grows and demand for charging increases, the commercial imperative will likely strengthen, leading to more businesses deploying destination charging options. On the one hand, if the government want this to move quicker, they will likely have to create incentives and additional support for businesses. On the other hand, if destination charging is to be left to the market, then the government should place greater emphasis on addressing the barriers to accessing convenient charging for those who cannot charge at or near their home.

Where destination businesses are located on local authority-controlled land, the solution may not be to incentivise businesses, but instead provide local authorities with the funding, resources and expertise to deliver more public charging on their territory. This is further explored in Chapter Five.

Rural vs. urban access to charging

A potential barrier to the EV market could also depend on whether drivers live in a rural or urban area, in part due to the network capacity of rural areas. Due to the UK's topography, the distribution network that serves many rural communities may require strengthening through significant investment in order to meet the increased electricity demands of decarbonising home heat and road transport.

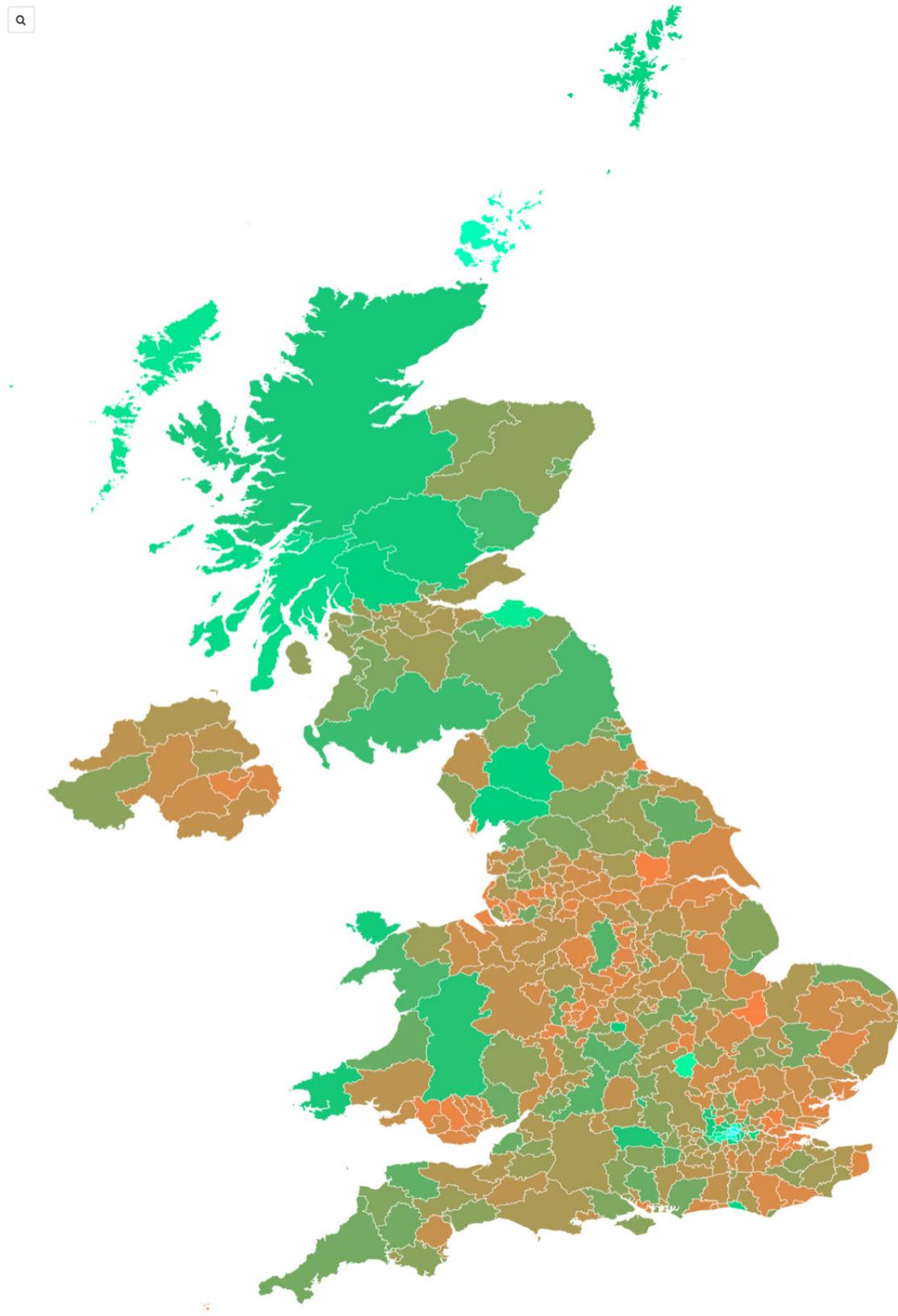
As referenced above, in 2018, the UK government itself recognised that the landscape of charging infrastructure is “patchy”, with notable variations across local authorities.⁷⁰ Figure 7, below, maps the distribution of public EV chargepoints in the UK by local authority thus far (October 2020), relative to their population. Many local authorities in London and Scotland have seen the greatest relative deployment of charging infrastructure, such as Westminster (213 chargepoints per 100,000 inhabitants), Hammersmith and Fulham (202), Orkney Islands (144) and East Lothian (96) in comparison to those in the East of England and North West, such as Fenland (2), Castle Point (2), Knowsley (6) and Wirral (6). While it is true that local authorities will have different charging needs from each other, findings from BEIS suggests that in some instances, differences in provision are the result of varied levels of resources and expertise.⁷¹

Mapped at a national level, the data reveal a pattern that extends beyond individual local authority differences. Figure 7 illustrates an inequality of access between rural and urban areas, where drivers near cities and towns benefit from a disproportionately higher rate of public chargepoints (per capita) than their rural counterparts. While this is conceivably the result of urban density and reduced off-street parking, research by the ICCT finds that even after modeling these differences, ‘metropolitan areas’ are closer to meeting their 2030 public charging needs^{vii} than ‘non-metropolitan areas’.⁷² This is despite a higher level of EV ownership in ‘non-metropolitan areas’ in 2019 (4,800 EVs per million inhabitants), compared to ‘metropolitan areas’ (4,100 per million inhabitants).⁷³

^{vii} ICCT second model scenario is based on the assumption that EVs represent 70% of new car registrations in 2030. Given the Government's decision to bring forwards the ban on the sale of new petrol and diesel cars to 2030, charging needs are likely to be at a *lower* rate than is now required. However, we conclude that despite the updated ban, the ICCT's figures are a reasonable indication of comparative local authority deployment rates.

Figure 7: Publicly available electric vehicle chargepoints per 100,000 population by local authority, October 2020

0 70



Source: SMF analysis, Department for Transport, Zap-map

The Electric Vehicle Energy Taskforce recognise that the market alone will not deliver geographically sufficient charging infrastructure to provide equitable access for all.⁷⁴ Areas with low network capacity that might require costly reinforcement to meet the needs of decarbonising home heat and road transport provide less of a strategic case for the market. As a result, targeted government support in these areas will likely be necessary to avoid the risk of leaving communities behind. One roundtable contributor said:

“I can't see a competitive market installing enough chargepoints in remote locations across rural villages and communities so that everyone feels they have access to this infrastructure – that is an essential part. With broadband you have communities where they felt left behind – we can't do that with transport.”

Previous SMF research highlights the rural-urban disparities in broadband speed across the UK.⁷⁵ Higher speeds tend to be clustered around the UK's major cities while mainly rural areas lack decent broadband, as a result of geographical constraints.⁷⁶ The challenges of technology, distance, population concentration and housing density, and topography are greater in a rural context, which makes investment incentives weaker. Learning from these mistakes will be critical to the success of EVs.

Having similar inequalities in EV charging infrastructure could end up locking rural communities in the petrol-diesel market. One roundtable contributor argued that sparse amenities and public transport alternatives in rural areas mean that residents are more reliant on private transport for mobility. As a result, unequal access to the EV market could exacerbate the existing economic, social and health implications of social exclusion in rural areas. For a Government committed to levelling up, this would be a political risk. One contributor said:

“This requires a lot of funding and investment in infrastructure. Fundamentally, if the government wants to level up, when it comes to the rollout of EVs, it has to start looking at rural and remote areas, and what kind of infrastructure they need.”

A Government representative at the roundtable echoed their commitment to ensuring levelling up was central to their approach; they stated:

“We recognise that the market can do a lot, but it can't do everything. We are committed to the levelling up agenda. It is absolutely vital. We know we need to see chargepoints everywhere.”

The importance of addressing potential rural-urban disparities in transport provision and policy is significant, especially when seen in international context. Such context includes the French experience of the *gilet jaunes*, a popular protest movement expressing the opposition of some voters in peripheral areas to – among other things – carbon-linked fuel taxes that were seen by some to unfairly hit low-income drivers at the instigation of Paris-based policymakers. A UK transition to wider EV-use that comes to be seen as something that primarily benefits richer urban voters while visiting costs on all voters including those in poorer and more rural households will be divisive and undermine support for the wider Net Zero agenda.

CHAPTER FIVE – GOVERNANCE, REGULATION AND FUNDING

The EV market has grown significantly under the current framework. However, decarbonising private transport fairly and efficiently will require greater levels of investment and coordination between government authorities, regulators, network operators and the market.

A local, coordinated delivery plan

A strategic and coordinated delivery plan between national, regional and local actors is critical to ensuring the deployment of charging infrastructure meets drivers' needs and minimises costs to the energy system. The Electric Vehicle Taskforce also recognises the need to develop such an approach to enable effective planning and efficient investment.⁷⁷

Charging solutions will differ based on a number of factors, including regional and local network capacity, drivers' journey requirements and their access to home charging and parking. Additionally, new infrastructure will need to be integrated within existing transport networks and spatial planning, which vary across different areas. A universal approach is unlikely to address these differences and meet the infrastructural requirements for Net Zero fairly and efficiently. One contributor noted:

"...this will be done sub-optimally if it is a one-size-fits-all approach."

Another contributor concurred:

"Regional differences are intrinsic to reaching ambitions for reductions in transport emissions and EV rollout. [...] We can't take a blanket approach to transport infrastructure in this way. That's something that has been missed from the puzzle."

Local government actors, working with local network operators, are well-placed to support the strategic planning and deployment of charging infrastructure in their areas. Roundtable contributors agreed that local authorities are well-informed about the needs of their local communities, shown by their responses to the Coronavirus pandemic. Additionally, local authorities are already responsible for planning and delivering local mobility strategies for transport, parking and clean air; integrating EV charging infrastructure into these plans will make for more effective planning, which promotes a better consumer experience and more efficient use public funds. One contributor articulated this point:

"In transport, whether it's cities, local authorities or local regions, they all want a different solution because it's linked to their own investment structure, their growth structure, transport structure, clean air policy etc. Local authorities, cities and towns work on that big integrated model and they're building it into that what they want to do."

Local plans should also be integrated within wider a regional and national approach to promote standardisation and interoperability across the country, enabling drivers to feel confident when traveling to different areas. However, roundtable contributors indicated that the current funding, governance and regulatory conditions are inconsistent with the Government's ambitions for ramping up the EVs market nationally. The ability of local

authorities to deliver these ambitions alongside market and network operators will be dependent on addressing challenges of chargepoint funding and coordination with network operators.

Funding for local authorities

Growing resource pressures on local authorities has made it difficult to deliver additional, non-statutory agendas, such as EV chargepoints.⁷⁸ While grant funding^{viii} is available to local authorities through the On-Street Residential Chargepoint Scheme (ORCS), it covers just two thirds (75%) of the capital costs of procuring and installing the chargepoint. Where resources are already tight and additional reinforcement costs may be required, many cannot afford to detract funding from their other obligations. One local government representative from the roundtable expressed this sentiment:

“In terms of support, we don’t have unlimited funding. [...] There’s little push for LAs to develop this infrastructure, and you need keen councillors to latch onto it as an idea to push it through, otherwise there’s no requirement.”

In February 2021, the Office for Zero Emission Vehicles (OZEV) allocated £20 million of funding to the ORCS for 2020/21 on-street residential projects.⁷⁹ However, this funding will only deliver around 4,000 chargepoints, which is six times less than the number of slow public chargepoints required per year by 2030 under Cambridge Econometrics’ estimate.⁸⁰ In order for public charging infrastructure to adequately support EV uptake, in line with the 2030 ban on the sale of petrol-diesel cars, greater amount of funding will be needed to urgently deploy more chargepoints.

There is an argument to consider making charging infrastructure a statutory duty on local authorities. However, if this were to be considered by policymakers, it should be conditional on local authorities receiving greater and more flexible funding from the OZEV to meet public charging needs, including network reinforcements. We, however, are cautious of placing more statutory duties on local authorities, particularly during the current context of a public health and economic crisis.

Roundtable contributors indicated that disparities in charging infrastructure between metropolitan and non-metropolitan areas could be the result of city-targeted funding schemes as well as variations in levels of expertise. Without central government intervention, what is already described as “patchy provision across the country” could be exacerbated between different local authorities.⁸¹ One contributor noted:

“If we look across the country – Dundee, Milton Keynes, Nottingham, Derby and Bristol – they’ve all got a few things in common: political will and leadership. You’ve got officers who are willing to do the job and have the expertise, and they have the relevant funding as well. They have the advantage of being a part of a Go Ultra Low City Scheme.”

^{viii} Local authorities can access grant funding to cover 75% of the capital costs of procuring and installing chargepoints through the Office for Zero Emissions’ (OZEV) On-Street Residential Chargepoint Scheme. Additional funding is also available to certain cities through the Go Ultra Low City Scheme.

Additional targeted support should be considered for areas that have accessed less funding thus far. Research by BEIS found that local authorities faced significant challenges not only in funding but also technical expertise.⁸² Roundtable contributors also echoed this point, arguing that support should also include best practice and expertise from other successful local authorities; however, central government should demonstrate leadership on encouraging this. One contributor suggested:

“There needs to be central government guidance for local authorities that tells them what they should be doing.”

Looking internationally could provide useful insight – Norway is considered the world leader in EV adoption. The Norwegian government drove this transition through both tax incentives for EVs, as well as significant public investment in charging infrastructure. The initial government support schemes in 2009 funded 100% of the installation costs for normal speed, public chargepoints with no geographical eligibility requirements (up to NOK 30,000 per chargepoint).⁸³ While the economic, social and geographical context of the UK differs from Norway, if the UK government’s ambition is for a similar EV market trajectory, policymakers should consider increasing funding support for public chargepoint installations.

Energy system actors

Network companies and regulators will also play an integral role with local authorities in the coordinated planning and delivery of EV charging infrastructure, as the uptake of EVs will directly impact the demand for electricity.

The areas that will require the greatest targeted government support will be where market deployment of infrastructure is low, due to network capacity limitations. It is suggested that a lack of incentives for District Network Operators (DNOs) to invest in grid reinforcements or share data on this has delayed installations in some areas.⁸⁴ Identifying these areas and planning the necessary improvements will be critical for the accessibility and fairness of the EV market. Consequently, DNOs, regulators (Ofgem and UKPN) and local authorities should be encouraged to work together to manage local energy demands, including for decarbonising other sectors such as home heat.

Roundtable contributors also questioned whether the current regulatory framework is suitable for overseeing a local, coordinated approach on investment planning. One contributor noted the need to decentralise the regulatory system to enable greater local ‘voice’:

“The regulatory system that we have for energy doesn’t [work well] when it comes to transport. I do not think you can have a model that is all centralised that makes this work [...] This can’t just be down to distribution companies and centralised regulators – you need to spread that system out.”

This reflects the National Infrastructure Commission’s recommendation that robust and transparent engagement mechanisms should be put in place between local policy actors (i.e. metro mayors and local authorities) and regulators for making long-term strategic investment decisions.⁸⁵

Allocating costs

Decarbonising the private transport sector will have significant cost implications. Capital Economics estimates meeting Net Zero by 2050, will cost nearly £46 billion to deploy sufficient chargepoints.⁸⁶ The network investment needed to meet increased the electricity demands of decarbonisation more broadly is estimated to cost a further £49 billion.⁸⁷ How these investment costs will be allocated has yet to be decided. Roundtable contributors discussed potential models of funding, including the existing energy distribution model or the taxation system.

Our polling finds that two in five would oppose being obliged to pay for the cost of charging infrastructure (40%) or grid expansion (38%). Investment in grid expansion and reinforcement is largely an inescapable cost of decarbonisation and the increased demand for electricity, not just from private transport but home heat and more. Conceivably, this may explain why the public report greater support for paying for these costs, perhaps out of a sense of collective responsibility or a perceived benefit from such measures. By comparison, those who do not own an EV may feel charging infrastructure costs are less relevant to them and therefore oppose being obliged to pay.

Furthermore, obligation-based costs such as this are significantly opposed by nearly half (47%) of those in lower socio-economic grades. Policymakers should consider funding models that distribute costs fairly and avoid disproportionately impacting low-income, vulnerable households. Policies that are even perceived to be regressive may give rise to discontent with green policies more broadly and risk damaging support for Net Zero entirely.

Regulated Asset Base (RAB) model

The current charging arrangements for network improvements uses a Regulated Asset Base (RAB) model, whereby up-front infrastructure costs are met by energy companies and then are recouped over time, often through consumers' energy bills. This model can be an effective way of incentivising private capital in large public infrastructural projects, which may be particularly attractive during a period of increasing public spending. One roundtable contributor emphasised the benefits of this model for distributing costs over time and the population:

“If you put it through the RAB model, those assets are lifted over 30-40 years, which spreads the cost across the entire population, and everyone is paying for it equally.”

As stated above, decarbonisation and electrification of large sectors of the economy will require reinforcement of the distribution network. Consequently, one argument for allocating costs via the RAB model is that all energy users are charged equally for the collective benefit of a functioning, reliable electricity system.

Although, some roundtable contributors noted the regressive nature of how this cost is translated into direct consumer levies. As the cost is applied equally across all consumers, a disproportionate cost burden is placed on the most vulnerable households. Our previous report in this series, *Boiler alert*, emphasised that public and political tolerance for additional levies on energy bills had reached its limits.⁸⁸ A key concern was the lack of transparency, which gave rise to discontent with the measure.⁸⁹ Policymakers

considering this funding option should clearly communicate the reasons for doing so to the public, in order to win and keep support for further decarbonisation measures.

There is also a concern that by sharing the costs and risks with consumers, private companies are not incentivised to deliver projects in a timely manner.⁹⁰ However, contributors noted that this could be mitigated by setting targets for energy companies that stipulate where improvements should happen and within set dates. Public-private investments can often draw criticism from the public; therefore, politicians should clearly communicate the rationale for using the RAB model to be as transparent as possible.

Taxation

While the RAB model could be used for allocating costs for grid expansion, there is still the matter of allocating costs for charging infrastructure and installations, as well as EV subsidies. In these instances, the taxation system would likely be the most appropriate means of raising revenue effectively and fairly.

Lessons learnt from previous funding models for green energy policies indicate that obligations-based cost, such as direct consumer levies, are unlikely to be a suitable policy option for funding EV policies. As noted above, public support for tariffs on energy bills was damaged by a lack of transparency from politicians and industry leaders in communicating the pricing and rationale for the additional costs.⁹¹ The Treasury should consider how the negative perception of tariffs may impact taxpayer support for further green policies. As a result, we identify two key principles that should underpin the design of tax policy to fund EV policies and Net Zero interventions more broadly.

The first principle is **fairness** – tax policies should be designed as progressive to avoid placing disproportionate costs on low-income and vulnerable taxpayers, compared to levies that charge consumers equally. Policies which are seen to be unfair and harmful to those already more vulnerable could likely give rise to public discontent and risk damaging political support for the Net Zero agenda. For example, the existing model for general taxation, such as through income tax, would maintain the progressivity of resourcing while spreading costs over a wide base.

The second principle is **transparency** – as part of the policy process, politicians should clearly communicate to taxpayers where their money is being spent and why. Meeting Net Zero by 2050 will mean disruptive and costly measures to change the way people live, drive, eat and heat their home. Winning and keeping support for these measures will depend on honest conversations between politicians and the public to explain why they are necessary and require such urgency. In SMF-commissioned polling, respondents cited transparent pricing most frequently as the most useful type of information to encourage them to engage with the EV market. While this is more likely to be pricing of the EVs themselves, this finding indicates that consumers and taxpayers want to know what their money is being spent on more broadly.

If policymakers do decide to allocate costs through general taxation, as we recommend, it will be critical that politicians communicate the collective benefits of Net Zero to taxpayers. Public arguments for funding through general taxation might stress the *public* benefits that arise from reduced carbon emissions: a more sustainable climate and less air pollution, for instance. Parallels could also be drawn with existing universal public

services funded from general taxation: all taxpayers fund schools whether or not they have children, because an educated population is generally beneficial.

Without a clear and convincing rationale, it is conceivable that non-EV owning taxpayers will reasonably object to paying for costs from which they believe they will have little benefit; particularly if the government does not sufficiently remove barriers to the market, such as for those without off-street parking, renters, or in rural areas. Where these barriers intersect with existing inequalities, public discontent may rise among those on lower incomes who feel they are subsidising wealthier homeowners to own EVs.⁹²

The perception of unfairness is a grave threat to the viability of all policies: where policy treats one group differently to another, there is scope for grievance and therefore a political opportunity for those who wish to capitalise on that grievance. Currently, EV drivers benefit from a greater differentiation in vehicle taxes compared to petrol-diesel vehicles, such as VED, fuel duty and London Congestion Charge exemption.⁹³ While this is a necessary incentive to support uptake of a growing market, once EV adoption reaches a significant majority market share, policymakers should set out a pathway for the removal of these tax breaks. In time, this could mean raising revenue specifically from EV-drivers to cover costs for public charging infrastructure improvements. However, it is critical that the timing of such a measure does not hinder the growth of the market; establishing the conditions for such a shift in policy are beyond the scope of this report, but we recommend that more consideration be given to the long-term planning of transport taxes in for a country where EVs are the norm.

Roundtable contributors agreed that an approach which allocates costs through balancing RAB and general taxation models will likely best raise private and public financing and to protect both consumers and taxpayers from unfair costs. Policymakers should also consider the current economic outlook of the UK and its households when designing plans to introduce any tax changes. If the public perceive such policies to cause financial harm during a time of economic hardship, politicians may face resistance to maintaining support for Net Zero.

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