

Road to Zero

Unlocking public
and private capital to
decarbonise road transport



Foreword

Road transport is a key contributor to global emissions and poor air quality, but as September's fuel crisis in the UK has shown, whether for business, pleasure or movement of goods, transport is crucial to a functioning economy.

The pace of change now afoot within the road transport ecosystem has not slowed during the pandemic. Since the Government announced in November 2020 it would bring forward its ban on the sale of internal combustion engine vehicles to 2030, electric vehicles (EVs) and charging infrastructure have rarely been out of the news. Global auto manufacturers continue to invest in new zero emission vehicles, regularly releasing new models with longer ranges, and almost every new car advertisement now highlights the benefit of going electric.

UK consumer interest is growing rapidly: the recent fuel shortages led to another spike in demand as consumers observed the benefits of refuelling vehicles at home and almost 1 in 7 new cars registered in October 2021 was an EV. The UK's public charging network continues to expand with Gridserve committing to replacing the aging Electric Highway network at all motorway service areas and Connected Kerb securing new deals for 10,000 on-street EV chargers across the UK in 2021 alone.

But against this backdrop, there are significant concerns about the pace and form of the transition – notably around how orderly and also inclusive it will be.

The UK's public charging network is currently unevenly distributed. This means access is unequal, raising concerns about the utility of EVs over long distances, especially in more remote but also in less affluent areas. This in turn raises further questions around who – in pursuit of an orderly transition to a fully electric system – should pay to ensure the roll out of a nationwide charging infrastructure and how this should be achieved.

Added to these challenges, with the cheapest family-size models currently costing more than £20,000 new, and a very limited supply of used models, EVs remain too expensive for the majority of consumers. Without intervention to bring down the costs and facilitate a second-hand market, EVs risk remaining in the reach of only the wealthier members of society.

Failure to address this inclusion point up front and ensure a just transition is delivered, risks undermining public support for the net zero vehicle transition and a UK gilets jaunes moment. This risk will be exacerbated by the rise of low emission zones in pursuit of clean air.

Proactive solutions are needed to address these challenges and increase the likelihood of a successful transition.

This report draws on the collective knowledge and experience of stakeholders across the road transport ecosystem to understand and develop a series of 'demonstrator solutions' to address the barriers to delivering an orderly and inclusive transition to decarbonised road transport in the UK. Over the coming year and beyond we look forward to working with our coalition partners and our growing stakeholder community to roll out those demonstrator solutions and, through radical collaboration, help accelerate the UK's journey down the road to net zero.

Dr Rhian-Mari Thomas OBE

Chief Executive, Green Finance Institute

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60-Second Summary

-  The UK government's deadline of phasing out sales of new petrol and diesel cars and vans in the UK by 2030 has very significant implications for the road transport market in the UK. An estimated £150 billion of gross capital investment is needed by 2030 to meet expected new consumer demand for electric vehicles (EVs) and charging infrastructure¹.
-  Established by the Green Finance Institute in January 2021, the Coalition for the Decarbonisation of Road Transport (CDRT) brings together an expert multi-stakeholder group focused on identifying the most promising market solutions to scale up the investment in zero-emission road transport and supporting infrastructure.
-  The report sets out the results of a focused review of the complex and wide-ranging barriers to realising road transport decarbonisation, building on existing research, international best practice, and extensive conversations with experts from across the road transport ecosystem.
-  Through this work the CDRT has identified 18 potential solutions ('demonstrator solutions') that have been co-designed to enable the systemic change that will accelerate the mass deployment of EVs to 2030 and beyond.
-  This portfolio of demonstrator solutions will now be developed and piloted by the CDRT's growing network of stakeholders to accelerate the deployment of finance into road transport decarbonisation.
-  This report also sets out further policy measures which can further help bolster the commercial viability and scalability of the demonstrator solutions and incentivise mass EV uptake in the UK.

Executive Summary



Executive Summary

Context

Against a backdrop of rising cumulative global greenhouse gases (GHG), the Intergovernmental Panel on Climate Change's (IPCC's) 2021 report indicates the window of time left to act is short – with just 10 years left to deliver substantive GHG emission reductions to prevent the most severe impacts of climate change².

In recognition of this urgency, the UK Government has introduced stringent new targets to reduce GHG emissions by 78% by 2035 compared to 1990 levels. Rapid transitions in key sectors including building, energy, transport, manufacturing, agriculture, and land use are now needed.

Transport is a priority sector to decarbonise. Road transport is the largest contributor to UK domestic GHG emissions, accounting for 24% of domestic emissions, with over half of this coming from the use of passenger cars and light commercial vehicles. The pandemic has disrupted historical transport patterns, with journeys by all forms of transport still below pre-pandemic levels³. If, as a recent survey of UK adults suggested⁴, only 1 in 7 adults want to return to commuting five days a week, this would mean a major change for the transport sector, resulting in fewer cars and buses occupying our roads and lower emissions of greenhouse gases and particulates. However, early indicators are that car journeys are rebounding faster than public transport⁵. This presents an immediate challenge to the longer term imperative of transitioning to zero emission personal mobility, through reducing the total number of miles driven (increase in public transport usage; promoting active travel, which brings its own health benefits); or through helping people transition to a zero-emission vehicle where a personal car is still required.

Significant public capital has already been committed to accelerating road transport decarbonisation, with government grant funding provided for charging infrastructure and vehicle purchases as well as for investment into research and innovation projects and facilities to drive the transformation of the mobility sector. However, the scale of the investment required – estimated in this report to be more than £150 billion of gross capital investment to 2030⁶ – means the public purse cannot, and should not, be expected to finance the entire transition. At the same time, the private market alone will not provide the investment required to decarbonise road transport quickly enough, particularly as private capital does not price in the vast societal benefits this transformation will bring.

To accelerate the redirection of private capital into road transport decarbonisation opportunities and achieve net-zero targets set by government, collaboration between public and private sector needs to happen to a greater extent. This needs to be supported by regulation and a clear direction of policy to give investors confidence – the phaseout of petrol and diesel options and the Zero Emission Vehicle (ZEV) mandate are good examples. The transition to zero emission mobility is bringing new stakeholders (such as energy and digital organisations) and complexity into play, and new business models are emerging. Industry-led, cross-sector collaboration across the road transport ecosystem and financial markets is crucial to overcome the barriers to delivering this vision and mobilise private sector capital at the pace and scale required to achieve an orderly transition to EVs.

The role of public capital to de-risk these investment opportunities is a key question addressed in this report, with potential solutions put forward.

² IPCC (2021) AR6 Climate Change 2021: The Physical Science Basis.

³ Noting this excludes commercial vehicles/vans. Department for Transport (2021) Domestic transport use by mode: Great Britain, since 1 March 2020.

⁴ Economics Observatory (2021) What is the future of commuting to work?

⁵ Department for Transport (2021) Domestic transport use by mode: Great Britain, since 1 March 2020.

⁶ CDRT Analysis

The Coalition has prioritised, in this initial phase of work, addressing the barriers to consumers adopting EVs through both widening the access to the vehicles and financing the charging infrastructure needed to enable large scale adoption. The former, in particular, is key to facilitating an inclusive transition.

- **Consumer Purchase & Leasing:** EV adoption by consumers has been slower than for business drivers who have benefited from multiple fiscal incentives to switch to EVs. Consumer adoption is hampered by higher upfront cost of both new and used vehicles relative to fossil-fuelled cars, lack of supply of affordable models and confusion around new technologies as well as concerns about access to reliable, nationwide charging infrastructure.
- **Charging Infrastructure:** Despite significant progress, there is regional disparity in infrastructure provision, and the UK has yet to achieve the nationwide infrastructure rollout required to enable mass uptake of EVs.

The £150bn plus of investment needed by 2030 represents a mix of investment opportunities and will require different financial mechanisms across numerous asset classes with varying risk and return characteristics that will appeal to different investors. Working with a wide variety of stakeholders across finance, industry, local and national government, academia and civil society, the Coalition dissected at a granular level the barriers to mobilising this capital investment and identified the potential solutions that could be deployed to address them.

Consumer Purchase & Leasing

Analysis performed by the Coalition estimates that the EV consumer financing market could be worth £31 billion annually by 2030, with cumulative growth of £140 billion between 2021 and 2030. However, consumer adoption of EVs is still in its infancy and a number of barriers deter larger numbers of consumers from switching in the short term. Higher upfront cost of the vehicles, pace of improvement in battery range, concerns about access to reliable charging infrastructure and perceived complexity of transitioning means many consumers are hesitant about making a new EV their next car. Within the used car market, the barriers to switching from internal combustion engines (ICE) are even higher, due to concerns about the battery health of a second-hand car on top of all the previously cited barriers to acquiring a new EV. The creation of a viable second-hand market for consumers was identified by all stakeholders as a key priority to support development of the primary market. It is also key to ensuring access to EVs across all income groups.

Consumer finance products which help consumers understand the total lifetime cost of ownership have the potential to help consumers overcome some of the barriers to accessing an EV, including the upfront price premium and technology risk. But lenders' concerns about the risks relating to residual values (i.e. how much the car is worth at the end of the finance agreement) are having a negative impact on consumer pricing.

Without solutions to reduce the risks faced by lenders rolling out EV consumer finance products, which in turn help consumers overcome their reluctance to switch across both the new and used market, there is a risk consumers will continue to wait, and the market as a whole fails to complete an orderly transition to all new EV sales by 2030.

Charging Infrastructure

Consumer and business confidence about transitioning to EVs is also hampered by a lack of widespread and suitable charging infrastructure within the UK today. If the potential market growth forecast for EVs is achieved, there could be as many as 11 million EVs on UK roads by 2030, necessitating significant chargepoint growth from the 27,000⁷ public chargers in operation today.

⁷ <https://www.zap-map.com/>

Recent announcements such as Connected Kerb securing new deals for 10,000 on-street EV chargers across the UK in 2021 alone, including up to 7,000 for West Sussex County Council in what is the UK's largest ever deployment by a local authority, as well as Gridserve's acquisition and upgrade of the Electric Highway, are very welcome. Continued acceleration in charging infrastructure build out is key to giving larger numbers of consumers and business fleets the confidence to switch.

Equally as important as the number of charging points is the location and type of chargepoint installed. The uneven roll out of EV infrastructure reflects the varying resource capacity in local authorities across the country. Without market intervention there is a risk the UK's public charging network remains unevenly distributed and unequitable, which ultimately could at best slow EV uptake overall and at worst, cause a disorderly, fast and late transition. Delivering a UK-wide charging infrastructure in an orderly fashion will require coordination and collaboration between local authorities, data providers, chargepoint operators and energy companies as well as the development of financial solutions that de-risk investment in areas where the business case for installation is less compelling today.

Whilst most charging is expected to happen within a home and workplace setting, public charging will play a vital role, particularly for the 10 million households⁷ without access to dedicated off-street parking. The barriers to investment in public charging are more complex than for private charging. They comprise a mix of both financial and non-financial obstacles including uncertain utilisation rates, risk of stranded assets, high capital costs, lack of upfront transparency about grid connection costs and complex planning regulations, which differ across the UK. The significant uncertainty about return profiles, creates a challenging landscape for investors. This is particularly apparent in rural and less affluent areas of the country, where the economic case for installing charging is currently less compelling due to slower EV uptake. Failure to address this issue will result in a widening gap in access to chargepoints that risks hindering the orderly roll out of EVs.

Potential solutions need to focus on building capacity and expertise in local authorities; reducing upfront capital costs; and signalling expected market demand through better data provision – all of which needs to be backed by a supportive policy and regulatory environment.

Next steps

The Coalition has identified a series of 18 demonstrator solutions which can start to tackle the most important barriers to scaling up EV consumer finance and investment in EV charging infrastructure. These are highlighted in Table 1.

Coalition members assessed the demonstrator solutions based on scale of impact on EV uptake and ease of implementation. The results are shown in Figure 1. Working groups are assembling to co-design and pilot these demonstrator solutions to test their feasibility, impact on EV uptake and ability to scale.

“Finance is the engine of this transition. It is a critical enabler in helping the real economy transition to a net-zero carbon model, and multiple financial players must be engaged to scale investment”.

Minister Trudy Harrison, Parliamentary Under Secretary of State for Transport
(Department for Transport)

⁷ RAC (2021) Standing Still.

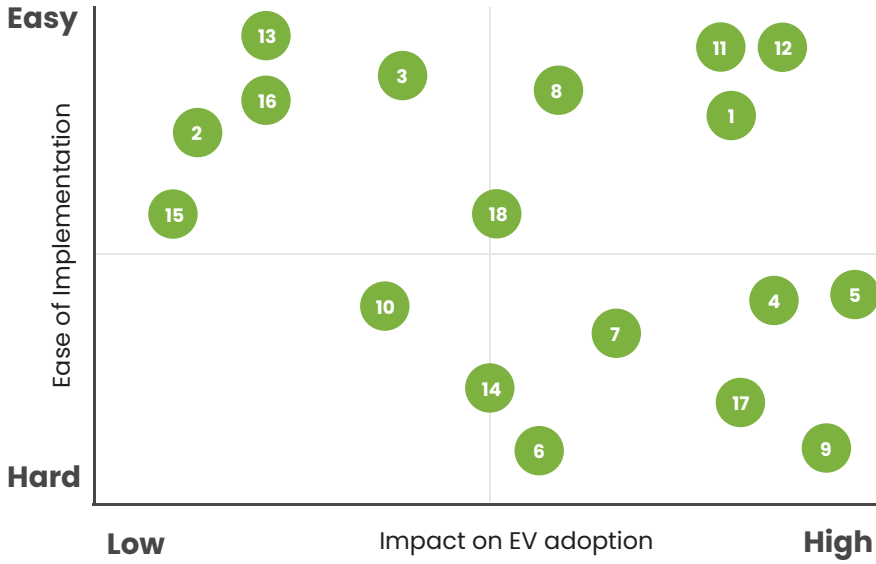
Table 1. Demonstrator solutions

Focus Area	#	Solution	Overview
Purchase and Leasing Electric Vehicles	1	EV Loan Securitisation	<ul style="list-style-type: none"> EV loan securitisation will enable larger EV loan lenders to aggregate loans or leases for sale in the secondary market. The balance sheet released can then be deployed toward further EV loans or leases.
	2	0% Consumer Finance Loans for EVs	<ul style="list-style-type: none"> 0% (or very low %) motor finance for EVs, similar to the existing Scottish 0% unsecured loan scheme, but likely to be hosted by private sector and applied to motor finance products.
	3	Means-Tested Subsidised Loans for Used EVs	<ul style="list-style-type: none"> Low-cost motor finance for used EVs targeted at lower income groups to provide funding where it is most needed. Scope to also adapt to leasing agreements.
	4	Battery Health Certificate	<ul style="list-style-type: none"> A compulsory battery health certification scheme for used vehicles, giving confidence to a used car buyer that the remaining battery health is adequate. Could be supported by an extended warranty scheme beyond the 8-year manufacturer warranty.
	5	Total Cost of Ownership Principles	<ul style="list-style-type: none"> A concise, comparable set of principles outlining the total cost of ownership for EVs for consumers, including a price and carbon footprint comparison of EVs and ICE vehicles.
	6	Battery Value Guarantee	<ul style="list-style-type: none"> A mechanism for the battery within an EV to have a guaranteed end-of-life value, providing a minimum value to which the vehicle depreciates. Could also include a mid-cycle swap mechanism in the event of battery failure.
	7	Bundled Finance Solutions	<ul style="list-style-type: none"> Bundled vehicle/infrastructure finance packages, enabling consumers to make one monthly payment for vehicles, chargepoints, energy supply and associated infrastructure such as solar panels.
	8	Salary Sacrifice for SMEs	<ul style="list-style-type: none"> Simplified salary sacrifice schemes which allow employees of smaller organisations to benefit from the tax and national insurance advantages of sacrificing salary in return for an EV.

Focus Area	#	Solution	Overview
Charging Infrastructure	9	Transport Infrastructure Facility (TIF)	<ul style="list-style-type: none"> A public/private facility to de-risk investment in charging infrastructure where there remains market failure, supporting the roll out of nationwide EV infrastructure, potentially including guarantees or cornerstone funding from public finance.
	10	EV Infrastructure Investor App	<ul style="list-style-type: none"> An application that assists EV charging infrastructure investors and other stakeholders by providing trusted curated data and models at the intersection of energy system capacity, EV charging demand and public policy – in alignment with the UK's net-zero goals.
	11	Local Authority Toolkit	<ul style="list-style-type: none"> Best practice frameworks and supporting materials to help local authorities navigate the processes and financial solutions available when installing charging infrastructure.
	12	Regional Area Tendering	<ul style="list-style-type: none"> Procurement framework to enable local authorities to aggregate and tender larger scale charging infrastructure, bundling together lower and higher utilisation sites.
	13	Community Municipal Investments	<ul style="list-style-type: none"> Crowdfunding approach to create an efficient, scalable and cost-effective source of funding for local authorities to finance capital expenditure on local charging infrastructure.
	14	Utilisation Linked Loans	<ul style="list-style-type: none"> Loans for chargepoint operators, local authorities and small businesses repayable based on utilisation. In a similar way to student loans, repayments would not commence until a base utilisation was achieved, which would likely be later for rural chargepoints.
	15	Property Linked Finance	<ul style="list-style-type: none"> Property Linked Finance enables building owners to access 100% upfront funding to install EV chargepoints through finance attached to the property. The responsibility for repayments remains with the property and is passed on to subsequent owners who are benefitting from the chargepoint. This model is based on the success of Property Assessed Clean Energy (PACE) financing in the USA.
	16	Demand Aggregation Finance (DAF)	<ul style="list-style-type: none"> An online service, coupled with new financial products, that establishes a critical mass for EV chargepoint demand in a local area, bringing down the up-front and financing costs for those that register an interest in the scheme. For businesses/local authorities, it could be structured as a Special Purpose Vehicle, enabling multiple co-located businesses to finance EV infrastructure.
	17	Revenue Guarantees	<ul style="list-style-type: none"> A mechanism guaranteed by Government to provide contractual utilisation revenue for chargepoints, where business cases remain uncommercial, for example, using a Contract for Difference mechanism for utilisation or e-credits funded by petrol/diesel sales if EV uptake is slower than expected.
18	Investor Showcase	<ul style="list-style-type: none"> An interactive knowledge hub to help connect businesses seeking investment to knowledgeable investors looking for investment opportunities. 	

Figure 1

Demonstrator Solutions Overview | Ease versus Impact



List of Potential Solutions

- 1 EV loan Securitisation/ Warehousing
- 2 0% Consumer Finance for EVs
- 3 Means-tested loans for used EVs
- 4 Battery Health Certificate
- 5 TCO Principles
- 6 Battery Value Guarantee
- 7 Bundled Finance Solutions
- 8 Salary sacrifice for SMEs
- 9 Transport Infrastructure Facility
- 10 EV Infrastructure Investor Application
- 11 Best practice frameworks for Local Authorities
- 12 Regional Area Tendering
- 13 Community Municipal Investments
- 14 Utilisation Linked Loans
- 15 Property Linked Finance
- 16 Demand Aggregation Finance
- 17 Revenue guarantees
- 18 Investor Showcase

Source: CDRT

1. Introduction



1. Introduction

2020 was the warmest on record across Europe, with temperatures across the region more than 1.9°C above the long-term average between 1981 and 2010. Cumulative global greenhouse gases (GHG) also rose to a record high in 2020 despite the global pandemic that slowed economic activity. As stated in the Intergovernmental Panel on Climate Change's (IPCC's) 2021 report, the window of time to act is short – with just 10 years left to deliver substantive GHG emission reductions to prevent the most severe impacts of climate change. In recognition of this urgency, the UK Government has introduced stringent new targets to reduce GHG emissions by 78% by 2035 compared to 1990 levels, as an interim part of the UK's wider net zero by 2050 target. Rapid transitions in key sectors including building, energy, transport, manufacturing, agriculture, and land use are now needed.

Transport is a priority sector to decarbonise. Road transport is the largest contributor to UK domestic GHG emissions, accounting for 24% of domestic emissions, with over half of this coming from the use of passenger cars and light commercial vehicles. In addition, air pollution – in part caused by fossil fuel use in vehicles – is responsible for more than 40,000 excess deaths in the UK every year⁸.

To underscore the urgency of the need to shift away from fossil fuel use in this sector, the UK has implemented a ban on the sale of new petrol and diesel vans and cars in the UK from 2030⁹, one of the most stringent timelines imposed by any government globally¹⁰, meaning the clock is now ticking on a rapid transition to an electric fleet.

The leadership shown by the UK Government in addressing the climate and health implications of continuing to burn fossil fuels in road transport also represents an opportunity for the UK to become a global leader in the deployment, and potentially manufacturing, of zero emission vehicles and their powertrains.

The UK has already made progress, but there are still barriers to delivering the vision of a fully electrified fleet. The pace of EV adoption has accelerated over the last few years, with EV ownership increasing at a compound annual growth rate of 55% between 2015 and 2020¹¹ (see Figure 2). However, this growth is starting from a low baseline, so that EVs still only made up just 9.5% of all new car registrations in the nine months to September 2021¹².

Currently, the majority of new EV registrations are in the corporate fleet market, driven by a combination of corporate sustainability targets and progressive fiscal policies, such as low benefit-in-kind rates¹³, which – together with lower running costs of EVs compared to ICE cars – have made it cost effective for company car drivers in business fleets to switch to electric cars and helped boost demand. 8% of company cars are EVs, compared with less than 1% (0.7%) of the total UK car parc^{14,15}. New car registrations by business fleets are an important driver of wider uptake of EVs, as these vehicles are typically operated for 3-4 years and then feed the used car market for consumers.

⁸ RCP (2016) Every breath we take: The lifelong impact of air pollution.

⁹ HM Government (2020) Government takes historic step towards net-zero with end of sale of new petrol and diesel cars by 2030.

¹⁰ ICCT (2021) Update on government targets for phasing out new sales of internal combustion engine combustion cars.

¹¹ Department for Transport (2021) VEH0133: Licensed ultra-low emission vehicles by body type and propulsion or fuel type.

¹² New AutoMotive (2021) Electric Car Count.

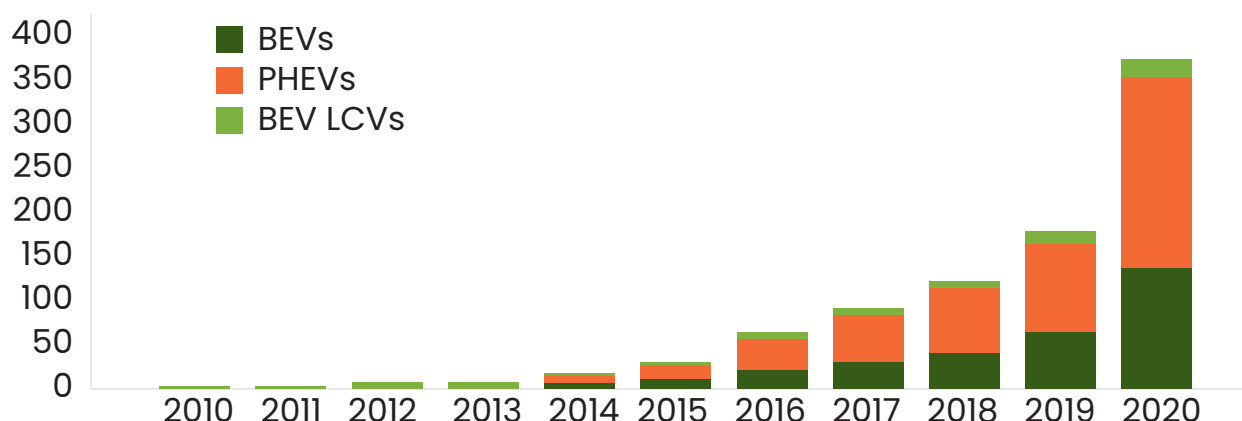
¹³ Benefit-in-kind is a tax on employees who receive benefits or perks on top of their salary. If you have a company car for private use, you will have to pay a BIK contribution, or company car tax (see box 4 for further information).

¹⁴ Car parc is defined as the total number of cars on UK roads.

¹⁵ BVRLA (2021) Fleet sustainability credentials 2021.

Figure 2

Number of licensed BEVs and PHEVs annually in the UK, ('000 vehicles)



Source: Department for Transport

Adoption within the retail market has been slower¹⁶, primarily because of the high upfront cost of the vehicles in comparison with fossil-fuel cars and, linked to this, a lack of supply of new and used affordable models. In addition, consumers express concerns about EV suitability and access to a reliable, nationwide charging infrastructure¹⁷. Targeting business fleets with incentives is effective in accelerating new technology uptake at scale, however, once these vehicles enter the used market, the consumer becomes the primary source of demand and so consumer uptake barriers need to be addressed in parallel.

Significant progress has already been made with the roll out of charging infrastructure, with almost 27,000 chargepoints installed to date in the UK¹⁸. Recent announcements such as Connected Kerb securing new deals for 10,000 on-street EV chargers across the UK in 2021 alone, including up to 7,000 for West Sussex County Council in what is the UK's largest ever deployment by a local authority, as well as Gridserve's acquisition and upgrade of the Electric Highway, are very welcome. Continued acceleration in charging infrastructure build out is key to giving larger numbers of consumers and business fleets the confidence to switch. Despite this progress, however, there is significant regional disparity in infrastructure provision and the UK has a long way to go to achieve the nationwide infrastructure roll out required to enable mass uptake of EVs.

This market context implies there remain significant challenges to scaling up the deployment of EVs and roll out of enabling infrastructure in the UK. Many of these issues relate to access to finance – and will require a public-private partnership approach to resolve.

The Green Finance Institute was established in 2019 to work at the interface of the public and private sectors. A key focus of our work is to identify the barriers to investment and co-design both the innovative financial solutions and enabling regulatory and legislative changes that will mobilise both public and private finance to achieve our vision of clean and resilient growth. In practice this is achieved through convening broad coalitions of expert practitioners from across finance, industry, academia and local and national government. The CDRT seeks to do exactly this for road transport decarbonisation in the UK.

¹⁶ Ibid.

¹⁷ AutoTrader (2021) Nationally representative tracker.

¹⁸ Zap Map (2021) EV Charging Stats 2021.

2. The Coalition for the Decarbonisation of Road Transport (CDRT)



Mission Statement

The CDRT aims to unlock the financial barriers to the decarbonisation of road transport and enabling infrastructure, initially in the UK, to support the transition to a zero-carbon and climate resilient economy.

2. The Coalition for the Decarbonisation of Road Transport (CDRT)

The Green Finance Institute established the Coalition for the Decarbonisation of Road Transport (CDRT or “the Coalition”) in January 2021, with generous support from Quadrature Climate Foundation. As with our pathfinder programme, the Coalition for the Energy Efficiency in Buildings, the CDRT brings together global experts from the finance, automotive and energy sectors, with leading thinkers from academia and non-profit organisations as well as local and central government leaders to identify, develop and deploy a portfolio of new financial solutions that will enable systemic change to accelerate the mass deployment of decarbonised vehicles in the UK. A full list of current Coalition members and contributors to this report can be found in Appendix 1.

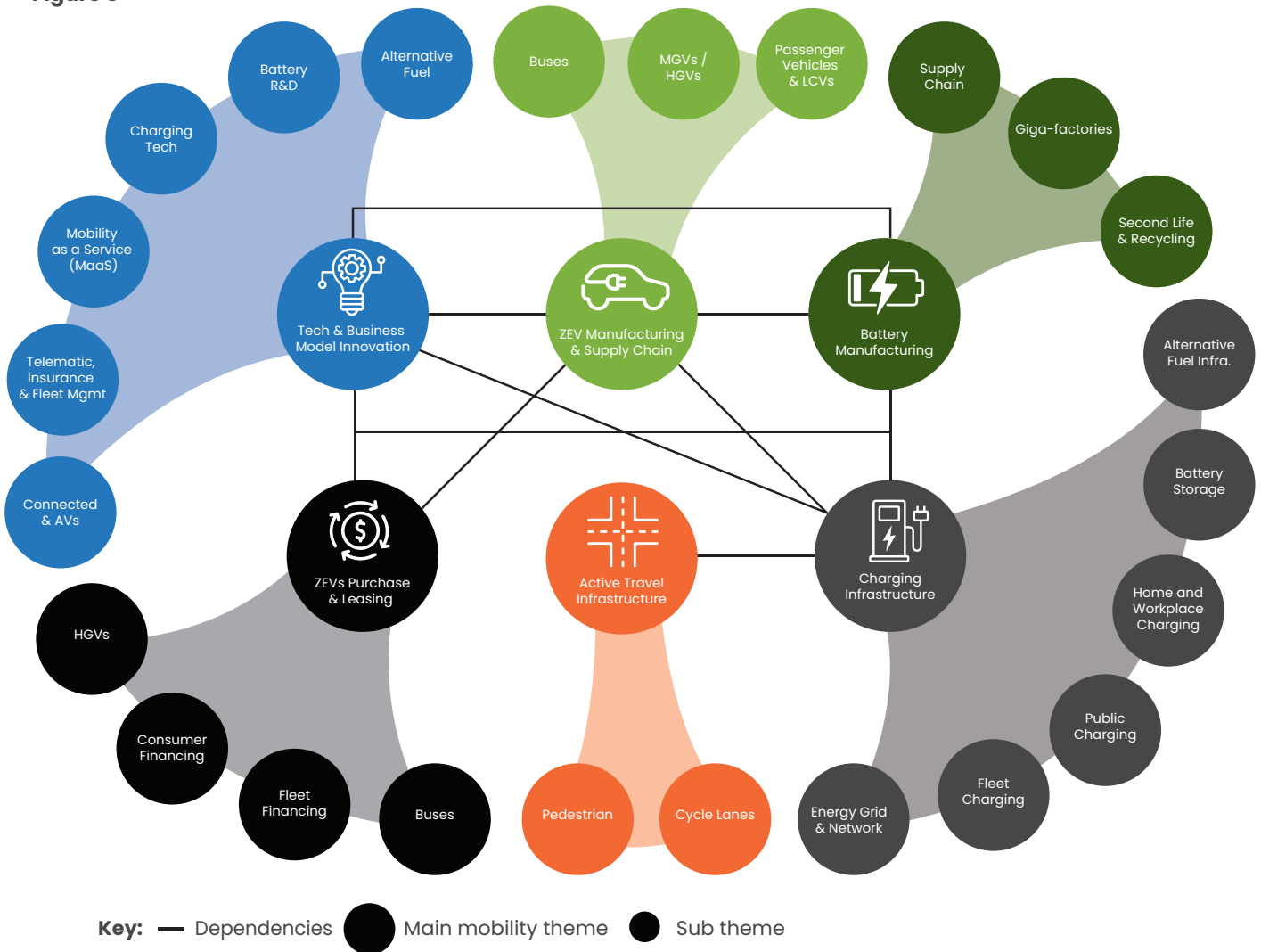
3. Methodology



3. Methodology

The road transport decarbonisation task is vast and complex with many different possible technology pathways and system interdependencies (see Figure 3). Because of this complexity, the financial solutions needed to facilitate decarbonisation will require collaboration across public and private sectors, and across finance, transport and energy sectors.

Figure 3

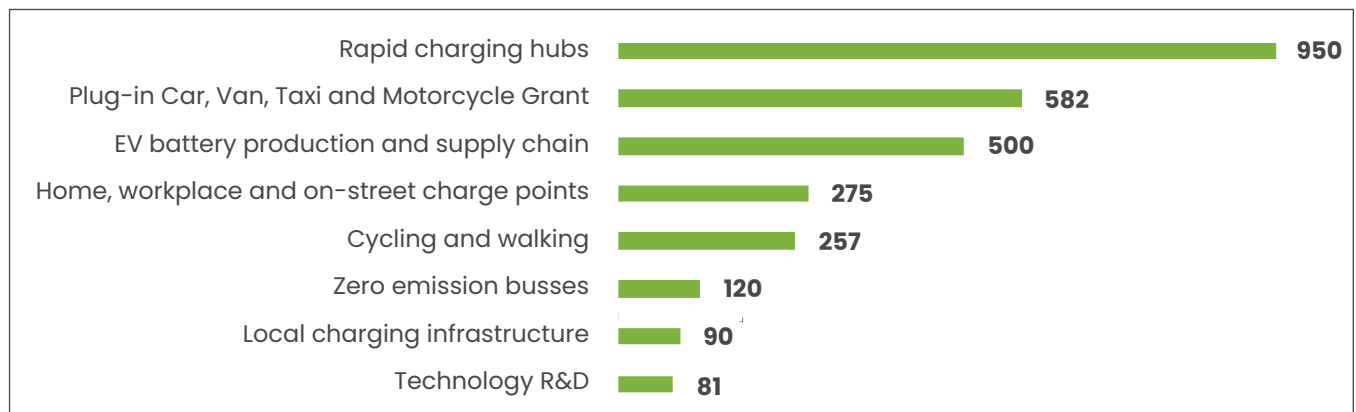


Source: CDRT Analysis

Significant public capital has already been committed to accelerating transport decarbonisation (see Figure 4), however, the scale of the investment required – estimated to be more than £150 billion of gross capital investment to 2030 – means the public purse should not and cannot be expected to finance the entire transition. Having identified a need for private capital, the Coalition has brought together experts from financial services, industry, academia, and not-for-profit organisations to consider what market interventions are needed to unlock the investment needed.

Figure 4

2020 Spending Review commitments by UK Government (£m)



Source: HMT Spending Review 2020

The Coalition has prioritised areas where the barriers are high, investment opportunities significant and where financial innovation could be a key means to unlock the capital needed to enable the transition to a zero-emission vehicle fleet in the UK.

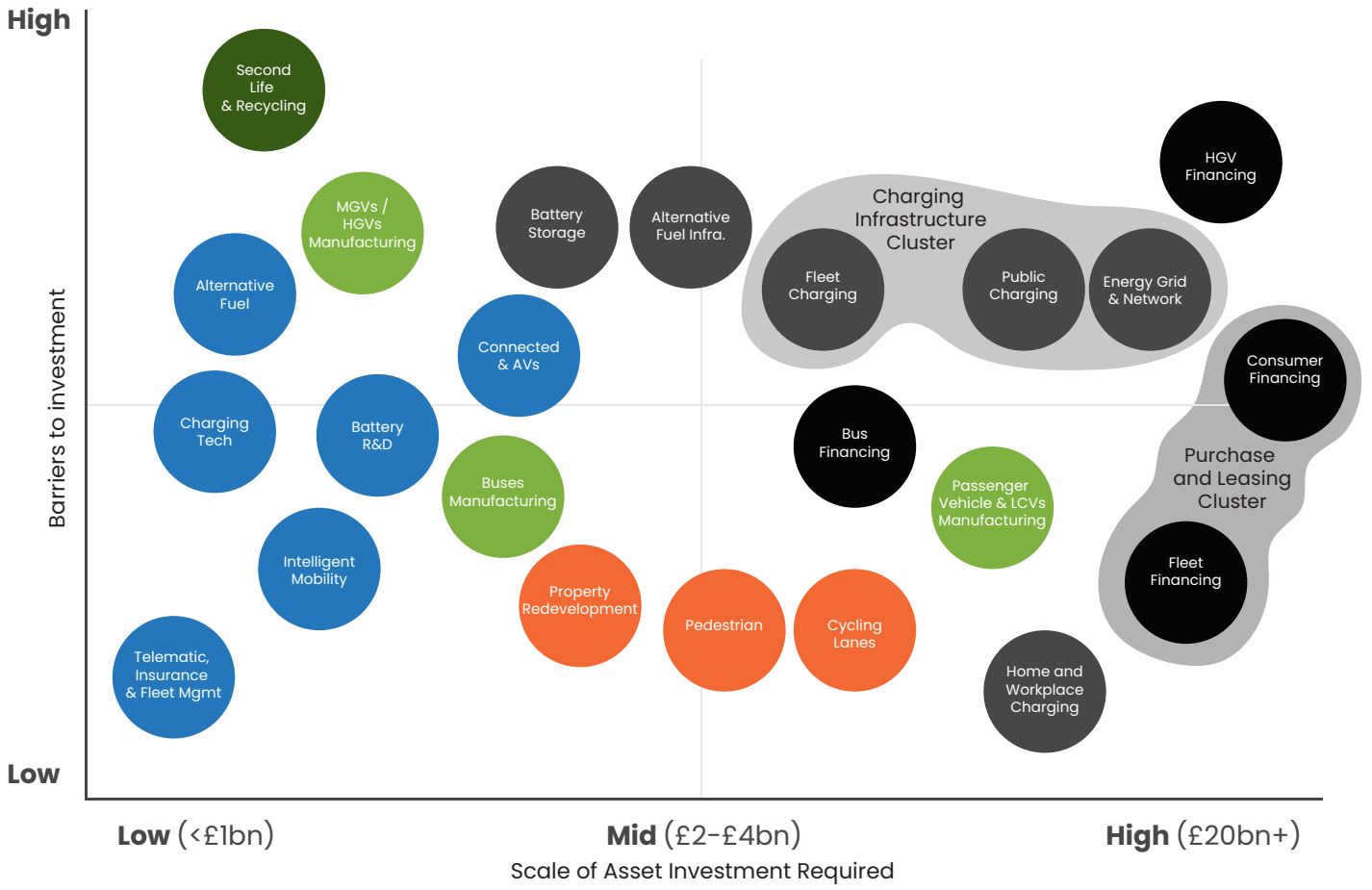
As a first step to identifying priority areas to explore, key components of the road transport ecosystem were set out and then categorised into sub-themes, as shown in Figure 3. Each sub-theme was then ranked based on the potential transformational impact of addressing the barriers to investment, which in turn was a function of the potential investment opportunity unlocked, as illustrated in Figure 5.

Through this screening process and verification with experts, we identified a need for a greater focus on the consumer segment, where the barriers to EV adoption are higher than for business drivers, and on charging infrastructure as a critical enabler to mass adoption by both businesses and consumers.

Prioritising consumer EV adoption and charging infrastructure does not discount the need for action in other areas of road transport. The Coalition recognises the value and importance of delivering change across the entire transport ecosystem, including through reducing the number of miles driven, promoting active travel, increasing public transport use and shared mobility. However, even with behavioural change and significant investment in public transport infrastructure, UK consumers and businesses will continue to rely on passenger cars and light commercial vehicles to move themselves and goods around beyond 2050. Therefore, accelerating the transition to zero emission vehicles through unlocking financial solutions to enable the transition, is a critical next step in facilitating the UK's pathway to net zero, and the focus of our first report.

Figure 5

Scalability and Ease of Implementation



Source: CDRT Analysis

4. Purchasing and Leasing Electric Vehicles



4. Purchasing and Leasing Electric Vehicles

4.1 Current Market Context

Monthly new vehicle registration statistics divide new registrations into two categories – vehicles registered by Fleets (including businesses, leasing companies and vehicle rental companies) and those registered by Retail (i.e., consumers). Historically, the split is approximately half and half¹⁹.

To date, the majority of EV registrations have come from the corporate fleet market, driven by a combination of corporate sustainability targets and progressive fiscal policies, such as low benefit-in-kind (BiK) rates, which together with lower running costs of EVs compared to ICE cars, have helped boost demand. New car registrations by business fleets are important as these vehicles are typically operated for 3–4 years and then enter the used car market for consumers. This growth is expected to continue if fiscal policies continue to favour EV over ICE and if the UK's charging infrastructure keeps pace with a growing vehicle parc. Our analysis showed little need for financial innovation within the corporate fleet market for purchase and leasing of the vehicles themselves, although businesses and vehicle rental companies do require finance solutions for more costly charging infrastructure.

To achieve mass adoption of EVs in the UK, growing uptake within the corporate fleet market needs to be matched by accelerated growth in the retail (consumer) market, particularly in the used car market. To date consumer adoption has been slower because of the higher upfront cost of the vehicles, consumer concerns about access to reliable charging infrastructure and lenders' concerns about the risks relating to EV residual valuations^{20 21}. The cost issue is compounded by the fact that total cost of ownership (i.e. the combined cost of the vehicle and running costs, which in some instances can be less than an equivalent ICE vehicle, see Table 2) is not clearly understood by consumers. In addition, nervousness around the suitability and useability of the new technologies and the perceived complexity and inconvenience involved in switching to an EV creates consumer inertia in relation to switching. These barriers apply to both the new and used market, with the added barriers of ageing technology and battery health concerns in the used car market, caused by the fact there is no trusted methodology to demonstrate battery reliability to a potential used EV buyer.

Incentives are needed to help consumers overcome these technology-related concerns. Where they have been used they have been effective – as demonstrated by strong growth in salary sacrifice fleets in 2021²². Bundled packages (i.e., financial products covering the cost of both charging and the vehicle cost and simplifying the acquisition process) are a convenient and attractive way to address perceptions of higher cost; however, existing consumer credit regulation is a barrier to realising the offering of such packages.

¹⁹ SMMT (2021) Vehicle data: car registrations.

²⁰ Residual value can be defined as the forecast value of the vehicle at the end of the finance contract period.

²¹ Ofgem (2021) Insights into consumer attitudes to decarbonisation and future energy solutions.

²² BVRLA (2021) Road to Zero Report Card 2021.

If solutions can be developed, the prize is large. We forecast there is potential for the EV consumer financing market to be worth £31 billion annually by 2030, with cumulative growth of £140 billion between 2021 and 2030²³. Most of this value will come from the sale of new EVs (see Figure 6). Alternatively car clubs such as Zipcar, and ride-hailing solutions such as Uber, are available for drivers who need occasional use of an electric vehicle.

“94% of new cars, and an increasing percentage of used cars, are bought using consumer finance. This means that, if the Government’s 2030 target is to be met, it’s not sufficient just for ‘sticker’ price parity between ICE cars and EVs to be achieved but also ‘pocket’ price parity – taking into account finance, maintenance, and running other costs as well.

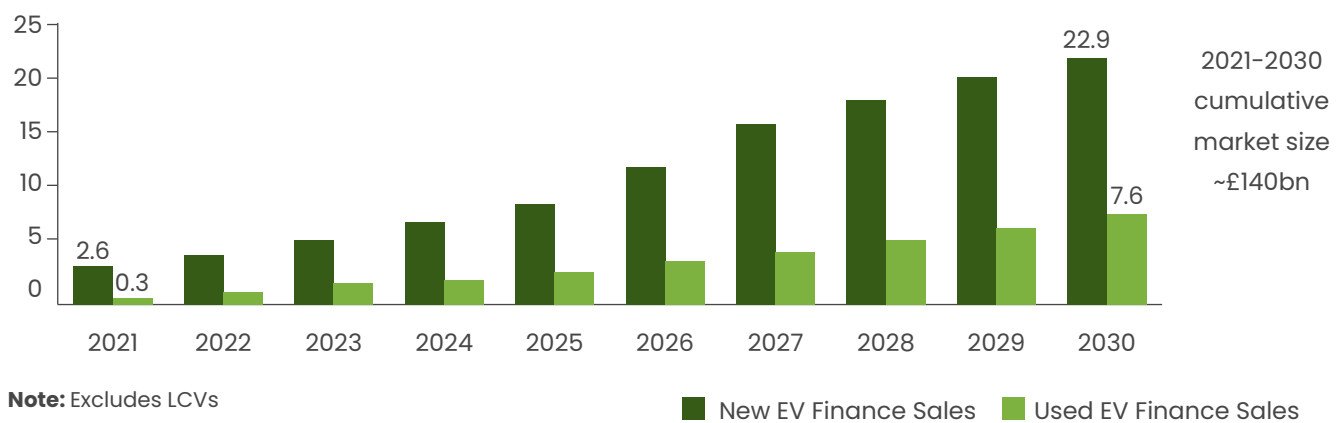
This means recognising that we’re starting from a position where financing EVs currently attracts a range of elevated credit risks, including residual value risk. Where credit risks are higher, so are credit prices and credit availability.

We have no doubt that solutions can be found to address these risks. While we recognise that managing risk is what our sector does best, we also believe that Government has a place to underwrite some of these risks on a transitional basis as part of a credible plan to achieve the 2030 target.”

Adrian Dally, Finance and Leasing Association (FLA)

Figure 4

Forecasted value of new and used consumer EV financing market, (£bn)



²³ CDRT analysis – projection based on modelling of number of transactions x average deal size.

A range of established consumer financing options are available to retail customers wishing to access a vehicle today. These include personal loans; hire purchase, conditional sales or personal contract purchases (PCPs); hire products (including personal contract hire); subscription products; and salary sacrifice (see Box 1). Alternatively car clubs such as Zipcar, and ride-hailing solutions such as Uber, are available for drivers who need occasional use of an electric vehicle.

Box 1

- 1. Personal loans** – Consumers can take out personal loans from their bank and pay for a vehicle with the equivalent of cash. That gives the consumer a loan relationship with their bank but is ultimately a cash purchase, where the consumer takes the asset risk.
- 2. Hire purchases, conditional sales or PCP** – These are credit products where the lender takes the asset risk throughout the duration of the contract term.
- 3. Personal contract hire** – The consumer uses the product and gives it back at the end of the hire term, often for a replacement on a new contract. Once again, the lender takes the asset risk.
- 4. Subscription products** – These products, offering shorter term, more flexible vehicle usership, are also growing in popularity, but often come with a price premium. The provider takes the asset risk.
- 5. Salary Sacrifice** – Employees can finance a fully maintained and insured car through payroll deductions. Typically, only available to employees of large organisations, although providers for SMEs are beginning to emerge. Again, the lender takes the asset risk.

Theoretically, these consumer finance mechanisms can be used to purchase EVs. However, there are – in some cases – some significant challenges to rolling them out from the lenders' perspective. One of the biggest issues is the nascent nature of the EV market, which means there are fewer data points from which lenders can price for asset risk. The absence of such data can lead to higher monthly costs for consumers financing or leasing vehicles, due to the need for lenders to make cautious assumptions about future residual values. For the consumer focused on price, this can make an EV a less attractive option than an ICE, due to the higher monthly repayments. In addition, concerns around the longevity of batteries in used vehicles – which is a key input to determining residual value – means some independent lenders are unwilling to offer finance on used EVs at all.

Currently almost all new retail car sales are facilitated by consumer finance products (92% up from 54% in 2010); in the used market consumer finance products support around 32% of sales²⁴. Thus resolving the challenges faced by lenders in rolling out EV consumer finance products in the new and used market is key to increasing the adoption of EVs in the UK.

²⁴. CDRT Analysis

Box 2**What is a Residual Value?**

In the context of motor finance, residual value refers to the expected resale value of the vehicle at the end of a finance or leasing agreement. The estimated residual value is calculated by the lender or lessor at the start of the agreement, either by a third party (such as CAP HPI) or by internal teams and is a key factor in determining the monthly finance or lease payments.

How are Residual Values calculated?

To calculate the expected residual value, a variety of data points are assessed including but not limited to:

- Vehicle specific data – manufacturer, model, vehicle specification, fuel type, fuel efficiency
- Economic data – registration volumes, GDP, inflation, unemployment, interest rates, exchange rates
- Editorial data – peer vehicle comparisons, expected regulatory changes, latest used values, future trends

For ICE vehicles, robust data points exist going back more than 15 years. For EVs, there remains very little editorial data due to relatively low registrations to date, and with added factors such as battery health and the ability of some manufacturers to increase a vehicle's battery range via a software update, the residual value setting process requires a greater degree of subjectivity.

Why is Residual Value important?

Predicting a used car price some way ahead is therefore critical to car manufacturers, leasing companies, fleet operators and private car buyers so they can budget reliably as to what a car will be worth in the future when economic and legislative conditions might be totally different. The confidence with which lenders can predict residual values impacts the provisions which need to be held on the balance sheet to mitigate future residual value losses and therefore the amount of residual value risk lenders are willing to hold.

4.2 Barriers

The Coalition considered the barriers to scaling up consumer finance for EVs from the perspective of the three sets of market participants: consumers, lenders (both banks and captive finance houses owned by manufacturers) and market intermediaries (i.e. car dealers and leasing brokers). The barriers fell into five categories that apply to all market participants, albeit not equally.

- (1) EV list price premiums
- (2) Residual value uncertainty
- (3) Technology obsolescence and longevity of batteries
- (4) Availability of charging infrastructure; and
- (5) Regulation

1. EV list price premiums**Table 2:** New Car Total Cost of Ownership Comparison

Model	Vauxhall Corsa (Petrol)	Vauxhall Corsa-e (Electric)	Delta £	Delta %
Manufacturer's List Price (after grant)	£21,814	£30,690	£8,876	29%
Annual Lease Cost	£4,406	£5,267	£861	20%
Annual fuel cost	£1,100	£400	-£700	-64%
Annual tax and maintenance	£585	£177	-£408	-70%
Annual insurance	£423	£566	£143	34%
Total annual running cost	£6,514	£6,410	£104	-2%

Source: Lex Autolease, Vauxhall Corsa Hatchback 1.2 Turbo Elite Nav Premium 5dr & Corsa-E Hatchback 100kw Elite Nav Premium 50kwh 5dr Auto on personal contract hire for 36 months, 10,000 miles per annum.

As noted in Table 2, the total cost of ownership can be similar or even lower for EVs versus a comparable ICE vehicle due to the lower running costs associated with EVs (which includes lower maintenance, road tax and fuel bills). Despite this, list price is still the primary driver of many consumers' decision making, even when they use consumer finance or leasing solutions instead of outright purchasing. Today's EVs carry a list price premium and are not expected to reach list price parity with ICEs until the mid-2020s, based on projected reductions in the cost of batteries²⁵. On average, volume hatchback cars are 73% more expensive than ICE equivalents, and volume SUVs 25% more expensive²⁶. This price premium also extends to today's used car market. As a priority, the lack of widespread understanding of the total cost of ownership concept and how this relates to list price needs to be tackled, both in the new and used markets. This is because to achieve mass adoption, the creation of a viable second-hand market for EVs is essential for the majority of consumers who will be buying used²⁷. Solutions such as the savings calculator provided by Electric Car Guide should be more widely promoted²⁸.

The list price premium challenge is compounded by manufacturers focusing on the higher end of the market for new product development. The premium end of the market is inaccessible to the majority of consumers today and access is often contingent on having a high credit score. In addition, manufacturers continue to provide significant discounts on new ICE vehicles in order to boost new vehicle sales and grow market share. An increased supply of more affordable EVs is needed – and is expected to be forthcoming as demand grows²⁹.

Another price lever lenders can use to reduce the cost of access to an EV is simply to reduce interest rates on consumer finance products. These interest rates are typically higher for used vehicles than for new vehicles because new vehicles benefit from manufacturer-backed subsidised finance and, typically, a higher credit-quality customer base. Solutions that lower the cost of capital for lenders in the used EV market will benefit consumers if those pricing benefits can be passed through to them.

In terms of addressing these barriers, solutions that focus on tackling the list price premium in the new and used markets, simplify the acquisition process, and provide better information on the total cost of ownership, are needed. The Coalition's demonstrator solutions 2 (0% Consumer Finance Loans), 3 (Means Tested Subsidised Loans) and 8 (Salary Sacrifice for SMEs) aim to reduce the cost of financing an EV. Demonstrator solutions 5 (Total Cost of Ownership Principles) and 7 (Bundled Finance) can provide information and simplify the acquisition process for consumers.

²⁵ BNEF (2021) Electric Vehicle Outlook 2021.

²⁶ AutoTrader advertised sale prices, October 2021.

²⁷ Department for Transport (2021) VEH0253: Cars registered for the first time by propulsion and fuel type – In 2019 there were 2.3 million new cars registered, accounting for 22% of total car transactions, with ultra-low emission vehicles making up just 3.4% of those registrations. In comparison, used car transactions amounted to 7.9 million, representing 78% of total transactions, with alternatively fuelled vehicles making up just 1.8% of that, proving that the second-hand market for EVs is still somewhat underdeveloped.

²⁸ Electric Car Guide (2021) Savings Calculator.

²⁹ Transport & Environment (2021) Explained: Are we ready to switch to emissions-free cars?

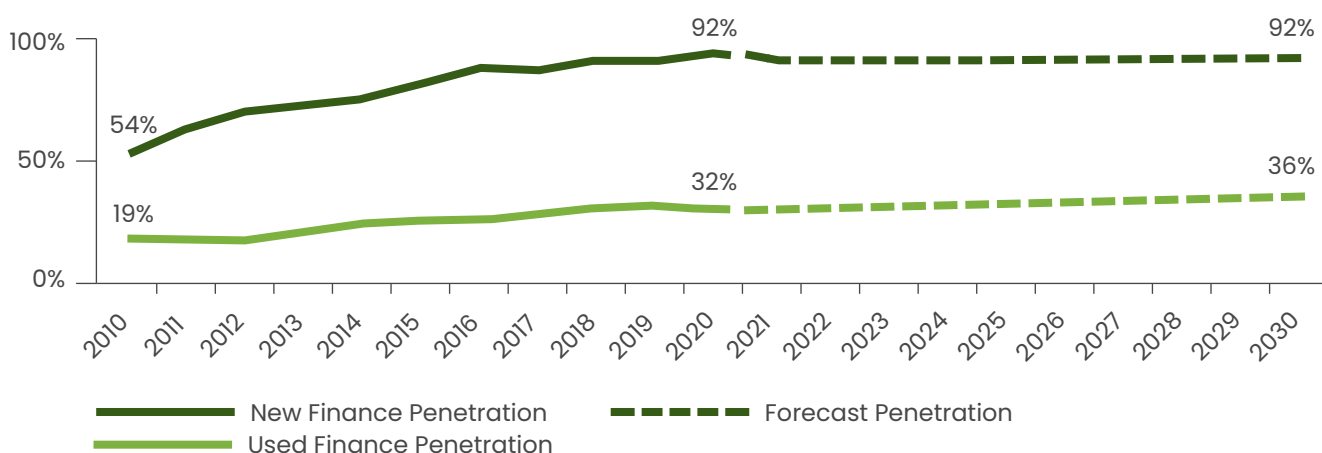
2. Residual value uncertainty

Due to limited data on resale values of EVs into the used market, lenders are reportedly taking a more cautious approach to setting residual EV values compared to ICE vehicles; this is a key driver of higher monthly finance repayments for EVs.

To date, the low number of vehicles entering the used market, coupled with low demand from consumers for used EVs, particularly premium models, has resulted in volatile residual values. This volatility is beginning to fall as consumer demand grows, and more data becomes available. But as new car sales return to their pre-pandemic levels (an increasing proportion of which are electric), demand for used EVs needs to increase rapidly in line with supply if used EV prices are not to be depressed. As presented below in Figure 7, around a third of used cars are bought using consumer finance, which is why making finance providers comfortable with residual values is critical to ensure that supply of competitively priced finance can support forecast market growth. While there is market consensus that lenders are responsible for managing residual value risk, there may be a role for government to intervene in the short term to offer lenders comfort and enable additional balance sheet lending.

Figure 7

Historical and forecasted new customer vehicle finance penetration rate, (%)



Source: CDRT Analysis

To achieve this, the Coalition is developing solutions focused on the most immediate issue for lenders: mitigating existing residual risk and identifying ways to reduce volatility of future residual values. Demonstrators 1 (EV Loan Securitisation) and 6 (Battery Value Guarantee) both aim to mitigate residual value risk on lenders’ balance sheets through guaranteeing an element of residual value.

In due course there may also be a need to develop different approaches to setting residual values, with novel data inputs such as battery health and charging history, which are not reflected in ICE depreciation curve modelling, and which have traditionally focused on vehicle age and mileage.

3. Technology Obsolescence and Battery Longevity

Uncertainty around the future technology roadmap for road transport decarbonisation and pace of technology innovation is exciting but also risky. Both consumers and lenders often see the pace of innovation mainly as a risk, based on concerns that they are investing in technology that may quickly become outdated. The possibility of hydrogen fuel cell vehicles competing as a major alternative to EVs and the expectation of solid-state batteries with 500+ mile ranges are often cited as reasons some consumers are unwilling to invest today, and one of the reasons for continued uncertainty about future residual vehicle values. Unique to used EVs is concern about the remaining useful life of the battery and, more particularly, what range can be achieved over time compared to the range manufacturers state for a new vehicle – and how that should be reflected in the used list price.

This is a legitimate concern. In the EV market, falling prices of new EVs combined with longer ranges for these new vehicles currently make a used EV less attractive to consumers both from a price and technology perspective, in turn making them harder to sell. Figure 8 sets out how technology-related risks are reflected in monthly finance costs, as advertised in AutoTrader. This has a knock-on effect on residual value setting, creating further demand uncertainty both in the used and new sales market. Coalition members therefore identified building confidence in the used EV market as a priority area of focus. Demonstrators 4 (Battery Health Certificate) and 6 (Battery Value Guarantee) seek to do this by independently certifying a used battery's condition and providing a minimum value to which a vehicle depreciates.

Figure 8
Comparing Finance ICE (Clio) vs EV (Zoe); New, Nearly New, Used
Monthly payment when applying consistent parameters

	New Clio	<1 Year Clio	3 Year Clio	New Zoe	<1 Year Zoe	3 Year Zoe
Monthly Payment	£173	£100	£53	£255	£316	£90
Customer Deposit	£3,750	£3,750	£3,750	£3,750	£3,750	£3,750
Cash Price	£16,595	£12,000	£8,550	£29,995	£22,995	£11,950
Government Grant	-	-	-	£3,000	-	-
OEM Contribution	£1,000	-	-	£3,000	-	-
Total Amount of Credit	£11,845	£8,250	£4,800	£20,245	£19,245	£8,450
Optional final payment	£7,001	£6,854	£4,209	£13,029	£11,983	£7,553
Total amount payable	£17,994	£14,209	£9,866	£28,966	£27,143	£14,286
Duration	37 months	37 months	37 months	37 months	37 months	37 months
Representative APR	4.9% APR	9.9% APR	9.9% APR	3.9% APR	8.9% APR	9.9% APR
Annual Mileage	10,000 miles	10,000 miles	10,000 miles	10,000 miles	10,000 miles	10,000 miles

Note: Figures correct at April 2021. Although vehicle pricing, Government Grant and OEM contribution will change, the used EV remains expensive compared to new, with no incentives to support. The Plug in Car Grant has since reduced to £2,500.

Source: Autotrader.co.uk, Renault.co.uk

Concerns about obsolescence are a common feature in new technology markets and should fall away as more EVs are successfully deployed. However, given the short timeframe in which the market needs to transition to EVs, there is a strong value case for intervening. In the short term, more active education programmes to raise awareness of the UK's future technology roadmap and the key role of EVs can help alleviate concerns about the pace of change for consumers, intermediaries, and lenders. Raising awareness of the benefits of consumer finance products such as personal contract purchase and personal leases in transferring this risk to the lender (via a guaranteed future value) could also support consumer adoption. In addition, the Coalition identified a need for solutions that build confidence in the health of a used vehicle battery, for both lenders and consumers: Demonstrators 4 (Battery Health Certificate) and 6 (Battery Value Guarantee) seek to do this by independently certifying a used battery's condition and providing a minimum value to which a vehicle depreciates.

4. Charging Infrastructure

Aside from the vehicles themselves, consumer confidence about transitioning to an EV is hampered by a lack of widespread and suitable charging infrastructure within the UK today, a lack of clarity about the cost of public charging, the complexity of paying for multiple providers, and a general lack of understanding of expected charging patterns. This is often exacerbated by media articles citing the issues with existing infrastructure. Charging infrastructure concerns are significant and addressed in the second part of this report.

5. Regulation and Public Policy

Coalition members highlighted some areas where regulation represents a barrier to providing finance to consumers for EVs, and where public policy interventions can facilitate increased private investment.

The regulatory backdrop of the Consumer Credit Act represents a barrier to creating innovative new financial mechanisms that could make it easier for consumers to finance or lease an EV, such as bundling the financing of the vehicle with access to charging infrastructure into one payment.

For example, lenders cited concerns about the risk of increased numbers of sales quality disputes, for which they are liable under s75 of the Consumer Credit Act. This is underpinned by perceptions of a high risk of dealers and brokers selling unsuitable EVs to consumers, the latter of whom can then exercise their right of return. Right of return and voluntary termination protections for consumers also make it difficult for lenders to provide bundled solutions that would enable consumers to wrap purchases of home chargers, vehicles and green energy tariffs into single monthly payments, which would help make more visible to consumers the lower total cost of ownership compared to ICEs. Updating consumer regulation to work for rather than against the EV finance market should be considered a priority area of focus for regulatory change.

The importance of regulation in financial product design

The regulatory backdrop of the Consumer Credit Act represents a barrier to creating innovative new financial mechanisms that could make it easier for consumers to finance or lease an EV, such as bundling the financing of the vehicle with access to charging infrastructure into one payment.

"It is entirely possible to maintain existing high standards of consumer protection, at the same time allowing for financial services legislation to be relaxed, and exemptions to be offered. The current financial services legislative regime does not support government policy around road transport decarbonisation. It is in the Government's interests to invest time and effort in giving the financial services industry customers certainty, clarity and simplicity".

Stephen Dawson, Partner at Shoosmith's,

As noted earlier, fiscal measures including reduced rates of benefit-in-kind tax for EV company car drivers and vehicle excise duty have helped stimulate demand from business drivers through offering financial incentives to offset the risks and the cost of switching to an EV. As the EV market remains at an early stage of development, clarity on how such incentives might continue to be targeted through to 2030 would enable the leasing sector, for example, to provide full and accurate pricing on contracts beyond 2021, supporting demand for new finance agreements. These new business registrations will remain important to supply the used EV market for consumers. The application of reduced rates of BIK tax to salary sacrifice is helping employees who do not usually qualify for a company car to access EVs, as evidenced by strong recent market growth reported by scheme providers³⁰. Such schemes should be more widely promoted and thought given to how they could be accessed by smaller businesses with a lower administrative burden. Clarity on how the Government's income from fuel duty might be replaced with new income streams is also important as it would give consumers and businesses confidence to transition ahead of 2030.

Further barriers, some specific to particular market participants, were identified by Coalition members as being important to address. These include a general lack of awareness of the environmental impact of switching to an EV or plug-in hybrid, which is compounded by misleading media articles, and mean that many consumers believe that EVs are no better than ICE vehicles for air quality and the environment. The added complexity of learning how to charge an EV and fears about the capacity and cost of using public charging network means that many consumers remain nervous about choosing an EV. Dealer showrooms represent an opportunity to educate and inform consumers, but in an already complex sales process it can be difficult for dealers, particularly independent dealers without access to manufacturer franchise support, to feel incentivised to promote EVs as an attractive alternative to ICE. Facilities such as the EV Experience Centre in Milton Keynes³¹ and the Arnold Clark Innovation Centre³² in Glasgow and organisations such as EVA England can be valuable educational resources for consumers and should be more widely promoted as sources of information to build consumer confidence. Tools such as the EV8 Switch app³³ launched by DfT in September 2021, with support from NatWest, can also help consumers understand the suitability of an EV based on their individual driving needs.

4.3 Demonstrator Solutions

Many of the barriers set out in the previous section are expected to dissipate as the market matures, particularly once purchase price parity is reached between EVs and ICEs. However, without intervention to accelerate the time taken to reach price parity, there is a risk consumers wait, failing to send demand signals to manufacturers producing EVs, resulting in the market failing to make an orderly transition to exclusively electric new car and van sales in 2030. Scaling up financial solutions will be key in this process.

The Coalition has selected the most promising interventions for helping facilitate this, which have emerged from discussions to date. The solutions require a mixture of adapting existing products, amending legislation and developing new financial mechanisms. They were conceived by Coalition members to address the barriers identified to widespread consumer adoption of EVs by enabling consumers to access EVs at a lower cost, simplifying the purchasing process, or allaying fears of technology obsolescence. Some solutions build on existing market offerings developed for other sectors or jurisdictions; others originated from the collective creativity of Coalition members.

The following section sets out the list of potential demonstrator solutions in more detail and provides further information on each. Each template includes an overview of the project, its intended outcomes, key delivery partners and potential policy levers.

³⁰ BVRLA (2021) Road to Zero Report Card 2021.

³¹ <https://evexperiencecentre.co.uk/about-us/>

³² <https://www.arnoldclark.com/innovation-centre>

³³ <https://apps.apple.com/gb/app/carbondiem/id1512971216>

Demonstrator Solution 1: EV Loan Securitisation	Consumer 	Lender
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Overview: EV securitisation will enable larger EV loan lenders to aggregate loans or leases for sale in the secondary market. The balance sheet released can then be deployed toward further EV loans or leases. A residual value risk guarantee provided by a government entity/third party would mitigate the residual value risks relating to EV loans, currently the key barrier to pure EV securitisations.

For smaller originators, a residual value risk guarantee can be provided to a warehouse facility set up to aggregate smaller standardised EV loans or leases in which multiple originators’ loans are grouped, packaged, tranching and sold to investors. This will need to be underpinned by green loan and lease principles to facilitate the standardisation and bundling of contracts.

Outcome: Green loan and lease principles combined with guarantees address risk and facilitate bundling and aggregating of securities, freeing up capital for lenders to provide further loans and leases, as well as creating more green bond investment opportunities.

Delivery partners include:

- EV Loan Originators / Banks
- Securitisation platform provider
- Secondary auto loan market investors
- Rating agencies
- HMT

Policy levers to support demand and scale up:

- In the early stages of market development, UK government could provide a residual value risk guarantee structure to insure investors against market failure. This would recognise the societal benefit accruing from stable used EV prices in creating consumer confidence in the used market

Demonstrator Solution 2: 0% Consumer Finance for EVs	Consumer 	Lender
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Overview: To overcome the list price premium for new and used EVs, a pilot is proposed, building on the key lessons from the Scottish Government 0% EV loan scheme³⁴, to provide 0% motor finance that would lower the cost of acquiring an EV and drive greater demand for EVs.

A time-bound pilot 0% or very low interest rate offer has been funded by Quadrature Climate Foundation and operated by Energy Saving Trust. It is similar to that provided by the Scottish Government, which provides unsecured loans of up to £28K to purchase an EV. In effect, the structure would guarantee the additional credit risk associated with EV compared to ICE loans. Building on lessons learned from the 0% EV loan in Scotland, the pilot scheme will identify the barriers faced by consumers in the sales process and put in operational processes that overcome some of the challenges identified. The project will also cover e-bikes and could extend to other forms of mobility.

Outcome: Reduces the cost of finance for consumers, narrowing the price premium of EVs vs ICE. Initially focused on one city in England, the initiative would stimulate demand for EVs in a demographic not expected to be early adopters and raise awareness of the lower running costs associated with EVs, stimulating further demand.

Delivery partners include:

- Energy Saving Trust
- EVA England /Consumer groups
- Motor finance providers/brokers
- Credit Reference Agencies
- Motor dealers

Policy levers to support demand and scale up:

- N/A

³⁴ Energy Savings Trust. Interest-free electric vehicle loan.

Demonstrator Solution 3: Means-Tested Subsidised Loans for Used EVs	Consumer ✓	Lender ✓
<p>Overview: To expand the used EV market and facilitate access to EVs for a wider range of income groups through providing means-tested subsidies for both consumer loans and for leasing agreements. Loans would be provided based on a maximum income threshold, thus ensuring public funding is targeted in a progressive manner.</p>		
<p>Outcome: Financial support targeting lower income households would accelerate a more inclusive transition to mass EV adoption, particularly if targeted to groups least likely to switch from older ICE vehicles, given the financial barriers.</p>		
<p>Delivery partners include:</p> <ul style="list-style-type: none"> • Energy Savings Trust • HMT • Credit reference agency • Motor finance providers 	<p>Policy levers to support demand and scale up:</p> <ul style="list-style-type: none"> • N/A 	

Demonstrator Solution 4: Battery Health Certificate	Consumer ✓	Lender ✓
<p>Overview: A compulsory battery health certification scheme to inform potential buyers of the remaining battery life and expected maximum range of a used vehicle, giving confidence they are purchasing a vehicle that is suitable for their needs. The certification could also facilitate commercial extended warranty products beyond the standard 8 year/100,000-mile warranty provided by OEMs today.</p>		
<p>A key determinant of battery life is the way it is treated – e.g., driving, charging, and parking behaviour. Battery management systems typically track this information, but it is not readily accessible to car buyers. The only visible evidence of the range of a battery is the dashboard display when the vehicle is fully charged, but this can be influenced by recent driving history. In the absence of more detailed information, it is likely that buyers will assume the worst possible battery treatment and range, reducing demand for used EVs.</p>		
<p>Outcome: Certifying battery health provides confidence to consumers, creating increased demand for used EVs and helping build a viable second-hand market. The existence of a certification process would also provide greater confidence to new car residual value setters about future resale values, reducing lender risk. It could also be an enabler for alternative residual value forecasting methodologies.</p>		
<p>Delivery partners include:</p> <ul style="list-style-type: none"> • OEMs • Car dealerships • MOT centres • DVLA • Consumer groups • CAP HPI • OZEV 	<p>Policy levers to support demand and scale up:</p> <ul style="list-style-type: none"> • Regulation to mandate battery health certificate displayed for all used car sales 	

<p>Demonstrator Solution 5: Total Cost of Ownership Principles</p>	<p>Consumer ✓</p>	<p>Lender</p>
<p>Overview: Total cost of ownership is often cited as the way in which consumers should consider the ‘real’ cost of an EV compared to an ICE. However, there is no standard approach to calculating this, with a variety of methods used by different players in the market. Coalition members, including consumer groups, advocate for a concise, comparable set of principles outlining the total cost of ownership for EVs compared to ICEs, including the environmental impact. This will require an official, central database of manufacturer information for every available car.</p>		
<p>Outcome: A single approach, agreed by OEMs, dealers, and motor finance providers, would simplify and standardise the terminology for consumers and allow for comparison of the real cost and emissions impact of switching to an EV, supporting increased adoption.</p>		
<p>Delivery partners include:</p> <ul style="list-style-type: none"> • Motor finance providers • Car dealerships • Consumer groups • OEMs • DfT 	<p>Policy levers to support demand and scale up:</p> <ul style="list-style-type: none"> • Mandating consistent data collection on cost of EVs • Passenger Car Regulations to mandate display of electronic information 	

Box 3

Existing Initiative Spotlight

The Coalition supports a project led by Zemo Partnership to create an “electronic information tool for new and used cars”³⁵. This project aims to become a mandatory electronic label which provides all car buyers with clear, engaging and meaningful information they can trust, to help them compare and choose the most environmentally friendly car for their needs. The CDRT will contribute to the working groups developing the product.

WHAT'S ON THE NEW CAR ENVIRONMENTAL LABEL?

- RUNNING COSTS:** Instantly see what your monthly fuel and annual VED costs could be for this car, making it easy to compare different models. Lowest zero-emission cars cost less. For pure electric and plug-in hybrids this total includes the cost of the electricity to charge the car at home.
- ELECTRIC RANGE:** For a pure electric or plug-in hybrid car, this tells you how far it may be able to drive on electricity only. If you're a company car driver, this also now might affect the benefit in kind tax you pay.
- TAILPIPE EMISSIONS:** The precise CO₂ emissions for this car. The lower the figure, the less first year VED and company car tax you pay. It'll also see if the car qualifies as an 'Ultra low Emission Vehicle', the exact Euro Standard and that it can drive free in Clean Air Zones and London's ULEZ.
- FUEL ECONOMY:** This car's official 'miles per gallon' figures for different types of driving, from city to motorway. You can use these to choose the most economical car for the journeys you usually do.
- ELECTRICITY CONSUMPTION:** How many miles a pure electric or plug-in hybrid car can travel on one kWh of electricity. The higher the figure, the more efficient the car is.

The infographic also shows a digital car label interface with the following data:

- Running costs:** Total monthly energy cost: £56. VED (road tax) for 12 months: £20. Total 2 annual: £140.
- Equivalent electric range:** 30 miles.
- Relative Emissions:** CO₂ emissions per litre (g/km): 115. CO₂ emissions (g/km): 115. CO₂ emissions (g/km): 115.
- Fuel economy:** Fuel type: Diesel. Fuel economy (l/100km): 6.6 (Urban), 4.9 (Extra-urban), 5.5 (Combined). Fuel economy (MPG): 43.5 (Urban), 58.8 (Extra-urban), 52.2 (Combined).
- Electricity consumption:** 11.7 kWh/100 miles.

³⁵ This shows the current paper-based dealership new car label only; this project aims to develop a more sophisticated electronic version for use across digital platforms, for both new and used cars.

Demonstrator Solution 6: Battery Value Guarantee	Consumer ✓	Lender ✓
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Overview: A mechanism for a battery within an EV to have a guaranteed end-of-life value, ensuring a minimum depreciated value for the vehicle. The guarantee provider could also include a mid-cycle swap mechanism in the event of battery failure (through an extended warranty), providing additional confidence to consumers.

When a new car list price is set, the battery itself would be assigned a final value and final owner. The final owner is likely to be OEMs (that are liable to dispose of batteries), battery recyclers or second life storage facilities. A unique identifier on the battery, also required to establish battery health certificates (see Demonstrator Solution 4), would allow the battery to be triaged at end of life to either have a secondary use (such as energy storage) or be recycled for component parts, dependent on the battery’s condition.

Outcome: The guarantee can flatten depreciation curves by giving each vehicle battery a residual value at the end of its life, reducing the balance sheet risk of the most expensive component of the EV and hence the cost to the consumer. Furthermore, it ensures a supply of batteries into second life facilities (either storage or recycling), reducing waste and the cost of disposal.

<p>Delivery partners include:</p> <ul style="list-style-type: none"> • Battery manufacturers/OEMs • Recycling / Second life users • Faraday Institute • Data provider to host and track battery passport data • CAP HPI 	<p>Policy levers to support demand and scale up:</p> <ul style="list-style-type: none"> • Regulation requiring all vehicle batteries have a passport or unique identifier
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Demonstrator Solution 7: Bundled Finance Solutions	Consumer ✓	Lender ✓
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Overview: Building on the total cost of ownership concept, bundled finance solutions both facilitate a one stop shop for EV purchasers and provide clarity on the potential for lower running costs. Bundled finance packages can simplify the process of switching to an EV offering consumers as a minimum a combination of a vehicle, with home charge-point infrastructure. Packages could also be extended to include financing for related items such as home solar panels, battery storage and energy supply, all in one monthly payment. This would ensure that consumers benefit early from a more efficient home, as well as smarter charging, and are then able to pay the loan back over time.

If bundled finance products can be sold under the Consumer Credit Act, this ensures consumers have protection from mis-selling and can build market confidence. However, in order to create consumer friendly products, reform to the act is required.

Outcome: A streamlined framework for offering bundled charging, vehicle and home solutions will enable more lenders to enter this market in a way that ensures consumers retain all the existing protections offered via the CCA. Importantly it can also allow consumers to compare and contrast financial offers more readily.

<p>Delivery partners include:</p> <ul style="list-style-type: none"> • Law firms • HMT • Financial Conduct Authority • Financial Institutions • Chargepoint operators • Dealer networks • Energy providers • DfT 	<p>Policy levers to support demand and scale up:</p> <ul style="list-style-type: none"> • CCA reforms • OZEV could consider how existing and future grant systems interact with this type of financing
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Demonstrator Solution 8: Salary Sacrifice for SMEs	Consumer 	Lender 
<p>Overview: Widening the access to salary sacrifice schemes for zero emission cars can enable more affordable EV pricing by leveraging existing tax benefits to reduce costs.</p>		
<p>Schemes that allow employees of smaller organisations (16.8m employees work in SMEs³⁶) to benefit from the tax and national insurance advantages of sacrificing salary in return for an EV, with minimal operational administration, can bring a wider customer base to vehicle leasing providers than exists today.</p>		
<p>Vehicles are typically provided with maintenance and insurance, and in some instances home chargepoints, simplifying the process of acquisition. In addition, employees of smaller organisations will be able to benefit from the purchasing power of large leasing companies, typically only available to large corporates. Existing salary sacrifice schemes offered by numerous vehicle leasing providers including Lex Autolease, Octopus Electric Vehicles and Fleet Evolution should be more widely promoted and consideration given to finding new routes to market to widen access.</p>		
<p>Outcome: Opening the product to a wider audience through new routes to market without increasing the administrative burden on small businesses can allow more consumers to access an EV at a reduced cost compared to existing retail consumer finance products. This creates a wider customer base for vehicle finance providers.</p>		
<p>Delivery partners include:</p> <ul style="list-style-type: none"> • HMT • Vehicle leasing providers • Payroll providers • Car insurance providers 	<p>Policy levers to support demand and scale up:</p> <ul style="list-style-type: none"> • Continued provision of BIK rates, with at least 3 years advance notice of extension given • Continued provision of Salary Sacrifice regulation 	

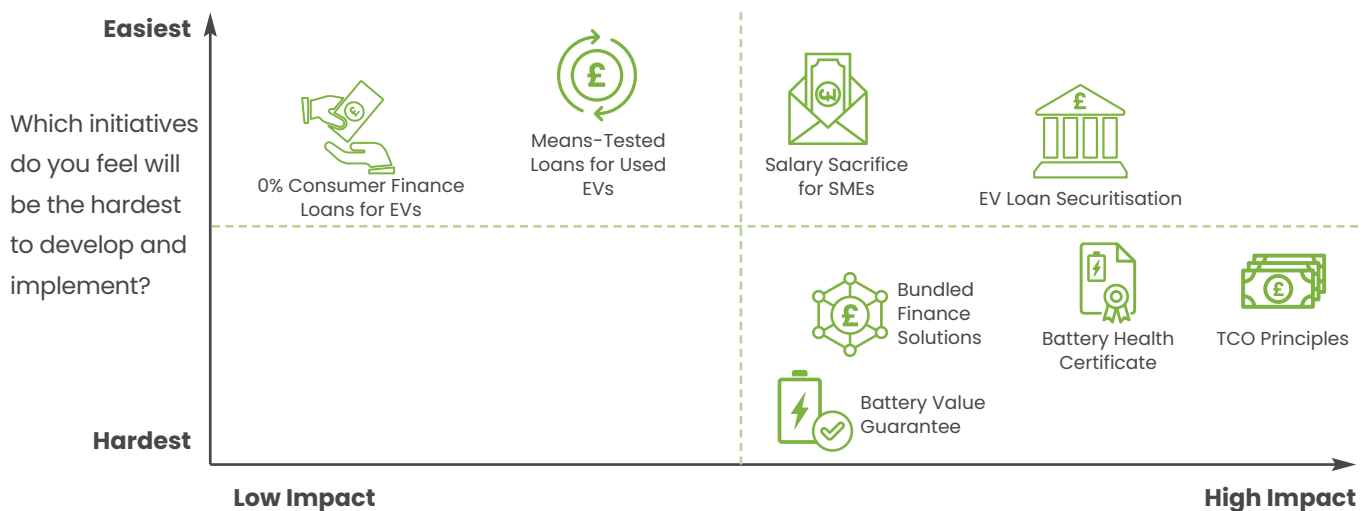
Coalition members have ranked the demonstrator solutions set out above in order of scale of impact on EV uptake and ease of implementation. The results are shown in Figure 9 below. Those thought to have the highest potential impact were those that closed the price premium between EVs and ICEs (either by reducing the cost of finance for the consumer or the cost of finance for the lender, which could then be passed on); made it simpler for consumers to access an EV and the associated infrastructure (through bundled finance); or reduced the residual value risk. These are the Demonstrator solutions that will be prioritised by the Coalition.

The current BiK taxation structure is the single biggest driver of zero emission vehicle uptake in the UK. Low BiK rates for EVs have made it financially viable for huge numbers of company car and salary sacrifice drivers to shift from internal combustion engine cars to EV. Drivers and fleets must be certain of their future tax liabilities for this momentum to be maintained. Foresight of the taxation glide path to 2030 is urgently needed.

Gerry Keaney, Chief Executive, British Vehicle Rental and Leasing Association

³⁶ House of Commons Library (2021) Business Statistics.

Figure 9
Impact vs Ease of Implementation



Source: CDRT

Which initiatives do you feel will have the most impact on EV adoption?

4.4 Policy Recommendations

To date, the Government has offered a range of grants and fiscal incentives to reduce the upfront and total cost of ownership for EVs, as described earlier. Listed below are several areas of government policy that could be refined to create an environment conducive to enabling the market to deliver the solutions identified above. High level recommendations are as follows:

- Working with the Financial Conduct Authority (FCA), the government should seek to **reform the Consumer Credit Act** on a number of fronts, particularly to make it easier to offer bundled finance solutions (i.e., to finance an EV and a chargepoint in the same lending agreement) to consumers.
- **Finalising the rapid implementation of the ZEV mandate**, as per the Net Zero Strategy, which proposes setting targets for a percentage of manufacturers' new car and van sales to be zero emission each year from 2024. This has contributed to accelerating the rates of EV adoption in California and China, and it could also lead to more competitive prices over time as economies of scale are achieved.
- **Tax and VAT changes should be considered to make second-hand EVs cost competitive** with used ICE vehicles and newer EVs. Consideration should be given to the case for exempting EVs from VAT to accelerate uptake. Working with industry on the development and display of mandatory **battery health certificates** would also boost consumer confidence in the second-hand EV market.
- **The Government should develop a clear BiK roadmap beyond 2025 to provide visibility for businesses looking to electrify their fleets.** Lower BiK rates for EVs compared to ICE vehicles are a strong motivator to continue incentivising EV uptake, as EV owners can save more than £1,000 per year. The reduction in BiK rates for EVs resulted in EVs making up 19% of new lease car registrations in the first quarter of 2021, three percentage points more than diesel according to the BVRLA. This is attractive for employees who are able to access an EV via a salary sacrifice arrangement, and these schemes should be more widely promoted.
- **Introducing a scrappage scheme for the oldest and most polluting diesel and petrol vehicles, with the money earmarked for the purchase of a new or second-hand EV**, could drive further consumer uptake and help the UK meet its phase out target in an orderly fashion.
- The Government should continue to support the roll out of **Clean Air Zones which have a role to play in signalling to consumers and businesses** the need to drive the cleanest vehicles possible and can incentivise an earlier transition.
- **Expansion of the OZEV funded Electric Vehicle Approved scheme**, an education and training programme for motor dealers and intermediaries, would help build knowledge within the sector and support consumers in the transition to an EV, helping to stimulate demand for used EVs.

5. Charging Infrastructure



5. Charging Infrastructure

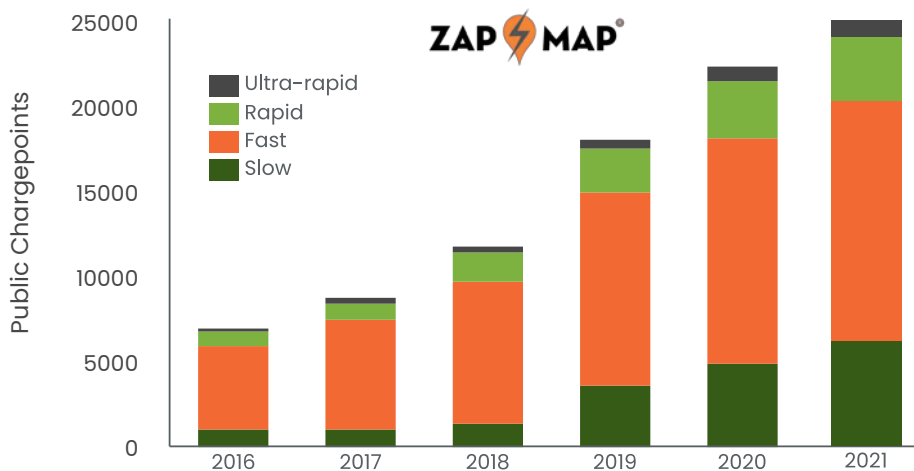
5.1 Current Market Context

If the potential market growth forecast for EVs is achieved, there could be as many as 11 million EVs on UK roads by 2030, necessitating significant chargepoint growth, across all locations³⁷. As other barriers to adoption, such as cost and availability of vehicles, are addressed over the course of this decade, adequate nationwide charging infrastructure will remain a key barrier capable of derailing mass EV adoption. A chicken and egg situation exists, as an accelerated roll out of charging infrastructure is required to advance EV adoption, yet economically viable investments in EV infrastructure are in turn dependent on the acceleration of EV adoption.

Much progress has already been made in this area, as outlined in Figure 10, with the number of chargepoints having increased from approximately 6,500 in 2016 to 27,000 at the time of writing³⁸. However, despite this progress, the UK is yet to have fully rolled out the system-wide infrastructure required to enable mass uptake by consumers and business fleets alike. Roll out to date has been non-systematic based on certain local authorities and private companies championing EV roll out and accessing public funding pots to support charging infrastructure.

Figure 10³⁷

Number of public chargepoints by speed (2016–to date)



Source: ZapMap

The number of chargepoints required by 2030 will depend on the number of EVs on the road and how these vehicles are expected to charge. Whilst the majority of charging is expected to happen within a home and workplace setting, public charging will play a vital role, particularly for the majority of UK drivers without access to off-street parking at home. Charging behaviours are expected to vary significantly by use case. For example, an EV driver with off-street parking who is using their vehicle for school runs and around town driving is most likely to charge overnight at home or during the day at the workplace. An EV driver undertaking nationwide deliveries and covering 30,000 miles per annum is likely to be reliant on public charging for an element of trips undertaken.

³⁷ CDRT Analysis.

³⁸ Zap Map (2021) EV Charging Stats 2021.

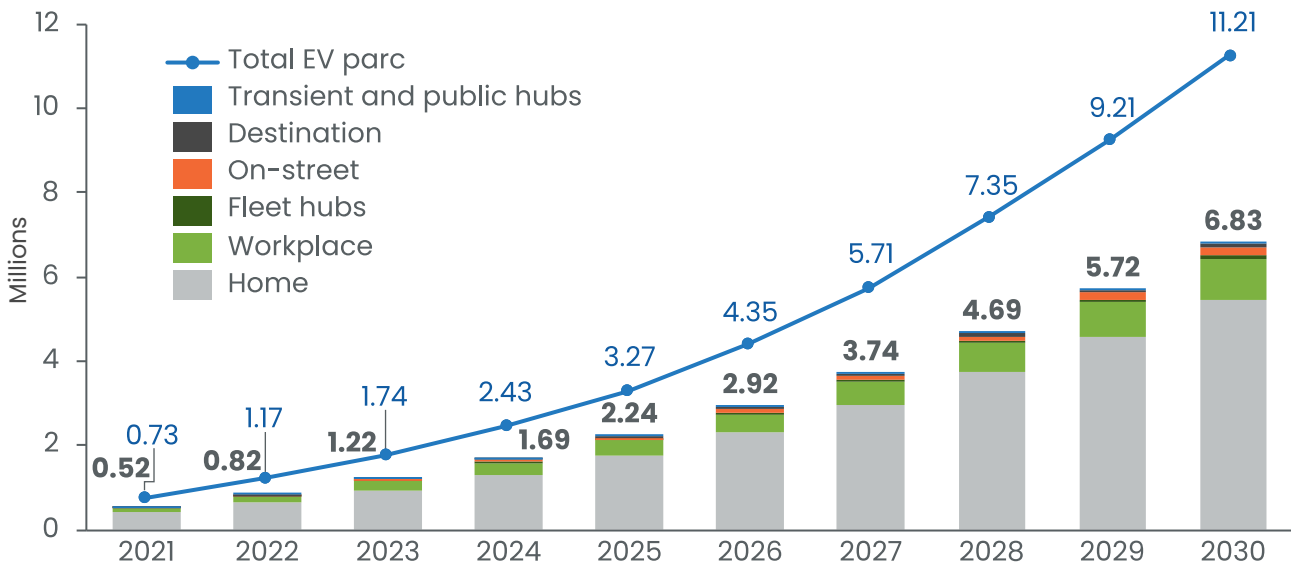
Charging locations can be categorised as private or public and each have different investment requirements as shown in Table 3.

Table 3
Charging locations

Private	Public
<ul style="list-style-type: none"> Home charging – for those with access to off-street parking 	<ul style="list-style-type: none"> On-street – charging on permissible parking areas on residential streets
<ul style="list-style-type: none"> Workplace – charging solutions available at office car parks for employees 	<ul style="list-style-type: none"> Destination – charging at destination sites with amenities and parking
<ul style="list-style-type: none"> Fleet hubs – dedicated overnight or rapid charging hubs for corporate and public sector fleets 	<ul style="list-style-type: none"> Transient and public hubs – en-route charging, mostly on primary roads, or public access hubs

Analysis supported by KPMG’s Future Mobility team forecasts the need for up to 6.8 million electric chargepoints in total in the UK by 2030, of which 300,000 to 400,000 would be at public locations (see Table 4), 5.5 million at-home and approximately 1 million at workplace, including fleet hubs³⁹. This is to support a forecast parc of around 11 million electric passenger cars and light commercial vehicles.

Figure 11
Forecast EV Parc and Chargepoints



Note: EV parc includes passenger vehicles and LCVs

Source: CDRT analysis

³⁹ Ibid.

Over the years, measures to accelerate the roll out of charging infrastructure have included:

- 1. Fiscal policies**, such as the On-street Residential Chargepoint Scheme, Workplace Charging Scheme or the EV Homecharge scheme, which offer grants of up to £350 (or 75% of the total cost, whichever is lowest) for the purchase and installation of chargepoints. These are targeted at individual consumers, companies installing chargepoints or local authorities, and generally come in the form of partial grants, but also include enhanced capital allowances and public-private funding partnerships.
- 2. Regulations** setting the direction of travel for the sector, including the 2030 ban on the sale of new petrol and diesel vehicles and requirements for new homes or renovated buildings to be fitted with chargepoints, as proposed in the recent Transport Decarbonisation Plan (TDP)⁴⁰ published in July 2021.
- 3. Measures to improve user-friendliness** announced in the TDP policy paper include making all rapid chargepoints accept card payments and making chargepoint data freely available so drivers can more easily locate chargepoints.

In its Ten Point Plan⁴¹, the UK Government has committed around £1.3 billion for the deployment of charging infrastructure, which can be broken down as follows: £950 million for chargepoints along motorways and key A roads (the Strategic Road Network), £275 million for homes, workplaces and on-street and £90 million for local infrastructure.

Beyond the Ten Point Plan, the Government has shown increased ambition and further funding, including in the net zero strategy, to deliver additional chargepoints. This is especially important now the phase out of petrol and diesel vehicles has been brought forward from 2040 to 2030.

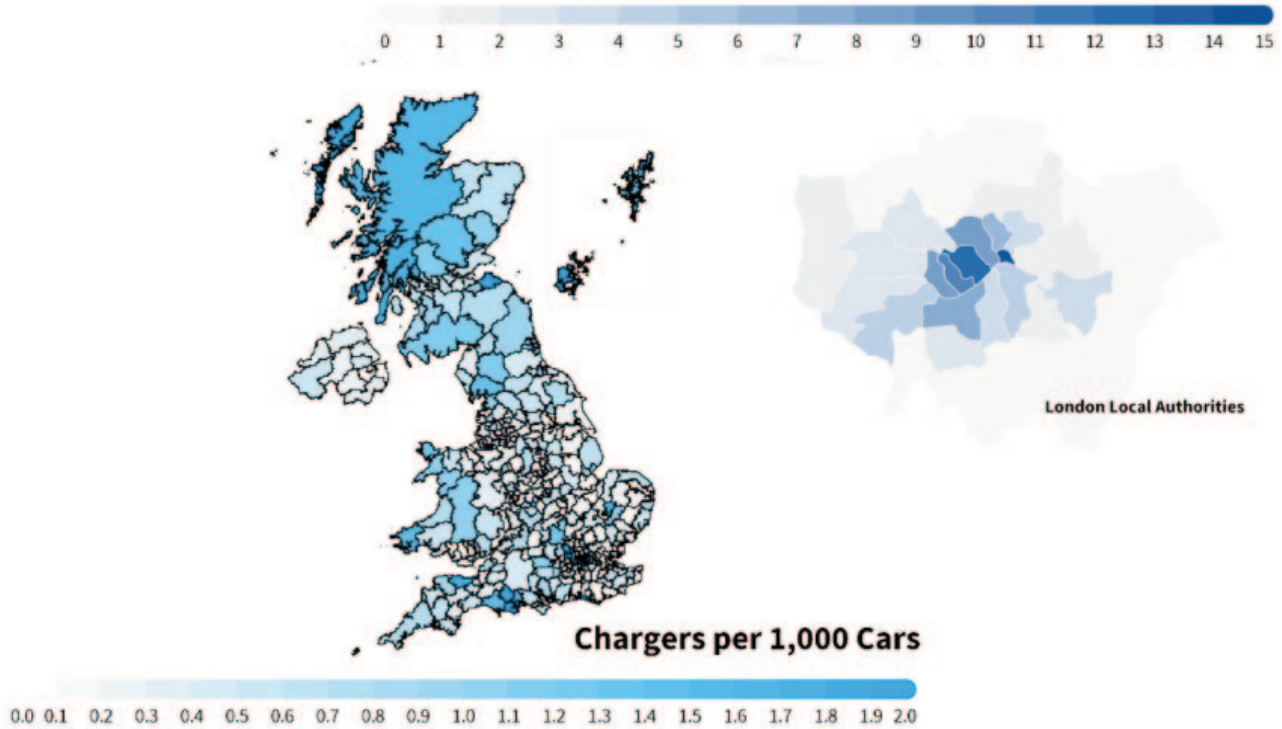
The availability of government grant and subsidy mechanisms for both local authorities and private sector organisations is a positive start, however there is no requirement for local authorities to provide electric charging points. It is up to them to decide, based on local priorities, whether to do so. Without a national EV infrastructure strategy⁴² there is a risk that the UK's public charging network becomes unequitable and unevenly distributed, which ultimately risks slowing mass EV uptake. Public funds to date have been universally offered but as the market evolves should be focused on those areas where the commercial case is harder to achieve in the short term. This includes rural and disadvantaged areas of the country, where the economic case for installing charging is less compelling today. Failure to do so will mean a widening gap in access to chargepoints which will hinder the universal roll out of EVs. This gap is already starting to emerge, with significant variability of chargepoint distribution across the country, as shown in Figure 12. A national strategic approach, which includes access to data about future mobility patterns and expected utilisation rates will be needed to address these issues and ensure a comprehensive network is rolled out across the UK.

⁴⁰ Department for Transport (2021) Decarbonising Transport: A Better, Greener Britain.

⁴¹ UK Government (2020) The Ten Point Plan for a Green Industrial Revolution.

⁴² OZEV are expected to launch an EV Charging Infrastructure Strategy in 2021.

Figure 12
EV chargers per 1,000 cars



Source: Transport & Environment using Department for Transport (2021) Electric vehicle charging device statistics: January 2021.

It is also critical to have an appropriate mix of charging speeds to suit different locations and use cases. Charging speeds have been defined in this report as:

- 1. Slow: 3.7–7kW AC charging**
- 2. Fast: 7–22kW AC charging**
- 3. Rapid: 50–150kW DC charging**
- 4. Ultra-rapid: 150kW+ DC charging**

For passenger vehicles, the majority of charging is expected to take place at home or in the workplace, accounting for around 70% of charging demand. The remaining 30% of demand will rely on a mix of public infrastructure, with on-street charging effectively acting as an overnight solution for those without access to off-street parking.

For fleets however, it is forecast only up to 50% of charging power demand will come from home and workplace locations, as vehicles do a significantly higher number of annual miles and will need to rely more on public infrastructure. Many businesses are starting to install a mix of charging solutions at their own hubs and depots, where vehicles are often parked overnight, reducing private charging needs.

With all public charging infrastructure, there will be a trade-off between cost and suitability. Rapid and ultra-rapid chargepoints often require electricity grid reinforcement, which can be costly. In return for the higher speed of charging, drivers typically pay a higher cost per kWh for charging, and the ability to fulfil multiple vehicles within a day means revenues are higher. Conversely slower chargers, which may only be used by 2-3 vehicles per day, typically cost less to install but generate significantly lower daily revenues.

By 2030, our analysis suggests the resulting mix of public chargepoints could be as shown below in Table 4.

Table 4
Forecasted mix of public chargepoints

Chargers in 2030 (000's)	Slow	Fast	Rapid	Ultra-rapid	Total
On-street	80-120	80-130	15-30	-	175-280
Destination	15-20	40-60	15-25	0-5	70-110
Transient and public hubs	-	-	15-30	5-15	20-45
Total	95-140	120-190	45-85	5-20	265-435

Source: CDRT Analysis

- **On-street:** A close to even split of mostly slow and fast chargers is forecast, with more fast chargers rolled out as costs decrease and on-street adoption increases. A very limited number of on-street rapid chargers is anticipated, depending on the location and grid constraints.
- **Destination:** Given users are likely to stay on location for a few hours, it is predicted that the majority of chargers will be fast. The additional cost to install rapid chargers is not typically justified unless a premium offering or where visitor turnover is high and charge time less than one hour (such as a supermarket or council car park). The forecast includes some slow chargers, many of which are legacy, and a very limited number of ultra-rapid chargers in locations with more premium offerings.
- **Transient and public hubs:** Enroute users are likely to expect rapid charging and minimal waiting time. Rapid chargers will dominate due to the price differential versus ultra-rapid options. However, a growing number of high-powered charging solutions are being deployed and this is expected to continue, particularly in premium, high traffic sites.

5.2 Barriers

The Coalition has identified the main financial and non-financial barriers that are slowing down private investment into public EV charging infrastructure. For drivers with access to off-street parking at home⁴³, the cost of installing a chargepoint is usually relatively low⁴⁴. In some instances however, there may be other more significant factors at play for consumers wishing to install home chargers. This can include homes where electricity supply needs to be upgraded to allow for an EV charger to be safely installed; where the consumer is a leaseholder; or where the user lives in accommodation with shared parking. In instances where the expected cost of installation is high, or where for example homeowners wish to also install complementary solutions such as solar panels linked to wider home energy efficiency retrofitting, there may be a role for consumer finance solutions such as demonstrator solution 15 (Property Linked Finance), demonstrator solution 16 (Demand Aggregation Finance) and further ideas being developed by the Green Finance Institute's Coalition for the Energy Efficiency of Buildings⁴⁵.

Barriers to the roll out of public charging and business workplace or depot charging are more complex, with public charging infrastructure involving a larger number of stakeholders and typically significantly higher costs. These barriers are summarised as follows.

Table 5
Barriers to the roll out of public charging infrastructure

		Private	Public
1	Revenue uncertainty (linked to utilisation of charging points)	N	Y
2	Capital cost of installation, including grid upgrades	Y	Y
3	Planning rules	Y	Y
4	Local authority capacity	N	Y
5	Technology obsolescence	Y	Y
6	Regulatory barriers	Y	Y

1. Revenue Uncertainty

There exists a chicken and egg situation with the speed and roll out of EVs and charging infrastructure. An acceleration in charging infrastructure build out is key to giving larger numbers of consumers the confidence to switch to an EV⁴⁶ (and anecdotally in some areas more chargepoints are already required to service existing user demand). However, investors and local authorities are reluctant to invest without reliable data on expected revenues (of which traffic flows and utilisation rates are the key driver), which relies on anticipated EV adoption. This is holding back investment. In addition, for residential on-street charging, the payback period can be lengthy and is typically longer than the period over which local authorities have historically been willing to contract with chargepoint operators. This increases the risk for investors.

Solutions that provide information on expected future charging demand across locations or ensure some level of base utilisation (revenue) through agreed target metrics are needed. Demonstrator 10 (EV Infrastructure Investor App) aims to provide investors with trusted curated data on costs and revenues to aid decision making. Demonstrators 14 (Utilisation Linked Loans) and 17 (Revenue Guarantees) aim to provide solutions for revenue uncertainty, either through linking loan repayments to minimum utilisation rates or through guaranteeing a minimum contractual revenue.

⁴³ The Electric Vehicle Homecharge Scheme grant provided by OZEV for home chargepoints will be refocused to renters, leaseholders and those living in flats from March 2022.

⁴⁴ NatWest has teamed up with Octopus Energy to offer discounted rates on chargepoints <https://www.natwest.com/banking-with-natwest/our-purpose/climate/travel/home-charging.html>

⁴⁵ Green Finance Institute (2020) Financing energy efficient buildings: the path to retrofit at scale.

⁴⁶ 37% people cite lack of charging as main reason <https://www.kwik-fit.com/press/pandemic-has-caused-almost-14-million-uk-drivers-to-change-their-car-buying-plans>

2. Capital cost of installation, including grid upgrades

For all types of charging, the cost of installation can be significant, particularly if a new or upgraded connection to the national grid is required. Installation costs can range from less than £100k to over £1m⁴⁷ and this cost is typically unknown until an application is made to the Distribution Network Operator (DNO), which can take a number of weeks to complete. In addition, existing regulations require the organisation requesting a grid upgrade to make the entire capital outlay required, regardless of the proportion of grid capacity they plan to utilise, although Ofgem are currently considering changes to this approach⁴⁸. There is also uncertainty about whether the costs of any excess capacity secured will be repaid by other parties sharing the additional grid capacity, which introduces further risk when considering investment. Infrastructure installers can be faced with a choice of either locating charging points where there is grid capacity but low demand or locating at sites where demand should be high but where higher upfront investment is needed. Data providing visibility on where EV charging is required to inform grid capacity upgrades is needed.

There is an opportunity to reduce the need for building new grid capacity in some areas by using smart pricing mechanisms to incentivise drivers to charge off-peak when surplus green energy supply exists, or through the use of battery storage solutions which can sometimes be installed at a lower cost. However, historically these have not qualified for grant funding. The focus of developers needs to widen from options looking at increasing grid capacity to also consider the development of smart and flexible capacity.

For the majority of home and workplace chargers, cost is not the most significant barrier, particularly as government support has been widespread to date. However, in some instances where installation is complex or electricity supply needs upgrading, additional capital costs can be significant and government support limited. Demonstrators 7 (Bundled Finance Solutions) and 15 (Property Linked Finance) could help consumers and businesses spread this cost, and demonstrator 9 (Transport Infrastructure Facility) aims to reduce the cost of capital for chargepoint operators or installers through de-risking investment.

Demonstrator 16 (Demand Aggregation Finance) can establish demand for EV charging solutions in a local area or for a group of businesses (such as car rental companies or holiday cottage owners), bringing down the upfront cost of chargepoints for those registered in the scheme.

3. Planning Rules

An issue highlighted by both residential and commercial property leaseholders, is the challenge of obtaining landlord permission to install charging infrastructure, even when the tenant is willing to bear the cost. These are similar issues to those facing the building retrofit market, as highlighted in the Green Finance Institute's Coalition for the Energy Efficiency of Buildings report⁴⁹. Either regulatory changes (such as requiring energy inefficient property to be upgraded before they are next rented) or financial incentives will be needed. Local authorities often own significant land and property, including local car parks and other buildings. These locations have the potential to host chargepoints of all speeds, depending on what grid connection upgrades are needed. Planning rules to build charging stations on these sites can be complex, and each local authority may have its own rules and processes.

To move forward, regulatory change is needed to mandate inclusion of charging infrastructure where feasible for new residential and commercial developments. This is currently being considered by Government and new regulations are expected by the end of 2021 following a consultation in October 2019⁵⁰. The complexity in relation to the processes to obtain necessary grid upgrades and connections, including local authority planning permission constraints, also needs to be addressed.

⁴⁷ CDRT Analysis.

⁴⁸ Ofgem (2021) Access and Forward-looking Charges Significant Code Review – Consultation on Minded to Positions.

⁴⁹ Green Finance Institute (2020) Financing energy efficient buildings: the path to retrofit at scale.

⁵⁰ HM Government (2019) Electric Vehicle Charging in Residential and Non-Residential Buildings.

4. Local Authority Capacity, including access to finance

As local authorities take on more responsibility for the roll out of charging infrastructure in their area, there will be greater demand for the requisite skills and capacity to support the process. To date, the uneven roll out of EV infrastructure reflects the varying financial and resource capacity in local authorities across the UK. Those local authorities that have been successful in drawing down grant funding typically have the capacity to draw up a local EV infrastructure strategy, draft lengthy written business cases and have experience of the complex procurement processes needed to realise the required investment. Many local authorities aren't in a position or are yet to appoint dedicated personnel to roll out EV infrastructure, with responsibility falling between planning, highways, environment and parking teams. Given their critical role in EV infrastructure deployment, it is essential local authorities receive the support required to address this capacity gap. This applies equally to capacity within the financing teams. Given the overall scale of investment in public charging infrastructure needed, the infrastructure funding model will need to shift from being primarily based on securing government grants to accessing alternative sources of affordable capital to finance the infrastructure roll out, which in some cases may be more complex or require specific financing expertise.

Solutions which provide local authorities with information about how to roll out and finance a local EV infrastructure strategy are needed. Demonstrators 11 (Local Authority Toolkit) and 12 (Regional Area Tendering) are designed to provide guidance and frameworks for local authorities looking to finance local charging infrastructure. Demonstrator 13 (Community Municipal Investments) can provide a scalable and cost-effective source of funds for local authorities to complete infrastructure projects.

5. Technology Obsolescence

As for all infrastructure there is a risk of asset stranding – in this case as faster chargepoints become available, reducing the time drivers take to charge. As noted earlier, typically, faster chargepoints are more convenient for users but are higher cost and often require grid reinforcement, in turn requiring further investment. It is currently unclear to what extent consumers are willing to pay for the convenience of faster charging, and there is likely to be a mixture of responses with some prioritising convenience over cost and vice versa. More data to enable informed decision making on the right option in the face of rapid technology evolution will help. Demonstrator 10 (EV Infrastructure Investor App) is focused on the provision of such data.

6. Regulatory Considerations for a functioning market

Akin to the broadband rollout of the 2000s, the forthcoming EV infrastructure strategy is needed to ensure a cost effective and comprehensive investment programme is delivered. As part of this, greater visibility for consumers on the cost of charging and service provision will be required. In due course, considerations should be given to managing the risk of geographic monopolies emerging that lock out competition, for example by focusing on bringing capacity to motorway service areas and strategic road networks.

5.3 Demonstrator Solutions

The Coalition has put forward several demonstrator solutions that could overcome the barriers identified to facilitate universal EV charging infrastructure roll out.

Solutions focus on supporting greater capacity building within local authorities, signalling expected market demand through better data provision, regulatory changes and financial innovation. Some solutions put forward by Coalition members build on existing market offerings that exist in other sectors or jurisdictions; others originated through their collective creativity.

The following section sets out the list of potential demonstrator solutions in more detail and provides further information on each. Each template includes an overview of the project, its intended outcomes, key delivery partners and potential policy levers. The template also identifies which market segment would be impacted by the development of the different solutions.

Demonstrator Solution 9: Transport Infrastructure Facility (TIF)	Consumer ✓	Local Authorities ✓	Fleets / Rapid ✓
<p>Overview: The Transport Infrastructure Facility seeks to bring together public and private capital to support the roll out of system wide EV infrastructure in the UK, focusing on areas of market failure which are not expected to be addressed through current available solutions. Public finance could be used to de-risk incremental private capital to supplement existing government funds such as the Rapid Charging Fund (RCF) and Charging Infrastructure Investment Fund (CIIF), leveraging this capital. Several options for structuring a facility are being explored with key stakeholders, including revenue and credit guarantees, financial loss against construction risk or first loss mechanisms to create financeable charging infrastructure projects.</p> <p>Beyond transport, the TIF could create a template that could be replicated across other key areas within the net-zero agenda.</p>			
<p>Outcome: Provide essential funding for the market failures within system wide EV charging (including rural and poorer areas, which would remain unprofitable) required to enable mass adoption of EVs in the UK.</p>			
<p>Delivery partners include:</p> <ul style="list-style-type: none"> • Public finance • Financial institutions • Institutional investors across private equity and infrastructure • CPOs • National Grid • DfT 	<p>Policy levers to support demand and scale up:</p> <ul style="list-style-type: none"> • Clarity and longer-term plan on fiscal incentives for installing chargepoints 		

Demonstrator Solution 10: EV Infrastructure Investor App	Consumer	Local Authorities	Fleets / Rapid
		✓	✓
<p>Overview: A new application (being actively developed by Zuehlke⁵¹) aiming to simplify the processes involved with charging infrastructure investment for investment groups and provide data to support revenue forecasts. The application will provide trusted data and models for prospective EV infrastructure investors and local authorities. Open-source data provides up-to-date information around current and planned initiatives and energy system capacity as this change to achieve the UK’s net-zero goals. The application would include a mix of free-to-use data and additional paid/premium features to share the core knowledge held by the technical leadership within DNOs.</p>			
<p>Outcome: Increases the number of investable opportunities by increasing the certainty of utilisation. For operators, it reduces the cost and time of dealing with DNOs and local authorities.</p> <p>For local authorities and corporate fleets, it can help identify suitable low-cost sites for development or installation of infrastructure without the need for lengthy application processes.</p>			
<p>Delivery partners include:</p> <ul style="list-style-type: none"> • Zuehlke • UK Power Networks, DNOs • Financial Institutions • Data providers 		<p>Policy levers to support demand and scale up:</p> <ul style="list-style-type: none"> • N/A 	

Demonstrator Solution 11: Local Authority Toolkit	Consumer	Local Authorities	Fleets / Rapid
		✓	✓
<p>Overview: Many local authorities lack the resources necessary to roll out EV charging infrastructure effectively, leading to inequitable roll out across the 408 Local Authorities. A best-in-class framework and toolkit would help non-expert resources in businesses and local authorities navigate the process behind charging infrastructure, reducing time and cost, as well as breaking down the complexity of planning and permission processes. The resource would build on existing materials such as those provided by Energy Savings Trust⁵² and include access to an approved supplier framework, identify relevant sources of data⁵³, ensure alignment with national strategy, provide details of financial providers/solutions and offer best-practice examples of how to roll out local infrastructure.</p>			
<p>Outcome: Support local authorities looking to implement charging infrastructure to start EV roll out, accelerating demand for infrastructure installation and facilitating greater EV adoption by local residents without access to off-street parking. The framework would reduce time taken and capacity needed for local authorities to prepare high quality applications to National Grid/DNOs, expediting the installation process.</p>			
<p>Delivery partners include:</p> <ul style="list-style-type: none"> • Local Authorities • New Automotive • DNOs • DfT • CPOs • Local Enterprise Partnerships • Energy Savings Trust 		<p>Policy levers to support demand and scale up:</p> <ul style="list-style-type: none"> • Streamlined planning processes across different local authority boundaries 	

⁵¹ Zuehlke (2021) Data for Electric Vehicles.

⁵² Energy Savings Trust (2021) On-street Residential Chargepoint Scheme: Information Pack 2021-2022.

⁵³ New AutoMotive (2021) Toolkit for local areas.

Demonstrator Solution 12: Regional Area Tendering	Consumer	Local Authorities ✓	Fleets / Rapid
<p>Overview: A national procurement framework to enable local authorities to aggregate and tender for larger scale charging infrastructure arrangements, bundling together lower and higher utilisation sites. The framework will be developed with local authorities to help address differing capabilities and resourcing among local authorities and replicate best practice to accelerate chargepoint network expansion. A tendering process could be structured to ensure a commercially viable package of chargepoints are identified, which is crucial for delivering a full network coverage. High utilisation charging sites will only be allocated if balanced with low utilisation sites, with sufficient modelling to provide adequate business cases and help address revenue uncertainty.</p>			
<p>Outcome: The tendering procurement framework would enable the deployment of lower utilisation chargepoints, predominantly in rural areas, to expedite EV adoption. An example of a potential approach could be inspired by the German government model to tender 1,000 fast charging parks⁵⁴.</p>			
<p>Delivery partners include:</p> <ul style="list-style-type: none"> Local Authorities Subnational Transport Bodies CPOs Strategic body to plan the tendering process DfT/OZEV 		<p>Policy levers to support demand and scale up:</p> <ul style="list-style-type: none"> Streamlined planning processes across different local authority boundaries 	

Demonstrator Solution 13: Community Municipal Investments	Consumer ✓	Local Authorities ✓	Fleets / Rapid
<p>Overview: A crowdfunding approach to create an efficient, scalable and cost-effective source of funding for local authorities to finance capital expenditure on local chargepoints. The funds would be raised directly from local residents through a platform (such as the Abundance⁵⁵ CMI methodology). The funds raised by the local authorities could be used in conjunction with On-Street Residential Chargepoint Scheme funds or for active travel infrastructure.</p>			
<p>Outcome: Community Municipal Investments create a powerful new model for Local Authorities to engage with local citizens as investors, thereby raising capital and awareness among the local community. Widespread adoption of this model offers a financing route for the two-thirds of Local Authorities that have declared a climate emergency and could foster a new community investment culture for retail investors.</p>			
<p>Delivery partners include:</p> <ul style="list-style-type: none"> Local Authorities Abundance Investments DNOs DfT CPOs Local Enterprise Partnerships Energy Savings Trust 		<p>Policy levers to support demand and scale up:</p> <ul style="list-style-type: none"> Streamlined planning processes across different local authority boundaries 	

⁵⁴ electrive.com (2021) Deutschlandnetz: Germany to tender 1,000 fast-charging parks.



⁵⁵ Abundance Investment (2021) About our new Community Municipal Investments.

Local Climate Bonds Initiative

Local Climate Bonds, a type of ‘community municipal investment’⁵⁶, allow local authorities to identify specific initiatives in their neighbourhoods, from wind farms to solar panel installations, rewilding and EV charging infrastructure and raise investment in increments as little as £5 through a crowdfunding model. They offer a source of funds cheaper than the Public Works Loan Board, a way to diversify a council’s funding base, and a valuable way to engage local people in plans for decarbonisation and projects identified in their environment strategies, encouraging wider collective action.

For citizens, the Local Climate Bond provides a lower-risk and fixed return investment, comparable to other Government-backed investments such as Gilts, and a way to mobilise their savings to help tackle the climate emergency in their area.

The Green Finance Institute and Abundance Investment have launched a national campaign to encourage and support the 300 local councils in England, Scotland and Wales who have declared a Climate Emergency to launch a Local Climate Bond in the 18 months following the critically important COP26 summit in November. The first five pioneering councils signed up to the campaign in September 2021.

Demonstrator Solution 14: Utilisation Linked Loans	Consumer	Local Authorities 	Fleets / Rapid 
<p>Overview: Loans for chargepoint operators or installers (such as local authorities) that are repaid based on utilisation. In a similar way to student loans, repayments would not commence until a base utilisation was achieved. This would offset the risk of loan repayment liabilities not matching revenues inflow – a particular risk for chargepoints in some rural communities for example.</p> <p>The income-based ratcheting repayment mechanism proposed would be structured to incentivise the installation of chargepoints initially expected to have lower levels of utilisation, increasing the overall network coverage ahead of demand ramping up.</p>			
<p>Outcome: Utilisation Linked Loans encourage supply of charging infrastructure ahead of demand, de-risking investment in areas where future utilisation is more uncertain over longer-term horizons and enabling the roll out of a UK-wide network.</p>			
<p>Delivery partners include:</p> <ul style="list-style-type: none"> • CPOs • Delivery body for loans (akin to the Student Loan Company) • Data providers • Local Authorities • Financial Institutions 	<p>Policy levers to support demand and scale up:</p> <ul style="list-style-type: none"> • Government underwriting of loans may be required 		

⁵⁶ Green Finance Institute (2021) Local Climate Bonds a cost-effective way to raise billions for councils’ green plans, says new campaign.

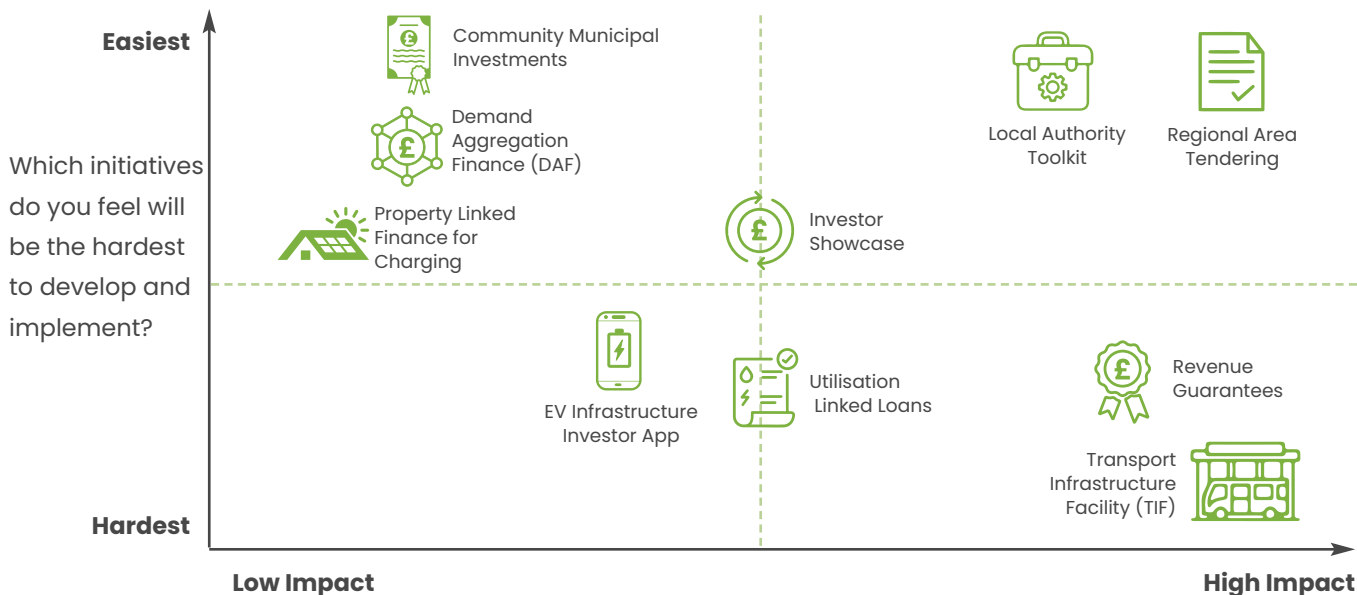
Demonstrator Solution 15: Property Linked Finance	Consumer ✓	Local Authorities	Fleets / Rapid ✓
<p>Overview: Property Linked Finance enables building owners to access 100% upfront funding to install EV chargepoints through finance attached to the property. The responsibility for repayments remains with the property and is passed on to subsequent owners who are benefitting from the chargepoint. This model is based on the success of Property Assessed Clean Energy (PACE) financing in the USA.</p> <p>Property Linked Finance overcomes several market barriers:</p> <ul style="list-style-type: none"> • Temporal split incentive: Obligations are transferable to subsequent property owners • Preference for short payback period: Financing terms can extend to +20 years • Limited cash/savings: Requires no upfront capital contribution • Owner-renter split incentive: Allows owners and tenants to share the costs and benefits of infrastructure • Programmes typically use private sector funding to finance the upfront cost of the infrastructure 			
<p>Outcome: Property Linked Finance overcomes the cost barrier to installing charging infrastructure for consumers and businesses and can unlock demand, particularly for property owners with limited debt capacity. The ability to transfer obligations to subsequent property owners and finance terms of 20+ years can improve the investment case where payback time is long. Lenders can support customers with a low-risk financial product, while the aggregation and securitisation of loans provides a route to lower cost of capital for lenders and borrowers alike.</p>			
<p>Delivery partners include:</p> <ul style="list-style-type: none"> • Local Authorities • Financial institutions • Financial regulators • Law firms • Mortgage holders • CPOs and installers • Utilities companies 	<p>Policy levers to support demand and scale up:</p> <ul style="list-style-type: none"> • Legislative amendments to enable finance to be attached to properties • Financial regulations that ensure robust consumer protections and allow scope for financial innovation • Standardised definitions of qualifying infrastructure costs 		
Demonstrator Solution 16: Demand Aggregation Finance (DAF)	Consumer ✓	Local Authorities ✓	Fleets / Rapid ✓
<p>Overview: An online service platform, coupled with new financial products that establishes and aggregates demand for EV infrastructure in a local area, bringing down the upfront and financing costs for those that register in the scheme and enabling supply to be scaled. Capturing local demand data from residents, local businesses and community groups in an online database can signal an investment need to local authorities and allow for better modelling of likely chargepoint utilisation in certain locations.</p> <p>For businesses and local authorities, it could be a Special Purpose Investment Vehicle, enabling multiple colocated businesses, potentially in designated green development zones or corridors, to finance EV infrastructure. For consumers, aggregating demand could signal the need for chargepoint finance solutions to financial institutions yet to offer this.</p>			
<p>Outcome: Enables consumers and/or local authorities to access chargepoint solutions at a lower cost, and with cheaper financing if coupled with a financial product suite. Financial institutions can benefit from a guaranteed level of demand for loans and manufacturers/installers have a guaranteed level of demand for equipment.</p>			
<p>Delivery partners include:</p> <ul style="list-style-type: none"> • Online service/platform • CPOs • Consumer groups • Financial institutions • Local Enterprise Partnerships • Local Authorities 	<p>Policy levers to support demand and scale up:</p> <ul style="list-style-type: none"> • Overarching national strategy (National Grid, Ofgem) for future cases 		

Demonstrator Solution 17: Revenue Guarantees	Consumer	Local Authorities	Fleets / Rapid
		✓	✓
<p>Overview: To enable mass roll out of EV infrastructure through guaranteeing a base level of utilisation and revenue for investors in EV infrastructure where the business case is not immediately commercially viable. A revenue floor mechanism guaranteed by the UK Government would provide utilisation revenue for chargepoints where the commercial business case is yet unclear/marginal. The guarantee could be structured as a Contract for Difference mechanism guaranteeing a minimum payment for installers regardless of actual utilisation.</p>			
<p>Outcome: A revenue guarantee could provide a minimum level of revenue to private sector investors if utilisation dips below market expectation, or the EV market fails to develop in time to achieve the 2030 phase out date. The guarantee mitigates utilisation risks in the short term, with visibility to making multiple chargepoint investments profitable.</p>			
<p>Delivery partners include:</p> <ul style="list-style-type: none"> Public Finance Intermediary body to verify guarantee CMA CPOs Data providers DfT / OZEV 		<p>Policy levers to support demand and scale up:</p> <ul style="list-style-type: none"> Regulation of the market to avoid market abuse Competition law verification Ability to structure guarantee price flexibly 	

Demonstrator Solution 18: Investor Showcase	Consumer	Local Authorities	Fleets / Rapid
	✓	✓	✓
<p>Overview: An interactive knowledge hub to connect businesses seeking investment to knowledgeable investors looking for investment opportunities and upskill new investors interested in the opportunities the sector offers. The knowledge hub would help distinguish between organisations across the charging infrastructure market, at different stages of maturity, allowing for targeted pitching and investment. While there is no guarantee of investment, such a tool could provide an opportunity for organisations to get in front of the right investors and could provide organisations with access to non-financial support.</p>			
<p>Outcome: Ultimately, the showcase would help match companies or projects with investors and assist companies struggling to raise investment. Further, the concept identifies domestic finance funding pools and could be expanded to other green tech sectors.</p>			
<p>Delivery partners include:</p> <ul style="list-style-type: none"> Software designers Investor community Renewable Energy Association CPOs 		<p>Policy levers to support demand and scale up:</p> <ul style="list-style-type: none"> N/A 	

Coalition members evaluated these solutions based on greatest impact and ease of implementation. Those that crowded in private capital to support public funding; reduced revenue risk for investors; and helped local authorities overcome resource and cost challenges were assessed to guide prioritisation of the Coalition’s work. The results are set out below.

Figure 13
Impact vs Ease of Implementation



Source: CDRT

5.4 Policy Recommendations

In addition to the market-led initiatives we set out above, a policy and regulatory environment conducive to accelerating the transition to zero emission vehicles is needed.

- **A planned approach to EV infrastructure roll out**

A national infrastructure delivery plan is a top priority and will need to be underpinned with an EV ‘heat map’ indicating where EV chargepoints are currently located, and also where they will need to be installed to create a fully functional UK-wide network. This should be underpinned by data on traffic flows and forecast utilisation over the next 5, 10 and 15 years – which can then be used to inform the development of policy and financial instruments required to deliver the investment needed through mechanisms outlined above.

The delivery of the EV charging network **should be treated as a national infrastructure project**, led by central government, with increased and ongoing coordination with local authorities and the private sector. For private sector actors looking to invest in public charging infrastructure in particular, having to understand the **different costs and planning requirements of 408 different local authorities** can act as a barrier. Such a coordinated approach would help address these issues – and has worked well in Norway, which now has one of the highest rates of EV adoption in the world⁵⁷. Germany has also announced a plan to tender 1,000 fast charging parks⁵⁸, demonstrating growing acceptance of the value of a more coordinated approach.

⁵⁷ Norsk Elbilforening (2021) Norwegian EV policy.

⁵⁸ electrive.com (2021) Deutschlandnetz: Germany to tender 1,000 fast-charging parks.

- **Addressing planning issues relating to grid upgrades and infrastructure roll out**

Because success in scaling the EV market will be heavily determined by the rate of grid upgrade, thought needs to be given to how this will be delivered in a proactive fashion that does not hold back EV roll out. This could be achieved through replicating the Offshore Transmission Network Review process, where the Government **brought together DNOs, chargepoint operators and businesses to conduct a review of onshore infrastructure needs. The process informed the streamlining of planning and consenting processes for grid upgrades and capacity expansion.** The same approach applied to EV charging infrastructure could transform the roll out process, particularly for installations such as multiple chargepoints in depots or business parks or ultra-rapid chargepoints across the Strategic Road Network.

The Government should also work with local authorities to **review and streamline local planning rules to ensure the installation of on-street charging is accelerated** and to reduce the timelines given to landlords to approve chargepoint installations on their land.

- **Market integration and transparency**

As the market develops, and as set out in the recent OZEV consultation⁵⁹, market integration should be a priority to integrate the services of **different chargepoint operators** to facilitate price transparency through offering comparable pricing information at chargepoints and making payments easier for consumers.

The priority of the Coalition in the short term is to deliver the highest impact/most immediately achievable demonstrators. Alongside this, an ongoing dialogue with Government will continue, with the support of Coalition members, on developing policy solutions to aid delivery of the full suite of demonstrators set out above.

⁵⁹ HM Government (2019) Electric Vehicle Charging in Residential and Non-Residential Buildings.

6. Conclusion



6. Conclusion

The Government's vision of ending sales of fossil fuel powered cars and vans in 2030 is a key component of the Government's commitment to reduce GHG emissions by 78% of 1990 levels by the same date. Achieving this outcome will, according to our forecasts, create a £150bn plus investment opportunity in the UK. However, there are significant concerns that a range of barriers will delay progress in transitioning to fully electric car sales in 2030.

There is an urgent need to create the right conditions to facilitate the transition in an orderly fashion. As we have set out, the barriers to investment – and solutions needed to address them – are granular in nature. Alignment, coordination and collaboration between the public and private sector, and between the finance, transport, and energy sectors, will be key to ensuring the necessary solutions are effective in unlocking the private capital needed.

The workshops and multiple stakeholder interviews conducted in this initial phase of the Coalition's work have highlighted where the most pressing barriers lie – and what the most promising solutions are. Our demonstrator solutions have identified how to tackle these barriers and this is where our efforts are now focused.

We invite finance and industry organisations to join the Coalition and work with us to co-design and pilot these demonstrator solutions. Collectively we can shape the future decarbonisation of road transport and catalyse investment opportunities from the ground up.

We look forward to you joining us on this journey.

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Abbreviations/Glossary

ABS	Asset-Backed Security
BEIS	Department for Business, Energy and Industrial Strategy
BEV	Battery Electric Vehicle
BIK	Benefit-in-kind
CAGR	Compound Annual Growth Rate
CAPEX	Capital expenditure
CMA	Competition and Markets Authority
CMI	Community Municipal Investments
CPO	Chargepoint Operator
DAF	Demand Aggregation Finance
DfT	Department for Transport
DNO	Distribution Network Operator
DVLA	Driver and Vehicle Licensing Agency
ESG	Environmental, Social, and Governance
EU	European Union
EV	Electric Vehicle – for the purpose of this report an EV is a zero-tailpipe emission battery electric vehicle and does not include hybrid vehicles
FCA	Financial Conduct Authority
GFV	Guaranteed Future Value
HGV	Heavy Goods Vehicle
HMT	Her Majesty's Treasury
HP	Hire Purchase
ICE	Internal Combustion Engine
LA	Local Authority
LCV	Light Commercial Vehicle
MSA	Motorway Service Area
OEM	Original Equipment Manufacturer
OFGEM	Office of Gas and Electricity Markets
OPEX	Operating Expenditure
OZEV	Office for Zero Emission Vehicles
PCH	Personal Contract Hire
PCP	Personal Contract Purchase
PHEV	Plug-In Hybrid Electric Vehicle
QCF	Quadrature Climate Foundation
RV	Residual Value
SQD	Sales Quality Dispute
SRN	Strategic Road Network
TCO	Total Cost of Ownership
UKIB	UK Infrastructure Bank
VAT	Value Added Tax
ZEV	Zero-Emission Vehicle (includes battery and hydrogen fuel cell electric vehicles)

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Amberside Advisors*	Glass's Guide
AMTE Power	Greater Manchester Combined Authority
Advanced Propulsion Centre	Gridserve*
Alphera Financial Services	Hitachi Capital
Arnold Clark	HSBC
Arval (BNP Paribas Group)*	Lloyds Banking Group*
Ashurst LLP	Lombard Odier*
Autotrader	M&G Investment Management*
AVID Technology	Midlands Connect*
Barclays	National Grid
Baringa Partners	NatWest*
Beauhurst	North Yorkshire Council
Benchmark Intelligence	Northridge Finance (Bank of Ireland)
BEIS	Octopus Electric Vehicles*
BloombergNEF	Osborne Clarke*
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British Vehicle Rental and Leasing Association*	Office for Zero Emission Vehicles
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Corsair Capital	Shoosmiths*
Cyan Finance	The Climate Group
Department for Transport	Transport & Environment
Drive Electric	Transport for London*
DSG Finance	Triodos Bank*
DWS	Triple Point Heat Networks
Ecotricity	Uber*
Enel X	UKPN
Energeo*	University of Warwick
Energy Savings Trust*	West Sussex County Council
Energy Systems Catapult	World Economic Forum
Envision AESC	ZapMap
EON	Zemo Partnership
EV Network*	Zenobe
EVA England*	Zeti*
Faraday Institute	Zouk Capital

Appendix 2 – Summary of Demonstrator Solutions

#	Demonstrator Solution	Purchase and Leasing		Charging Infrastructure		
		Consumer	Lender	Consumer	Local Authorities	Fleets / Rapid
1.	EV Loan Securitisation	✓	✓			
2.	0% Consumer Finance Loans for EVs	✓	✓			
3.	Means-Tested Subsidised Loans for Used EVs	✓	✓			
4.	Battery Health Certificate	✓	✓			
5.	Total Cost of Ownership Principles	✓				
6.	Battery Value Guarantee		✓			
7.	Bundled Finance Solutions	✓	✓			
8.	Salary Sacrifice for SMEs	✓	✓			
9.	Transport Infrastructure Facility (TIF)			✓	✓	✓
10.	EV Infrastructure Investor App				✓	✓
11.	Local Authority Toolkit				✓	✓
12.	Regional Area Tendering				✓	
13.	Community Municipal Investments			✓	✓	
14.	Utilisation Linked Loans				✓	✓
15.	Property Linked Finance for Charging			✓		✓
16.	Demand Aggregation Finance (DAF)			✓	✓	✓
17.	Revenue Guarantees				✓	✓
18.	Investor Showcase			✓	✓	

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