FINAL REPORT

2030 ZEV Mandate Plan

PREPARED FOR EUROPEAN CLIMATE FOUNDATION

22ND NOVEMBER 2024

European Climate Foundation

Sustainability is our business

About the authors

Partner-in-Charge: Celine Cluzel, Partner

Project Director: Richard Riley, Consulting Director

Project Manager: Jacob Dalder, Managing Consultant

Policy Modelling Lead and Project Delivery: Robert Pearce-Higgins, Senior Consultant

Project Analyst: Natasha Harland, Consultant

This study uses data derived from publicly available sources and incorporates independent modelling and analysis performed by ERM. Policy modelling inputs and assumptions have been approved by the European Climate Foundation.

Founded in 1971, ERM are the largest advisory firm in the world focusing solely on sustainability, offering unparalleled depth and breadth of expertise.

We shape a sustainable future with the world's leading organizations

Our purpose guides everything we do. We create a better future by helping the world's biggest brands address today's sustainability imperatives.

We are the recognized market leader in sustainability services

Numerous industry benchmarks attest to our market leadership and the majority of our work is sole-sourced, reflecting trusted partnerships we build with our clients.

ERM OVERVIEW

8000+ Professionals	40 Countries & territories	**ESG & Sustainability consulting leader** Verdantix Green Quadrant 2024
150+ Offices	50+ Years of experience	#1 Sustainability service provider – HFS 2022

Glossary of acronyms used in the report

AFIR – Alternative Fuels Infrastructure Regulation

BEV – Battery electric vehicle

BiK – Benefit-in-kind

CA – Combined Authority

CLTC – China Light-Duty Vehicle Test Cycle

CPO – Charge point operator

DfT – Department for Transport

EU – European Union

EV – Electric vehicle

EVCP – Electric vehicle charge point

EVSE – Electric vehicle supply equipment

ICEV/ICE – Internal combustion engine [vehicle] (i.e., petrol or diesel vehicle)

ITT – Invitation to tender

LA – Local Authority

LEVI – Local Electric Vehicle Infrastructure [fund]

NEVIS – National EV Insight & Support [tool/knowledge repository]

OEM – Original equipment manufacturer (e.g., Volvo, Ford, etc.)

ORCS – On-street Residential Charge point Scheme

OZEV – Office for Zero Emission Vehicles

PHEV – Plug-in hybrid electric vehicle

RCF – Rapid Charging Fund

SoC – State of charge

STB – Sub-national transport body

TCO – Total cost of ownership

TfN – Transport for the North

WLTP – Worldwide Harmonised Light Vehicle Test Procedure

VED – Vehicle Excise Duty

ZEV – Zero-emission vehicle

Contents

Reducing the barriers to BEV purchase that UK consumers face could both support the current ZEV mandate and ensure it is compatible with a just transition

Background:

The UK's planned ban on the sale of petrol and diesel internal combustion engine (ICE) cars by 2030 was replaced in 2024 by the zero-emission vehicle (ZEV) mandate, a law which requires 80% of new car sales to be ZEVs by 2030. Despite the UK's charging infrastructure rollout and the decreasing costs of battery electric vehicles (BEVs), the sales share of BEVs in the UK has not increased over the last two and half years. Because of this, and in the context of the Labour parties' stated intention of "restoring the phase-out date of 2030 for new cars with internal combustion engines"[1], additional policy and government actions are necessary to accelerate BEV uptake to support the ZEV mandate. Furthermore, without additional intervention, the BEV transition will impact consumer groups differently, so a focus on equity is needed to ensure lower income groups are not left behind.

Approach:

First, recent surveys of UK consumers and industry manifestos were analysed to understand the most significant barriers, whether real or perceived, that inhibit BEV car purchase decisions. Next, a range of fiscal policies were analysed (and modelled where possible) to characterise their costs to government and impacts on accelerating new BEV sales. In parallel, interviews were conducted involving varied stakeholders (from local authorities (LAs) to charge point operators (CPOs)) involved with the Local EV Infrastructure (LEVI) Fund and the Rapid Charging Fund (RCF) to understand how these funds might be adjusted to maximise their impact. Other non-cost actions were evaluated to accompany any fund adjustments. The policy/actions analysis was brought together as a recommended policy package for government implementation.

Barriers to BEV adoption in the UK:

UK consumer opinion surveys and manifestos produced by industry groups were reviewed to identify the most common barriers consumers face that discourage BEV adoption. Some of the identified barriers are real/backed by data, while others are perceived barriers based on lack of information or consumer misconceptions. The four main barriers (see table at right) were explored in detail and used to inform the analysis of possible fiscal policies and non-cost actions that could reduce them.

Top four barriers to BEV purchase among UK consumers

Barrier	Affordability (vehicle price)	Affordability (operational costs)	Charge point numbers	Charging experience (reliability, simplicity and accessibility)
Real or perceived?[2]	Real	Perceived, in part	Perceived, in part	Real

1: Labour Party Manifesto 2024
2: Assigned by ERM, with indication from the surveys where applicable

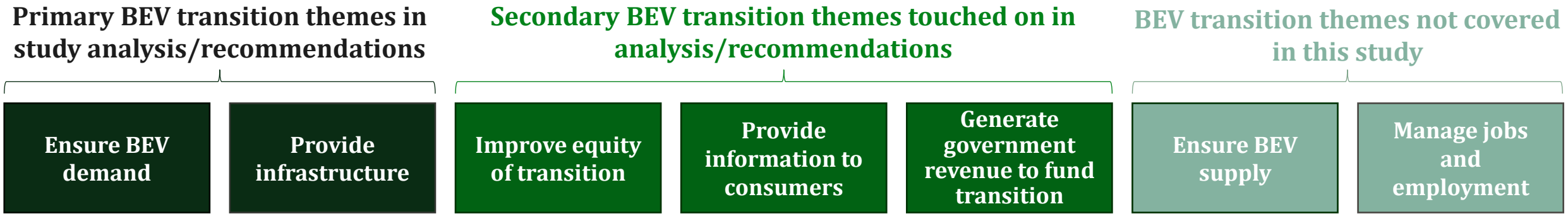
A breadth of policy action is needed to accelerate the BEV transition in the UK; for this study, the focus is on supporting BEV demand and ensuring appropriate charging infrastructure

A policy package is needed to support the accelerated uptake of BEV so that the ZEV mandate becomes a floor rather than a cap for BEV uptake

Policy is also needed to ensure a range of BEVs become available with different sizes and prices as they enter the new car market. This will help to ensure affordable BEVs are available for second-hand buyers and will help to form a well-structured market with depreciation trends similar to the petrol car market.

The package should include a range of measures under seven pillars. These should ensure supply of BEVs from OEMs across vehicle sizes and prices, ensure demand for BEVs from consumers, provide the government with revenue to pay for green policy and lost fuel duty revenue, provide charging infrastructure which is available and affordable for everyone, improve transport equity, provide reliable and trusted consumer information, support the creation of new jobs, and manage the transfer of skills to support people who may lose employment during the transition.

Of the comprehensive list of measures that are needed to support the BEV transition, this study looks at those that 1) ensure consumer demand for BEVs increases and 2) support the provision of charging infrastructure which is available and affordable for everyone.



Policy analysis yields a recommended package of fiscal policies as well as several non-cost actions and adjustments to charging funds that when implemented in parallel, would support the ZEV mandate

Recommended fiscal policy package:

- Out of four fiscal policies qualitatively assessed in terms of their impact on four criteria, the three described to the right form the recommended policy package.
- Illustrative designs for the feebates and social leasing scheme policies were modelled to quantitatively assess costs and emissions impact over time as well as to understand their impact on key consumer groups.
- Based on this illustrative policy modelling, the whole fiscal policy package's 2025-2030 (six-year) cumulative cost is ca. **£2.3bn** and the minimum cumulative emissions reduction is **ca. 5 million tonnes CO_2e** over this same time period.
- Road user charging and amendments to the UK company car tax regime are highlighted as separate revenue-generating policies that could fund the policy package cost
- Case studies, implications, and leading practices for each of the three fiscal policies were also detailed.

Descriptions & qualitative analysis of fiscal policies included in recommended policy package

Policy	General description	BEV sales impact	Cost to government	Equity impact	Ease of implementation
Feebates	Tax expensive, high-emissions ICE cars and use revenue to subsidise BEVs to encourage powertrain switching		(Depends on format)		
Social leasing scheme	Discounted BEV leasing scheme for low-income, car-dependent households.		(Depends on number of leases offered)		
Information campaigns	Reduce the perceived barriers around BEVs through messaging campaigns and engagement with consumers				

Positive *Negative*

Recommended non-cost actions:

- Based on interviews conducted with LAs, CPOs, and other stakeholders invested in accelerating the UK's charge point rollout, modifications to LEVI and RCF were identified (see table at right).
- In addition, several actions are recommended to improve the consumer charging experience:
  - **Reliability**: E.g., Mandate that charge points retain the PIN pad and a reliable internet connection for contactless payments
  - **Simplicity**: E.g., require vehicle OEMs to provide free upgrades to the in-car routing software to incorporate the latest charge point locations for all EVs with CPOs providing data on broken or new charge points and charge point availability
  - **Accessibility**: E.g., perform state-of-the-network accessibility review and implement improvements

Recommended adjustments to charging funds

LEVI	RCF
• Continued funding for the Support Body and LA EV officer staff, with additional analysis tools available for LAs • Communication improvements (of timelines and deadlines) and better CPO-LA engagement	• Provide design clarity and a timeline • Ensure coverage of all roads needed to provide national charging coverage • Encourage CPO competition and control prices were funding leads to local pricing advantage • Use funding rounds

To enable the intended increased ambition of the ZEV mandate, the UK government should consider the below supporting policies and actions

Policy / Action	What this achieves	Who is impacted
1. Implement **feebates** that apply to the sale of new cars	Financially penalises vehicles that are highly-polluting (e.g., ICEVs) and subsidises zero-emission vehicles to encourage powertrain switches	All car buyers would benefit from BEV prices that are more competitve with ICEVs. Purchasers of large, polluting ICEVs would be negatively impacted
2. Launch a **social leasing scheme** to ensure a just transition for BEV	Ensures that households facing transport poverty are brought along in the EV transition (dependent on scale and terms of scheme)	The most cost-conscious consumers who can only afford to lease a car (rather than purchase outright)
3. Run an **information campaign** focussed on addressing consumers' perceived barriers to switching to a BEV	Corrects misconceptions about EVs such as range, battery lifetime, charging time, and sustainability that may otherwise negatively influence consumers' decision to purchase an EV	Consumers who are skeptical about buying an EV for reasons that are misinformed
4. **Do not** implement additional **tariffs on the import of Chinese EVs**	Chinese EVs imported into the UK market with their current mark-up would remain as options for consumers to purchase	UK consumers who prefer smaller cars will have a wider selection of cheaper BEVs from China. Competitive pricing from Chinese BEVs may apply some downward pressure on EV price for other OEMs, accelerating ICE/BEV price parity
5. **Continued funding for the Support Body and LA staff**, with additional analysis tools available for LAs	Enables the continuation of support for EVCP delivery and reporting under the LEVI fund	Drivers without access to home charging will benefit the most from the strategic and efficient rollout of on-street EVCPs. Indirectly, these changes would help to incentivise drivers of ICE vehicles to transition to BEVs
6. **Communication improvements and better CPO-LA engagement**	Strong initial EVCP contracts would be created between CPOs and LAs, minimising the time needed for additional negotiations and creating stronger partnerships	
7. **Accelerate RCF delivery** while ensuring clear communication in advance, support for national infrastructure coverage, and funding rounds to support delivery of initial projects	Provides confidence and clarity to investors, supports infrastructure delivery across all significant charging gap, and boosts BEV rollout	Everyone would benefit from a timeline and clarity. Drivers would benefit from faster delivery. Charging providers looking to build a national network and drivers would benefit from a wider scope than only motorways
8. **Improvements to the Public Charge Point Regulations** to address reliability, simplicity and accessibility issues	Using and paying for charging at public charge points would be easier for all users	All drivers of EVs would benefit. Indirectly, these changes would help to incentivise drivers of ICE vehicles to transition to BEVs

Green = Fiscal policies **Purple = Non-cost actions/charging fund modifications**

Contents

Why is a feebate needed

With a ZEV mandate in place, it could be argued that no further policy is need. Why is this not the case?

1. The ZEV mandate places all the emphasis on OEMs to sell BEVs, without sufficient encouragement for consumers to buy them there is always a risk OEM pushback and bad press results in a political reversal. Even if this does not occur pushback is still likely to take up a lot of political capital better spent elsewhere.
2. The policy which is in place to encourage consumer demand for BEVs is a favourable salary sacrifice scheme. This is encouraging the purchase of lots of large expensive BEVs with the knock-on effect of reduced road safety and falling resale values as not enough people in the second-hand market want these high spec vehicles.

Some commentators have proposed solutions such as cutting VAT on BEV purchase, but these fail in a number of places. These include:

1. These policies are regressive providing the largest benefits to the richest consumers buying the most expensive vehicles.
2. By encouraging more expensive models into the market they are likely to further contribute to the low resale value seen for BEVs in 2024. This low resale value is a major issue as it is pushing up leasing costs on new BEVs which discourages people to buy them.

A feebate can meet these challenges

A feebate which places a fee on new expensive and highly polluting vehicles while providing a grant (rebate) for the smallest cheapest BEVs can be a far more progressive policy which supports OEMs in meeting their mandate targets while also rebalancing the market by increasing the number of smaller BEVs, which second hand buyers are looking for, thus helping BEVs to have a more stable market overall.

Note, the "fee" component of **the feebate has value by itself** in accelerating the transition of large polluting cars toward ZEV earlier if the "rebate" component ends up being deemed infeasible (but in this case, the just transition aspects of the feebate policy would be lost).

How a feebate can be easily implemented

Introducing a completely new policy is not time efficient. The outcome of a feebate therefore needs to be delivered through the structure of existing policy.

The fee

The existing policy which charges drivers a fee at point of vehicle purchase is first year VED. The fee is currently based on car CO_2 emissions (as summarised to the right). These fees go up every year to account for inflation. They also need to go up to account for the falling emissions of new vehicles.

On top of these two effects the fee should go up to better reflect the environmental and social damage of these vehicles, as is the case in other European countries. This added cost could form the fee of the feebate. The exact fee would have to be calculated each year based on sales, but a good initial target would be to increase the cost for the most polluting vehicles from £5,490 today to £10,000 by 2027/2028. The increase in fee should be focused in the bands above the national average (e.g. if the average new car emits 100gCO_2/km then the price increase should focus on bands 101 and up.

CO_2 Emissions (gCO_2/km)	First year VED rate (£)
0	10
1-50	110
51-75	130
76-90	270
91-100	350
101-110	390
111-130	440
131-150	540
151-170	1360
171-190	2190
191-225	3300
226-255	4680
More than 255	5490

The grant (or rebate)

The fee above would raise money to support a grant. This could most easily be achieved by reinstating the plug-in car grant. The grant should be set with different levels based on car price. For example, cars with a RRP below £20,000 could receive a £3,000 grant and cars with a RRP between £20,000 and £30,000 a £2,000 grant. Cars above £30,000 or £35,000 should receive no grant so that the policy focuses the funding on driving smaller more affordable models into the market.

Managing budgets

To ensure the fee and bate balance each other and result in no cost to government, the government could raise the fee in a budget and introduce the grant in the next budget. Between the budgets the government can calculate/estimate the fee coming in and use this to cap the total spend on the grant in the next 6 months. By adjusting the fee rates, grant rates and grant total in each budget and by setting the grant total based on the fee collected in the previous period the scheme can be carefully adjusted to match BEV demand to the mandate and avoid any costs to government.

Contents

As of January 2024, the ZEV mandate officially became law in the UK, formally adjusting the auto decarbonisation pathway

- The UK's **2030 ban on the sale of new petrol/diesel cars** planned by the 2019-2022 Johnson Conservative government previously brought the countries' auto decarbonisation ambition in-line with leading EU countries, including the Netherlands, Sweden, and Denmark.
- The ZEV mandate made law by the 2022-2024 Sunak Conservative government **requires manufacturers to meet annual ZEV new car sales share targets up to 2030**.
- Although the end point of 100% zero emissions car sales by 2035 remains the same under both regulatory frameworks, **the current ZEV mandate policy replaces the 2030 ICEV sales with the explicit target of 80% ZEV sales**.
- This change loosens the requirement of near-term car tailpipe emissions decarbonisation, **making it more difficult for the UK to meet its legal commitment of a 78% reduction in emissions by 2035 compared to 1990 levels**[1], with transport responsible for the highest share of emissions of any sector (and 90% of domestic transport emissions coming from road transport)[2].

The UK's shifting regulatory pathway to 100% zero emission cars

Year	The 2020 Ten Point Plan for a Green Industrial Revolution, planned two key car decarbonisation milestones[3]	The ZEV mandate passed in 2024 requires manufacturers to meet the annual ZEV car sales shares below[4]
2024	Auto OEMs transition production to prepare for 2030	22%
2025		28%
2026		33%
2027		38%
2028		52%
2029		66%
2030	Ban on sale of new petrol/diesel ICEVs	80%
2031	New PHEV car sales are permitted	84%*
2032		88%*
2033		92%*
2034		96%*
2035	100% ZEV sales	100% ZEV sales*

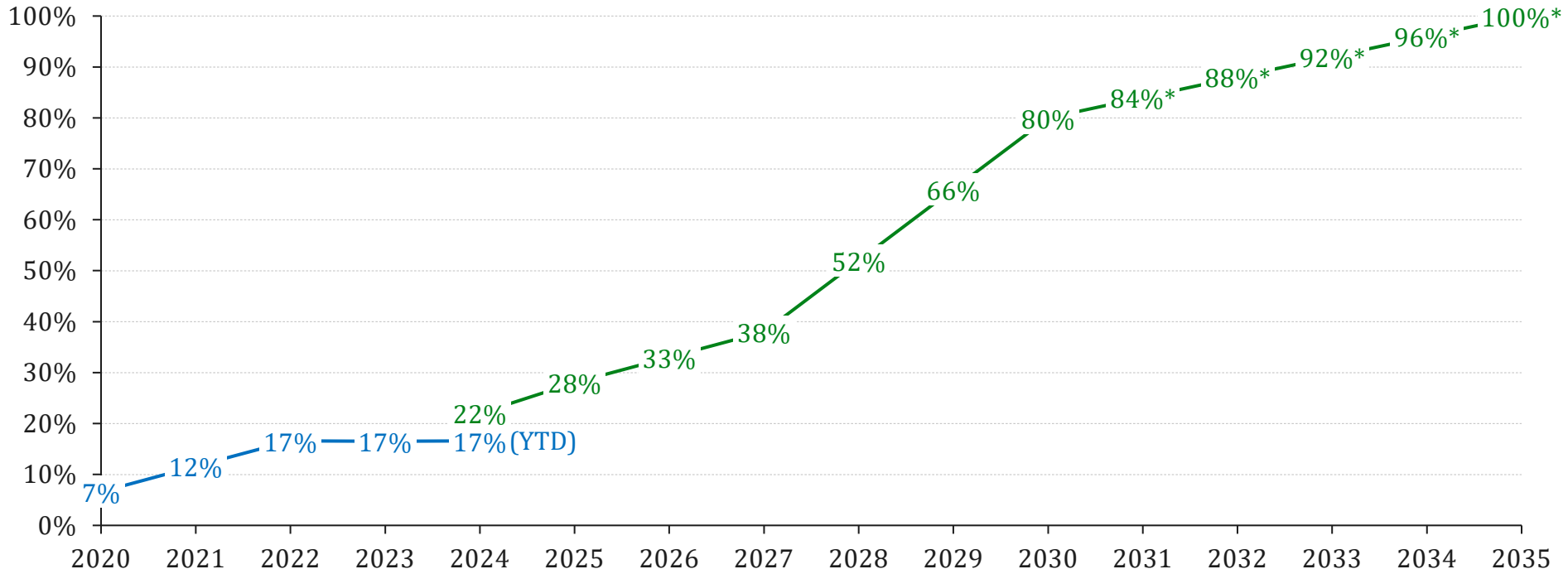
1: UK.gov (2021) Press release
2: UK.gov (2023) Transport and environment statistics: 2023
3: UK.gov (2020) Transitioning to zero emission cars and vans: 2035 delivery plan
4: UK.gov (2023) ZEV mandate and Vehicle Emissions Trading Schemes Order (2023)
* Uptake targets beyond 2030 are not covered by current legislation but are set out in source 4.

In recent years, the sales share of new zero-emission cars in the UK has stagnated, and to meet the current ZEV mandate, accelerating growth in BEV market share will be required

The 2024 Labour Party manifesto published in June mentions "restoring the phase-out date of 2030 for new cars with internal combustion engines."[1]
Both of the options to adjust the ZEV mandate presented in the table below are in-line with this intention.

Option	Up to 2030	From 2030 onward	Comments
Current policy	Annual targets beginning in 2024 that reach 80% BEV sales by 2030 (see chart below)	Additional intended targets on path to 100% BEV by 2035	Note, % sales targets beyond 2030 are not yet mandated by policy but have been presented by UK Gov as indicative.
#1	Keep the existing ZEV mandate (80% BEV sales by 2030)	Ban ICE sales (only PHEV and BEV sales permitted)	Same as what was set out in original petrol/diesel phase-out requirement. Low emissions impact due to high real-world emissions of PHEVs and more non-electric miles driven by second-hand PHEV buyers
#2		Require 100% BEV sales by 2032	In-line with CCC's recommendation

Sales share of new zero-emission cars in the UK: historical and needed in future to meet current policy targets[2]



Assumptions:

The full ZEV mandate is assumed to be delivered through the sale of zero emission cars with no assumption taken for the use of flexibilities, banking or trading. All zero-emission cars are assumed to be BEV.

Both of the two options for increasing the ambition of the current ZEV mandate in the table above were used to guide the analysis for this report.

1: Labour Party Manifesto 2024
2: Historical figures of BEV new sales in the UK from SMMT June 2024 (2024 figure is YTD as of June 2024); Future figures from Zero emission vehicle (ZEV) mandate (www.gov.uk), not accounting for banking/borrowing of allowances.
* Uptake targets beyond 2030 are not covered by current legislation:

The overall aim of this report is to present a clear policy plan that demonstrates how the increased ambition of the ZEV mandate can be made deliverable and compatible with a just transition

This overarching aim translates into **three supporting objectives**, and the steps undertaken to answer each are summarised below.

1) Assess current real and perceived barriers to buying a new BEV today and how these barriers are projected to change over time

- Review surveys and manifestos focussed on UK car buyers to identify the top barriers to BEV uptake
- Describe the relevant background details for the financial and charging infrastructure-related barriers, including analysis of how these barriers may change in the coming years
- Use the top BEV uptake barriers to create four archetypes of consumer groups representing the “extremes” of the new car buyer market to support testing policy impacts through modelling

2) Model and evaluate a range of fiscal and non-cost policy options to reduce the BEV adoption barriers

- Identify a short-list of fiscal policies as possible complements to the ZEV mandate that could accelerate BEV uptake
- Qualitatively evaluate fiscal policies and model their implementation to yield illustrative impacts
- Explore additional non-cost policy interventions (particularly related to the government charging infrastructure funds LEVI and RCF) through interviews with key stakeholders and additional research

3) Recommend a robust package of policies that when implemented together would support both the ZEV mandate and a just transition

- Estimate the cost to government and emissions avoided through increased BEV uptake by the recommended fiscal policy package
- Explore the equity risks associated with individual policies as well as how they could be mitigated by other policies or complementary interventions
- Present additional research-backed findings and implications of policies and recommend non-cost actions
- Recap recommendations to government for supporting the increased ambition of the ZEV mandate

Contents

Section introduction: Assessment of barriers to BEV adoption in the UK

Characterising car buyers: An overview comparing the demographic picture of car buyers in the UK, showing that on average those who buy new cars are more likely to be older, wealthier and own their own home.

Survey analysis: barriers to EV ownership: Analysis of car consumer and charging infrastructure surveys and industry manifestos, confirming that the top four barriers to electric car ownership are vehicle price, operational costs, charge point numbers and charge point accessibility. There are differences in the barriers mentioned by EV drivers and non-EV drivers, demonstrating that some barriers are perceived by consumers. Each main barrier will require a number of policies to address it.

The following icons are used as tags in the upper right-hand corner in the following sub-sections to make clear that slides are focussed on discussion of one or more of the four main barriers identified:

Affordability (vehicle price) Affordability (operational costs) Charge point numbers Charging experience

BEV vs ICEV financial comparison: BEVs cost more upfront, particularly compared to their counterpart ICEVs from the same brand. However, large ICEVs have become prohibitively expensive for many consumers and operational costs for BEVs are already lower than for ICEVs.

Charging infrastructure assessment: This sub-section details how the UK's EV charge point rollout has not kept pace with the growth in EVs, the regional/distributional disparities in where public charge points are located, and the differences in the cost of home charging vs public charging. In addition, a breakdown of issues with the consumer charging experience in terms of reliability, simplicity, and accessibility is introduced.

Projecting barriers to 2030: This sub-section is broken down in terms of analysis of three factors that are likely to most impact the development of barriers to BEV adoption over the next few years: 1) BEV vs ICEV purchase cost differences/ price parity; 2) EV charge point deployment and market trends in the charge point market; 3) Additional charging regulations or guidance

Consumer archetypes for testing policy impacts: Four archetypes were produced to assess the effects of policies to address BEV adoption barriers: high-income buyers with large cars, low-income buyers with smaller cars, urban buyers with no charging access and rural buyers with high annual mileage. Together they represent 42% of new car buyers.

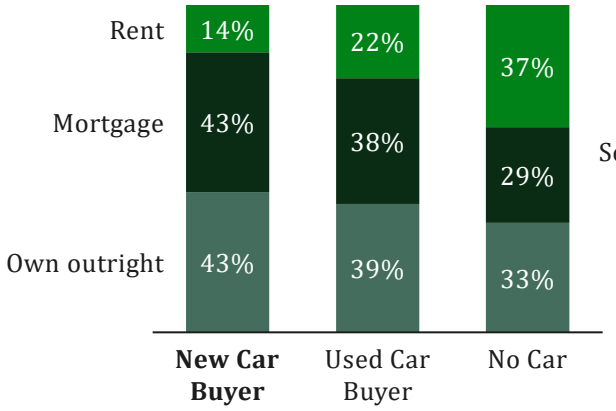
Contents

Demographics of car buyers: people who buy new cars are on average older, wealthier, and more likely to own their home

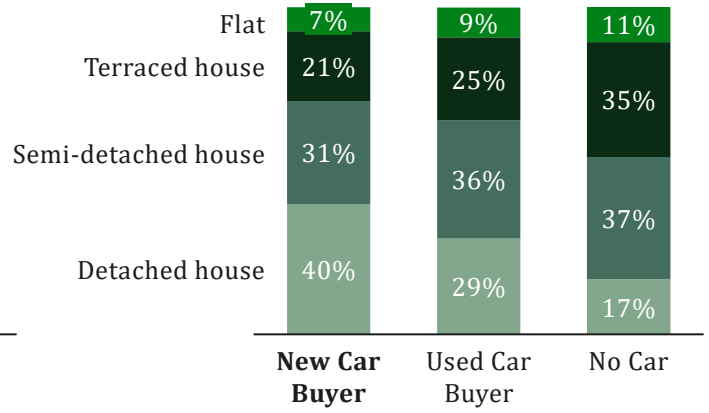
*Highest value for each row is **bolded***

Metric	New car buyers	Used car buyers	No car	Average
Percentage of adult population	14%	**52%**	34%	--
Average Age	**50**	49	46	48
Average Household Income (pre-tax)[1]	**£62,600**	£52,500	£38,800	£49,500
Average Individual Income (pre-tax)[1]	**£32,200**	£25,800	£15,400	£23,400
Average Household Makeup	2.3 Adults (>16 years) 0.49 Children **1.8 cars**	2.3 Adults (>16 years) **0.55 Children** **1.8 cars**	**2.4 Adults (>16 years)** 0.43 Children 0.6 cars	2.3 Adults (>16 years) 0.50 Children 1.5 cars

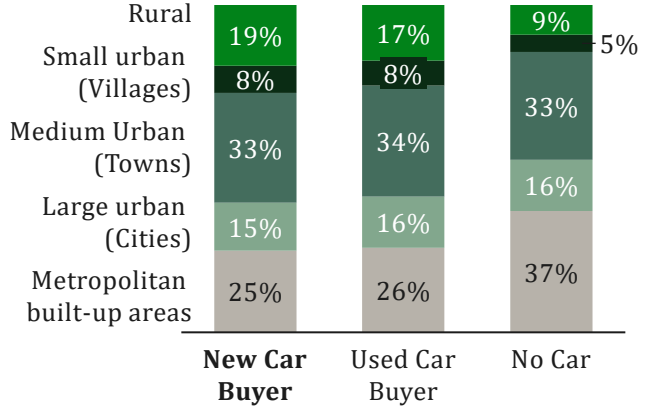
***Home Ownership:** New car buyers are more likely to own their house outright or have a mortgage*



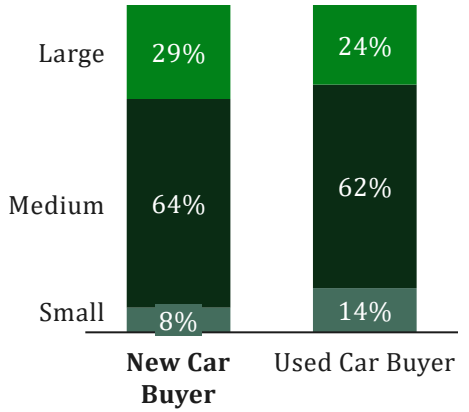
***House Type:** New car buyers are more likely to live in a detached house*



***House Location:** New car buyers are slightly more likely to live in rural areas.*



***Car size:** New car buyers are more likely to own a large or medium car than a used car buyer*



Analysis of UK National Travel Survey responses from 2016 to 2019 (including weighting to covert England-only NTS responses to be representative of UK)
1: Income has not been adjusted for inflation from the response period (2016-19) to current day, or in between different survey years.

Contents

ERM analysed Autotrader analyses and a variety of consumer surveys to understand the main barriers to EV adoption in the UK

Source	Year	Sample Size	Geographic Coverage	Relevance		
				New	BEV	ICE
Autotrader Analyses						
Retail Price Index	2024	>800k per day	UK		✓	✓
ZEV Mandate Effect Analysis	2024	2,000	UK	✓	✓	✓
Consumer opinion surveys[1]						
T&E UK New Car Buyers Survey	2024	1,605	UK	✓	✓	✓
DfT National Travel Attitudes Study Wave 7	2022	2,171	UK	✓	✓	✓
DfT National Travel Attitudes Study Wave 9	2023	2,011	UK	✓	✓	✓
FairCharge Consumer attitudes to EVs	2022	2,002	UK	✓	✓	✓
Element Energy Electric Mobility: Inevitable or not?[2]	2022	14,052	7 European markets	✓	✓	✓
Midlands Connect – EV Charge Points: A Barrier for EV Adoption	2024	2,500	UK - Midlands	✓	✓	✓
CUPRA Perceptions of Electric Cars Survey	2024	377	UK		✓	✓
DfT EV Charging (phases 2 & 3)	2022	1,006 / 848	UK		✓	✓
DfT Public electric vehicle charging infrastructure: drivers without access to off-street parking	2022	1,006	UK		✓	✓
Which? 2024 consumer survey	2024	1,004	UK		✓	
Transport Focus Survey	2024	274	UK		✓	

Relevance: Focused on new car buyers of both ICE and BEV

Understanding main (real/perceived) barriers is key to predicting EV uptake

- **Cost:** Upfront purchase price, total cost of ownership
- **Vehicle availability/spec**: Driving range, size/models available
- **Charging access:** Home charging, public charging
- **Charging experience**

Relevance columns key:

New = refers to information focusing on new car buyers/ owners, or new EV owners

BEV = refers to information focusing on BEV buyers/ owners

ICE = refers to information with a broad scope including petrol/diesel car buyers/ owners

1: Other surveys fed into minor later analysis in this report, and these are listed in footnotes when referenced.
2: Not a survey but an analysis report based on the results of a survey that included a consumer choice experiment.

ERM also analysed manifestos from car and charging industry groups to better understand the main charging barriers

Relevance: Focused on new car buyers of both ICE and BEV

Source	Year	Geographic Coverage	Relevance		
			New	BEV	ICE
Manifestos					
ChargeUK Manifesto	2024	UK	✓	✓	✓
SMMT Manifesto	2023	UK	✓	✓	✓
AA Motoring Manifesto	2024	UK	✓	✓	✓
AFP Manifesto	2024	UK	✓	✓	✓
BVRLA Future of Fleets Manifesto	2023	UK	✓	✓	✓
REA Manifesto	2024	UK	✓	✓	
Carwow Group Manifesto	2024	UK	✓	✓	
EVA England EV Drivers' Manifesto 2024	2024	England	✓	✓	

Relevance columns key:

New = refers to information focusing on new car buyers/ owners, or new EV owners

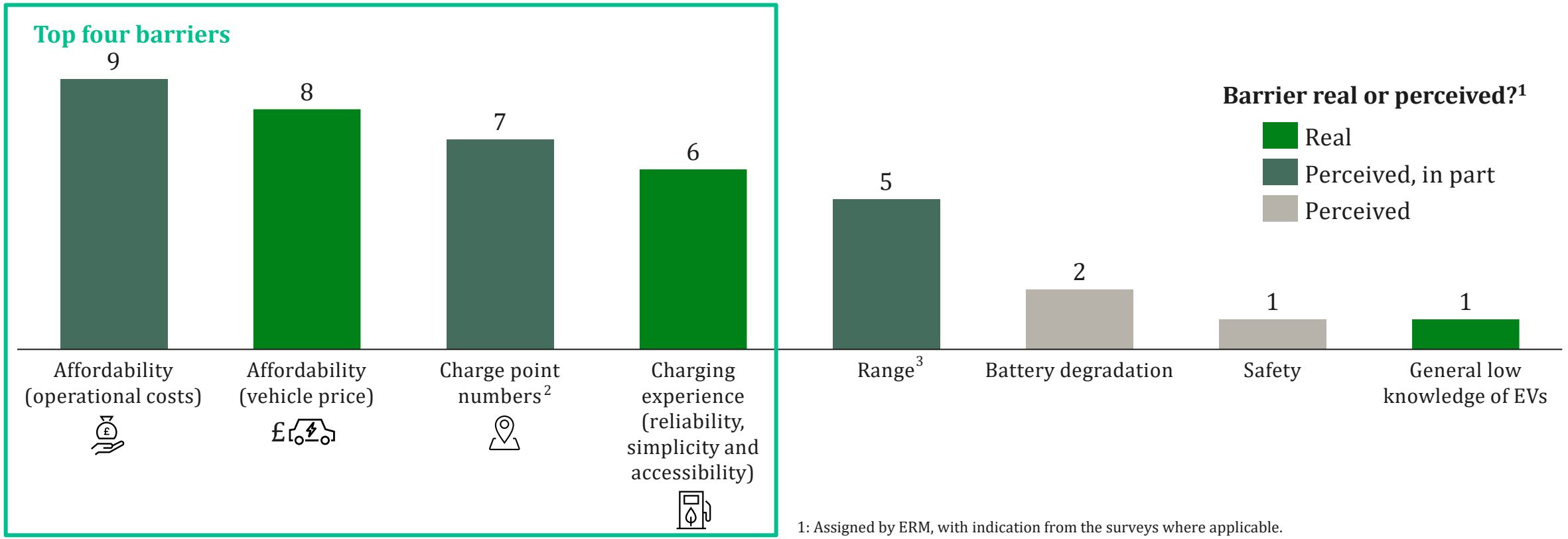
BEV = refers to information focusing on BEV buyers/ owners

ICE = refers to information with a broad scope including petrol/diesel car buyers/ owners

There are four main barriers (perceived and/or real) to EV purchase that were mentioned in a majority of the consumer surveys: affordability (upfront purchase price and total cost of ownership), charge point numbers and charging experience

- Based on the review of the survey results relative to the real-world situation, we have noted whether each BEV adoption barrier is real or largely perceived by the public and not backed by data.
- Further detail on the survey coverage is available in the Appendix.

Number of surveys reviewed that mention each barrier

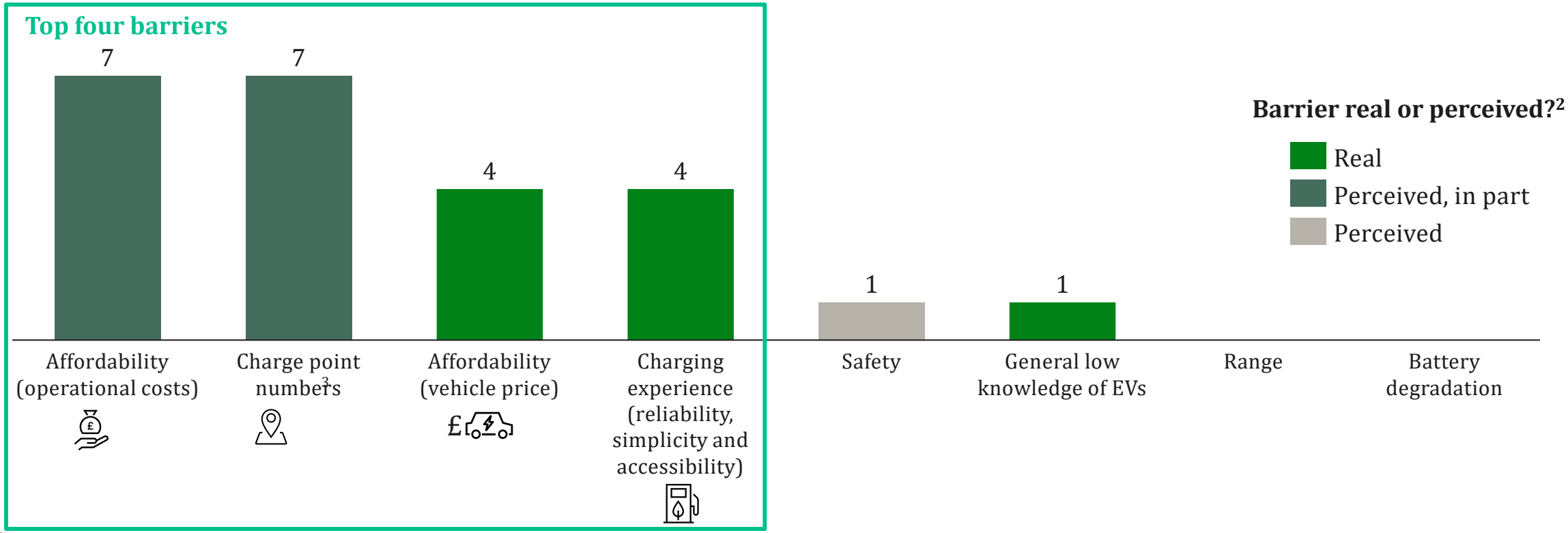


1: Assigned by ERM, with indication from the surveys where applicable.
2: The charge point numbers barrier varies across regions and consumer types, therefore perceived, in part.
3: Range is also a function of affordability, with more expensive cars having longer ranges. This barrier will be addressed in part by the recommendations for improving affordability (vehicle price).

Findings from the further review of manifestos are consistent with the main barriers identified in the initial review

- To understand the key charging infrastructure-related barriers, the review shown on the previous slide was supplemented by a review of manifestos. Findings were consistent with the main barriers identified previously. A common theme across sources reviewed is a call to reduce VAT on public charging from 20% to 5% to match that of home-charging.[1]
- A number of manifestos reviewed had brief or no mention of public light-duty vehicle specific charging points (FLA, PACTS, Logistics UK, RHA, CIHT, UK Finance).
- Further detail on the coverage of the manifestos is available in the Appendix.

Number of manifestos reviewed that mention each barrier



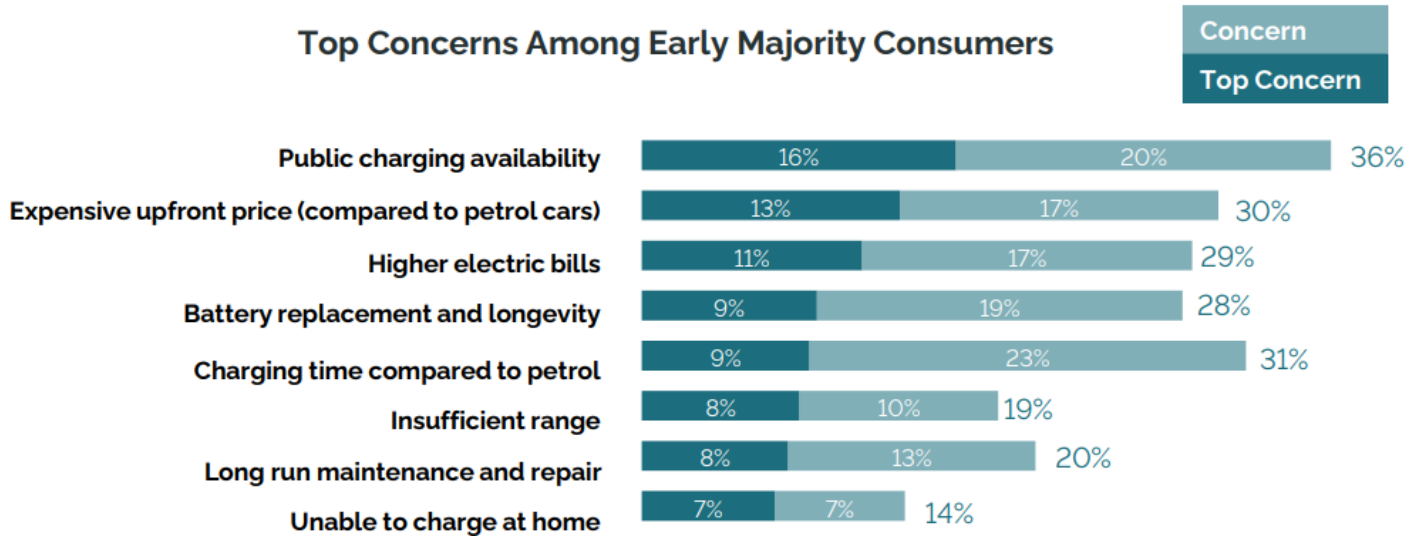
1: This potential action was not analysed further based on feedback from ECF.
2: Assigned by ERM, with indication from the surveys where applicable.
3: The charge point numbers barrier varies across regions and consumer types, therefore perceived, in part.

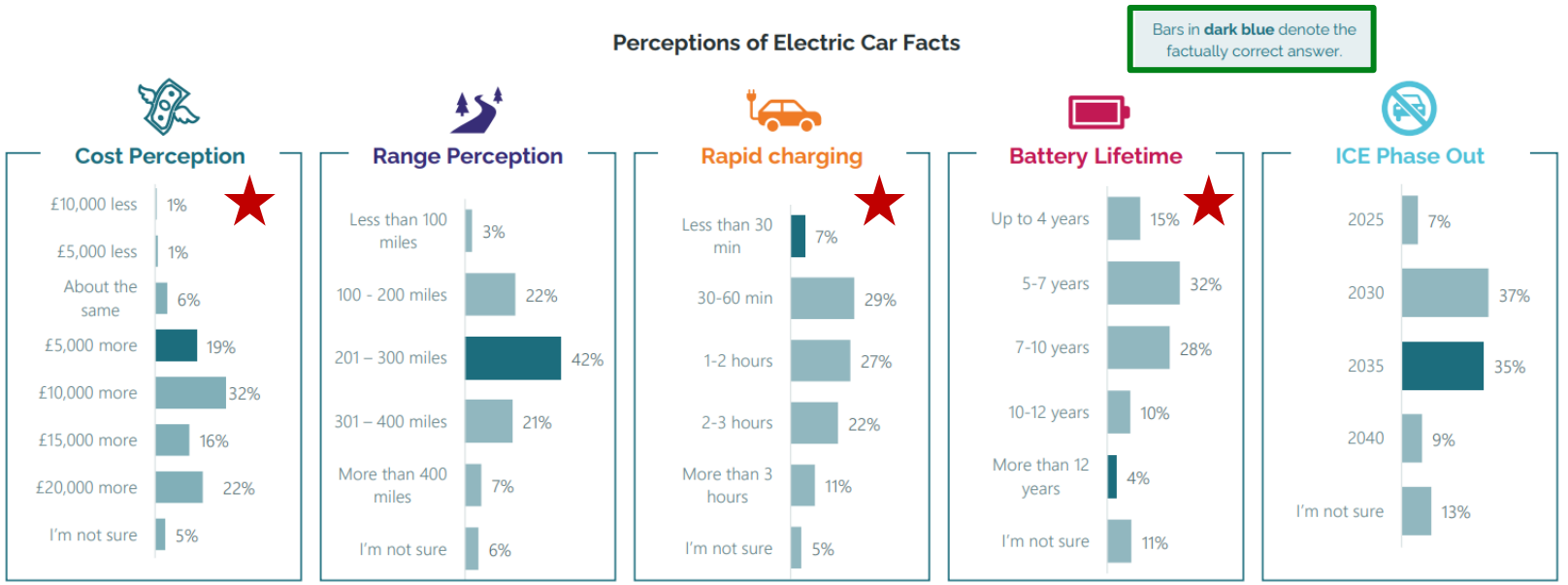
Purchase price and public charging availability are concerns of early majority consumers, which may quickly become majority views as BEVs become increasingly mainstream

Consumers' concerns influenced by perception:

- As shown on the previous slides, top concerns consumers hold that influence BEV purchase are purchase price and public charging availability
- Consumers appear to have **a more accurate understanding of purchase price differences than the availability or time required for public charging**
  - People earning over £100,000 think the purchase price difference is £20,000 compared to petrol, while lower earners believe it is £5,000 - £10,000 more
- Consumers' **greatest misconception is around battery lifetime**
  - "I thought batteries get weaker and weaker like a mobile phone"
- This likely means **BEVs need to be cheaper than petrol/diesel alternatives to overcome consumers' fears around additional maintenance costs** from choosing a BEV.

Source: T&E UK New Car Buyers Survey - From Early Adopters to Early Majority: Accelerating the Electrification of Cars (2024) (n=1,605)





★ = Areas where a large majority of 'early majority consumers' hold incorrect perceptions about BEVs

The consumer surveys show significant differences in how EV drivers and non-EV drivers perceive concerns around EVs

Non-EV drivers are consistently more concerned about the realities of owning an EV compared to EV drivers

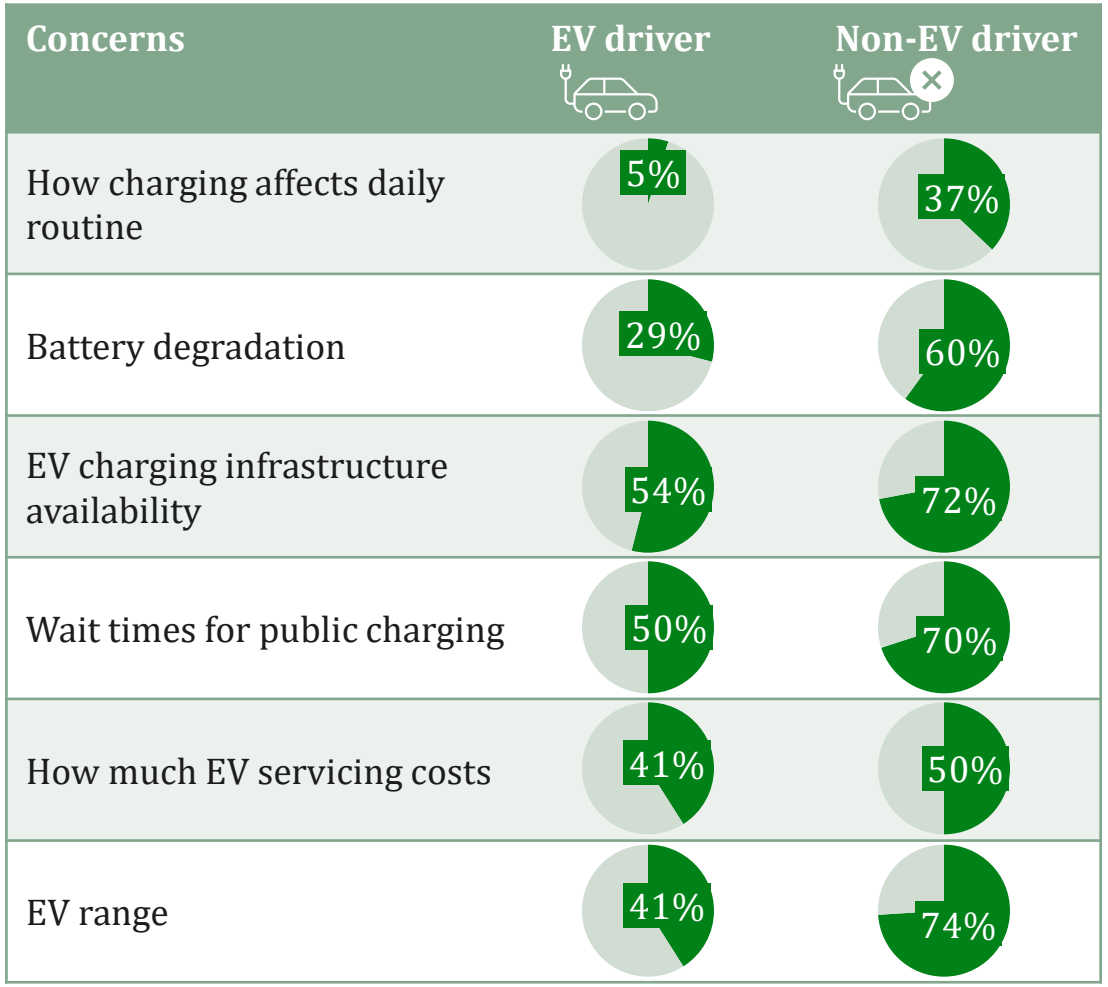
- On every issue, concern about EVs was higher among non-EV drivers than among EV drivers
- For some issues, the concern is removed almost entirely after switching to an EV (e.g., only 5% of EV drivers remain concerned about how charging affects their daily routine)

However, significant proportions of EV drivers are concerned about some factors of owning an EV

- While EV drivers were less concerned than non-EV drivers, a significant proportion are still concerned on many key issues
- This includes **EV charging infrastructure availability, wait times for public chargers, EV range, EV servicing costs and battery degradation**
- In some cases, concern among EV drivers is only slightly lower than concern among non-EV drivers (e.g., 54% of EV drivers are concerned about EV charging infrastructure availability compared to 74% of non-EV drivers)

The above trends are supported by both the CUPRA perceptions of electric cars survey[1] and by the surveys conducted in phases 2 and 3 of the Electric Vehicle Charging Research commissioned by DfT.[2]

Concerns about EVs among current EV and non-EV drivers[1] - percentage of survey respondents concerned about each issue

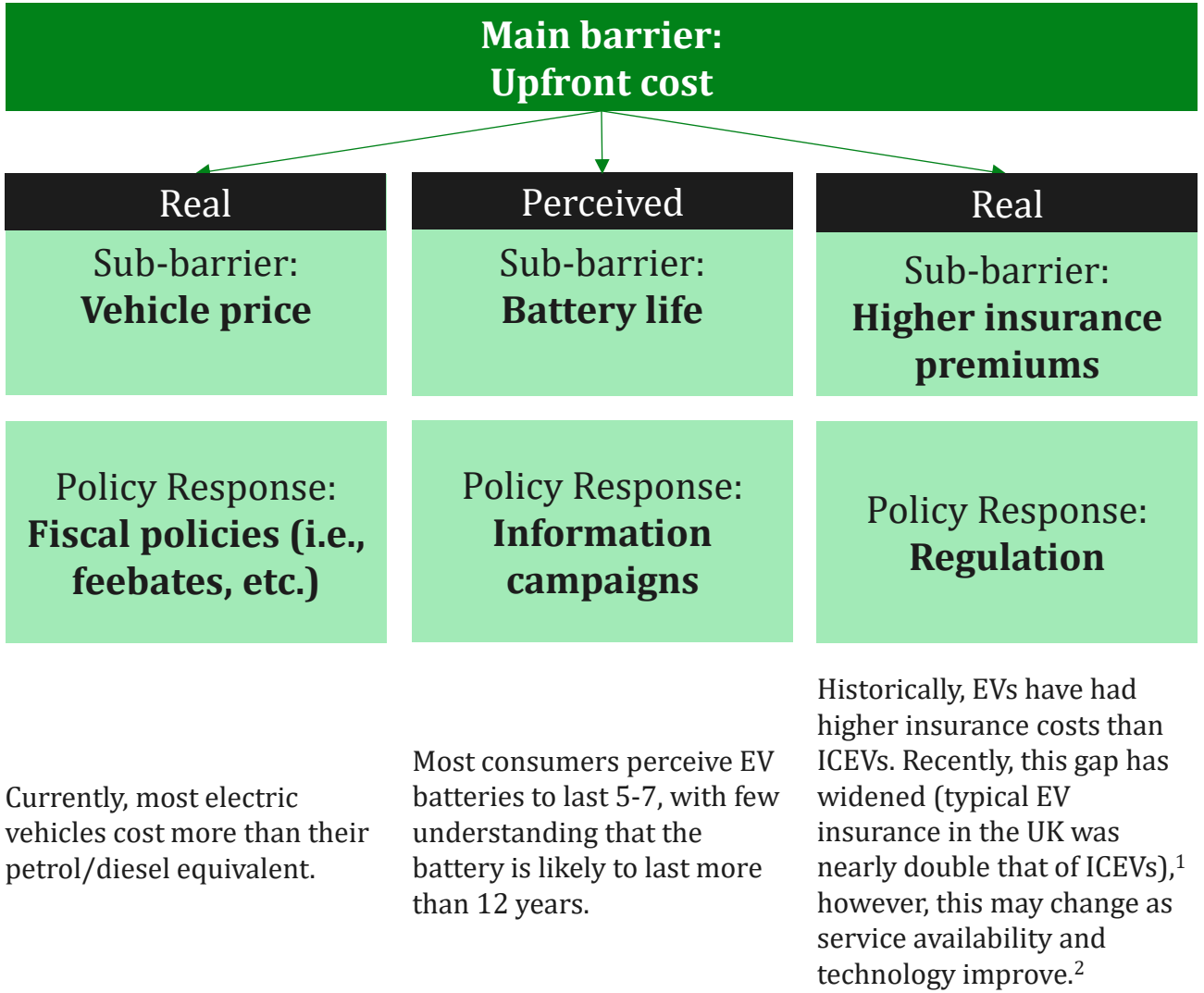


1: CUPRA perceptions of electric cars n = 377 drivers ('roughly even' mix of EV and non-EV drivers)
2: DfT Electric Vehicle Charging Research (phase 2: n = 1,006 UK non-EV drivers; phase 3: 848 UK EV drivers)

The upfront cost barrier encompasses several real and perceived sub-barriers, suggesting that a portfolio of policies will be needed to address it

The upfront cost barrier seems to encompasses several sub-barriers, both real and perceived

- For example, the upfront cost barrier was usually mentioned with reference to vehicle price, but consumers also mentioned insurance costs and battery life when discussing cost concerns.
    - Consumers in the surveys expressed concerns that new batteries would be required every 5-7 years for an electric vehicle, adding an additional costs on top of upfront purchase cost in the minds of consumers.
- As such, addressing each main barrier with one policy is unlikely to create significant change. A portfolio of policies, tackling different sub-barriers, is more likely to be successful.
- For the upfront cost barrier, different policies will be needed depending on whether the sub-barriers are perceived or real. Educational policies will be required for the perceived barriers, and fiscal or practical policies will be needed for the real barriers.

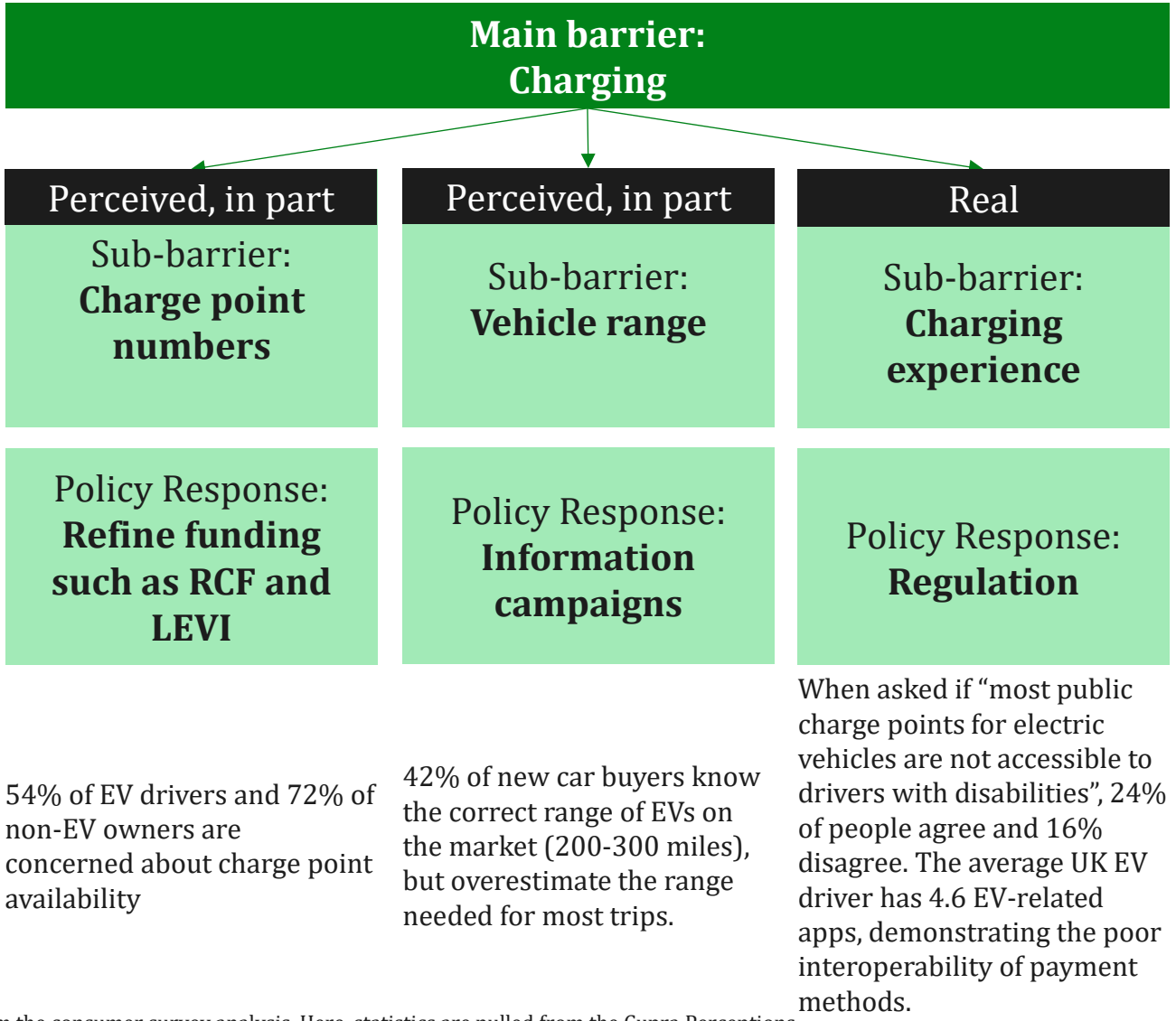


Note: Information on barriers and sub-barriers is collated from the consumer survey analysis.
1: Institute for Energy Research (2024)
2: Further analysis of the projected developments of the EV insurance marketplace was not in scope for this study.

The charge point barriers can also be grouped, similarly to the vehicle cost barrier

Charging as a barrier encompasses several sub-barriers, with a mixture of real and perceived barriers

- The biggest concern among respondents to EV surveys is the lack of EV charge points, with both EV and non-EV drivers sharing this concern.
  - Surveys noted that some EV drivers recognise EV charge point deployment is better in London, and worse in the north and rural areas of the UK.
- The second sub-barrier on vehicle range is perceived, in part. Although almost half of all new car buyers know the correct range of electric cars, the belief that EV range is an issue differs between EV-owners and non-EV owners (41% of EV owners state that it is an issue, compared to 74% of non-EV owners).
  - This suggests a misconception of the average journey distance (8.4 miles).
- Finally, charging experience is another barrier within the charging main category, with charge points reported as faulty, inaccessible for wheelchair users and too many apps are needed for charging.[1]



Note: Information on barriers and sub-barriers is collated from the consumer survey analysis. Here, statistics are pulled from the Cupra Perceptions of EVs survey (n=377), the T&E UK New Car Buyers survey (n=1,605) and the NTAS Wave 9 survey (n=2,011).
1: Shell EV driver survey report 2023 (n=24,771 across Europe including the UK) and DfT and Britainthinks ERV charging research 2022 (n=1,086)

Contents

The larger price increment of BEVs represents a significant cost barrier compared to petrol/diesel cars

Current cost barriers:

- Today, BEVs are on average 35% more expensive than petrol and diesel vehicles[1]
- At the same time the price of petrol vehicles is rising rapidly, resulting in cars generally becoming less affordable to large segments of society[2]
- However, costs are so varied across makes and models (see figure at right)[1] that it is often possible to find a BEV much more closely matched in price to petrol if the consumer is willing to switch brands
  - For example, from the table at right, an ICE Kia SUV costs on average ca. £43k, while a BEV Kia SUV costs on average ca. £76k. This is a huge price difference that may not be pallatable for many Kia-commited consumers. However, on average the price of a BEV Skoda SUV is ca. £46k, which is much closer to the the price of the ICE Kia SUV, but it would require a brand switch for the consumer.
- According to a 28 August 2024 press release, the Vauxhall Frontera may be the first BEV to be offered at the same list price as the petrol hybrid version of the model at £23,495, demostrating how rapidly the figures at right may change.[3]

Greatest BEV vs ICEV price difference

Smallest BEV vs ICEV price difference

Price comparison of petrol/diesel car models and BEV models

Make	Model	Fuel type	Average advertised price	% Difference
KIA	EV9	Electric	£75,535	+75%
	Sorento	Petrol	£43,111	
FIAT	500e	Electric	£29,283	+72%
	500	Petrol	£17,003	
NISSAN	Ariya	Electric	£46,507	+54%
	Qashqai	Petrol	£30,202	
HYUNDAI	IONQ 5	Electric	£50,198	+54%
	TUCSON	Petrol	£32,619	
VAUXHALL	Corsa-e	Electric	£27,322	+38%
	Corsa	Petrol	£19,828	
JAGUAR	I-PACE	Electric	£73,490	+32%
	F-PACE	Diesel	£55,754	
PEUGEOT	E-2008	Electric	£30,300	+19%
	2008	Petrol	£25,566	
SKODA	Enyaq	Electric	£45,735	+19%
	Kodiaq	Petrol	£38,401	
BMW	iX	Electric	£86,268	+4%
	X5	Diesel	£82,870	
Audi	Q8 e-tron	Electric	£82,035	0%
	Q8	Diesel	£82,038	

Source: Autotrader Road to 2035 (based on UK data, averaged from advertised prices of new cars, including discounts as of April 2024)

1: Autotrader Road to 2035
2: Average Cost of Cars UK 2024, NimbleFins
3: Stellantis.com

However, ICE vehicles are becoming larger and more expensive over time, pricing out consumers looking for small, low-specification ICE cars

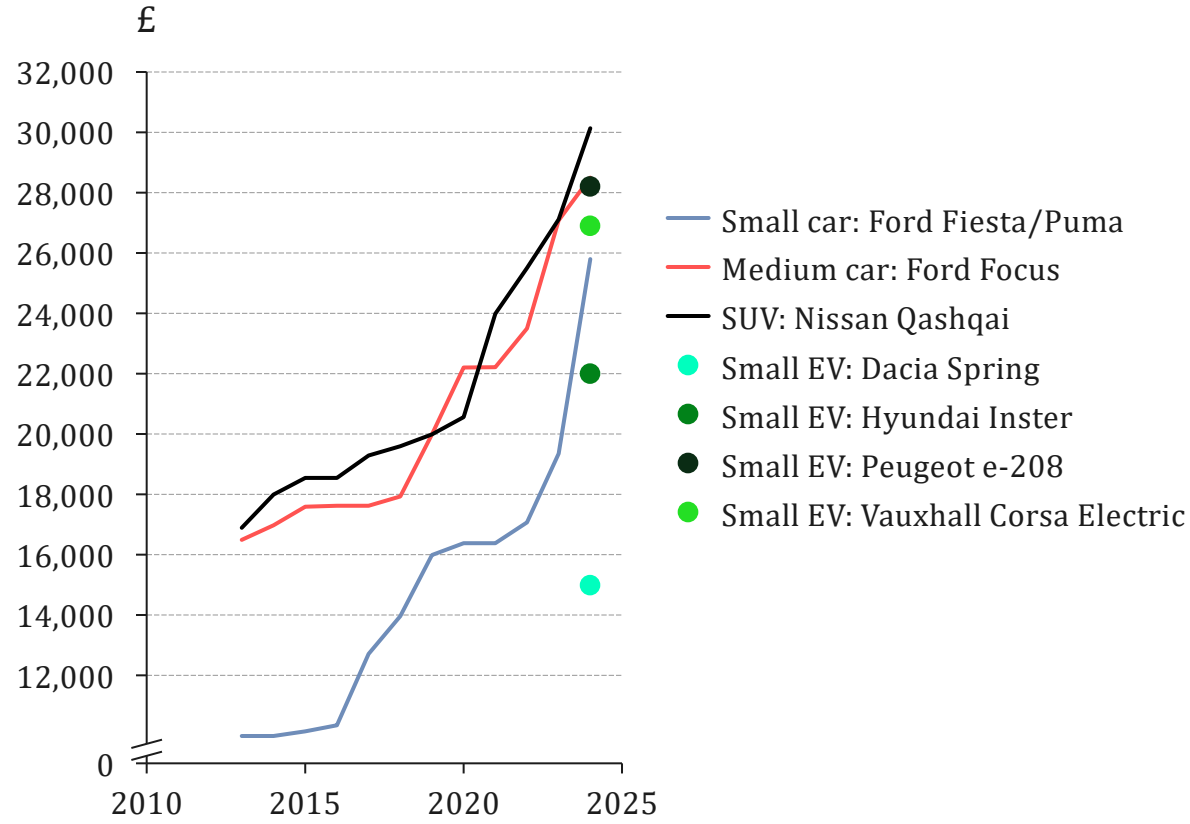
Prices of ICE vehicles are increasing

- Small car prices have risen 42% on average since 2020, with the Ford Fiesta (recently replaced by the Ford Puma) rising 94% in price since 2013.
- The Ford Focus, a popular medium-sized car, has risen 64% in price since 2013, and the Nissan Qashqai SUV has risen 60% in price since 2013.

Phase-out of low-spec models and shift in segments

- Research by J.P. Morgan suggests that the rise in prices comes from a mix of inflation (higher production costs) and rising OEM profit margins.[2]
- Many small ICE cars with basic features are being discontinued (e.g., the Ford Style and Zetec) as manufacturers target higher-end consumers. This is a large contributor to the price rise of small cars.
- Additionally, the size of the average new car is increasing. The number of models in the SUV segment has increased by 75% since 2013, with the Mini segment shrinking by 83%.[3]
- The prices of several small electric cars are now lower than the most popular ICE cars.
- As this trend continues, it will become increasingly difficult for a consumer to buy a new small, basic ICE car. This will continue to shift the average buyer of a new car to wealthier individuals and companies.

10-year price trends of small, medium and SUV petrol cars in the UK (lines) compared to current small electric car prices (circles)[1]



1: Using Average Cost of Cars UK 2024 | NimbleFins for historic prices and manufacturer websites for current recommended retail prices (accessed in June 2024). Includes delivery charge, number plates, road tax and the first government registration fee. Prices account for inflation.
2: Inflation and the auto industry: When will car prices drop? (jpmorgan.com)
3: SMMT-Motor-Industry-Facts-May-2023.pdf

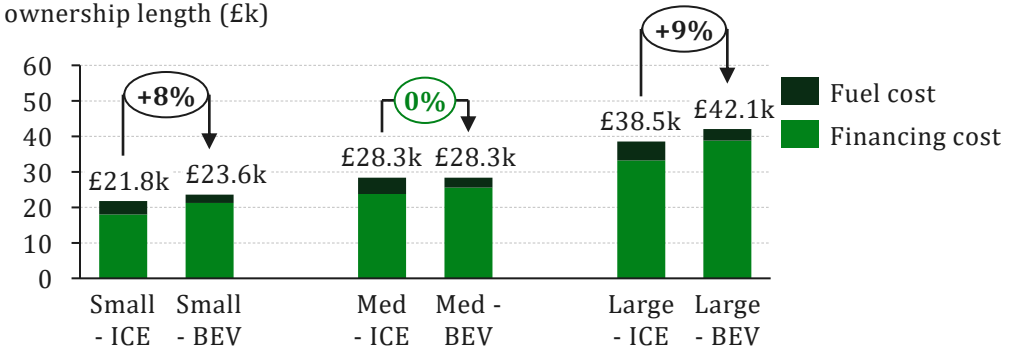
Importantly, BEVs are cost competitive over their ownership and will become even more competitive in the future

Total Cost of Ownership (TCO) is similar for BEVs and ICE currently and becomes cheaper by 2030 for most vehicle size segments.

New Cars[1]

2025 Purchase

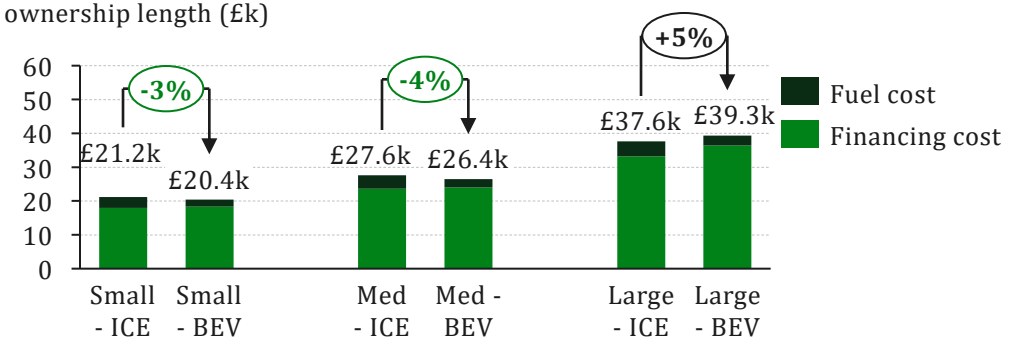
TCO over ownership length (£k)



Current TCO for an average new car consumer is similar between ICE and BEV for all segments, Significant fuel savings balance the higher lease cost for a medium BEV versus ICE.

2030 Purchase

TCO over ownership length (£k)

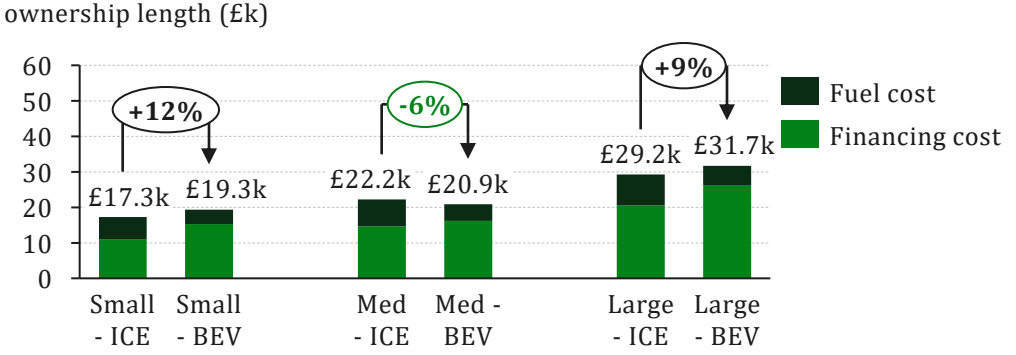


Small and medium BEVs are at purchase price parity and cheaper to run in 2030, whilst large BEVs have a similar TCO to a large ICE.

Second-Hand Cars[2]

2025 Purchase

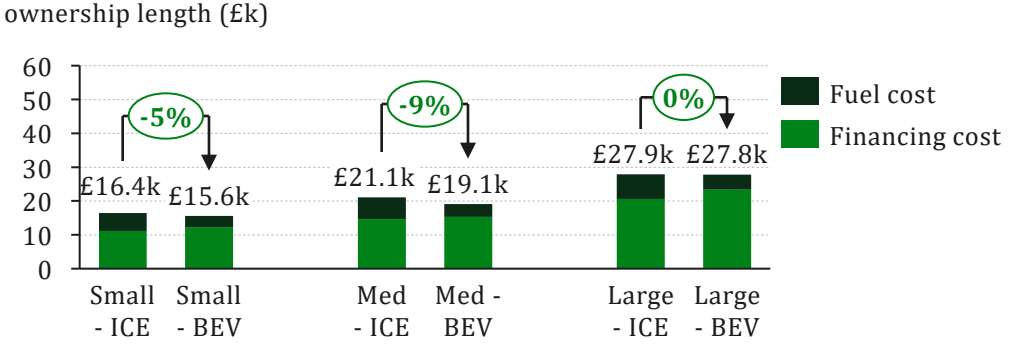
TCO over ownership length (£k)



Current second-hand medium BEVs are significantly cheaper than used ICE over the ownership length, whilst small and large BEVs are have a similar TCO to their ICE counterparts.

2030 Purchase

TCO over ownership length (£k)



All used BEVs are cheaper over their lifetime by 2030, with medium and small BEVs giving the largest percentage savings.

1: Average mileage 9,400 mi/year (NTS), 3 yr ownership length, purchase with a PCP with 6.6% APR (comparison of quotes for new car PCPs), 50-50 split of public/private charging.
2: Average mileage 8,500 mi/year (NTS), vehicle purchased at 3 years old, 5 year ownership length, purchase with a PCP with 10% APR (comparison of PCP quotes from AutoTrader, July 2024), 50-50 split of public/private charging.

Some OEMs are also starting to offer favourable leasing deals for EVs to increase their uptake

Deposit contributions & lower interest rates are being used to reduce the monthly cost of leasing an EV, but this depends on the OEM.

The largest purchase price differences are seen for small vehicles and SUVs when comparing EVs to petrol cars.

Basic trims (no extras). Positive values mean a BEV is more expensive.

SMMT vehicle segment	Difference in purchase price (%)	Difference in Monthly Lease[1] (%)	Potential fuel cost savings (£/month)[2]
B (Small)	+ £8,800 (+40%)	+ £126 (+30%)	£60-70
C (Medium)	+ £5,600 (+20%)	+ £82 (+16%)	£75-85
D (Upper Medium)	+ £3,500 (+8%)	+ £211 (+28%)	£85-95
H (SUV)	+ £17,000 (+54%)	+ £203 (+35%)	£90-100

- Segment C is close to monthly price parity for an average use.
- Segment H has the largest difference in vehicle prices, this may be linked to the ballooning size of batteries in this segment.
- Segment D sees a larger difference in leasing price than purchase price: this is due to the less favourable leasing parameters offered by BMW (a significant contributor to this segment)

The quality of offerings from OEMs vary, with some providing more favourable offers for petrol ICE leases.

Highly favourable rates for BEVs in green, with unfavourable comparisons in red.

OEM	Deposit contribution by OEM (% of vehicle price)		% APR offered	
	Electric	Petrol ICE	Electric	Petrol ICE
Hyundai	2.6%	2.5%	2.3%	7.9%
Vauxhall	5.6%	2.0%	2.9%	8.9%
Ford	Not researched	1.4%	Not researched	1.7%
MG	2.9%	Not researched	2.5%	Not researched
Nissan	Not researched	3.2%	Not researched	6.0%
VW	Not researched	3.9%	Not researched	7.9%
Kia	2.6%	4.9%	2.9%	7.9%
Polestar	16%	NA	0%	NA
Tesla	0.5%	NA	3.9%	NA
BMW	4.6%	2.5%	7.2%	4.9%
Audi	10.1%	13.5%	4.9%	6.9%
Skoda	0%	Not researched	0.8%	Not researched
Average	**3.0%**	**3.4%**	**3.5%**	**6.6%**

All data presented on this slide is from analysis of 121 leasing quotes for 42 different popular vehicle models across 12 different OEMs (researched 12th-19th June 2024)
1: For a 36-month lease for 9,000 mi/year (where possible).
2: Range relevant to consumers who have access to home charging, 9,000 mi/year

Contents

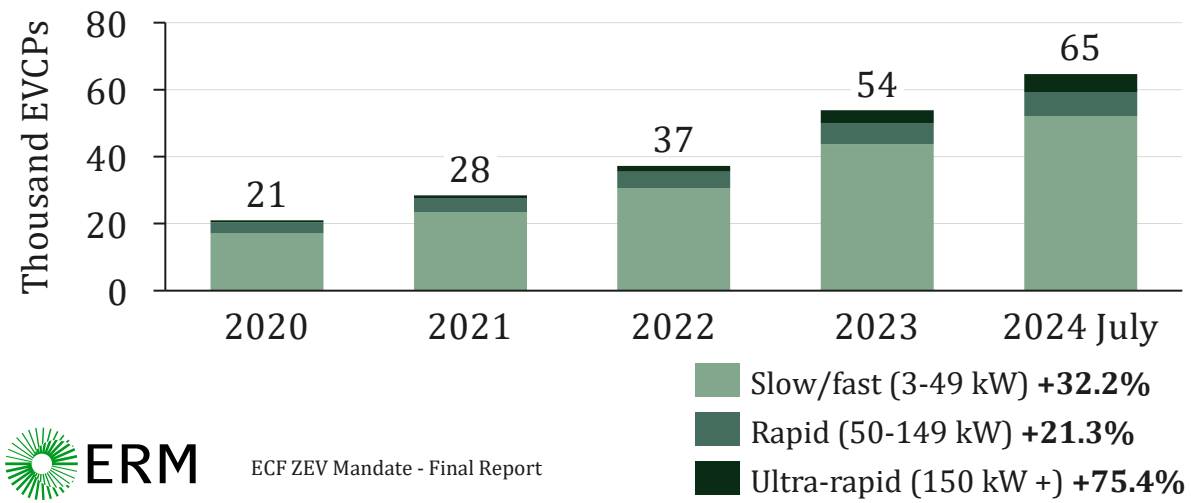
EV charge point deployment in the UK has increased significantly, but still falls behind the rate of BEV uptake for most charging speeds

Public charging

(For background information on the breakdown of the EV charge point power ratings and their use cases, see this Appendix slide.)

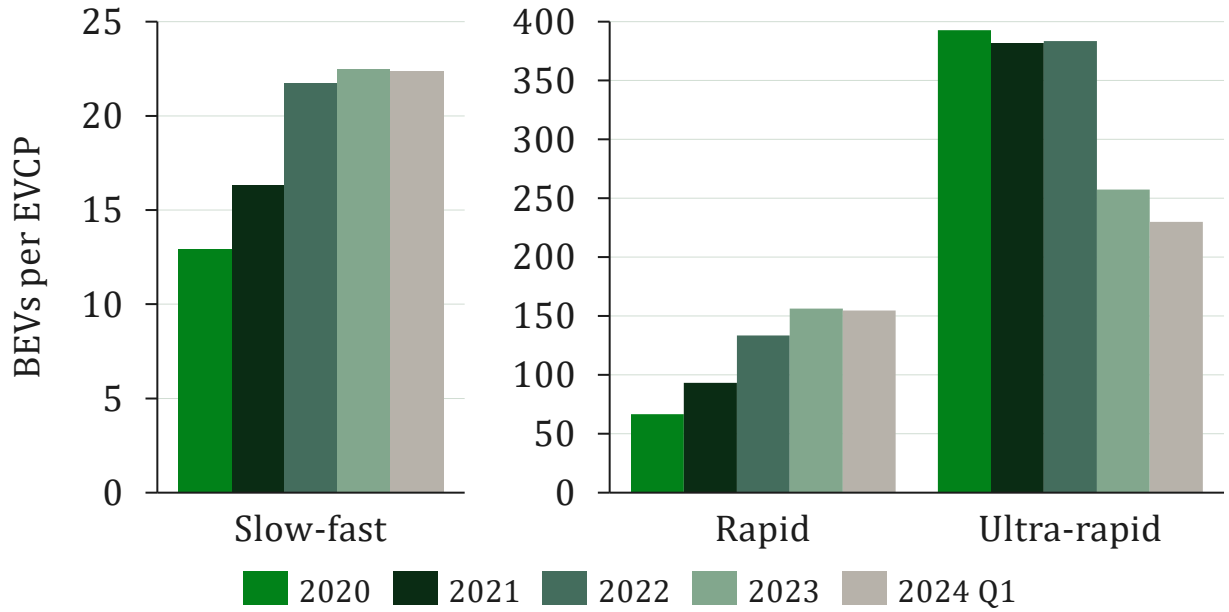
- There has been over an 180% increase in EV charge point (EVCP) deployment since 2020. Deployment increases have been most significant for ultra-rapid (150 kW+) EVCPs, where there are now 8x as many EVCPs as there were in 2020.
- There are currently 18.0 BEVs per public EVCP in the UK. In France, there are 6.8 BEVs/EVCP, in Germany there are 11 BEVs/EVCP and in Spain there are 5.9 BEVs/EVCP.[1] (a lower number = better charging availability)
  - This shows that although BEV uptake has been strong in the UK, public charge point deployment has not kept up with BEV demand as quickly as in other European countries.

UK public EVCP deployment by kW 2020-2024[2]



- EVCP deployment has been slower than BEV uptake for slow to fast (3-49 kW) and rapid (50-149 kW) EVCPs from 2020 to today, meaning the number of BEVs per EVCP has increased.
- However, ultra-rapid (150 kW+) EVCP deployment has increased faster than EV uptake in the same period, leading to a decrease in the number of BEVs each EVCP serves.

UK BEVs (car + van) per public EVCP by kW 2020-2024 Q1[1,3]

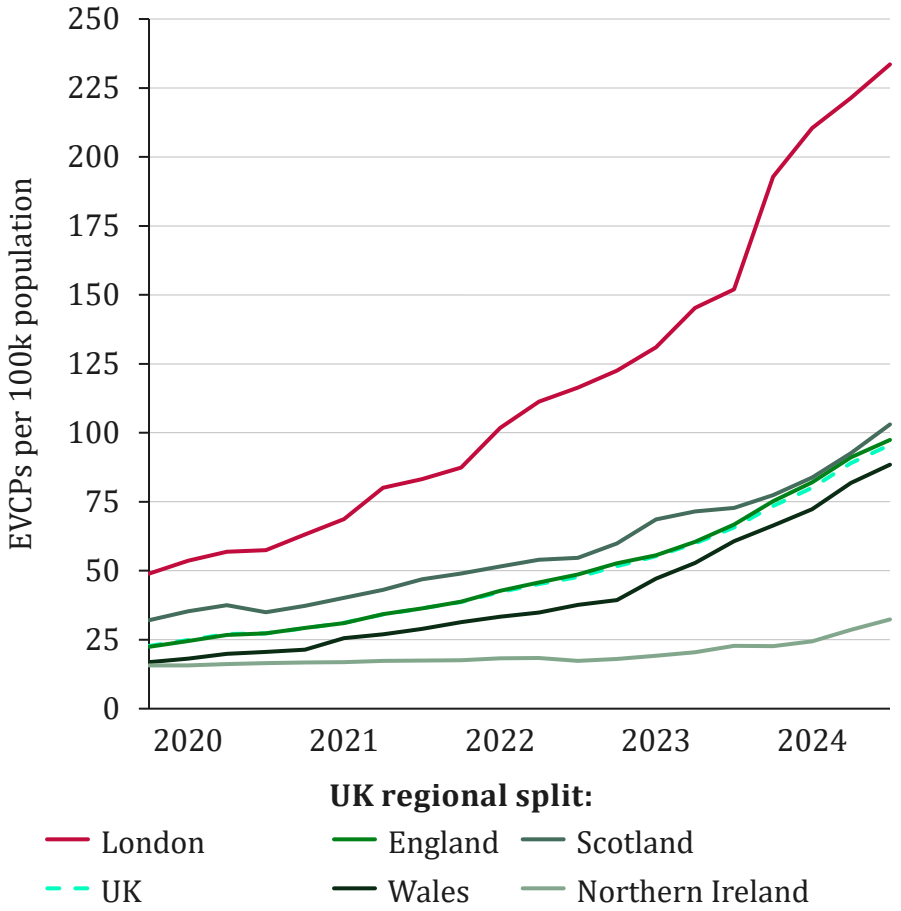


1: Road | European Alternative Fuels Observatory (europa.eu) (Q3 2024)
2. Electric vehicle public charging infrastructure statistics: July 2024 - GOV.UK
3: Zapmap EV charging statistics April 2024

There are high regional disparities in public EVCP deployment across the UK, with EVCPs densely concentrated in London

- The deployment of **AC (alternating current) EVCPs** (e.g., on-street residential) is currently dependent on **local authorities (LAs)** and their use of the **Local Electric Vehicle Infrastructure (LEVI) Fund,** as well as charge point operators (CPOs) who generally have ambitious rollout targets
- Deployment of DC EVCPs (e.g., rapid hubs) is expected to take place commercially, however, deployment at motorway service areas has been **delayed by the slow rollout of the rapid charging fund (RCF)**
- CPOs make commercial decisions largely based on the **expected utilisation of charging infrastructure**
  - This may result in a challenging paradox of drivers being unwilling to switch to EVs until more EVCPs are deployed, but CPOs not deploying more EVCPs until there are more EV drivers to ensure high utilisation
- So far, the UK's commercially driven approach has led to **regional inequality**
  - **EVCP deployment is highly concentrated in London:** as of April 2024, London deployment is 2.4 times the UK average[1,2]
  - Within England, there is also a **north-south divide in charger deployment**, with northern regions lacking, which may be due to lower funding or CPO interest, not having formal EV infrastructure plans, and staffing challenges in northern councils[3]
  - Unlike the European Union, where the Alternative Fuels Infrastructure Regulation (AFIR) requires member states to install fast chargers every 60km along the major road network, the UK does not have a similar regulation in place, putting **rural areas** (with low utilisation potential) **at risk of remaining cut off from charging infrastructure rollout**

Publicly available EVCPs (all speeds) per 100k population in London compared to the rest of the UK over 2020 - 2024[1]



1: Electric Vehicle Public Charging Infrastructure Statistics: July 2024, Department for Transport
2: Charging Up the UK, Common Wealth, June 2024
3: Significant North-South divide in EV charger availability, Regit, August 2024

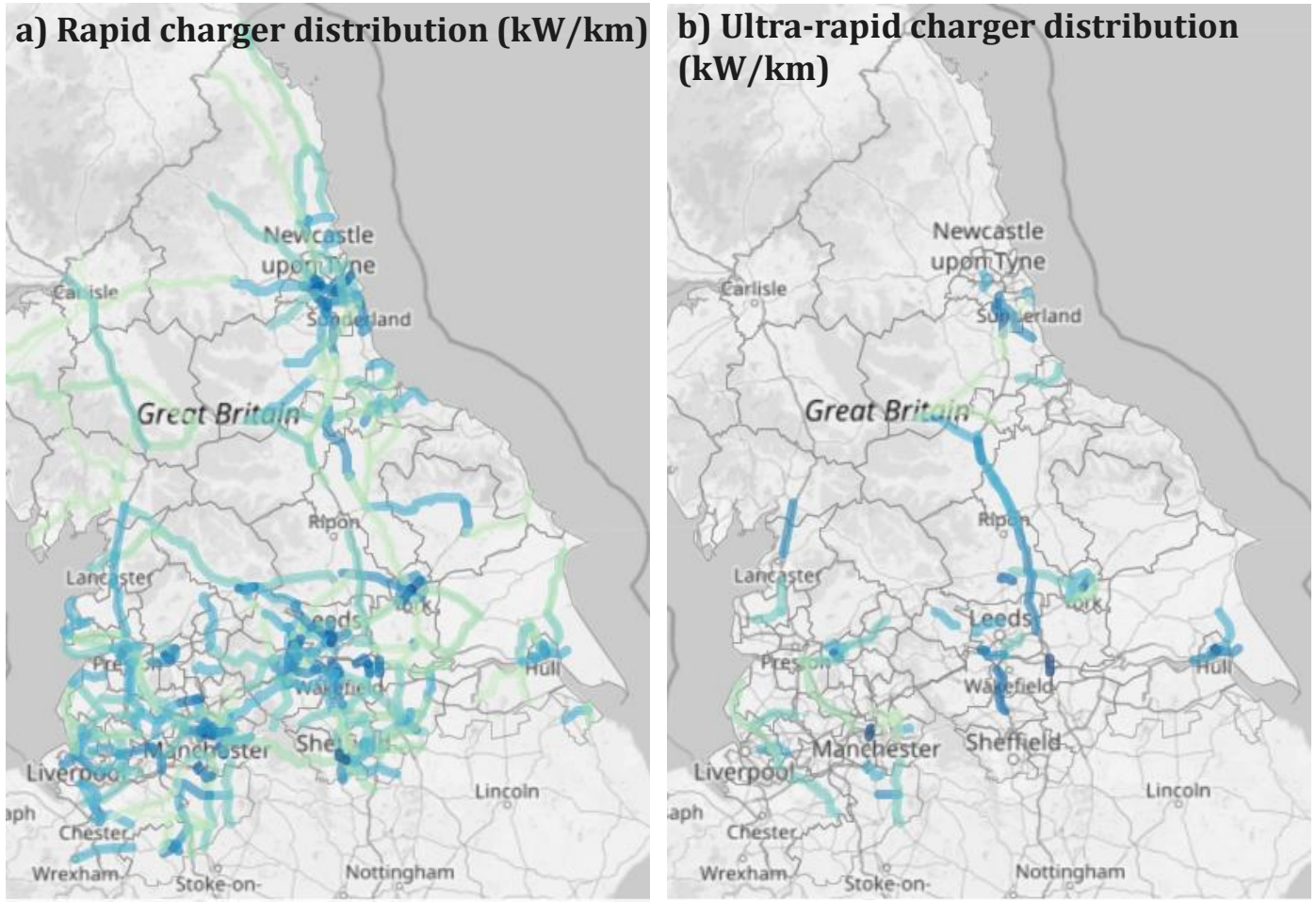
Regional inequality in the en-route rapid charging network along strategic roads holds back BEV adoption everywhere as drivers are looking for national coverage

Public charging

- Rural communities need a rapid/ultra-rapid charging network on rural strategic roads to support their adoption of BEV
- Urban communities need a rapid/ultra-rapid charging network on rural strategic roads to support holiday and leisure travel
- Drivers are looking for an ultra-rapid charging network* with national coverage to provide confidence that they can go anywhere in their EV
- Project Rapid[2] initially aimed to have at least six ultra-rapid EVCPs at each motorway service area in England by 2023, with 2,500 total ultra-rapid EVCPs by 2030, and 6,000 by 2035
  - However, this 2023 target was missed, and as of 22nd February 2024, only 56 of the 114 motorway service areas (49%) meet this aim[3]
- The many white areas of strategic road in the map on the right (b) show how ultra-rapid charger rollout still lags well behind rapid charger map (a) deployment
- Provision is particularly limited in some areas, particularly on east-west roads

Supply of rapid (left) and ultra-rapid (right) chargers Q3 2023 on the strategic and major road network in the North of England.

(White = no chargers, Green = low charger rollout, Blue = high charger rollout)



*See this slide in the Appendix for further detail on rapid versus ultra-rapid charging.

From ERM analysis of DfT's National Chargepoint Registry (NCR)

1: Zapmap Annual Charging Insights 2023 2: Project Rapid 3: Motorway Service Area EVCP deployment

Drivers who cannot charge off-street will face higher recharging costs than ICE drivers, but drivers that can charge often/mostly at home have lower costs

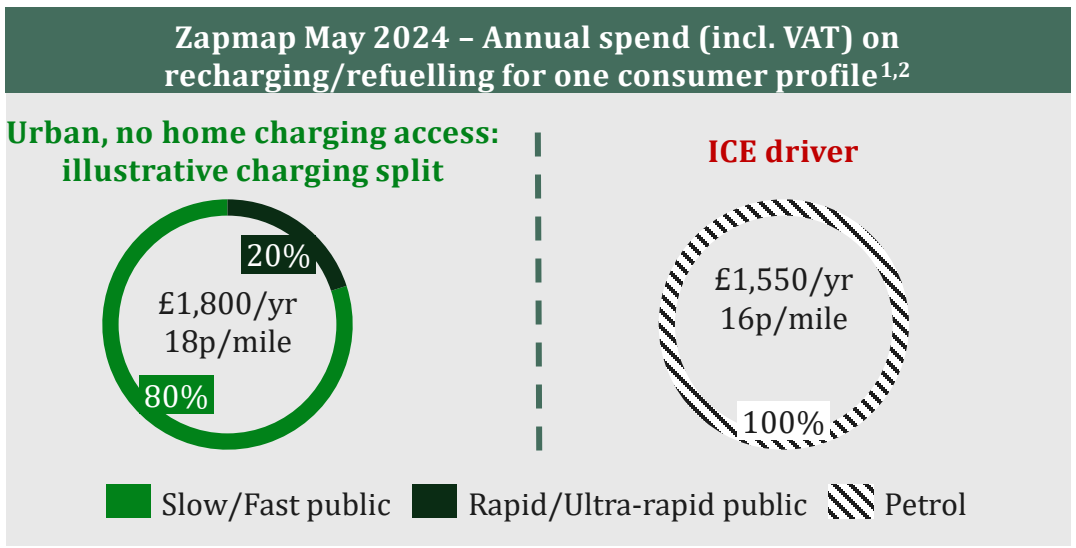
Zapmap price data[1] shows charging prices have increased in the year to May 2024 for both slow/fast and rapid/ultra-rapid charging, but have stabilised throughout 2024 (see top right)

- Slow/Fast prices have increased 17% from £0.48/kWh (May 2023) to £0.56/kWh (May 2024)
- Rapid/Ultra-rapid prices have increased 8% from £0.74/kWh (May 2023) to £0.80/kWh (May 2024)

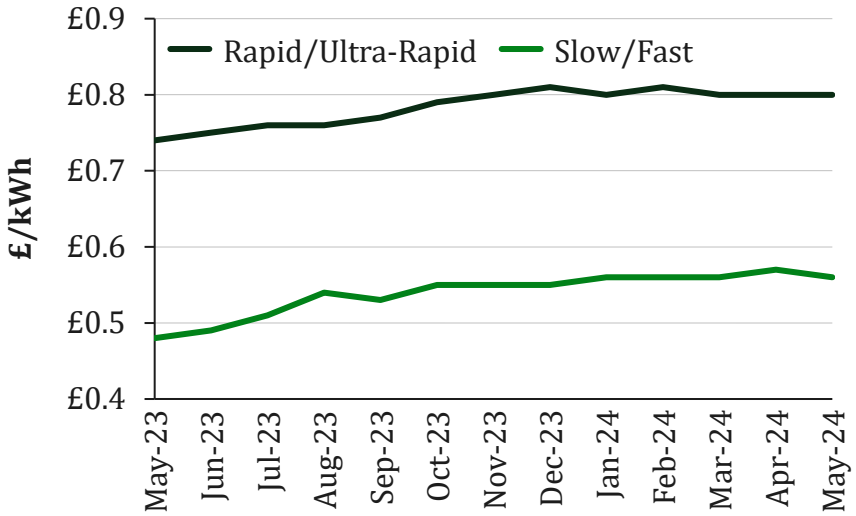
Based on prices from May 2024, Zapmap estimates that BEV drivers without access to home charging could spend more on recharging than drivers of equivalent petrol ICE vehicles (see below graphics)[1,2]

- The cost to refuel/recharge is compared on a pence/mile basis for other profiles in the bottom right chart. **Note that drivers who mostly or often charge at home (blue and purple bars) have lower costs** than an ICE driver.

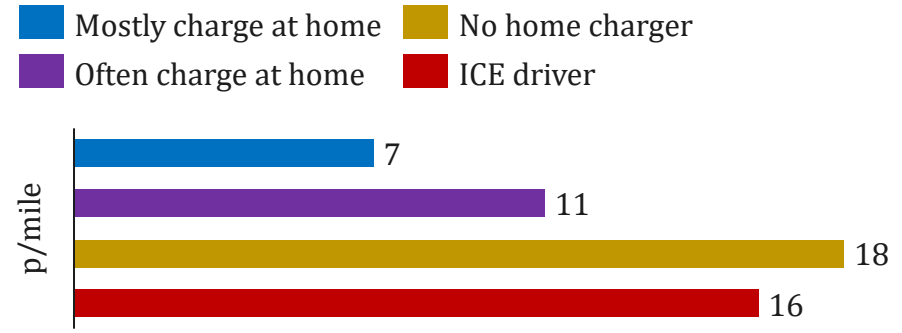
Zapmap May 2024 – Annual spend (incl. VAT) on recharging/refuelling for one consumer profile[1,2]



Zapmap May 2023 – May 2024 price index data (£/kWh)[1]



Refuelling/recharging cost by consumer profile (p/mile)[1,2]



1: Zapmap Price Index - Average weighted price to charge on the public network - Zapmap (zap-map.com); 2: Zapmap assumptions: 10,000 miles per annum, May 2024 price index recharging prices (0.56p/kWh for slow/fast public and 80p/kWh for rapid/ultra-rapid public), a home EV tariff of 8.0p/kWh, a VW electric ID.3 for the BEV (298Wh/mile) and a petrol VW Golf (43.5mpg) for the petrol driver profile – a petrol price of 149p/litre from May 2024 pump prices was used. The cost of a home charger was not included (for consumers that can charge at home).

The current public charging experience in the UK needs to improve for consumers to trust the network of chargers

Charge point reliability, simplicity and accessibility are significant barriers to charge point usage and may influence consumer EV purchase decisions.

RELIABILITY

- Surveys like the Transport Focus and ZapMap survey of EV drivers,[1] the DfT Electric Vehicle Charging Research survey report,[2] the CUPRA survey[3] and the Which? EV owner survey[4] found that users experience varying levels of reliability with charge points.
- The CUPRA survey and the DfT Electric Vehicle Charging Survey found that queuing and wait times for charge points was a key issue.
- Some survey responders reported that the **charging speed was lower than advertised**, and others reported that **chargers were often broken**.
- The lack of payment reliability is discussed on the next slide.

SIMPLICITY

EV drivers currently need to navigate **several different apps** to access and pay for the full network of charge points in the UK. 47% of users surveyed by Shell Recharge would be willing to pay more for a single method of access to charge points.[5]

This leads to several key issues:

- 63% of the respondents to the Which? EV owner survey[3] said that it was **difficult to compare prices** between operators.
- In-car **navigation maps often do not have a fully updated list of all charge points** in the UK, so drivers must consult multiple sources to plan their routes.
- Charge points **do not have the same level of (often large and illuminated) signage as petrol stations**, with the price visible to motorway drivers, so they can be difficult to find/compare en-route.

ACCESSIBILITY

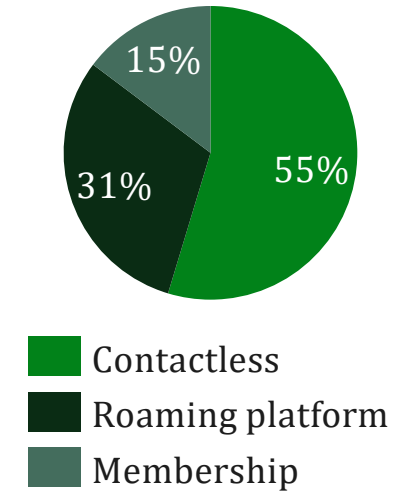
- The DfT National Travel Attitudes Study, DfT EV Charging Infrastructure survey and several industry manifestos mention **the lack of charge points that are fully-accessible to all users.**
- The BSI Accessibility Standard (PAS 1899) was released in 2022 as a voluntary standard for charge point accessibility, but it is not mandated in UK charge point regulations.[6]

1: Transport User Voice February 2024 - Electric Vehicle Charging Survey - Transport Focus (n=274)
2: Electric Vehicle Charging Research. Survey with electric vehicle drivers. Research report. (publishing.service.gov.uk) (n=848)
3: Perceptions of electric cars revealed | CUPRA UK (cupraofficial.co.uk) (n=377)
4: EV owners say public charging still isn't up to scratch - Which? News (n=1,004)
5: Shell EV Driver Survey Report 2023 (storyblok.com) (n=24,771)
6: PAS 1899:2022: Electric vehicles - Accessible charging Specification

The experience of paying to use a charge point is more complicated and unreliable than using a petrol pump

- The transition to paying for electricity instead of petrol or diesel fuel has not been smooth for many, with **60% of respondents** to the Which? EV owner survey saying that they have **experienced a payment issue at least once** while attempting to charge their vehicle.[1]
- There are several potential roots to the problem:
  - → When charging, it can be **unclear whether the issue lies with the payment or the charging process**. Some users report pre-authorising payment for charging, then not being able to charge their vehicle through the charge point due to an unclear issue and realising later that they have been charged even though they could not access the service.[2]
  - → There are a **myriad of apps and payment methods** that need to be used to pay for charging in the UK. 87% of respondents to the EV Café survey reported using more than one payment option (contactless and different apps) to pay for charging.[2] Some players are attempting to address this problem. For example, Zapmap are introducing Zap-Pay, with access to many different providers across the UK, but not all providers are signed up to this scheme.[3]
  - → Additionally, some users have experienced issues when paying for charging within a charging app or through a QR code due to a lack of internet connection. 80% of respondents to the EV Café survey have faced **app connectivity problems when trying to pay**.[2]
  - → Furthermore, sometimes the **PIN pad is removed** from charge points that accept contactless and app payments only, which prevents users from paying with non-contactless cards if needed. This could impact many consumers given the high share of charging payments through contactless (see figure at right).
  - → There are **no attendants at charge points** located on streets, and sometimes the attendants at service stations do not understand the charge point technology or process to be able to assist users.

ERM analysis of payment type for public EVCPs, (n = 41,286 charging sessions)



1: EV owners say public charging still isn't up to scratch - Which? News (n=1,004)
2: EV drivers face payment anxiety due to 'complicated' charging experience (fleetnews.co.uk) (n=200)
3: How do you pay for electric car charging on the public network? - Zapmap (zap-map.com)

In conclusion, charge point deployment, charging costs and charging experience need improvement

Charge point numbers in the UK

- The number of charge points in the UK is growing consistently, and currently meets targets like the AFIR target for kW per BEV.
- However, growth in slow-fast charge points (3-49 kW) and rapid charge points (50-149 kW) has slowed in recent years. Additionally, the 2023 target for ultra-rapid chargers in Project Rapid was missed (only 56/114 motorway service areas have six ultra-rapid chargers), and ultra-rapid charger deployment has been patchy leaving some areas of the UK with no service at all
- Overall, charge point deployment is highly regional, with London experiencing the highest deployment per population and Northern Ireland experiencing the lowest.
- There is further discussion of the Local Electric Vehicle Infrastructure Fund and the Rapid Charging Fund later in this report, which directly impact the deployment of chargers.

Charging cost

- Charging is more expensive than petrol for drivers without home charging, and prices per mile have increased over the last year
- However, charging is cheaper than petrol for drivers with access to a home charger for some or all of their charging needs. It should be noted that 80% of existing EV drivers have access to a charge point at home installed on a private driveway or garage.

Charging experience

- There are key issues with the reliability, simplicity and accessibility of using public charge points in the UK
- In particular, the payment experience is not as simple or reliable as petrol refuelling.

The next section details the projected evolution of these barriers to 2030 and exposes gaps where additional policy may be needed to mitigate the barriers.

Contents

Between now and 2030, the development of three factors will have an impact on increasing/decreasing barriers to UK BEV adoption

Each of the factors below will be considered in the following slides in this sub-section.

1. BEV vs ICEV purchase cost differences/ price parity

2. EVCP deployment and charge point market trends

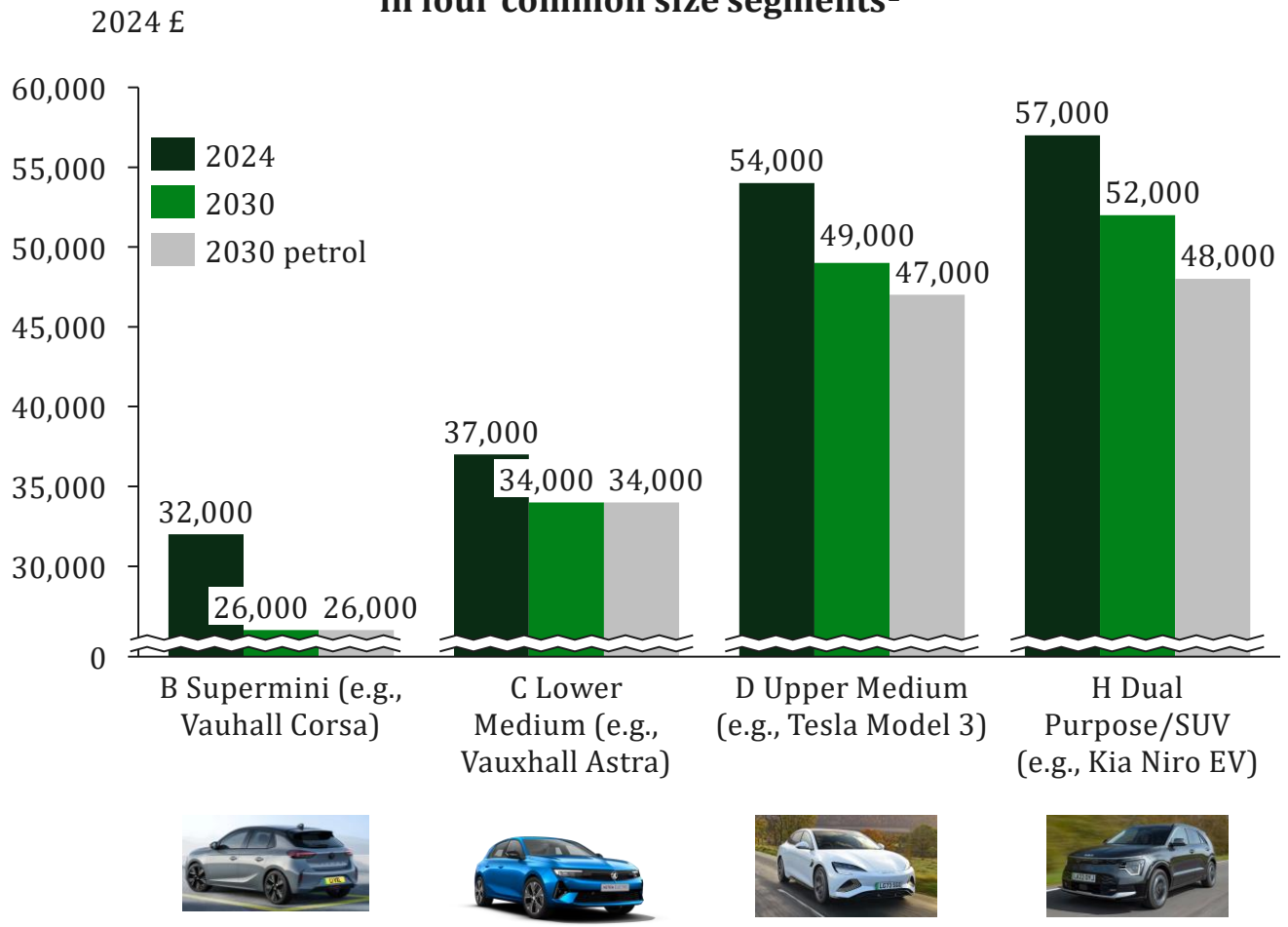
3. Additional charging regulations or guidance

BEV prices are expected to decrease over time, with the largest price drops expected in the smallest segments

Small segment BEV car prices will likely reach price parity with ICE vehicles by 2030 in the UK, but price parity for larger segments is expected to take longer.

- B and C segment BEV prices are likely to decrease into the future, with projections suggesting that price parity will be achieved by 2030 (supported by 2024 IEA projections [2], while 2023 T&E analysis suggests price parity for smaller size segments may be as soon as 2026/2027 in the UK[3]).
- This is likely to occur as batteries become cheaper over time (because batteries are the costliest component of electric powertrains).
- Additionally, as larger electric vehicle segments become more popular, smaller segments will attract lower demand and therefore retain lower prices.
- Larger segments will be more popular to new car buyers (see analysis earlier in the report), thus the price decrease will not be as substantial as for smaller segments. Additionally, large BEVs have increasingly larger batteries to achieve high ranges, which increase the price more than for smaller BEVs.
    - BEVs in these larger segments are not projected to reach price parity with ICE vehicles before 2030.

Projected real prices of average BEV and petrol cars in four common size segments[1]



1: Using ERM cost and performance modelling results. Prices in real 2024 £, including 20% VAT.
2: Global EV Outlook 2024 – Analysis - IEA
3: Small and Profitable: Why Affordable Electric Cars in 2025 are Feasible (2023) T&E

Chinese OEM EVs could outcompete similar EVs on either range or cost

However, BYD are currently selling EVs at the UK market price, rather than undercutting the competition by selling closer to the price in China.

Top 5 estimated Chinese EV imports in 2026[1]

~130,000 EVs from Chinese brands (including brands like Volvo which are subsidiaries of Geely, ~15% of total UK EV supply in 2026) are expected to be imported in 2026 from 18 different brands, with the top 5 models from pure Chinese brands (not Volvo, MG, etc.) below accounting for roughly 35,000 of these in 2026.

Brand + Model	Size (Segment)	Range (Test cycle, km)[2]	Price, including taxes (location)[3]	European EV Comparator (Segment, Range, Price)	
				Comparable Size	Comparable Range
Roewe D7	Medium (C/D)	610 km (CLTC, link) 490-550 km (WLTP est)	£13,600 (China, link)	Kia Niro '2' (C, 460 km, £37,300)	Audi Q4 Sport 45 Etron (H, 530 km, £52,000)
BYD Yuan Plus	Medium (C/D)	420 km (WLTP, link, branded as Atto 3)	£13,100 (China, link)	Kia Niro '2' (C, 460 km, £37,300)	
BYD E1	Small (A)	305 km (CLTC assumed link) 245-275 km (WLTP est)	~£8,000 post subsidies (est £2,000, link) (China 2019, link)	Dacia Spring (entering market 2024) (A, 225 km, £15,000)	
BYD Dolphin	Medium (C)	425 km (WLTP, link)	£11,000 (China, link) £30,195 (UK, link)	Kia Niro '2' (C, 460 km, £37,300)	
BYD Seal	Medium (D)	570 km (WLTP, link)	£24,000 (China, link) £45,695 (UK, link)	BMW i4 Sport (D, 479 km, £51,270)	Skoda Enyaq 85 (H, 560 km, £44,500)

- If BYD look to increase exports from China to the UK, this suggests that they could **quickly reduce their price to outcompete comparable BEVs**.
- However, it is not only Chinese OEMs that show a price disparity between China and the rest of the world, with Tesla selling its Model 3 for ~£25,200 in China (link), compared to ~£40,000 in the UK (~60% higher in the UK).
- This could potentially point toward OEMs being able (or forced to) reduce prices in markets where there is significant demand (i.e., China), with OEMs either reducing their profits or making short-term losses to gain/maintain market share.
- Alternatively, the UK Government may ultimately decide to impose tariffs on the imports of Chinese vehicles to reduce the threat to UK and European OEMs. In July 2024, the European Commission raised tariffs on Chinese EV imports up to 38% depending on manufacturer.[4]

1: Production and Export Data purchased from S&P Global by ERM (March 2024), analysis performed by ERM. **Note:** These numbers only cover current plans for each OEM, future numbers are less certain as new production lines might later be planned which are not accounted for here, or planned production gets changed or cancelled.
2: China Light Duty Vehicle Test Cycle (CLTC) ranges are roughly 10% higher than Worldwide Harmonised Light Vehicle Test Procedure (WLTP) ratings, but will vary dramatically between OEMs and models. Est WLTP ranges shown have been estimated by reducing the CLTC range by 10-20% (How To Convert Conflicting EV Range Test Cycles: EPA, WLTP, CLTC (insideevs.com))
3: Chinese prices converted from USD with £1 = $1.27
4: European Commission

While Chinese brand BEVs may be competitive in the UK, production in Europe is expected to increase faster than imports from China

However, Chinese brand EVs made in China are (on average) smaller than non-Chinese brand EVs made within China, and are expected to make an increasingly larger proportion of imports from China

Chinese-made BEVs currently in the UK

- Approximately one third of BEVs currently sold in UK are made in China.
- More than half of these are from non-Chinese brands (e.g. Tesla, BMW, Mini)
- Many are from European brands which are now owned by a Chinese parent company (e.g. Volvo and Polestar as part of Geely, MG as part of SAIC)
- Chinese-made BEVs are currently concentrated in the small and medium car segments, currently accounting for approximately 50% of small and medium cars sold in the UK.

Chinese-made BEVs in the UK up to 2030

- The percentage of Chinese-made BEVs is expected to decline up to 2030, as European manufacturing scales up to match demand.
- Of these Chinese-made BEVs reaching the UK, the proportion of these from Chinese brands is expected to increase over time, as European brands start production in Europe and other countries.
- Imports of large BEVs from China are expected to increase, driven predominately by the production of large BEVs for European OEMs in China.

From data before the recent EU and US tariff announcements, Chinese OEMs may increase their exports but are unlikely to do so in sufficient volumes to make a substantial difference to the UK BEV market. This may change since the announcement of BEV tariffs in the EU, which may shift Chinese exports to the UK rather than the EU.

Whilst raising tariffs on Chinese BEVs might increase revenue to the UK government, this is likely to delay the reduction in price of BEVs on the market, especially for smaller cars for consumers who are most price sensitive. This will delay the uptake of BEVs, and the government revenue generation might be reduced if China introduces retaliatory tariffs on UK goods.

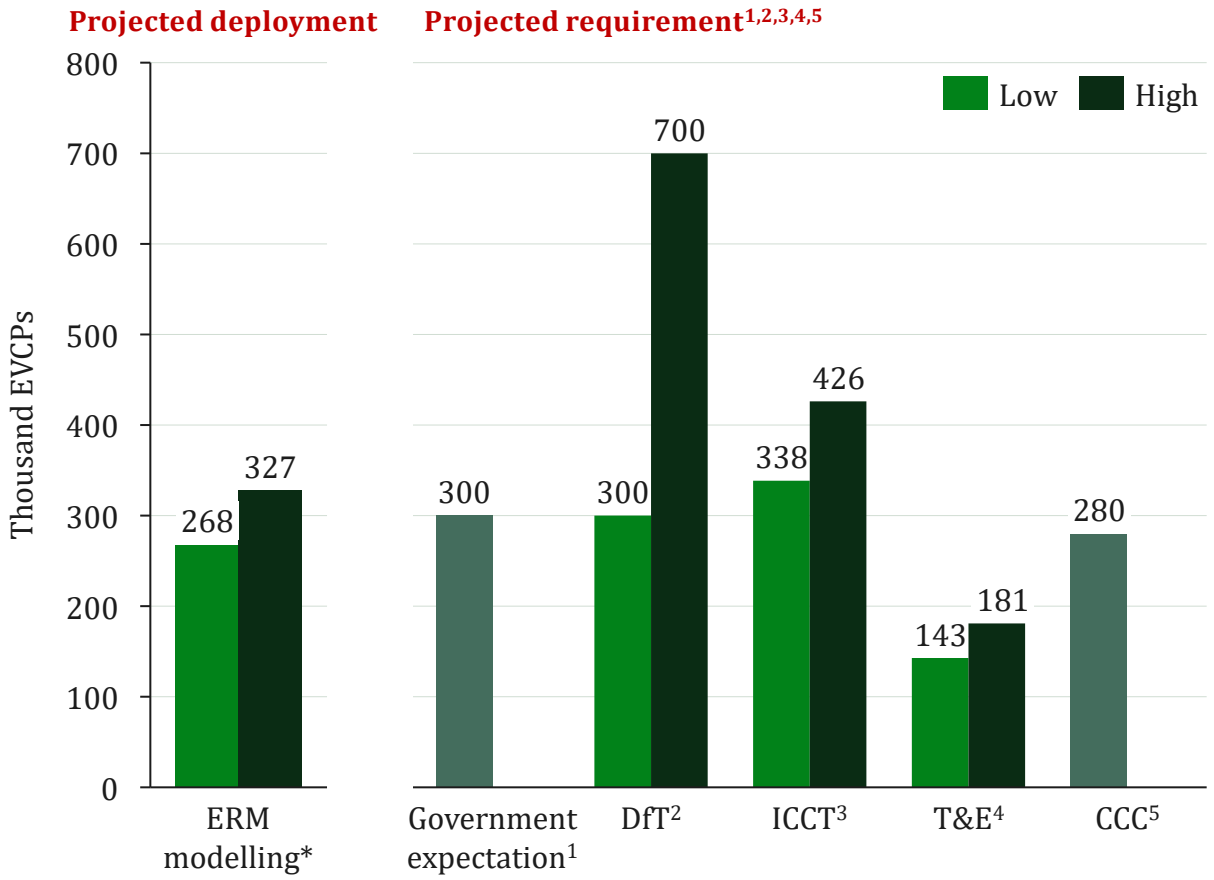
Production and Export Data purchased from S&P Global by ERM (March 2024), analysis performed by ERM.
Note: This data only covers current plans for each OEM, future numbers are less certain as new production lines might later be planned which are not accounted for here, or planned production gets changed or cancelled. These projections do not account for recent tariffs placed on Chinese-made BEVs in the US and EU, which may influence supply to the UK

Projected UK EVCP deployment based on deployment trends and CPO announcements is in line with expected EVCP requirements

There is uncertainty in how many EVCPs will be needed in the future, but the estimated range is in line with projected deployment

- As shown at right, there is a range of estimates of the number of EVCPs that will be required by 2030 in the UK: between 143k-700k EVCPs
- This is largely due to uncertainties about the **uptake of EVs** in the UK, as well as uncertainty about **future charging behaviours**
  - High requirement scenarios represent a future preference for deploying lower power AC EVCPs (e.g., on-street residential) rather than higher power DC EVCPs (e.g., rapid hubs)
  - Due to their lower power, more low-power AC EVCPs would be required to meet the UK's charging needs (e.g., in more rural areas to achieve an equitable distribution) than high-power DC EVCPs
- As shown at right, ERM has modelled the deployment of EVCPs across the UK by 2030 based on **deployment trends and CPO announcements**: between 268k-327k EVCPs
  - As set out above, ERM's high and low deployment scenarios represent high AC and high DC deployments respectively*
- **Modelled deployment** is roughly in line with the **estimated range required and the UK government expectation** of 300k EVCPs by 2030
- It will be important to ensure this **deployment is distributed equally across the UK**, which has not previously been the case (see this slide)

Comparison of ERM modelled deployment of EVCPs [excluding home chargers] in the UK by 2030 with the range of estimates for number of EVCPs required by 2030 in the UK[1,2,3,4,5] (thousand EVCPs)



*Note: ERM Low scenario assumes high demand for DC EVCPs, while the ERM High scenario assumes demand for AC EVPS (e.g. on-street residential) is higher

1: UK Government expectation of 300,000 EVCPs by 2030 2: DfT Taking charge: the electric vehicle infrastructure strategy
3: ICCT Quantifying the EV infrastructure gap in the UK 4: T&E Charging forward 5: CCC The Sixth Carbon Budget

The Government's Public Charge Point Regulations guidance[1] will improve some but not all current issues with the charging experience

Policy Area	Summary of policies/mandates	Policy effective date
Contactless payment	• New public charge points of 8kW and above and existing charge points of 50 kW and above must accept contactless payments, **but there is no requirement for a PIN pad to remain on the charge point, or for there to be sufficient internet connection for contactless to work well.**	24th Nov 2024
Payment roaming	• Charge point operators must enable consumers to pay through at least one roaming provider at their charge points (similar to a fuel card for ICE vehicles).	24th Nov 2025
Pricing transparency	• The maximum price of a charging session must be displayed clearly in pence per kilowatt hour. The price can be displayed either on the charge point or through a separate device. However, there is **no requirement for large signage.**	24th Nov 2023
Reliability	• Rapid charge points must be **99% reliable**, measured as an average across each charge point operator's rapid network. Information on reliability compliance must be published on the charge point operator's website.	24th Nov 2024
Helpline	• A free to use 24/7 staffed telephone helpline must be available and advertised at all charge points. **This will help to mitigate the issues of broken charge points and no attendants at charge points.**	24th Nov 2024
Open data	• All data must be accurate, and charge point operators must use the Open Charge Point Interface (OCPI) to hold and open their data. Reference and availability data must be made publicly available and in a machine-readable format. Government bodies, Distribution Network Operators, Transmission Owners and Electricity System Operators must have access to all data. This is hoped to allow the creation of **freely available maps with up-to-date charge point** information.	24th Nov 2024

1: Public Charge Point Regulations 2023 guidance - GOV.UK (www.gov.uk)

Cross-pavement charging solutions are receiving increased attention and could improve the experience and cost of charging

Cross-pavement solutions allow EV drivers without off-street parking to charge on-street without paying high rates for public charging or trailing cables across the pavement

- Government policy announced in the Plan for Drivers supports deployment of cross-pavement solutions:[1]
  - A **£350 grant is available since March 2024** for installation of home chargers that are installed alongside a cross-pavement solution at a property without off-street parking[2]
  - Government is planning to consult on applying permitted development rights to chargers installed at properties without off-street parking, and is developing guidance for local authorities on relevant legislation and permissions for cross-pavement solutions
- The Electric Vehicle Association (EVA) England have also included a proposal to allow cross-pavement solutions in their 2024 manifesto[3]
- **Cross pavement solutions are being trialled across the country** by several local authorities and can receive LEVI funding[4,5]
- The issues with charging experience (reliability, simplicity and accessibility) could all be mitigated by cross-pavement solutions
- However, **many councils do not yet permit cross-pavement solutions**, citing concerns around residents feeling like they "own" the parking space, highway maintenance and pavement accessibility

- Cross-pavement solutions can support charging affordability. They give **access to home electricity tariffs** for drivers without off-street parking**:**
  - The difference between a cost of 7p/mile using home charging tariffs and 18p/mile for public charging creates a savings of £1,000/year (based on an average annual mileage of 9,500 miles)[6]
  - They can also reduce the need for public charging in general, mitigating the issues with charging experience
- Cross pavement solutions are a threat to residential public charging network business models as they would decrease demand at public charge points. Given LAs also have a stake in the revenue from public charge points, there might be a lack of support from LAs for these solutions.
- Only a few LAs have shown interest in cross pavement solutions so far (based on current LEVI applications), mostly because of the low maturity of the solution and the concerns listed on the left. Therefore, the potential "conflict of interest" issue has not arisen yet.
- Early deployment of cross pavement solutions should be monitored (including impact on public charging) and experience shared across LAs.

1: The plan for drivers - GOV.UK (www.gov.uk) 2: Electric Vehicle Chargepoint Grant for Households with On-Street Parking - GOV-UK Find a grant (find-government-grants.service.gov.uk) 3: EV-Drivers-Manifesto-24.pdf (evaengland.org.uk) 4: Easy EV Charging for West Berkshire Residents! - West Berkshire Council 5: Apply for a home EV charging channel | Milton Keynes City Council (milton-keynes.gov.uk). 6: Average mileage of new cars, based on ERM analysis of NTS data.

Contents

Four archetypes of new car buyers that represent the "extremes" of the new car market were produced to assist with testing fiscal policy impacts

Collectively, these cover ~40% of the new car market,[1] and address the extremes which highlight the impact/opportunities arising around each major barrier.

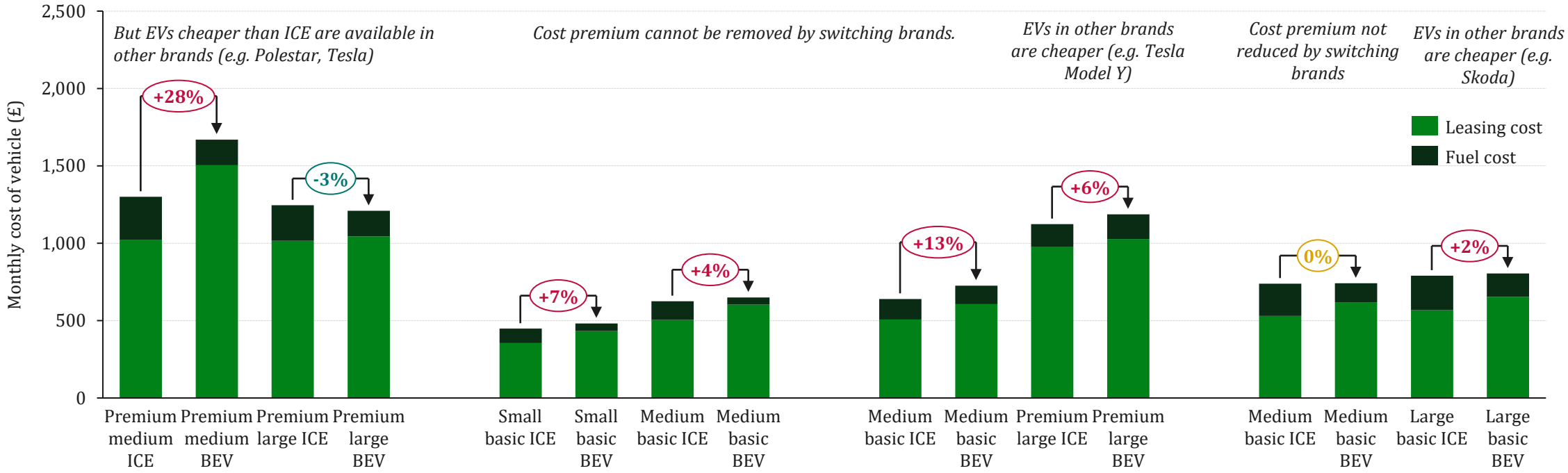
Archetype "Name"	Defining features	% of new car buyers	Average annual mileage (miles/year)	Average household income[2]	Barrier(s) experienced most by the archetype
High-income, large cars and charging access	• Individual income >£40k, Household income >£50k[2]. • Either own their home outright or with a mortgage. • Large or medium sized car. • House type is likely to have access to off-street parking.	18%	13,100	£115,000	Brand loyalty leading to increased transition cost.
Low-income, smaller cars	• Individual income <30k, Household income <40k[2]. • Rents their home. • Small or medium sized car.	7%	7,500	£20,000	Cost, lower availability of smaller BEVs
Urban, no private charging access	• Urban area. • House type is unlikely to have access to off-street parking.	8%	8,300	£70,000	Lack of private home charging leading to increased costs and reduced appetite for EV.
Rural, high annual mileage	• Rural area. • >8,000 mi/year	10%	13,100	£60,000	Lack of public charging coverage, increased costs of public charging.
All others		ca. 57%	8,500	£55,000	More varied experience of barriers to EV adoption than above groups

1: ERM analysis of the National Travel Survey in England (2016-2019) (selected since this represents pre-COVID travel data)
2: All income values shown are pre-tax

Monthly cost comparisons by archetype varies with mileage and access to charging, with the best case for BEVs being for consumers who can charge at home or who have higher annual mileages

The largest cost differences arise for small car owners who have no alternatives, and the Urban archetype which does not have access to private charging.

The ICE models chosen are within the top 5 most-sold cars in their segment, and they are compared to an equivalent BEV (within the same brand where an equivalent BEV is offered by the OEM).



Group size	45% of archetype, 8% of all buyers	55% of archetype, 10% of all buyers	15% of archetype, 1% of all buyers	85% of archetype, 6% of all buyers	60% of archetype, 4% of all buyers	30% of archetype, 2% of all buyers	65% of archetype, 7% of all buyers	30% of archetype, 3% of all buyers
Archetype	High-income, Larger cars, Charging access		Low-income, smaller cars		Urban, no private charging access		Rural, high annual mileage	

Analysis on a single representative ICE and BEV vehicle, based on quotes and fuel consumption data from OEM website. Comparison will vary with different OEMs and models chosen. Further details in the Appendix on the specific models chosen and leasing costs by archetype.

Contents

Section introduction: Analysis of policy options to enable acceleration of BEV adoption in the UK

In this section, where the focus of a slide is on a particular policy, a tag with the policy name is included in the upper right-hand corner of the slide:

Feebates	**Information campaigns**
Social leasing scheme	**Tariffs on Chinese imports**

Policy analysis background: This short sub-section first provides possible factors that have in aggregate stifled BEV uptake in the UK in recent years, including discussion of the successive economic shocks that have likely contributed to consumers' price sensitivity when purchasing a new car. Next, a short explanation of the guiding principles used to direct the policy analysis is provided.

Qualitative and quantitative assessment of fiscal polices: The four fiscal policy options considered are evaluated in terms of BEV sales impact, cost to government, equity impact, and ease of implementation, and then each policy option is analysed in detail, including illustrative policy design/quantitative modelling as applicable.

Charging funds background: Background on the Local Electric Vehicle Infrastructure (LEVI) Fund and Rapid Charging Fund (RCF), including details learned from interviews conducted for this study, is outlined. For LEVI, this includes a flow chart summarising the communication and funding flows among ecosystem actors and a funding/activity timeline. For RCF, this includes a summary of the fund background and structure from interviews and the literature on how the RCF could be more impactful.

Contents

BEV uptake has not increased in recent years, despite the rapid reduction of BEV prices, more varied model choices and technology advancements seen since 2020, suggesting additional policy intervention is necessary

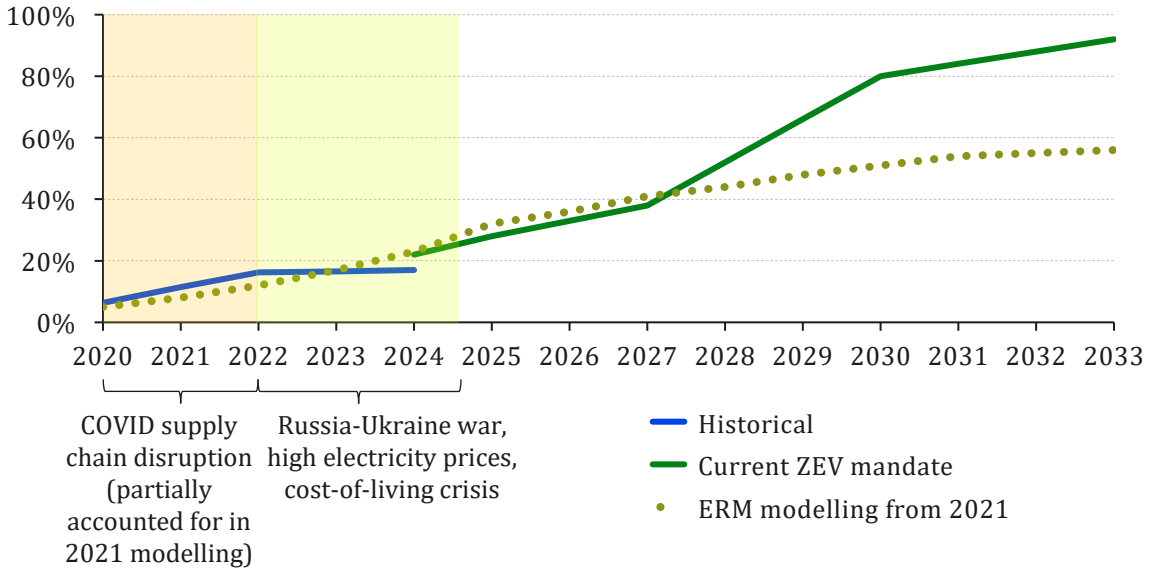
Modelling BEV uptake performed in 2021 matches the historic BEV uptake, even though BEV prices have dropped faster than modelled in 2021. Therefore, a faster uptake of BEVs would be expected compared to the 2021 projection, **which has not been seen.**[1]

The lack of increased uptake could be due to a combination of factors:

- **Perceived additional capital costs of an EV** (e.g., battery replacement expectations, higher insurance costs)
- Consumers being **more purchase price sensitive** since the cost-of-living crises.
- Consumer **misconceptions of running costs of EVs** compared to petrol (either through misinformation or lack of information, fuelled by concerns around electricity prices), amplified by **consumer's increasing price sensitivity.**
- Past modelling **does not account for vehicle leasing.** Most people now lease new cars, and people's choices around leasing costs may be different compared to purchase price differences (comparing a £50/month difference would be different to a £5k upfront cost difference).

Overcoming these negative impacts will be crucial to meet the current ZEV mandate up to 2030. Some of these factors will reduce naturally as consumer's gain experience with and learn more about BEVs, but **additional policies are likely to be required to match or exceed the current ZEV mandate.**

Modelled BEV car sales in the UK compared to historic sales and the ZEV mandate



Successive economic shocks have reduced private consumers' desire to purchase higher-priced cars.
Mixed with supply chain disruptions, misconceptions and misinformation on the costs and performance of BEVs, **this may have stifled BEV uptake compared to what could have happened in a non-disrupted world.**
Additional policies and actions are likely to be needed to ensure BEV uptake follows or exceeds the ZEV mandate.

1: BEV uptake projections from https://www.platformelectromobility.eu/wp-content/uploads/2022/01/20220110_InevitableEV_Final.pdf

Several guiding principles informed the selection of a short-list of fiscal policies and supporting non-cost actions to carry through the analysis

The below principles were agreed in partnership with the European Climate Foundation at the beginning of the policy analysis phase of work.

FISCAL POLICIES

The fiscal policies considered should focus on unblocking the barriers identified in order to accelerate BEV uptake among new car consumers in the UK.

The individual policies analysed can have a net cost to government, although policies with a range of potential costs should be considered.

Include additional analysis of import tariffs on BEVs to understand the impacts of the UK following similar policy as the USA, Canada and EU.

NON-COST ACTIONS / CHARGING FUND MODIFICATIONS

The non-cost actions considered should focus on accelerating and improving the UK's charging network by unblocking the charging-related barriers identified.

Some recommended actions may include modifications to UK government charging funds (LEVI and RCF).

Other recommended actions may focus on adjustments to regulations or other requirements that could improve the consumer charging experience.

Contents

Different fiscal policies may increase the sales of new BEVs to meet or exceed the current ZEV mandate

Each policy would have different impacts on BEV sales, cost to government, and equity (just transition), and each vary in how difficult they may be to implement.

Policy	General description	BEV sales impact	Cost to government	Equity impact	Ease of implementation
Feebates	Tax expensive, high-emissions ICE cars and use revenue to subsidise BEVs to encourage powertrain switching		(Depends on format)		
Social leasing scheme	Discounted BEV leasing scheme for low-income, car-dependent households. Can focus on existing new-car buyers or households currently with older cars.		(Depends on number of leases offered)		
Information campaigns	Reduce the perceived barriers around BEVs through messaging campaigns and engagement with consumers				
Introducing BEV tariffs on Chinese imports	Increase import tariffs on Chinese-made BEVs, to protect UK-based manufacturers		(Depends on Chinese response)		

Colour	BEV sales impact	Cost to government	Equity impact	Ease of implementation
	Significant increase in BEV sales (>200k/year)	Revenue positive for government	Direct significant benefit to equity	Straightforward to administer, or political and/or public praise likely
	Moderate increase in BEV sales (<200k/year)	Revenue neutral for government	Small or indirect benefit to equity	Some challenges to administer
	No impact	Low government cost (< £200m/year)	No or limited impact on equity	Major challenges to administer
	Decrease in BEV sales	High government cost (>£200m/year)	Negative impact on equity	Very difficult to administer, or political and/or public criticism likely

A feebate scheme could be created to not only be revenue generating, but also encourage BEV uptake while avoiding increasing the cost of cheaper ICEVs

Subsidies given to lower cost BEVs may be balanced by fees added to expensive ICE cars, leading to a revenue neutral policy which promotes BEVs, and doesn't increase costs on consumers who buy average-priced cars.

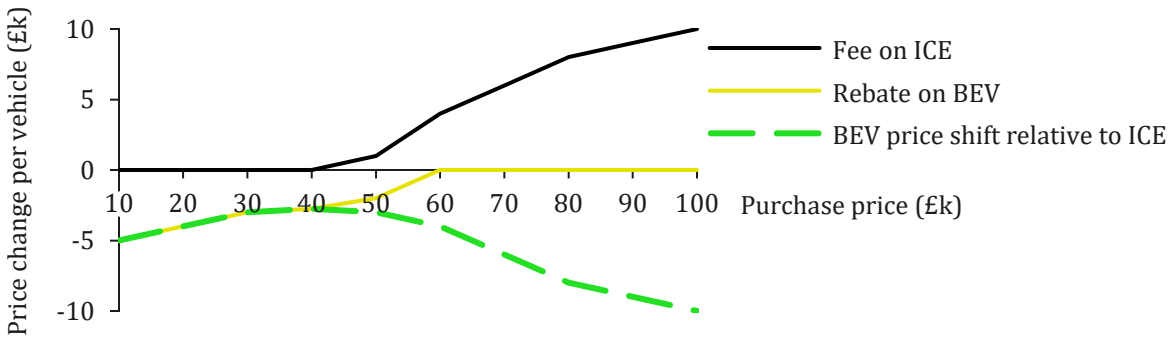
Feebate principles

By only applying fees on the most expensive ICEVs, **80% of ICE cars sold in 2025 would not have a fee**, with another 8% of ICE cars having a fee significantly less than the average price increase paid for higher trims of cars.

These fees on the **top 20% most expensive ICEVs** sold could fund subsidies on the **cheapest 60% of BEVs sold in 2025.**[1]

This will incentivise BEV sales across all price ranges, whilst **not taxing working families who tend to purchase average-priced cars.**

Example of a feebate structure, based on purchase price



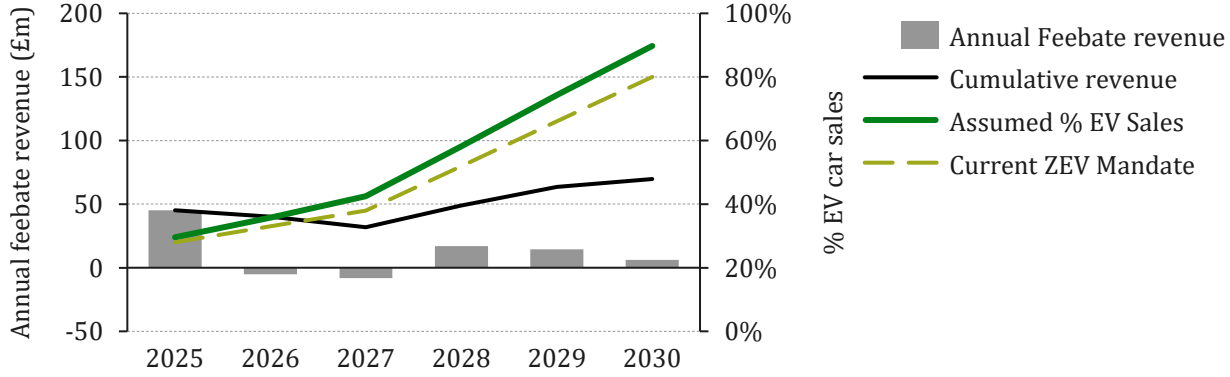
Revenue neutral policy design

As BEV uptake increases over time,[2] the balance of fees and rebates will **need to be updated regularly** to ensure that the policy remains revenue neutral.

This can be achieved by increasing the fees on expensive ICE cars, ensuring that substantial fees are not levied on average-priced ICE cars and subsidies can still be applied to the cheapest BEVs.

By tailoring this policy each year, it can be possible to maintain a **revenue neutral incentive up to 2030**, even in a world where BEV uptake is accelerated beyond the current ZEV mandate.

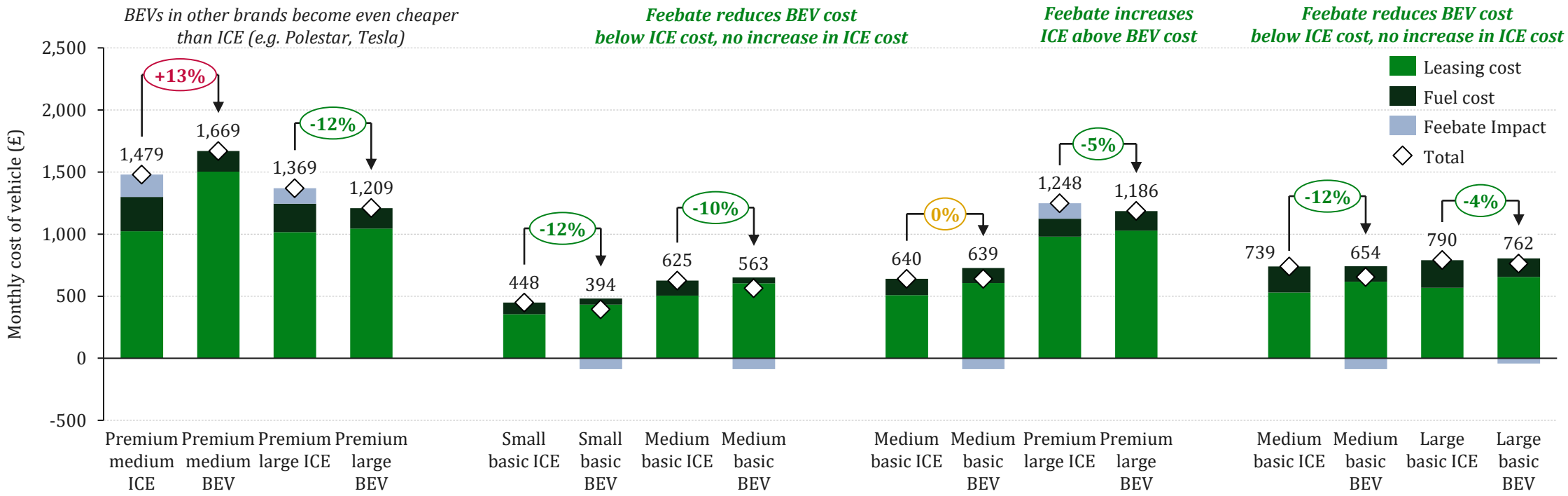
Example revenue projection in a rapid EV uptake scenario



1: There are different options for how increased fees on expensive ICEVs could be implemented, including increasing first year VED for these cars, as recommended by T&E in Reforming UK car taxation (2024).
2: And consumer choices change (e.g. towards different sized and priced vehicles).

The feebate could close the monthly cost gap between most consumer groups without increasing the costs for those buying smaller cars

All consumers buying cheaper cars now see a reduction of BEV costs below the ICE cost, with premium vehicle buyers able to find a cheaper BEV by shopping around



Group size	45% of archetype, 8% of all buyers		55% of archetype, 10% of all buyers		15% of archetype, 1% of all buyers		85% of archetype, 6% of all buyers		60% of archetype, 4% of all buyers		30% of archetype, 2% of all buyers		65% of archetype, 7% of all buyers		30% of archetype, 3% of all buyers
Archetype	High-income, Larger cars, Charging access				Low-income, smaller cars				Urban, no private charging access				Rural, high annual mileage		

Analysis on a single representative ICE and BEV vehicle, based on quotes and fuel consumption data from OEM website. Comparison will vary with different OEMs and models chosen. Further details of vehicles and mileages used in the Appendix (link).

A social leasing scheme could turbocharge the uptake of EVs in low-income households

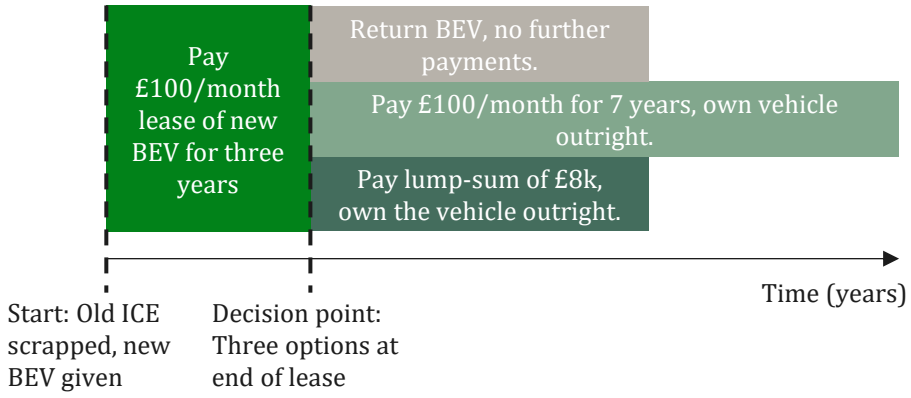
A scheme to provide subsidised BEVs to car-dependent, low-income households who currently use older ICE vehicles will have a significant impact on the equity of the transition and have a direct impact on BEV uptake and emissions.

Social Leasing Principles

Low-income households which are car dependent (e.g., require a car to commute to work or reach amenities) who currently own an old ICE car (>10 years old) will be able to **trade their vehicle in for a new BEV, at a guaranteed low monthly "lease" price**.

After the end of the set lease term, the consumer can either return the vehicle, extend the monthly lease for additional years to fully own the car, or pay a lump sum to own the car outright. Each option would be **subsidised by the government to increase affordability**.

Illustrative social leasing scheme design (consumer payments)



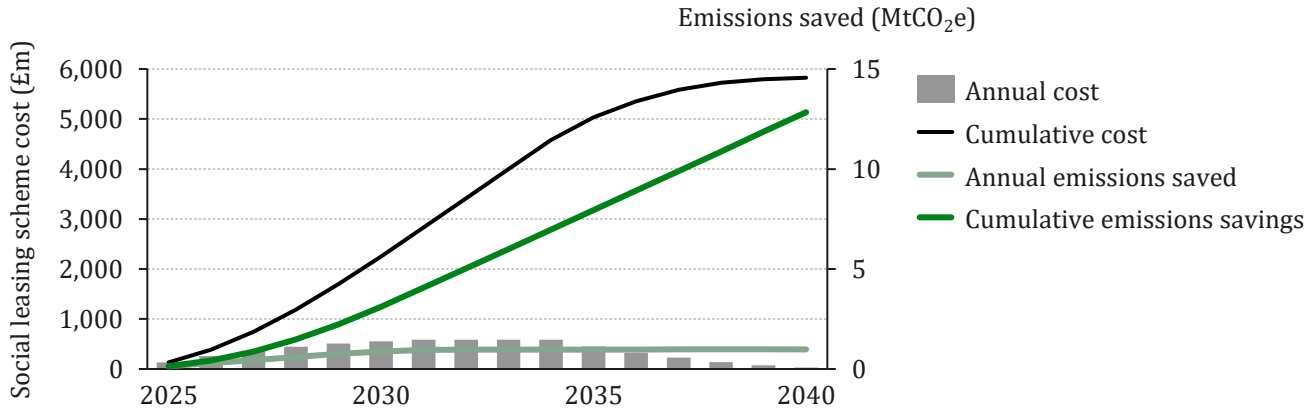
Costs, scale and emissions

The costs and emissions savings depend on the **scale of the scheme implemented**.

The chart below shows the impact of an indicative scheme, with 40-80k leases offered per year between 2025-31 (500k in total)[1], with a monthly lease cost of £100-200/month.

The scheme would save **1 million tonnes CO_2e/year by 2030**, increasing the number of BEVs on the road in 2030 by 5%, **while costing the government less than £400m/year on average**.[2]

Social leasing scheme cost projection in a rapid EV uptake scenario



1: There are currently ~3 million cars over 10 years old in households with an annual income below £20,000, based on ERM's analysis of the National Travel Survey in England.
2: See later slides with additional supplementary policies that could generate revenue to cover this cost.

An information campaign to reduce perceived barriers to BEV adoption could increase BEV demand at minimal cost to government

Since an information campaign measure does not by itself provide any financial incentives, it is expected to be relatively **low cost** for the government to implement.

- Due to the focus of media, anecdotes, personal experiences and/or other factors, many of the perceived barriers to BEV adoption that consumers face could in-part be corrected through a concerted effort to distribute accurate information and data.
- Changing public sentiment to reduce one or more of the perceived barriers **may support BEV adoption**.
- If these perceived barriers are responsible for the slower-than-expected sales of BEVs seen, then **reducing these barriers should enable new consumers to consider purchasing a BEV**.

"Perceived" barriers identified that could be the focus of an information campaign (not exhaustive):

Operational costs (home charging): Perception that charging a BEV at home will be more expensive than fuelling an ICE vehicle

Charging times and public charge point reliability: Perception that public charging times are too long to be convenient or that public charge points will not work properly

BEV battery life: Perception that EV batteries may degrade at a similar rate as smart phone batteries

Negative environmental impact of EVs: Perception that EVs are worse for the environment than ICEVs due to emissions from manufacturing.

DfT's Go Ultra Low information campaign (see later slide with full details) had an **annual budget of £4m** for the national campaign.[1]

For example, consumers may not be aware of ZEV mandate battery performance requirements, which could alleviate some battery life concerns

UK ZEV mandate requirements for cars for EV warranty[2]

- 8 years / 100,000 mi for battery
- Battery replacement if capacity falls below 70% during warranty period

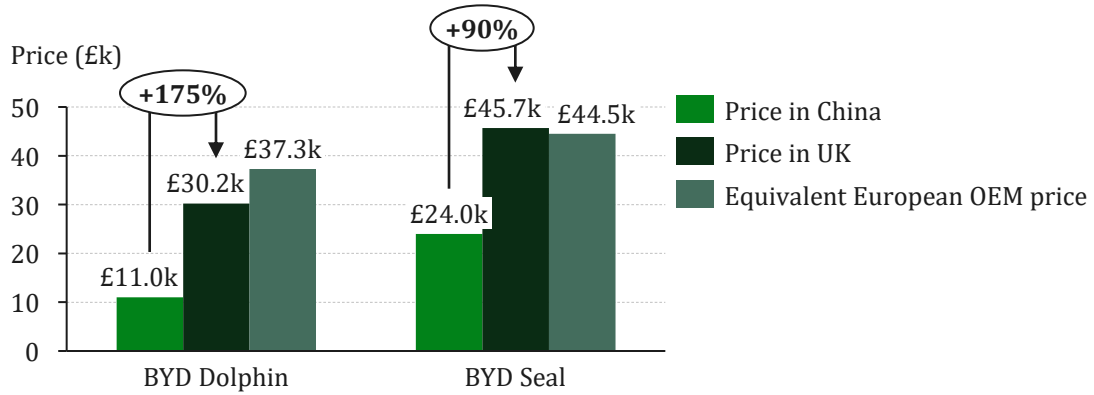
1: ICCT Funding the Transition to All Zero-Emission Vehicles (2019)
2: Gov.UK

Additional tariffs imposed on BEVs made in China would reduce competition, which may slow the price reductions of smaller BEVs in the UK

Chinese OEMs selling cars in the UK do so at a higher price than their offerings in China. The UK introducing tariffs is unlikely to increase Chinese vehicle prices, but this may reduce supply and reduce the downward pressure on EV prices for non-Chinese manufacturers.

Currently, Chinese OEMs are not significantly undercutting European OEM BEV prices, even though they could be capable of doing so.

BEV model price comparison by geography of sale

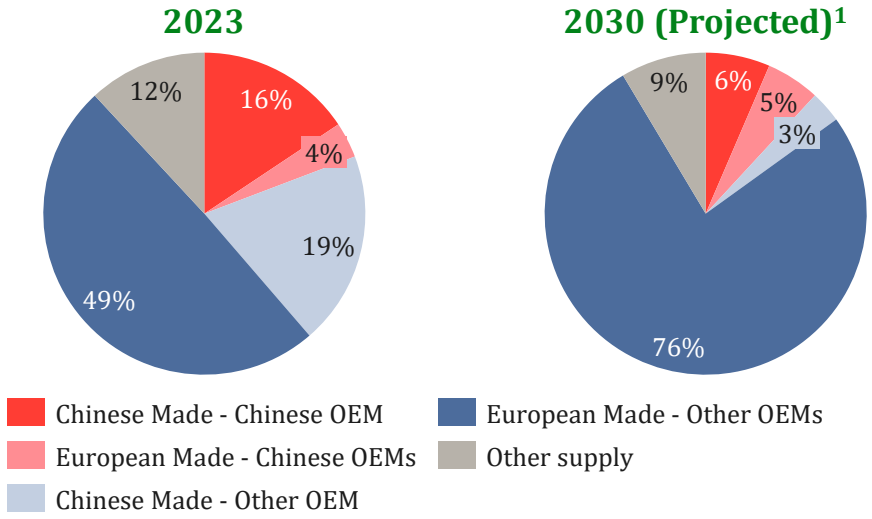


Tariffs may not increase the price of Chinese BEVs due to their current mark-up, so they might be seen to increase government revenue with minimum consequences. However, new tariffs imposed by the UK on Chinese-imported cars may cause:

- Retaliatory tariffs on UK exports to China, which could **neutralise any financial benefit** to the UK government.
- A **slower decrease in BEV prices in the UK**, as Chinese OEMs would have less ability to apply downward pricing pressure on European OEMs
- Reduced supply of BEVs from China, which would affect **consumers looking for smaller BEVs most** (for whom affordability is likely to be a bigger concern, impacting equity of the EV transition)

Chinese-made BEVs are not predicted to flood the UK BEV market by 2030.

Share of UK sold BEVs by geography of manufacture and Chinese vs non-Chinese OEM



The above projections are from before the EU placed new tariffs on imported Chinese BEVs in July 2024.[2]
However, even if all BEVs from Chinese OEMs planned to enter the EU are shifted to the UK, this would only increase the proportion of Chinese OEM BEVs to ~25% of sales in 2030, **similar to current levels.**

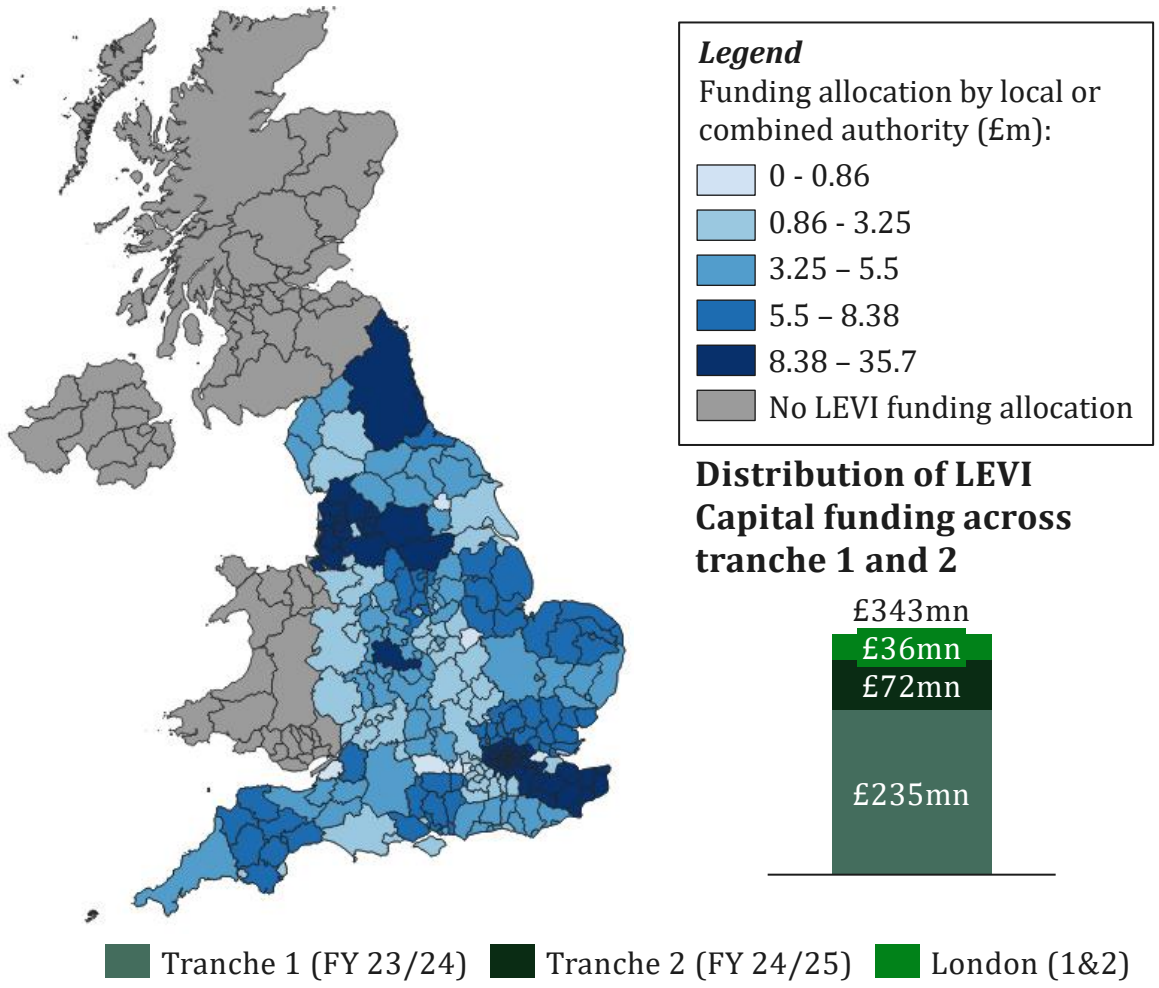
1: Production and Export Data purchased from S&P Global by ERM (March 2024), analysis performed by ERM.
Note: This data only covers current plans for each OEM, future numbers are less certain as new production lines might later be planned which are not accounted for here, or planned production may be changed or cancelled. These projections do not account for recent tariffs placed on Chinese-made BEVs in the US and EU, which may influence supply to the UK.
2: Electric vehicle value chains in China (europa.eu)

Contents

The Government's LEVI funding intends to deliver a step-change in the deployment of public charging infrastructure in England

- The Local Electric Vehicle Infrastructure (LEVI) Fund supports local authorities (LAs) in England to **scale up the rollout and commercialisation of EV charge points (EVCPs)** in their area. LEVI is **intended for residents without off-street parking, to make charging access more equitable** Funding includes:
  - £343m capital funding to support charge point deployments
  - £43m capability funding for additional LA staff costs
- LEVI funding awards are due to end in 2025, but there is no time limit for LAs to spend the funds. Funding is available to tier 1 LAs. The amount distributed to each area is shown on the right and calculated as discussed here. LAs are allocated into tranches, which determine when funding must be applied for[1].
- LEVI is aimed at **< 22 kW EVCPs** (with the majority needing to be 8 kW or lower)**.**
- The LEVI programme is the largest residential charging programme to date (the previous On-street Residential Charge point Scheme (ORCS) was £31.3m),[2] the first to include staff funding and to remove the need for LAs to 'compete' for the funding. It will support the deployment of 10,000s to 100,000s of EVCPs.[3] English LAs/CAs have been busy with the application process since early 2023 and CPOs have been waiting for contracts to be finalised.

LEVI Capital funding across English local and combined authorities



Source: Local Electric Vehicle Infrastructure (LEVI) funding amounts and tranche allocations: capital - GOV.UK (www.gov.uk)
1: 71 LAs and 9 CAs expressed preference for a tranche by submitting expressions of interest before 26th May 2023, and the LEVI support body (comprising Energy Saving Trust, Cenex and PA Consulting) finalised tranche allocation based on LA preparedness to submit funding applications 2: https://www.gov.uk/government/statistics/electric-vehicle-charging-device-grant-scheme-statistics-april-2024/electric-vehicle-charging-device-grant-scheme-statistics-april-2024 3: Number will depend on capex (which varies significantly across technologies) and capex contribution from CPOs.

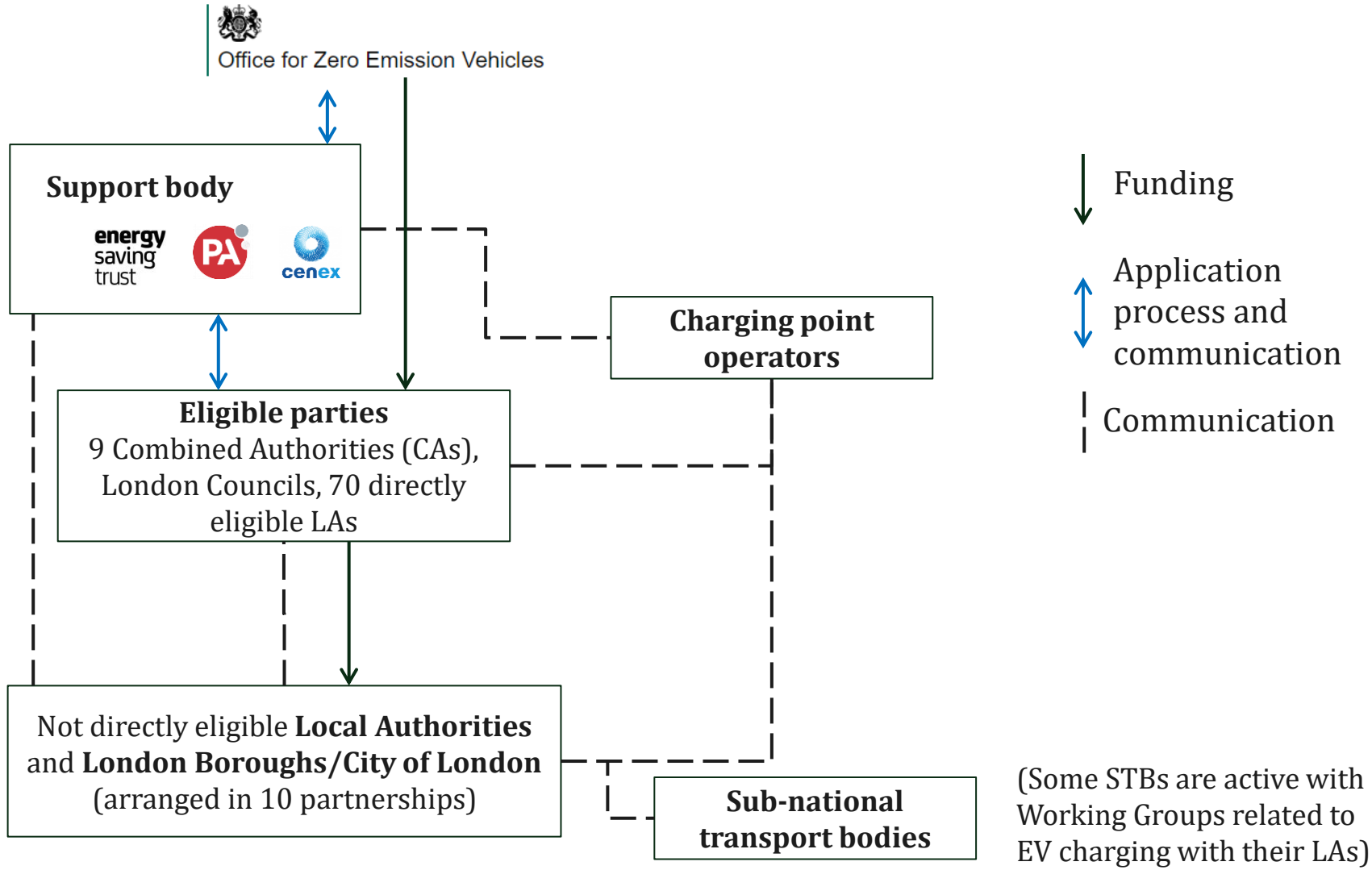
The LEVI (Local Electric Vehicle Infrastructure fund) process involves several layers of reviewing and alignment

- Makes final decisions

- Reviews LAs' applications and provides feedback/support
- Offers training programmes for LAs
- Creates online resources & tools for LAs

- CAs work with LAs to organise and submit application, receive needed approvals, compile a joint procurement and allocate funding to LAs
- LAs secure Cabinet approval, submit application and procurement, enter into contracts with CPOs

- Contribute to LEVI applications for OZEV
- Work with joint LAs/Boroughs for common procurement
- Secure Cabinet approvals
- Enter into contracts with CPOs



(Some STBs are active with Working Groups related to EV charging with their LAs)

LEVI and RCF stakeholder outreach and engagement overview

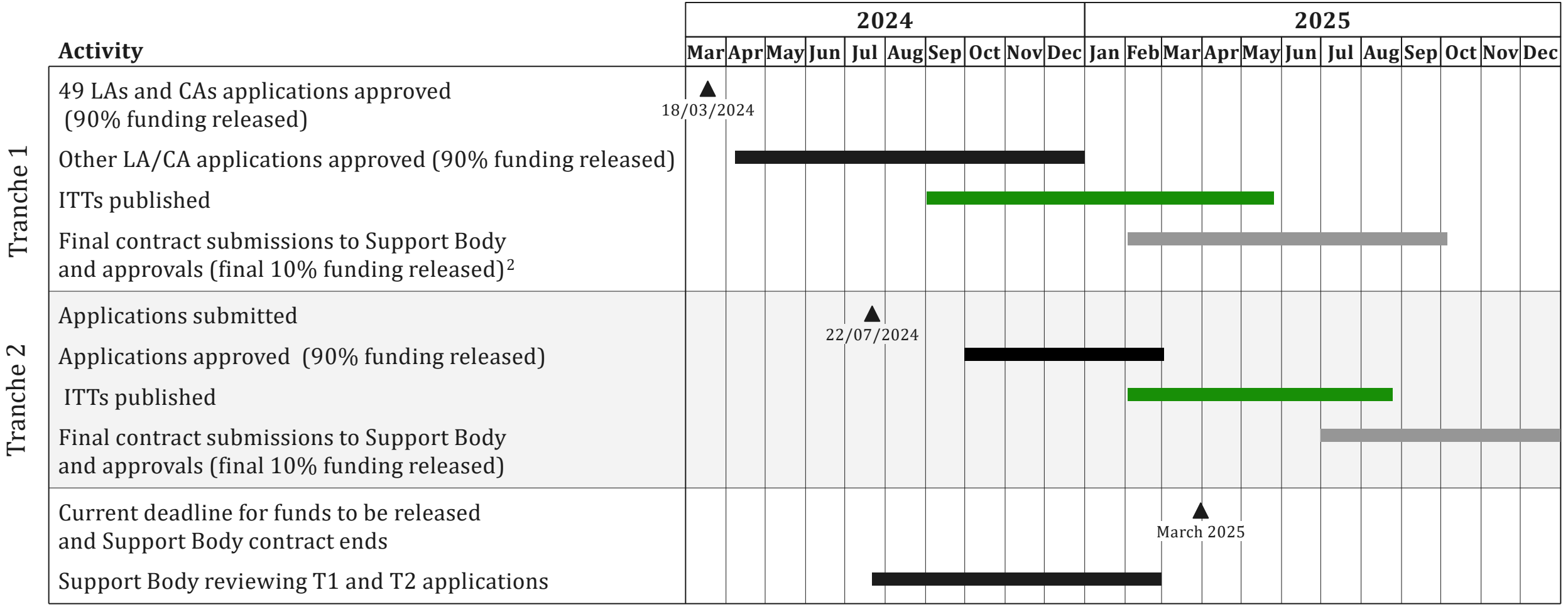
ERM interviewed stakeholders representing all ecosystem players involved in LEVI, from LEVI support (Energy Saving Trust) and LEVI applicants and representatives (Combined Authorities and Local Authorities, Transport for the North), to market and industry stakeholders (i.e., charge point operator representatives) to get a well-rounded perspective of the experiences with LEVI.

Role / Type	Organisation[1]	Focus of interview and notes
Support body member	energy saving trust	LEVI
Combined Authority/London Councils	LONDON COUNCILS	LEVI: receives funding and coordinates applications for 10 Borough Partnerships
LAs with prior experience in EVCP rollout	OXFORDSHIRE COUNTY COUNCIL	LEVI: receives funding directly
	Birmingham City Council	LEVI: receives funding through the West Midlands Combined Authority
Statutory sub-national transport body	TRANSPORT FOR THE NORTH	LEVI: Experience from TfN's partnership of Local Transport Authorities
CPO perspective	LEVI/RCF: Charge point operator representatives	

1: Note, the interviewee list of LAs comprises the LAs where ERM had contacts and that had the capacity to speak with us. The selection of views presented in this reporting may not represent the view of all LAs.

The timeline for LEVI deadlines has slipped considerably compared to the original expectations

This Gantt timeline provides an estimation from online sources and ERM interviews of the current LEVI timeline. It would mean installation of LEVI funded EVCPs will start 2025 Q2 at best. The original intention was for Invitation to Tender (ITTs) to start coming out in November 2023.



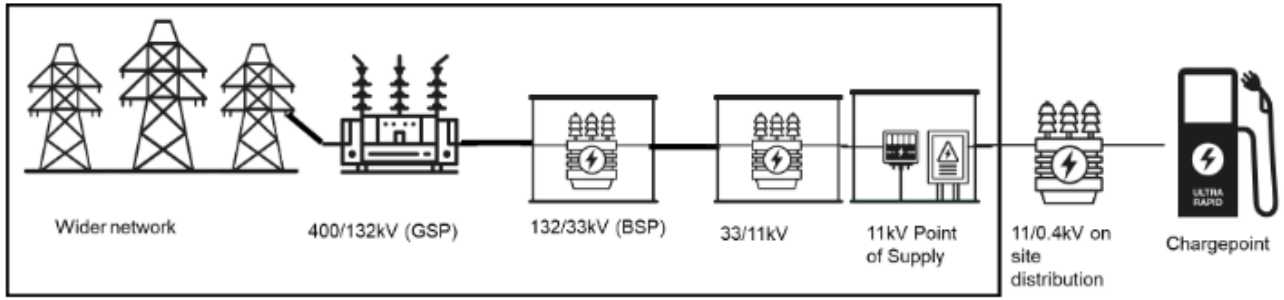
1. There may be a few exceptions, when recent existing procurements are accepted for LEVI funding.
2. Official new deadline for final contract submission is November 2024 but may be extended.

The Rapid Charging Fund is being designed by DfT to support grid connection costs for ultra-rapid chargers at sites on the motorway network

Rapid Charging Fund (RCF) current position

- First announced in the March 2020 budget with a budget of £1bn.
- Scheme design completed and a pilot scheme launched in 2023. Applications ran to early 2024. Five to ten sites should be funded through the £70mn pot, however, winners have not been announced as of September 2024.
- A date for the release of the full fund has not been announced as of September 2024.

RCF to fund future proofing of grid connection to a charging site (i.e., assets within the box below are eligible for funding)



RCF design

- The RCF is designed to apply funding toward the cost of electricity network capacity at key sites where it is not commercially viable for the private sector to do so alone. The RCF will fund grid assets feeding a site, but not the grid assets on the site (see figure above) and applies to costs above and beyond normal grid connection cost.
- The RCF will only fund ultra-rapid charge points (i.e., charge points capable of 150kW+ charging speeds) designed to support BEV drivers on long journeys.
- Grid connections at sites funded by the RCF will be future-proofed for a minimum of 10 years, to around 2035, with applicants allowed to future-proof beyond that up to 2050 where feasible. Once paid for, these grid assets will be held ready until sites need to use them.
- The fund is focused on motorway service areas as these sites are tied to specific locations, and grid connection costs are seen as a key barrier. Funding for A-road sites is currently deprioritised as it is assumed that on A-roads CPOs will have the flexibility to choose where to place chargers as there are more land parcels and existing car parks to choose from. This allows CPOs to avoid sites with high grid upgrade costs. The site focus may be revisited in response to the 2023 consultation.
- The fund is currently focused on grid strengthening to support car charging specifically but may be extended to HGVs and coaches depending on budget and responses to the 2023 consultation.

Based on feedback from interviews and Rapid charging fund: scheme design - GOV.UK (www.gov.uk)

Contents

Section introduction: Recommendations and conclusions

In this section, where the focus of a slide is on a particular policy, a tag with the policy name is included in the upper right corner of the slide:

Feebates	**Information campaigns**	**Additional revenue generation**
Social leasing scheme	**Tariffs on Chinese imports**	

Recommended fiscal policy package: A total 2025-2035 (six-year) cumulative cost to government and minimum cumulative emissions reduction over this time year is presented for the proposed fiscal policy package of feebates, a social leasing scheme, and information campaigns. An analysis of risks and mitigation steps for the policies comprising the policy package is presented, including high-level analysis of two additional supplementary revenue-generating policies (road user charging and modifications to the UK's company car tax regime), which would generate more than enough revenue to pay for the net cost of the policy package.

Research-backed findings/implications of fiscal policy implementation: This sub-section details case studies, implications, and design considerations/leading practices from additional research for each of the three fiscal policies included in the recommended policy package.

Discussion of interview findings, charging fund modifications, and non-cost actions to improve charging infrastructure: This sub-section synthesises the LEVI and RCF interview outputs and frames them in terms of recommendations to strengthen the schemes. It also sets out actions to improve the charging experience in terms of the buckets of reliability, simplicity, and accessibility laid out previously in the report.

Summary of recommendations: This is a summary of all recommendations to address the barriers to BEV uptake discussed in this study.

Agenda

Executive summary

Real world delivery

Introduction and context

Assessment of barriers to BEV adoption in the UK

Analysis of policy options/actions to enable acceleration of BEV adoption

Recommendations and conclusions

Recommended fiscal policy package

Research-backed findings/implications of fiscal policy implementation

Discussion of interview findings, charging fund modifications, and non-cost actions to improve charging infrastructure

Summary of recommendations

Appendix

It is recommended that UK government implement three of the fiscal policies analysed, resulting in an estimated £2.3bn total cost to government and a minimum of 5 million tonnes CO_2e in emissions savings by 2030 through accelerated BEV uptake

The below quantitative estimates for the policy options are based on the illustrative policy designs presented on previous slides.

1. FEEBATES	2. SOCIAL LEASING SCHEME	3. INFORMATION CAMPAIGNS
A potentially revenue-neutral tax programme to penalise vehicles that are highly-polluting (e.g., ICEVs) and subsidise zero-emission vehicles to encourage powertrain switches.	Programme to fund a reduction in leasing rates for BEVs. This may involve reducing the upfront purchase price of BEVs to reduce their monthly payments and/or capping monthly payments for certain models (and subsidising the difference).	Government led information distribution initiative(s) focussed on addressing the perceived barriers that consumers face when evaluating whether to purchase a BEV.

ca. **£2.3 bn** = 2025-2030 (six-year) cumulative financial picture =

£70m revenue[1] + £2.2bn cost + £24m cost

ca. **5 Mt CO_2e** = 2025-2030 (six-year) minimum cumulative emissions reduction =

2 MT CO_2e[1] + 3 MT CO_2e + (Emissions impact not estimated)

Since this proposed policy package represents a net cost to government, two additional supplementary policies are described at a high-level on two later slides that could help to reduce the cost to government if implemented. For example, **removing some of the corporate tax advantages for ICE company cars could raise more than half of the revenue in 2025-2030 needed to implement the three policies above.**

1: The cost and emissions savings of the feebate policy is highly dependent on how the feebate is implemented and the consumer and OEM response to the policy. As policy design and consumer response will impact each other in a circular fashion, this hasn't been explicitly modelled. The cost and emissions savings here are based on an accelerated EV uptake pathway and the feebate design described on this slide, but whether this feebate design would achieve this increase in EV uptake has not been modelled.

Implementing a policy package reduces the risks posed by policy options implemented in isolation

Risks and mitigation steps for policy options to accelerate BEV car adoption in the UK

Policy	Risk type	Risks	Potential mitigation steps	Other policies that mitigate risk
Feebates	Cost	**Policy may be net cost to government:** Revenue from fees imposed on ICEVs do not make up for rebates for BEVs	Frequently (annually) revisit and adjust policy design based on EV uptake and funds generated	Additional revenue-generating policies
	Equity	**Policy increases the overall cost of vehicle purchase for households at risk of transport poverty:** ICEVs become more expensive for some buyers	Evaluate the structure of the ICEV fees to ensure that no or minimal fees are added to cheaper ICEVs which would be bought by those at risk of transport poverty	Social leasing scheme
	Criticism	**Policy receives negative responses:** Reaction to policy includes push-back from private buyers, industry, and/or other transport actors	Careful design (including public consultation) and communication of policy in terms of "wealth tax" or similar to make clear that fees will not be imposed on all vehicles	Information campaign
Social leasing scheme	Cost	**Policy overruns budget set by government:** Scheme is oversubscribed or costs more to administer than budget allows	Tailor eligibility criteria to limit consumers who can take part, set negotiable terms with manufacturers to adjust level of government subsidy of vehicle cost, and/or impose concrete limits on the number of vehicles available for lease in the scheme each year	Additional revenue-generating policies
Information campaign	Lack of impact	**Policy fails to address perceived barriers to BEV adoption**: Incorrect perceptions about BEVs persists among consumers, inhibiting uptake	Adopt multi-pronged approach for information campaign using various options and mediums to reach consumers	N/A

Car electrification policies as a whole are costly, and it is unlikely that their implementation is fully funded (e.g., RCF alone will cost £1bn). Pairing this with the net cost to government of the policy packages described on the previous slide, two **additional revenue-generating policies** are presented for consideration on the next slides:

- Road user charging
- Company car tax adjustments

While not a policy designed to improve BEV uptake, road user charging might be adopted to recover lost fuel duty revenue

However, care must be taken to ensure that the introduction of road user charging would not dampen the demand for BEVs

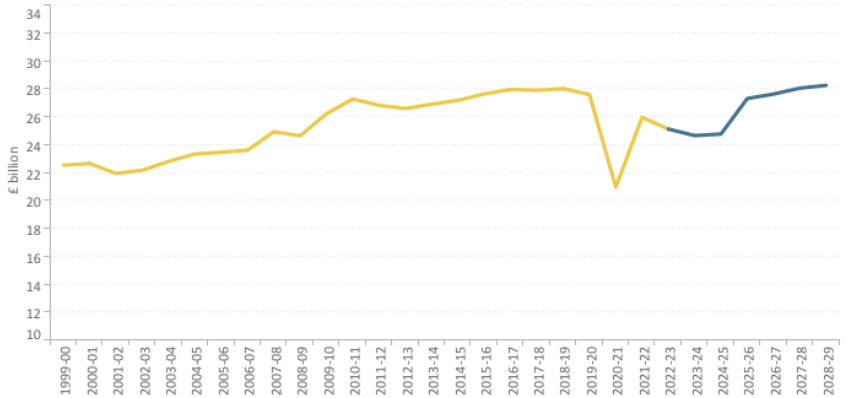
Road user charging principles

Fuel duty currently earns the government ~£25bn/year.[1] This revenue will decrease annually as BEV uptake increases (since running a BEV does not require buying fuel).

Under road user charging, drivers pay a tax on the number of miles driven, replacing the revenue from fuel duty added to petrol/diesel sale. Many campaign groups are currently advocating for this reform.[2]

However, a flat rate per mile travelled is likely to disproportionately affect rural consumers, **increasing transport poverty for lower-income rural households** who do not have sufficient public transport links to ditch the car.

Projection of fuel duty revenue to 2028-29[1]



Source: ONS, OBR

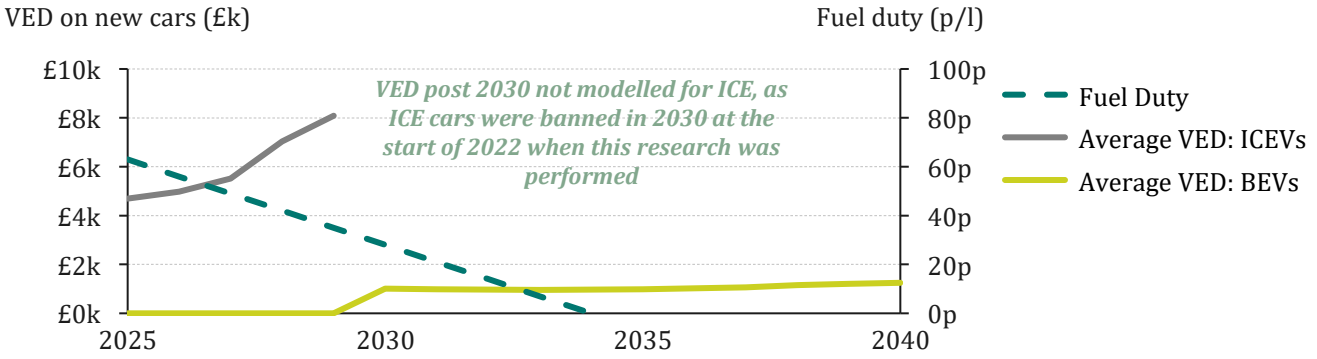
Maximising BEV uptake and an equitable transition

The most **equitable** road user charging policy is likely to be a **variable tariff dependent on time-of-day and type of road** coupled with **a phase out of fuel duty by 2035 and an increased VED for ICEVs.**[3] This policy would see a slight reduction in revenue up to 2030 (modelled ~£300m/year from 2020-30) but would be revenue neutral beyond 2030.

The most **inequitable method would be a flat charge per mile driven**, forcing rural individuals to spend a disproportionate share of their income on the charge with few alternatives (e.g., poor public transport links).

The phase out of fuel duty and increase in VED **reduces the cost on the lowest income groups** (as they use older cars which will remain ICEVs for longer), minimising the impact of transport poverty on these groups.

Potential phase-out of fuel duty and increase in first-year VED[3]



1: OBR 2024 (Fuel duties - Office for Budget Responsibility (obr.uk)). The OBR predict a rise in fuel duty revenue to 2029, assuming that the temporary 5p/l fuel duty cut introduced in 2022 is reversed, and fuel duty is increased over time proportional to RPI. These outweigh the rise in the number of BEVs not paying fuel duty.
2: UK electric car drivers should be charged per mile, say campaigners | Transport policy | The Guardian 3: Analysis performed for Green Alliance in 2021-22 by ERM (under the brand Element Energy), unpublished.

Increasing taxes linked to company cars can reinforce BEV uptake while providing revenue to government for other policies

Policy changes can focus on the employer rather than employee, reducing the tax-saving benefits available to companies offering ICE company cars.

Reducing tax rebates for ICE company cars

There are approximately 760,000 company cars in the UK, roughly split into 390,000 ICEVs, 150,000 PHEVs and 220,000 BEVs.[1]

While some company car taxes penalise highly emitting vehicles (e.g. benefit-in-kind (BiK) taxes), some **tax rules provide a tax benefit for purchasing an ICE company car** compared to a private car.

Removing these benefits will **increase government revenue and encourage further BEV uptake** for company cars. These measures will mostly impact the taxes paid by the employer, with **minimal impact on the tax paid by employees with a company car.**

ICE-favoured tax loopholes, with estimated lost government revenue[2]

- **Depreciation write-off:** Allowing companies to depreciate non-BEVs against profits reduces corporate tax revenue. Removing write-offs for non-BEV company cars could have increased corporation tax revenue by **£1-1.5bn** in 2023.
- **VAT deduction on leased company cars:** Companies can claim 50% of VAT back on company cars leased from another company. Removing this deduction for non-BEVs would have raised **£200-300m** in 2023.
- **Favourable BiK tax rates on PHEVs:** PHEVs have low BiK tax rates, but generally have higher-than-reported emissions.[3] Increasing the BiK tax rate consistent with actual PHEV emissions (approximately 100 gCO2/km) could have raised an additional **£0.5-1bn** in 2023.

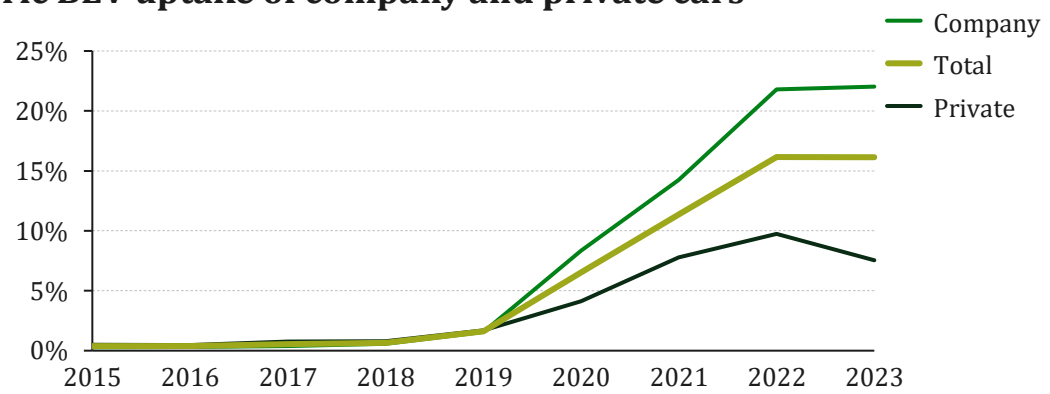
More ambitious company car targets as part of ZEV mandate

Since 2020, **company-registered cars have led the uptake of BEVs in the UK** compared to privately purchased cars.

Given that companies receive tax benefits from using BEV company cars, **an earlier ban on ICE company cars** than for private consumers could be possible. This will also give **OEMs further confidence to develop electric vehicle models** by securing a guaranteed level of demand.

Company-registered cars make up 50-60% of new car sales, so a faster company car ZEV mandate (e.g., 100% of company cars ZEV by 2030) would have a **significant impact on new sales and second-hand market**, without affecting private new-car buyers.

Historic BEV uptake of company and private cars[4]



1: Benefit in kind statistics commentary June 2024 - GOV.UK (www.gov.uk)
2: ERM preliminary analysis of company car tax rules and company car registrations
3: Plug-in hybrids 2.0: A dangerous... | Transport & Environment (transportenvironment.org)
4: VEH1153: Vehicle licensing statistics data tables - GOV.UK (www.gov.uk)

Contents

Feebate schemes have proved popular in other countries such as France as a means of improving overall fleet emissions through penalising ICE sales while also bringing down the purchase cost of BEVs

High-income groups could resist a feebate policy, while it is likely to increase BEV uptake among both low-income new car purchasers and second-hand buyers

Case Study:[1]

As of the start of 2024, France has adjusted its bonus-malus scheme for passenger cars, which is functionally the same as a feebate.

The malus (fee) component of the scheme is based on the emissions intensity of vehicles and is added to the new vehicle registration cost. Cars with WLTP ratings of <117 gCO2/km (including BEVs) are not taxed by the malus at all, but the fee goes up in increasing € increments as emissions intensity increases, reaching >€1k at 141 gCO2/km and >€10k at 172 gCO2/km, topping out at €60k for the highest polluting ICEVs.

The bonus (rebate) component of the scheme reduces the cost of new passenger cars by up to €7,000 (subject to income conditions) for cars with purchase prices under €47k.

Policy implications and design considerations

- For the **fee component** of the feebates scheme, the continued sale of the largest, high-emitting ICEVs would be penalised by making them more expensive. Since **the fees would apply to vehicles that are mostly purchased by higher income households**, the messaging around these fees could be positioned as a “wealth tax” or similar. High-income individuals are more likely to be opposed to the policy.
- For the **rebate component** of the feebates scheme, the purchase price of BEVs is subsidised, reducing the cost difference of comparable ICEVs. Although all consumers would be able to benefit from the reduced BEV prices, this reduction is likely to **positively influence the BEV purchased decisions of lower income households** most since they are more sensitive to transportation cost differences.
- It is possible that **OEMs could absorb feebates as a hit to their profit margins**, which would reduce the impact of the feebates policy on bringing forward BEV and ICEV price parity.
- If policy design encourages the sale of smaller (and cheaper) BEVs, **the feebate policy could improve equity for second-hand car buyers** once the new vehicles reach the resale market. In addition, a shift toward more small vehicles on the road would have many safety benefits.

1: Service-Public.fr 2024 Malus Tax on the Most Polluting Vehicles and Ecological bonus: which new vehicles are eligible?

Information campaigns to accelerate BEV adoption could take many forms

The specifics of how an information campaign could be structured and delivered are not provided in this report. Discussions with campaigning and public messaging specialists is recommended to maximise the impact of this measure.

Sample of information campaign options:

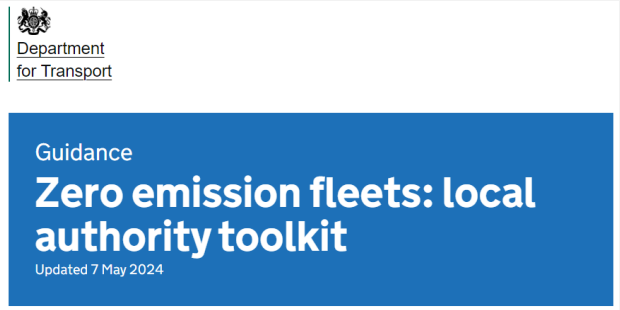
- **Mass/multi-media campaign:** Coordinating strategic press and media coverage over a variety of mediums (digital, print, radio, social media, etc.) to promote wide exposure to specific facts that address the perceived barriers to BEV uptake
- **Standardised availability of information:** Implementing measures that reduce consumer confusion during key decision points in their BEV purchase journey (e.g., mandatory labelling at the charge port on a vehicle to inform would-be buyers about the maximum charging capability that an EV has for AC and DC charging)
- **Source of truth/trusted authority:** Running targeted advertisements and outreach that directs consumers to a Gov.UK landing page with vetted and up-to-date facts and information about BEVs

Examples of BEV information campaigns in the UK

Go Ultra Low

- From 2014-2020, Go Ultra Low was run as a joint campaign involving OZEV, OEMs, energy providers, and SMMT targeted at informing consumers and fleets to accelerate the ULEV transition
- The campaign involved fact-based TV/radio/digital/print ads and even an Amazon Alexa/Google Play app to answer verbal EV questions asked by consumers
- The campaign had an annual budget of £4m for the national campaign, and £40 million for the eight GUL cities

- More recently (since early 2024), DfT has used the "Zero emission fleets: local authority toolkit" as a landing page for LA resources and facts to support a broader understanding of the options available for greening their fleets



Sources: FleetNews, Gov.UK (2020), Gov.UK (2024), ICCT (2019)

Research broadly finds that direct corrections work effectively to reduce reliance on misinformation in reasoning and are strengthened by repetition

- A widely-cited 2022 review in Nature[1] defined **five leading practices for an impactful reactive response to combatting misinformation**, all of which have been applied by the **UK's successful 75-year campaign to increase road safety, reducing road deaths by 46% in a decade**.[2]
- **Successful debunking campaigns need to be seen/experienced frequently** to have a lasting impact, especially to combat the illusory truth effect, which causes misinformation that is heard repeatedly (e.g., from anti-EV media sources) to be perceived as truthful even when presented with correct information.[1]

Misinformation debunking leading practices[1]		Examples from the UK's Central Office of Information *THINK!* the official road safety campaign on speeding[2]
1. Provide a correction in terms of a factual account, accompanied by an alternative explanation for the instance of misinformation	→	"Speed contributes to around 1 in 4 fatal collisions on our roads and on average kills and injures 58 young people a week"
2. Repeat the misinformation (typically only once to prevent its familiarity) to demonstrate how it is incorrect	→	"You might have travelled the same route hundreds of times and think that driving slightly faster than the right speed for the conditions, isn't risky."
3. If possible, deliver the correction by or in association with high-credibility sources (which may include socially connected sources)	→	Uses UK Government and Royal Automobile Club sources, content is customised based on local weather conditions, uses targeted social media campaign
4. Pair the correction with relevant social norms such as consensus (e.g., demonstrating expert agreement) or descriptive norms (e.g., what the average person is expected to do)	→	• "Be the mate who won't speed" • "Good drivers—we salute you"
5. Use appropriate language in the correction, typically simple wording, informative graphic, and/or empathetic communication	→	• "Remember, rural roads change fast. Is pushing it worth it?" • Ads focussed on relationships with mates to show reverence for these connections

To influence the hard-to-reach audience of young drivers and maximise repeat impressions, this particular speeding campaign ran on video-on-demand, social media, online video, and digital audio from January-March 2024.

1: Nature (2022) "The psychological drivers of misinformation belief and its resistance to correction"
2: Think.gov.uk "Is pushing your speed worth it"

A social leasing scheme could be a progressive and affordable policy option that balances government cost with supporting a just transition

Aimed at low-income, car-dependent consumers, a social leasing programme could ensure that households facing transport poverty are brought along in the EV transition.

Case Study:[1]

At the start of 2024, France offered 50,000 European-built electric cars for lease at a rate of €100/month, specifically available for low-income households (annual taxable income of ≤€15.4k/person).

A three-year leasing contract could be renewed once, with the option to purchase the vehicle at the end of the leasing agreement, with government subsidies on the cost of the EV up to a maximum of €13k off the purchase price.

The scheme closed in February 2024 after six weeks due to overwhelming demand (90,000 applications received by the end of January), but is intended to be relaunched in 2025, with details available on the revised scheme available at the end of this year.

Policy implications and design considerations

- **Net new BEV sales resulting from a social leasing scheme** are assumed to be equal to the number of grants provided **directly replace ICEV sales**. (It is assumed that recipients would not/could not afford to purchase a new BEV otherwise).
- A social leasing scheme is **inherently equitable** because low-income households tend to lease instead of own vehicles, and they are more likely to select smaller and cheaper BEV models.
- Social leases may also **encourage low-income households who normally buy second-hand vehicles to lease a new BEV**. By providing an option to buy the vehicle at the end of the social lease, this would support meeting the ZEV mandate. However, as shown on a previous slide, low-income households who may be more likely to live in housing that does not make home charging access possible could face **higher annual fuel costs (ca. 16% more)** from public electricity to charge a BEV compared to petrol/diesel to fuel an ICEV, which could represent a noticeable share of household income.
- Based on the illustrative design of this policy included on a previous slide, a social leasing scheme could involve eligible consumers trading in or scrapping their old ICE car to participate in the scheme. **ICE scrappage schemes should only be used in cases like this where the equity and emissions value of scrappage can be clearly demonstrated**.
- **Increasing familiarity with BEVs** in groups which wouldn't own one otherwise may also **increase acceptance and desire for BEVs more widely**, increasing sales more than just the social lease does.
- **Cost to government could be controlled** by limiting the number of grants available each year, limiting the leasable vehicles to smaller/cheaper models, and focussing eligibility criteria on a small subset of consumers.
- Programme execution may involve **pre-selecting the models of EVs to be leased** (and ensuring availability of models with OEMs) and/or **screening leasing companies**.

1: France halts €100-a-month electric car leasing scheme after huge demand | France | The Guardian

Contents

ERM has collated feedback from interviews into recommendations for the LEVI fund (1/2)

LEVI has many positive aspects that have been well-received

- Interviewees stated that the knowledge support resources are excellent (National EV Insights and Support (NEVIS) tool, training course, templates, etc.), and the Support Body is particularly helpful for LAs that are less advanced in their EVCP and LEVI strategies
- The Capability funding (funding for 2-year staffing contracts for each LA/CA) has been well-received and represents an important way of addressing the EV/charging expertise gap in local government
- LAs are pleased that the LEVI funding is not a competition, and that funding is provided directly to Highway authorities.

Continued funding for the Support Body and the Capability-funded LA staff would be welcome

- The Support Body (comprising Energy Saving Trust, Cenex and PA Consulting) contract ends in March 2025 and the Capability fund only provides funding for two years of full-time employee staff for LAs.
- Feedback from the interviewees detailed the continuing need for support from the Support Body and the funded LA staff after March 2025, as LAs complete ITTs and begin procurement, delivery, and reporting. Additionally, the Support Body will be helpful in continuing to build out the communication channels between LAs and CPOs.
- ERM recommends that the Support Body contract and LA staff contracts be extended until March 2026 both to provide continued help to LAs and also to assist in designing the next infrastructure support schemes. For LA staff (funded through the Capability fund), this will likely require £4.3 mn for CAs and £17 mn for LAs.

There are some communication improvements that would be helpful

- LAs and CPOs expressed a need for better and more frequent communication from the Support Body and OZEV. In particular, interviewees desired clearer timelines with regular updates on changes to deadlines, and accurate indications of when application feedback would be provided to LAs.

ERM has collated feedback from interviews into recommendations for the LEVI fund (2/2)

Greater trust in LA knowledge of their locality is desired

- There is a focus from OZEV on rolling out a defined number of charge points, with LAs feeling that there is a lower regard for their strategies on decreasing car usage or prioritising accessible streets over charging convenience
- The requirement that low power charge points must represent the majority (< 22 kW and majority 8 kW or lower) can be restrictive for some LAs' strategies

Interviewees requested ITT and contract best-practice examples to be shared

- Interviewees described the need for learnings and best-practice examples of ITT and contract documents, with input from CPOs, to be distributed to other LAs and CAs to speed up the processes of OZEV approval and LA-CPO contract negotiation.

Further opportunities for CPO-LA engagement would aid understanding

- Both CPO representatives and LAs agreed on the need to have more opportunities for CPO-LA engagement. They advocated for a stronger steer from OZEV and the Support Body on this, particularly with providing opportunities for CPOs to provide knowledge to LAs on appropriate commercial terms for contracts.
- Additionally, LAs requested that CPOs provide indicative deployment timelines of the infrastructure across all their LA contract partners, and for equitable deployment to be considered in these.

LAs requested additional analysis tools to be made free

- LAs request that government consider which tools and datasets are already available to LAs, and how they can be extended or supported to enhance delivery of ITTs and contracts. In particular, Field Dynamics (for the density of on- and off-street parking) and Zapmap (for locating public charge points) were mentioned as useful add-ons that would be helpful for all LAs to receive for free as part of the Cenex NEVIS licence. However, LAs can benefit from access to the Electric Vehicle Charging Infrastructure (EVCI) framework and visualiser that is being rolled out to all STBs. Government could consider making it clearer to LAs that this framework is freely available.

Several themes for adjusting the RCF arose from the interviews conducted for this study and ERM's ongoing engagement with ecosystem players for other projects

Timeline:

- The main piece of feedback from those interviewed about RCF is the timeline. It has taken four years to progress from announcement to pilot. This long period of uncertainty makes it difficult for ecosystem players looking to invest in and/or benefit from ultra-rapid charging infrastructure in the UK. **This could be helped by a clear public timeline for completion and resolving the uncertainties pointed out below.**

Competition:

- Awards offered by the RCF naturally exclude other sites in the vicinity from competing with the fund winner. **The fund design must therefore ensure a range of companies are supported by the fund and that the fund includes requirements/caps on charging pricing since the fund winner gains the advantage of a local monopoly by winning.**

Geographical Coverage:

- The fund currently only supports motorway service areas, with the funds dispersed to the motorway service area operator as the site owner. However, there are many locally important A roads which cross less populated areas of the UK where grid connection costs are likely to be very high. **The fund should be extended to a defined list of A roads/sections of A roads which are strategically important for national coverage of charging infrastructure and where their location means they are distant from electricity grid/grid connection points that could accommodate ultra-rapid chargers.**

Vehicle Coverage:

- It is not yet clear if the fund will cover trucks and coaches. Given the "dig once" principal of the fund and the broader cost savings of considering all vehicles in charging design, it would be a major missed opportunity not to include all vehicles. **This point should be publicly clarified as soon as possible.**

Funding:

- Committing £1bn in funding is very challenging when the government is looking to cut costs elsewhere. **Other transport related fund-raising policies should be introduced alongside RCF to ensure its full funding** (see later slides). **As often done with government-awarded funds, RCF could be completed in rounds. A portion of the funding could be distributed in each round, and this would be beneficial if it accelerated the delivery of initial projects.**

ERM recommends a varied assortment of non-cost actions to improve different aspects of the charging experience in the UK

RELIABILITY

- In the EVCP Regulations,[1] an additional EVSE[2] status should be added to measure vehicle overstay.[3] CPOs should be incentivised to minimise this EVSE status as part of ensuring high reliability of the network.
- However, as overstay fees become more common, they must be fair. Regulations could treat overstaying in the same way as parking overstay. For example, a limited 'grace period' should be obligatory.
- Government should mandate that maximum charge point power is displayed on the EVCP, with a clear indication that true power could be lower (due to the limitations detailed in this Appendix slide).
- Data on *energy-based* utilisation of charge points should be collected as part of the Open Data requirement, so that third-parties and government can better assess the needs of the network in different areas (see this Appendix slide).

SIMPLICITY

- Government should mandate vehicle OEMs to provide free upgrades to the in-car routing software to incorporate the latest charge points, for all electric cars, using the open data from the new Regulations.[1]
- Government should provide guidance on the required signage for charge points, targeting a similar level of visibility to drivers as petrol station or restricted parking signage. The p/kWh price should be large and clear on the signs.

ACCESSIBILITY

- The Government could work with Motability, Charge UK and disability groups to produce state-of-the-network accessibility reviews of the EVCP network across the UK and create proposals for improvements, as necessary.

Additional actions to improve the charging payment experience

- Government should mandate that charge points retain the PIN pad for physical card payments, to allow users to pay for charging even if they have reached their limit for contactless payments or cannot access their charging app. Government should also include the requirement for the EVCP to have a reliable internet connection so that contactless payments work correctly.
- Pre-authorisation of card payments is likely to still be required to prevent users not paying for charging. However, Government could regulate that CPOs:
  - Provide clearer information on why the pre-authorisation is required, how much it will be, what the likely refund timeline will be, and how to contact the CPO if a refund is not correctly provided.
  - Implement a maximum time period for the pre-authorisation refund to be issued.
  - Prevent users from paying for a charge point that is out of service.

1: Public Charge Point Regulations 2023 guidance - GOV.UK (www.gov.uk)
2: EVSE: Electric vehicle supply equipment
3: Defined as the time after which the vehicle is fully charged but is still occupying the charge point space.

Contents

To recap, to enable the intended increased ambition of the ZEV mandate, the UK government should consider the below supporting policies and actions

Policy / Action	What this achieves	Who is impacted
1. Implement **feebates** that apply to the sale of new cars	Financially penalises vehicles that are highly-polluting (e.g., ICEVs) and subsidises zero-emission vehicles to encourage powertrain switches	All car buyers would benefit from BEV prices that are more competitve with ICEVs. Purchasers of large, polluting ICEVs would be negatively impacted
2. Launch a **social leasing scheme** to ensure a just transition for BEV	Ensures that households facing transport poverty are brought along in the EV transition (dependent on scale and terms of scheme)	The most cost-conscious consumers who can only afford to lease a car (rather than purchase outright)
3. Run an **information campaign** focussed on addressing consumers' perceived barriers to switching to a BEV	Corrects misconceptions about EVs such as range, battery lifetime, charging time, and sustainability that may otherwise negatively influence consumers' decision to purchase an EV	Consumers who are skeptical about buying an EV for reasons that are misinformed
4. Do not implement additional **tariffs on the import of Chinese EVs**	Chinese EVs imported into the UK market with their current mark-up would remain as options for consumers to purchase	UK consumers who prefer smaller cars will have a wider selection of cheaper BEVs from China. Competitive pricing from Chinese BEVs may apply some downward pressure on EV price for other OEMs, accelerating ICE/BEV price parity
5. **Continued funding for the Support Body and LA staff**, with **additional analysis tools available** for LAs	Enables the continuation of support for EVCP delivery and reporting under the LEVI fund	Drivers without access to home charging will benefit the most from the strategic and efficient rollout of on-street EVCPs. Indirectly, these changes would help to incentivise drivers of ICE vehicles to transition to BEVs
6. **Communication improvements** and better **CPO-LA engagement**	Strong initial EVCP contracts would be created between CPOs and LAs, minimising the time needed for additional negotiations and creating stronger partnerships	
7. **Accelerate RCF delivery** while ensuring clear communication in advance, support for national infrastructure coverage, and funding rounds to support delivery of initial projects	Provides confidence and clarity to investors, supports infrastructure delivery across all significant charging gap, and boosts BEV rollout	Everyone would benefit from a timeline and clarity. Drivers would benefit from faster delivery. Charging providers looking to build a national network and drivers would benefit from a wider scope than only motorways
8. **Improvements to the Public Charge Point Regulations** to address reliability, simplicity and accessibility issues	Using and paying for charging at public charge points would be easier for all users	All drivers of EVs would benefit. Indirectly, these changes would help to incentivise drivers of ICE vehicles to transition to BEVs

Green = Fiscal policies **Purple = Non-cost actions/charging fund modifications**

Contents

There are four main barriers (perceived and/or real) to EV purchase that were mentioned in a majority of the consumer surveys

Barrier real or perceived?[1]		Real	Perceived, in part	Perceived, in part	Real	Real	Perceived	Perceived	Perceived, in part
Survey	Year	Affordability (vehicle price)	Affordability (operational costs)	Charge point numbers	Charging experience (reliability, simplicity and accessibility)	General low knowledge of EVs	Battery degradation	Safety	Range
Autotrader ZEV Mandate Analysis	2024	✓	✓					✓	
T&E UK New Car Buyers	2024	✓	✓	✓			✓		✓
DfT NTAS Wave 7 and Wave 9	2023	✓	✓	✓	✓	✓			
FairCharge survey	2022	✓		✓					
Electric Mobility: Inevitable or not?	2022	✓	✓						✓
Autotrader Retail Price Index	2024	✓							
CUPRA Perceptions of Electric cars	2024	✓	✓	✓	✓		✓		✓
DfT EV Charging	2022		✓	✓	✓				
DfT EV Charging Infrastructure	2022		✓		✓				✓
Midlands Connect – EV Charge Points: A Barrier for EV Adoption	2024	✓		✓					✓
Which? 2024 consumer survey	2024		✓	✓	✓				
Transport Focus Survey	2024		✓		✓				

Relevance: Focused on new car buyers of both ICE and BEVs

1: Assigned by ERM, with indication from the surveys where applicable.

Findings from the further manifestos review are consistent with the main barriers identified in the initial review

Relevance: Level of detail on charging network topics

Barrier real or perceived?[1]		Real	Perceived, in part	Perceived, in part	Real	Real	Perceived	Perceived	Perceived, in part
Survey/Manifesto name	Year	Affordability (vehicle price)	Affordability (operational costs)	Charge point numbers	Charging experience (reliability, simplicity and accessibility)	General low knowledge of EVs	Battery degradation	Safety	Range
ChargeUK Manifesto	2024	✓	✓	✓					
SMMT Manifesto	2024		✓	✓	✓				
AA Motoring Manifesto	2024		✓	✓	✓	✓			
AFP Manifesto	2024		✓	✓	✓				
BVRLA Future of Fleets Manifesto	2023	✓	✓						
REA Manifesto	2023			✓					
Carwow Group Manifesto	2024	✓	✓	✓				✓	
EVA EV Drivers' Manifesto	2024	✓	✓	✓	✓				

1: Assigned by ERM, with indication from the surveys where applicable.

There are four key types of public EV charge point, categorised by their charging speeds and therefore use cases

Most charging takes place at private chargers, but those without access to private charging or on longer journeys charge in public

	Private	1. Slow to fast	2. Low power DC	3. Rapid	4. Ultra-rapid
kW	3-7 kW AC	3-22 kW AC	25-30 kW DC	50-149 kW DC	150-350 kW DC
Example					
Plug-in time	Overnight (home) or during working day (workplace)	Overnight (residential) or 1-5 hours (destination)	2-3 hours	1-2 hours	< 30min
Locations	Private off-street home, workplace, depots	Public car parks and on-street residential Long-stay destinations (e.g. retail, train stations, hotels)	Public car parks and on-street residential Medium-stay destinations (e.g. retail, leisure, tourism)	Motorway service stations, forecourts, car parks, city centres Short-stay destinations (e.g. supermarket)	Mostly at motorway services and hubs Recent deployment at supermarkets
Charging	Private	Residential or destination	Residential or destination	Destination or en-route	En-route or topping up
Existing deployment	Deployment driven by individuals and businesses	Deployment led by local authorities, site owners and CPOs	Limited deployment so far in the UK	Deployment driven by site owners and CPOs*	Deployment driven by site owners and CPOs

*There is some existing deployment of rapid charge points on-street / in residential areas (typically for taxis), though this is unlikely to continue at scale

EV charging speed depends on the charge point power and the EV model specifications

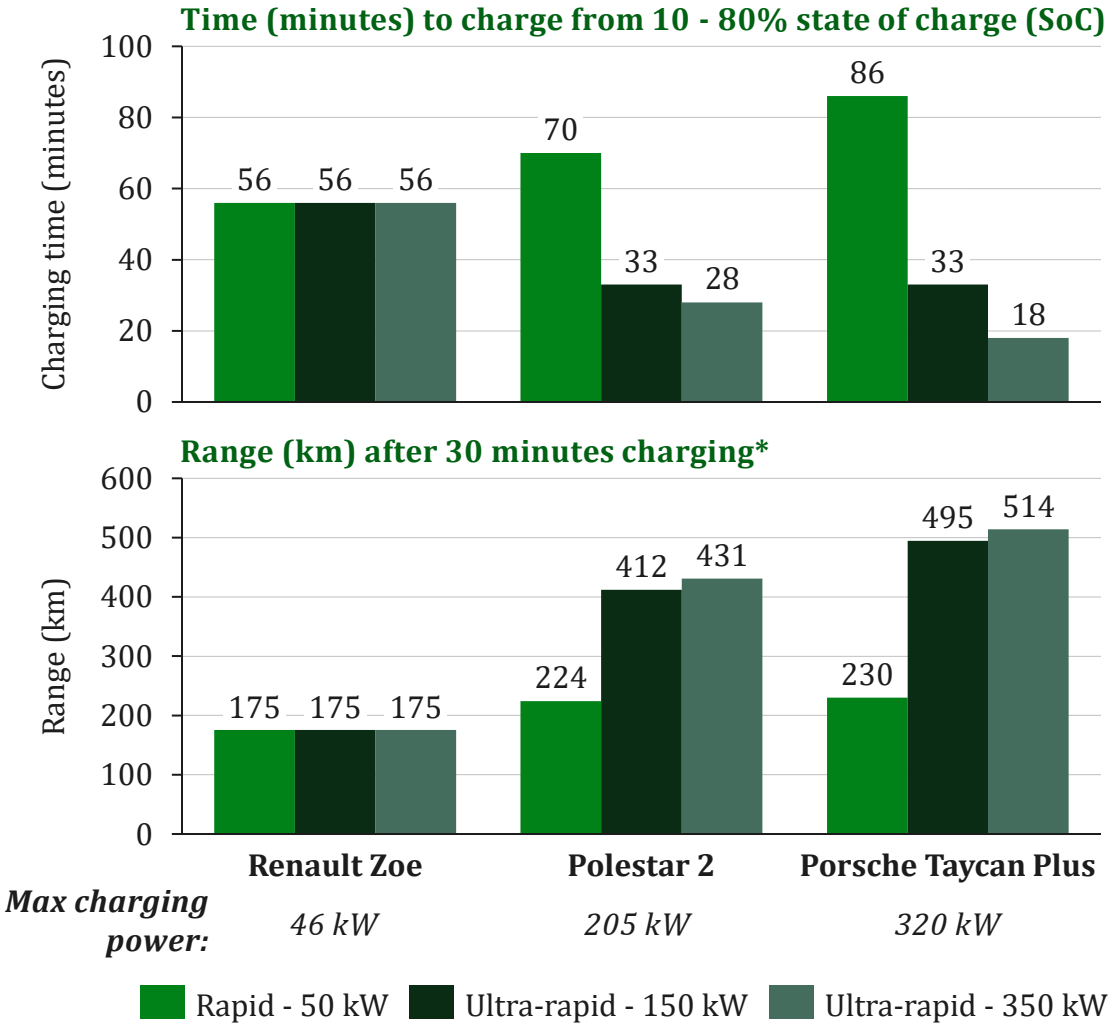
EV charging speed depends both on the rated power of the charging infrastructure and on the EV model specifications

- Charging power determines the time it takes for an EV battery to reach full charge, and therefore also the range achieved after a given period of charging
- Although increasing numbers of ultra-rapid 150 kW+ charge points are being deployed in the UK, a BEV's charging speed may be restricted by the **maximum power allowed by the model**
- Higher specification, more expensive BEVs, such as the Porsche Taycan Plus, are typically able to **charge at a higher power than more affordable models**, such as the Renault Zoe
  - As shown at right, the Renault Zoe is limited to a maximum charging speed of 46 kW, so using a 350kW charge point instead of 50kW does not lead to faster charging unlike for the Polestar 2 or Porsche Taycan Plus

Actual charging power is also determined by factors including the battery's state of charge while charging and the grid connection

- Charge point power indicates the **rated power** of the charge point, (i.e. the maximum power it can provide)
  - The average power over a charging session is lower than the maximum rated power, as the EV's **charging rate changes** as the **EV battery's state of charge increases** to protect the battery health (this is called a **charging curve**)
- A charge point's power may also be impacted by the **power it can pull from the grid at a point in time,** e.g. at a hub, multiple charge points may share a single grid connection and cannot all charge at the maximum rate at the same time

Impact of charging infrastructure speed on the charging of different BEV models

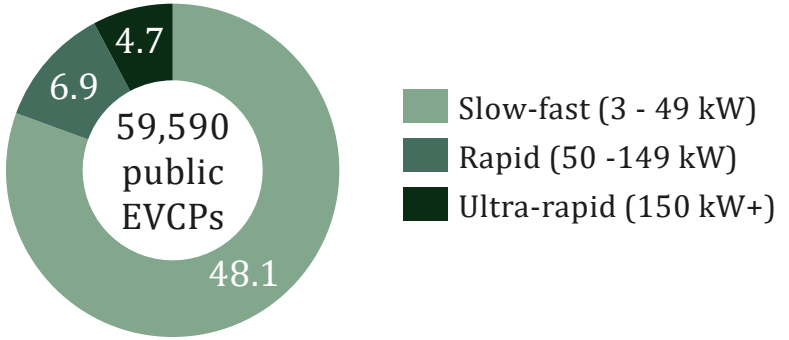


*Calculated from the average power provided by charge point from a session over 10 – 80% SoC and real energy consumption (Combined – Mild Weather), and assuming charge starts at 10% and total charge cannot exceed 80% SoC
Source: Battery size, maximum and average charging speed at different rated charge point powers, and electricity consumption from EV Database

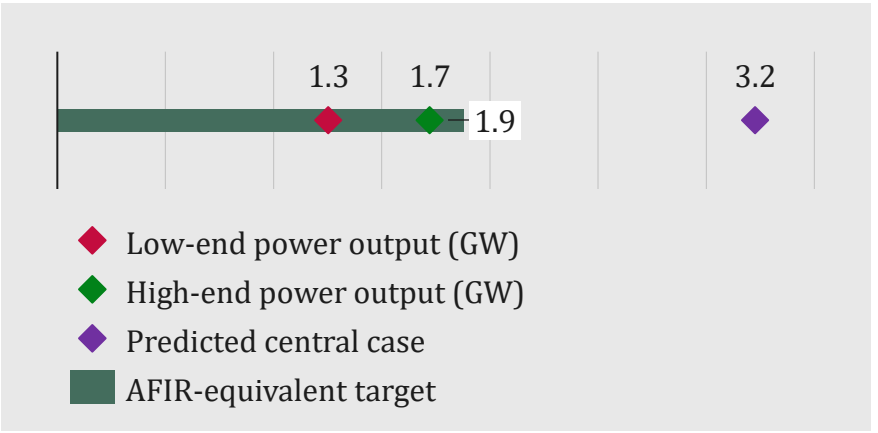
BEVs per charge point and kW per BEV UK stats

- As of the end of Q1 2024, there were 1.07 million BEV cars and vans in the UK (and 0.61 million PHEV)[1] and 59,590 public EV charge points[2]
  - This means there are 18.0 BEVs per EV charge point
- The EU's Alternative Fuels Infrastructure Regulation (AFIR)[3] includes requirements for the minimum power output of all public EVCPs per country, as a product of the number of BEVs and PHEVs registered in that country
  - AFIR requires a minimum of 1.3 kW/BEV and 0.8 kW/PHEV
- Comparing the UK's public network to AFIR's power output requirements, the UK's fleet of light-duty BEVs and PHEVs would require a total network power output of approx. 1.88 GW to meet AFIR (note, the UK is not subject to AFIR targets):
  - Data on the exact kW of each EVCP is not available, though the UK's public EV charging network is estimated to have a total power output of 1.72 GW[4] (minimum 1.25 GW – maximum 3.23 GW*)
- AFIR requirements alone will not provide sufficient EVCP deployment, and should be taken as a minimum deployment

Thousand EVCPs in the UK by charging speed[1]



UK EVCP network – estimated total power output (GW) and AFIR-equivalent target



* For the 8kW – 49kW category, an upper limit of 22kW was assumed for the total power output calculation given the limited number of 22kW+ chargers within this category
1: BEV uptake from EAFO April 2024 2: Zapmap EV charging statistics April 2024 3: AFIR
4: Assuming average kW per category of 5kW (3 – 8kW), 16.5 kW (8 – 49kW), 75kW (50 – 149kW), 175kW (150kW+)

Indicative monthly leasing costs and demographic breakdown for each archetype

	High-income, large cars and charging access		Low-income, smaller cars		Urban, no private charging access		Rural, high annual mileage	
Car segment and trim	D (Upper Medium), premium	H (Large, SUV), premium	B (Small), basic	C (Medium), basic	C (Medium), basic	H (SUV), premium	C (Medium), basic	H (SUV), basic
% of group (and of all buyers)	45% of group (10% of all buyers)	55% of group (8% of all buyers)	15% of group (1% of all buyers)	85% of group (5.5% of all buyers)	60% of group (4% of all buyers)	30% of group (2% of all buyers)	65% of group (7% of all buyers)	30% of group (3% of all buyers)
Car models	**Electric:** BMW i4 M50 (84 kWh) **Petrol:** BMW 4-series M xDrive Coupe	**Electric:** BMW iX3 MSport Pro **Petrol:** BMW X3 20 xDrive MSport	**Electric:** Vauxhall e-Corsa YES **Petrol:** Vauxhall Corsa YES	**Electric:** Kia Niro EV '2' (64 kWh) **Petrol:** Nissan Qashqai Acenta	**Electric:** Kia Niro EV '2' (64 kWh) **Petrol:** Nissan Qashqai Acenta	**Electric:** BMW iX3 MSport Pro **Petrol:** BMW X3 20 xDrive MSport	**Electric:** Kia Niro EV '2' (64 kWh) **Petrol:** Nissan Qashqai Acenta	**Electric:** Hyundai Ioniq 5 Premium **Petrol:** Hyundai Tucson Advance
Charging split[1]	**Often at home**: 50% home, 25% Public Slow, 25% Public Rapid		**Mostly at home**: 80% home, 20% Public Rapid		**No home charging:** 80% Public Slow, 20% Public Rapid		**Often at home**: 50% home, 25% Public Slow, 25% Public Rapid	
Mileage	13,100 mi/year		7,500 mi/year		8,300 mi/year		13,100 mi/year	
Monthly Lease cost[2]	**Electric:** £1,504 **Petrol:** £1,023	**Electric:** £1,045 **Petrol:** £1,016	**Electric:** £433 **Petrol:** £355	**Electric:** £604 **Petrol:** £505	**Electric:** £606 **Petrol:** £508	**Electric:** £1,028 **Petrol:** £979	**Electric:** £617 **Petrol:** £530	**Electric:** £654 **Petrol:** £567
Monthly fuel cost	**Electric:** £165 **Petrol:** £277	**Electric:** £164 **Petrol:** £229	**Electric:** £48 **Petrol:** £93	**Electric:** £46 **Petrol:** £120	**Electric:** £120 **Petrol:** £132	**Electric:** £158 **Petrol:** £145	**Electric:** £124 **Petrol:** £209	**Electric:** £150 **Petrol:** £223
Total Monthly Cost	**Electric:** £1,669 **Petrol:** £1,300 **Δ:** +£369	**Electric:** £1209 **Petrol:** £1245 **Δ: -£35**	**Electric:** £482 **Petrol:** £447 **Δ:** +£34	**Electric:** £650 **Petrol:** £625 **Δ:** +25	**Electric:** £726 **Petrol:** £641 **Δ:** +£85	**Electric:** £1,187 **Petrol:** £1,124 **Δ:** +£63	**Electric:** £741 **Petrol:** £739 **Δ:** +£2	**Electric:** £804 **Petrol:** £790 **Δ:** +£14

But significantly cheaper than ICE if buying another electric brand (E.g. Polestar, Tesla)

Even cheaper for a Tesla or Audi EV

No effective electric competition for the smallest vehicles, but some competition in the medium EV segment (though limited to a few brands).

But EV cheaper than ICE for a Tesla Y

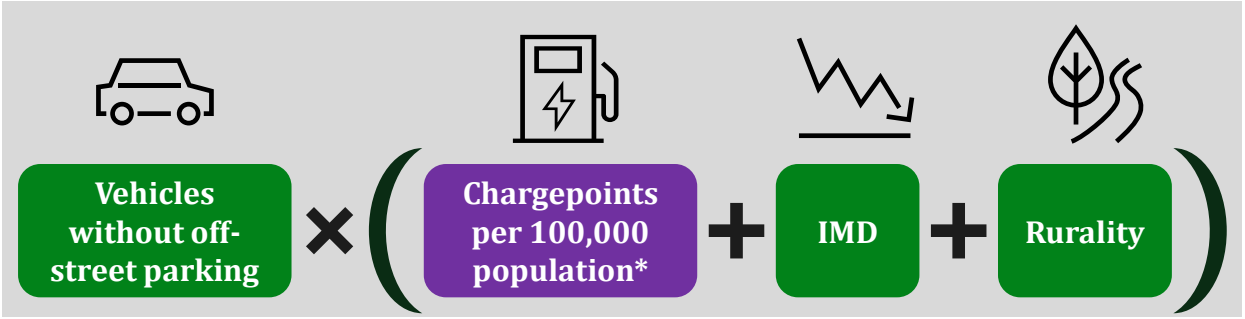
Skoda Enyaq 60 is ~£30/month cheaper than ICE.

1: ERM assumes that home charging is split between 80% on an overnight EV tariff and 20% on standard domestic tariff (for daytime charging)
2: 36 monthly payments with no deposit, with annual mileage set to the archetype's annual mileage. Retrieved from OEM websites 27th June 2024

The Office for Zero Emission Vehicles (OZEV) used four main metrics to assess the level of EVCP need and progress within an LA, which dictated the level of LEVI funding allocated

LEVI funding is allocated based on a model developed by DfT, which evaluates the degrees of need and progress within Tier 1 LAs in England (formula below):

- **Need:** LEVI primarily targets areas in **need** for EV charging (e.g. areas with lower levels of residential off-street parking). The variables selected to allocate LEVI funding looked to account for this need
- **Progress:** Given that some local authorities are further ahead than others in their charging network rollout, the allocation model reflects this to ensure that provision is developed across the country



- The metrics shown in the brackets are scaled and weighted* equally to form a "characteristic score" that is then scaled by the proportion of vehicles without access to off-street parking in each LA – this then determines the LA allocation scores used to determine allocations under **capital funding**
- LEVI funding also offers **capability funding** to LAs following a similar method

The four metrics used are defined in more detail on the right

Public EVCPs per 100,000 population – This variable accounts for existing levels of charging infrastructure available across the country. It is inversely weighted such that areas with greater levels of charging infrastructure per population receive a lower score, and vice versa. The data underpinning this variable has been taken from January 2023 DfT chargepoint statistics

Index of multiple deprivation (IMD) – This index is a relative measure of the level of deprivation across England. This weights different aspects of an area such as income, employment level and education. The average score for the LSOA within each local authority has been taken from the Department of Levelling up, Housing and Communities 2019 scoring

Level of rurality – This 6-fold urban and rural categorical variable is used. The categorisation is based on the proportion of residents within the local authority that are in rural or 'rural related' hub towns. Areas with more rural residents receive a higher score. The categorical variable is produced by the Office for National Statistics

Vehicles without off-street parking – This variable provides an estimation of the total size of the LEVI Fund target population in a local authority. It is created from 2 different data sources. The first contains estimates derived from a property attribute dataset of the level of households without off-street parking in local authorities. These proportions are then applied to the total number of vehicles registered in each local authority

*the "EVCPs per 100,000 population" metric is inversely weighted
Source: Local Electric Vehicle Infrastructure (LEVI) funding allocation methodology - GOV.UK (www.gov.uk)

Energy-based utilisation data provides more insight than time-based utilisation data, and should be included in the Open Data requirement in the upcoming Charge Point Regulations

Energy-based utilisation data

$$\text{Energy-based utilisation (\%)} = \frac{\textit{Energy supplied by an EVCP in a given time period}}{\textit{Potential maximum energy that could have been supplied in the same period}}$$

- Energy-based utilisation data describes how much energy is used at a charge point, and therefore how many EVs each charge point can serve.
- This utilisation metric does not account for the time that an EV is plugged in but not actually charging (e.g., after the battery reaches 100%), so it provides a **more accurate account of usage**.

Time-based utilisation data

$$\text{Time-based utilisation (\%)} = \frac{\textit{Amount of time a vehicle is plugged into an EVCP in a given time period}}{\textit{Length of time period}}$$

- Time-based utilisation data describes how much time a charge point is used, but it does not describe how many EVs are using the charge point.
- This utilisation metric represents the time that an EV is plugged in, but it may not actually be charging during this entire time duration, so it provides a **less accurate account of usage**.

Currently the Charge Point Regulations coming out in November 2024[1] will mandate time-based utilisation data to be made open, but energy-based utilisation data will be more useful.

1: Public Charge Point Regulations 2023 guidance - GOV.UK (www.gov.uk)

Thank you

If further information is required, please contact:

Celine Cluzel

Celine.Cluzel@erm.com