Understanding the tail of the electric vehicle transition

Tender Reference Number: ED-10/23

# Specification of Requirements

Invitation to Tender for analysis to understand what the tail of the transition to electric vehicles is likely to look like, and what impact key risks and measures designed to mitigate these might have on uptake rates and costs.

Tender Reference Number: ED-10/23

Deadline for Tender Responses: 17th November 2023.

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# Introduction and summary of requirements / Preamble

The Climate Change Committee (CCC) is an independent, statutory body established under the Climate Change Act 2008. Our purpose is to advise the UK and devolved governments on emissions targets and to report to Parliament on progress made in reducing greenhouse gas emissions and preparing for and adapting to the impacts of climate change.

Part of the CCC’s role is to advise the Government on the appropriate level for each carbon budget – a cap on the amount of greenhouse gases emitted in the UK over a five-year period. The budgets describe the cost-effective pathway to achieving the UK’s long-term climate change objectives. They take account of economic, social and technological factors.

We have recently commenced our work programme for developing our advice on an appropriate level for the Seventh Carbon Budget (the period from 2038-2042). As part of this we would like to explore the impacts, delivery challenges and opportunities that are likely at the tail end of the transition to electric vehicles.

# Background

Surface transport is currently the UK’s highest-emitting sector, and the transition to electric vehicles (EVs) will play a significant role in changing this on the UK’s path to Net Zero. This transition is now well underway, and we have seen a rapid increase in EV uptake over recent years, with battery-electric vehicles (BEVs) making up 17% of new car sales and 6% of new van sales in 2022.

To build on this early progress, the Government is expected to introduce a zero-emission vehicle mandate from 2024 that will require new sales of zero-emission vehicles (most likely BEVs) to scale up each year to reach the majority of new car and van sales by the end of the decade. As a result of this policy, along with market trends, we now have clarity on the minimum rate at which EV sales can be expected to grow through the 2020s. Beyond this, sales are expected to continue growing to meet the requirement that all new cars and vans must have zero tailpipe emissions by 2035. These are likely to be almost exclusively BEVs.

While the zero-emission vehicle mandate provides a trajectory for how the share of EVs within the new car market will scale up, what ultimately matters in terms of reducing emissions is the rate at which the entire fleet of cars and vans turns over from petrol/diesel to electric. As a typical car or van currently remains on the road for around 14 years, this may take some time even once EVs reach full market penetration, and some older petrol and diesel vehicles are likely to continue running for a considerable period. These vehicles will also continue to be sold in the used vehicle market, alongside a growing market for used EVs.

This research is looking to understand more about this ‘tail’ phase of the EV rollout, in particular looking at the impacts it could have on the rate at which the fleet switches to EVs and exploring potential interventions that could accelerate this process. This research will be used to inform updates to the CCC’s assumed pathways for EV uptake.

# Aims and Objectives

There are three key topics that this research will aim to address:

1. Understanding the tail end of the EV transition:
* What groups of consumers are likely to continue driving non-electric cars and vans beyond 2035?
* What factors could influence their ability or choice to purchase an EV during this period, and what impacts might these have?
1. Exploring policies at the tail end of the EV transition:
* What measures could address any risks to the pace of the EV transition or potential negative impacts on particular groups that have been identified?
* How effective are these measures expected to be in accelerating EV adoption to deliver a quicker, fairer, and more cost-effective completion of the EV transition, and what other impacts might they have?
1. Estimating EV uptake at the tail end of the EV transition:
* What impact might the factors considered in research question 1 and the measures identified in research question 2 have on the makeup of the fleet and the rate at which it transitions to EVs?

We now discuss each of these three key research questions in turn, setting out the topics that the research should cover. This specification will highlight various factors that could be of interest in the study. However, we recognise that the research aims to investigate potential behaviours and choices over a fairly long time period, meaning that there will be considerable uncertainty around the exact mechanisms of change. Therefore, this specification should be seen as a guide to the types of factors that might be relevant rather than a prescriptive list of everything that the research is expected to cover – the successful bidder may choose not to pursue some areas identified, and equally there may be some other factors that come to light during the research which they do wish to explore. Our intention is to be flexible on the exact content of the research, and we would expect the successful bidder to justify their choices on areas of focus.

Research question 1: Understanding the tail end of the EV transition

Purchases of EVs to date have been disproportionately by commercial fleets,[[1]](#footnote-2) higher-income or more technology-driven individuals,[[2]](#footnote-3) and households with access to private off-street parking.[[3]](#footnote-4) As EVs become more prevalent, however, sales will need to grow beyond these early-adopter groups, eventually becoming accessible to all drivers.

This is likely to become particularly important beyond 2030. At this stage of the EV transition, a large majority of new vehicles entering the fleet (80%+) will be fully electric, but some will continue to be petrol, diesel, or hybrid until 2035. Moreover, there will remain a sizeable (but declining) stock of existing petrol, diesel, and hybrid vehicles on the road for a considerable period of time beyond this. Our calculations, based on phase-out assumptions and the zero-emission vehicle mandate targets, estimate that BEVs will make up around a quarter of the fleet by 2030, growing to a half by 2035 and three quarters by 2040. Through this research, we would like to build a greater understanding of what the remaining portion of the fleet is likely to look like, the pace at which they will switch to BEVs, and what impacts drivers may experience during this stage of the transition – this is what we mean by the ‘tail’ of the EV transition.

This portion of the fleet will consist of drivers who, whether by choice or feasibility, have not yet purchased a new or used BEV. There could be multiple reasons underpinning this, including:

* Reliance on used-car markets with initially more limited electric options.
* The possibility of EVs retaining value longer than conventional alternatives and hence taking longer to reach price parity in the used market.
* Concern about suitability of vehicle characteristics or charging infrastructure (e.g. in rural locations or densely-populated areas).
* A perception that petrol, diesel, or hybrid vehicles better meet their requirements.

As BEV ownership grows, the share of drivers driving legacy petrol, diesel, and hybrid vehicles will decrease. As part of the research, we would like to understand more about who these drivers are likely to be as well as whether this could lead to negative impacts for groups within this portion of the fleet. Factors of interest here could include:

* Cost and convenience impacts (e.g. whether/how drivers will still be able to refuel as overall demand for liquid fuels drops) for non-BEV drivers.
* Specific use-cases that may continue to require petrol or diesel vehicles or be disproportionately disinclined towards BEVs.
* Impacts on residual values (positive or negative) of legacy vehicles and whether these could further restrict people’s ability to switch to a BEV.
* Potential future restrictions on driving non-BEVs in certain areas (e.g. zero-emission zones).
* Whether particular regions or groups within society are likely to be particularly impacted by the above factors.
* Perceptions of fairness that could arise from these impacts.

Research question 2: Exploring policies at the tail end of the EV transition:

The first section of the research is expected to have identified a range of risks that could delay the transition of the full fleet to zero-emission vehicles or impose negative impacts on particular groups of society. The research should explore options that could be implemented to address these risks and help bring the EV transition to completion in a quick, fair, and cost-effective manner.

Such measures could include:

* Targeted incentives to encourage certain groups of consumers to purchase new or used BEVs.
* Targeted scrappage schemes to replace or remove older vehicles from the fleet.
* Measures to support affordability of BEVs in the used-car market (e.g. interest-free loans).
* Consumer information measures, helping reluctant consumers to understand more about the benefits and suitability of BEVs.
* Schemes to retrofit existing vehicles to battery power.

The research should consider how effective the interventions considered could be at addressing risks or potential negative impacts identified within research question 1, as well as the associated cost impacts.

Research question 3: Estimating EV uptake at the tail end of the EV transition

We are particularly keen to understand what impact the tail effects considered in research question 1 and the potential interventions identified in research question 2 could have on the rate of BEV adoption and the makeup of the vehicle fleet in the later years of the transition. Factors of relevance to this question could include:

* The proportion of drivers likely to remain unable or reluctant to switch to BEVs.
* The rate at which BEVs become available and affordable across all price points and market categories within the used car and van markets (in particular looking at access to BEVs for drivers who typically buy vehicles third- or fourth-hand or later).
* New vehicle buyers who may either choose to buy a new petrol or diesel vehicle in their final years of availability or switch to buying second-hand petrol or diesel vehicles post-2035.
* The potential for drivers to choose to keep existing vehicles on the road longer than they would today, increasing the age of the fleet.
* Indirect impacts of drivers’ preferences on new vehicle supply and demand. For instance, relative preferences in the second-hand market influence residual values, which impact the affordability of new vehicles (particularly when purchased using financing).
* The effectiveness or uptake rates of different interventions.
* Supply-side risks, such as restrictions on supplies of critical minerals or disruptions to supply chains, are not within the scope of this study.

The research should consider these and any other relevant factors to quantify (where possible) the impact that the effects considered in research question 1 and the measures identified in research question 2 could have on the rate at which consumers make the switch to BEVs.

The optimal timing for introducing interventions should also be a key consideration. Although many projections of BEV uptake assume a smooth tail in which the proportion of non-BEVs remaining on the road gradually drops to zero, in practice there are a number of reasons why this may not be viable:

* It may not be cost-effective for the required supporting infrastructure (refuelling stations, maintenance provision, etc.) to remain in place to support such a gradual reduction in fossil-fuelled vehicles.
* Fuel and maintenance costs may become unaffordable for regular use by the majority of consumers.
* Demand for used non-BEVs would likely fall substantially at some point, undermining residual values for those remaining in the fleet and hindering their drivers’ ability to switch to BEVs.

Therefore, it may be necessary to use measures such as those identified in research question 2 to accelerate the final stages of the transition. We are keen for the research to explore how this might be achieved and the optimal timing for such interventions to be introduced.

Note that, while the focus of this research is on drivers switching to ownership of BEVs, we recognise that there is also a role for investment in sustainable alternative modes of transport to reduce individuals’ reliance on private cars. This includes public transport, active travel, and shared mobility, including increasing availability and attractiveness of car club vehicles, which could allow some drivers to choose not to own a private vehicle. The CCC will be exploring these approaches in parallel work as part of developing our Seventh Carbon Budget scenarios, so we do not expect the successful bidder to study these approaches in detail within this research. However, we would be happy to be directed to any insightful evidence on these topics that does come to light during the course of the project.

# Methodology

This research should be conducted through a combination of reviewing existing literature and research as well as sourcing and analysing data relevant to addressing the questions outlined in the previous section.

The CCC holds its own model of EV uptake, which we intend to use as the basis for our Seventh Carbon Budget uptake assumptions. The CCC can provide the successful bidder with our central deployment trajectory, as well as the modelling underpinning this if required. This model does not explicitly consider variations in demographic or spatial factors (for example) and focuses only on the new car/van market, so the first step would be to develop an evidence-based assessment of the likely fleet makeup based on these uptake assumptions (including who is driving what sort of vehicle, how the used market might look, etc.) and then explore this to understand any potential implications of this for further deployment, costs, and fairness. One approach to doing this would be to model the used car and van markets, looking at the rate at which BEV supply is expected to flow in from the CCC’s levels of new BEV sales, how much these vehicles are likely to costs, and levels of demand. We would be interested in such a modelled approach if feasible, although we are also open to alternative approaches.

We do not expect this project to require any large programme of primary research. Existing survey findings, data on current demographics and vehicle sales, and agreed assumptions, complemented where needed by targeted engagement and expert discussions, should be sufficient to develop an evidence-based characterisation of the groups of consumers likely to be still driving petrol, diesel, and hybrid vehicles and identify the potential consequences for the pace, cost, and fairness of the EV transition. Literature reviews, evidence from past transitions and overseas, and expert judgement (potentially including targeted stakeholder engagement) should then be used to determine a shortlist of measures that could be used to address any risks identified and estimate their potential impact.

We understand that the long time period that this study aims to investigate necessarily implies significant uncertainty around factors such as demographics, consumer preferences, market dynamics, and travel behaviours. The research team will therefore likely need to make major assumptions about the state of society and the vehicle market in order to produce the analysis required. We see this as an important part of the project and are keen that (where feasible) these assumptions should all be transparently reported and evidence-based. Where uncertainties around key assumptions could drive sizeable changes in outcome, these should be highlighted and (if possible) sensitivity testing should be performed to quantify the scale of the potential impacts. The CCC team will be happy to be involved in discussions to agree assumptions and discuss plans for considering uncertainties.

The key aim of this project is to quantify any impacts that could cause EV uptake to deviate from our existing status quo-based model and quantify the effect of mitigation measures that could address these risks. Specifically, we will require outputs that estimate:

* The extent to which tail effects within consumer groups or the market could slow or accelerate the completion of the EV transition.
* Any disproportionate costs or benefits likely to be experienced by any particular groups within society.
* The effect of a range of measures that could address any risks identified on the rate of uptake of EVs during the tail of the transition.
* The costs, both to society and to consumers, of these measures.

Ideally, these quantitative outputs should (as far as possible) be structured in such a way that we can easily incorporate them into our existing modelling of EV uptake – either as modules that can be added on top of the resulting uptake and cost curves or as quantified adjustments that need to be made (e.g. scaling factors) to account for each of the risks and measures considered. This will allow us to incorporate some or all of the findings into our central pathway for EV uptake that will be used in our analysis to advise Government on the level of the Seventh Carbon Budget.

# Outputs Required

The outputs required from the project include:

* + Analytical outputs, including:
* A set of interim quantitative outputs, required by early-March, setting out an initial assessment of the key impacts on the rate of uptake of EVs and a first draft of that rate of uptake.
* A full set of quantitative outputs alongside the final report, setting out the detail of each of the impacts and mitigation measures studied in terms of their effect on the pace of the EV transition, their associated costs, and any wider consequences. These should be set out through a transparent set of tables or Excel spreadsheet (or other appropriate way of presenting the findings in sufficient detail to be incorporated into the CCC’s modelling of EV uptake).
	+ A technical report summarising the research methodology, the outputs and findings, and the evidence and assumptions upon which these were based.
	+ Presentation of the interim and final results from the project to members of the CCC Secretariat and other interested parties.

# Ownership and Publication

The CCC will publish the report to provide an evidenced view of potential tail impacts on the EV rollout, as well as measures that could address these. The quantified outputs from the research will also be incorporated into the CCC’s uptake assumptions for EVs, which will be used within our analysis to advise Government on the level of the Seventh Carbon Budget.

# Quality Assurance

All research tasks and modelling must be quality assured and documented. Contractors should:

* Include a quality assurance (QA) plan that they will apply to the modelling and analysis.
* Specify who will take lead responsibility for ensuring quality assurance. This responsibility should rest with an individual not directly involved in the research or analysis.
* Provide a QA log to demonstrate the QA undertaken, which must identify who undertook the QA and the scope, type and level of QA that has been undertaken.

Sign-off for the quality assurance must be done by someone of sufficient seniority within the contractor organisation to be able to take responsibility for the work done. Acceptance of the work by the CCC will take this into consideration. The CCC reserves the right to refuse to sign off outputs which do not meet the required standard specified in this invitation to tender.

The successful tenderer will be responsible for any work supplied by sub-contractors and should therefore provide assurance that all work in the contact is undertaken in accordance with the quality assurance expectation agreed at the beginning of the project.

The CCC expects that:

* All analysis must be delivered in a simple, transparent Excel spreadsheet, where key assumptions (agreed with the CCC) are clearly stated. All assumptions and figures should be adequately referenced, and include any supporting workings. Any such spreadsheets will be the property of the CCC.
* Existing analysis and published research should be reviewed and considered in developing the scenarios and approaches to be analysed within this assignment.
* Analysis should appropriately reflect uncertainty regarding model inputs. Where appropriate, a sensitivity analysis of key parameters should be conducted.

# Timetable

The proposed timetable for the project is set out in the following table:

|  |  |
| --- | --- |
| Date | Action/deliverable |
| w/c 9th October | Advertise tender |
| 17th November | Deadline for responses to tender |
| w/c 27th November | Interviews (if required) |
| w/c 8th January | Kick-off meeting |
| w/c 4th March | Interim meeting |
| w/c 4th March | Interim quantitative outputs setting out initial assessment of the impact that key risks and mitigation measures studied could have on EV uptake |
| w/c 22nd April | Initial version of final report |
| w/c 6th May | Final report agreed with CCC, ready for publication |

The CCC is willing to be flexible with timelines and will consider alternative timetable proposals.

# Challenges

Tenderers should highlight any challenges or risks that they envisage in delivering all the outputs of the project, whether in terms of scope of the work, resources or timelines. Alternative suggestions will be considered if the risks are such that the project is unlikely to be able to be delivered in its current form.

# Working Arrangements

The successful contractor will be expected to identify one named point of contract through whom all enquiries can be filtered. A CCC project manager will be assigned to the project and will be the central point of contact.

# Skills and experience

CCC would like you to demonstrate that you have the experience and capabilities to undertake the project. Your tender response should include a summary of each proposed team members experience and capabilities.

Contractors should propose named members of the project team, and include the tasks and responsibilities of each team member. This should be clearly linked to the work programme, indicating the grade/ seniority of staff and number of days allocated to specific tasks.

Contractors should identify the individual(s) who will be responsible for managing the project.

# Consortium Bids

In the case of a consortium tender, only one submission covering all of the partners is required but consortia are advised to make clear the proposed role that each partner will play in performing the contract as per the requirements of the technical specification. We expect the bidder to indicate who in the consortium will be the lead contact for this project, and the organisation and governance associated with the consortia.

Contractors must provide details as to how they will manage any sub-contractors and what percentage of the tendered activity (in terms of monetary value) will be sub-contracted.

If a consortium is not proposing to form a corporate entity, full details of alternative proposed arrangements should be provided. However, please note CCC reserves the right to require a successful consortium to form a single legal entity in accordance with Regulation 28 of the Public Contracts Regulations 2006.

CCC recognises that arrangements in relation to consortia may (within limits) be subject to future change. Potential Providers should therefore respond in the light of the arrangements as currently envisaged. Potential Providers are reminded that any future proposed change in relation to consortia must be notified to CCC so that it can make a further assessment by applying the selection criteria to the new information provided.

# Budget

The budget for this project is £66,667 excluding VAT.

Contractors should provide a full and detailed breakdown of costs (including options where appropriate). This should include staff (and day rate) allocated to specific tasks.

Cost will be a criterion against which bids which will be assessed.

Payments will be linked to delivery of key milestones. The indicative milestones and phasing of payments can be adjusted and agreed with the contractor and Project Manager. Please advise in your tender response how this breakdown reflects your usual payment processes:

In submitting full tenders, contractors confirm in writing that the price offered will be held for a minimum of 60 calendar days from the date of submission. Any payment conditions applicable to the prime contractor must also be replicated with sub-contractors.

The Committee on Climate Change aims to pay all correctly submitted invoices as soon as possible with a target of 10 days from the date of receipt and within 30 days at the latest in line with standard terms and conditions of contract.

# Evaluation of Tenders

Contractors are invited to submit full tenders of no more than 25 pages, excluding declarations and CV’s. Tenders will be evaluated by at least three CCC staff.

CCC will select the bidder that scores highest against the criteria and weighting listed below, see the ITT for further information.

**Evaluation criteria**

|  |  |  |
| --- | --- | --- |
| Criterion | Description | Weighting |
| 1 | RELEVANT EXPERIENCE / DEMONSTRATION OF CABABILITY | 15% |
| 2 | MANAGING YOUR RELATIONSHIP WITH THE CCC | 5% |
| 3 | QUALITY ASSURING THE SERVICES YOU PROVIDE | 10% |
| 4 | MANAGEMENT STRUCTURE | 5% |
| 5 | PROJECT TEAM – SKILLS AND KNOWLEDGE | 15% |
| 6 | METHOD, ABILITY AND TECHNICAL CAPACITY | 25% |
| 7 | UNDERSTANDING OF REQUIREMENTS | 15% |
| 8 | RISK AND CHALLENGES | 10% |

**Scoring method**

Tenders will be scored against each of the criteria above, according to the extent to which they meet the requirements of the tender. The meaning of each score is outlined in the table below.

The total score will be calculated by applying the weighting set against each criterion, outlined above; the maximum number of marks possible will be 100. Should any contractor score 1 in any of the criteria, they will be excluded from the tender competition.

|  |  |
| --- | --- |
| Score | Description |
| 1 | Not Satisfactory: Proposal contains significant shortcomings and does not meet the required standard |
| 2 | Partially Satisfactory: Proposal partially meets the required standard, with one or more moderate weaknesses or gaps  |
| 3 | Satisfactory: Proposal mostly meets the required standard, with one or more minor weaknesses or gaps. |
| 4 | Good: Proposal meets the required standard, with moderate levels of assurance |
| 5 | Excellent: Proposal fully meets the required standard with high levels of assurance |

**Scoring for Pricing Evaluation**

Price will be marked using proportionate pricing, as set out in the example below.

There will be a maximum of e.g. 20 marks. The lowest priced bid will receive the full 20 marks, all other bids will then be marked following the method illustrated in the table below.

Proportionate Pricing scoring example:

If 20% = 20 marks

|  |  |  |
| --- | --- | --- |
| Supplier | Price | Marks |
| 1 (lowest bid) | £50,000 | 20 |
| 2 | £60,000 | 50/60 \* 20 = 16.7 |
| 3 | £70,000 | 50/70 \* 20 = 14.3 |

**Structure of Tenders**

Contractors are strongly advised to structure their tender submissions to cover each of the criteria above and supply a price schedule specifying the daily rates (ex-VAT) you will charge for each level of your staff.

**Evaluation for Interviews, if held**

CCC reserves the right to award the contract based on applicants’ written evaluation only if one candidate emerges from the evaluation stage as significantly stronger than the others.

Should interviews go ahead, CCC will shortlist the top three suppliers with the highest marks from the written proposals. Interviews are provisionally expected to be held in the week commencing 27th November 2023. If this date changes, CCC will notify applicants.

The areas to be covered in the interview, and markings allocated to each topic area will be sent to the shortlisted supplier prior to interview.

Further details of interviews will be sent to successful applicants on selection.

**Feedback**

Feedback will be given in the unsuccessful letters or emails.

1. Department for Transport (2023) *Vehicle licensing statistics*, <https://www.gov.uk/government/statistical-data-sets/vehicle-licensing-statistics-data-tables> [↑](#footnote-ref-2)
2. Ernst & Young (2023) *Mobility consumer index 2023*, <https://www.ey.com/en_gl/automotive-transportation/how-mapping-the-evolving-consumer-mindset-is-key-to-ev-mass-market-appeal> [↑](#footnote-ref-3)
3. Ricardo Energy & Environment for the CCC (2022) *Understanding the costs and impacts of potential approaches to providing electric vehicle charging for households without private off-street parking*, <https://www.theccc.org.uk/publication/costs-and-impacts-of-on-street-charging-ricardo-energy-environment/> [↑](#footnote-ref-4)