**Specification for analysis to investigate the potential excess charging demand along the strategic road network on days of peak demand, compared to the average.**

Tender Reference Number: JJ-1222

**Specification of Requirements**

Invitation to Tender for analysis to identify what the excess charging demand along the strategic road network on days of peak demand is, compared to the average.

Tender Reference Number: JJ-1222

Deadline for Tender Responses: 20th January 2023.

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**1 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.

# 2 Background

In November 2020, the UK Government announced that all new sales of conventional petrol and diesel light-duty vehicles must end by 2030. Therefore, the automotive market will need to transition to electric vehicles.

As the UK’s transition to EVs ramps up, charging infrastructure will be needed to meet the demand of all drivers, whilst ensuring that the network is able to deliver the amount of charging required. It is likely that there will be certain periods throughout the year where demand will be higher than the average levels of travel demand on which the majority of charging infrastructure plans are likely to be based. For example, during winter months and particularly around the Christmas period, demand is expected to be higher as a result of higher consumer demand for home delivery, maintenance and medical services, as well as increased personal travel on certain days.

Daily traffic flow data published by National Highways from their network of MIDAS detectors along the strategic road network can be used to infer information about demand variation along different roads. This data shows that, in 2019, on the motorway in one region there were nine days (mostly around bank holiday weekends) for which car traffic was over 10% above the typical weekly peak (Fridays). When compared to the overall average demand across the year, these peaks were around 30-40% higher. By contrast, demand on the motorway in another region was much more stable, with no days surpassing 10% above the typical weekly peak and variation from the overall daily average never exceeding 20%. This shows that there can be rare peak events on heavily trafficked tourist roads that see traffic climb considerably above typical demand. We would expect this to translate to excess peak demand for en-route charging at service stations along such roads. However, these patterns are not uniform, with demand on roads that are less associated with leisure travel showing less variation.

Therefore, it is clear that, in some regions, there will be points across the year where demand is significantly higher than average. This raises the question – is the current plan for charging infrastructure deployment enough to meet the needs of drivers on these peak demand days? More in-depth exploration of data, such as National Highways, could be used to generate evidence-based peak demand scenarios.

This research aims to characterise the differences between peak and average travel demand patterns, understand what impacts these differences might have on EV drivers’ ability to recharge their vehicles during journeys, and assess the additional charging infrastructure that would be needed to mitigate these impacts. We are interested in an assessment of demand on the strategic road network.

The CCC previously commissioned Systra to determine the optimal UK charging network that will be required to meet expected travel demand between urban locations each year out to 2035. This research was undertaken in 2018 and did not give explicit consideration to peak travel demand patterns, with the analysis based on average travel demand assumptions. The task is to extend this, or other similar, modelling to a set of scenarios representative of a peak demand day.

# 3 Aims and Objectives

These are the key questions that this research should aim to answer:

1. What will the peak demand scenarios look like, and what sort of charge point infrastructure is needed to deliver this?
   * Do requirements under peak demand scenarios vary by type of road or location?
2. How does an optimal public charging network for the average demand scenarios compare to an optimal network for the peak demand scenarios in 2025, 2030 and 2035?
   * It would also be valuable to conduct a lighter-touch assessment of how this comparison is likely to look further in the future (e.g. 2050), to understand any further risks that might arise once almost all cars on the road are fully electric.
3. To what extent are the potential options for providing public charging infrastructure under average demand scenarios able to support charging requirements under peak demand scenarios?
4. What will be the charging impacts and requirements under these scenarios?
   * What is the impact to drivers? E.g. on wait times or lost charging demand?
   * How many additional chargepoints would be required to reduce these impacts, if significant, to reasonable levels?
   * What will be the additional cost of ensuring EV infrastructure is suitable under peak demand scenarios?

We now discuss each of the four key research questions in turn, setting out the topics that the research should cover.

**Peak demand scenarios and charge point infrastructure required**

There are certain points throughout the year, for example around the Christmas period, where travel demand will be much higher than average on some routes as a result of higher consumer demand for home delivery, maintenance and medical services as well as increased personal travel. This research should assess demand on the strategic road network, outlining when such periods of peak travel demand may occur and identify solutions to meet higher levels of charging demand, understanding what levels of additional infrastructure may be required and if that varies by type of road or location, to meet the needs of all drivers.

**Optimal network for peak demand scenarios compared to an optimal network for average demand scenarios in 2025, 2030 and 2035**

As outlined above, peak demand scenarios will occur at certain points in the year. Therefore, the optimal network under peak demand is likely to differ to the optimal network for average demand. This section of research should aim to quantify:

* + The length and frequency of trips typically undertaken by vehicles under peak demand and average demand
  + Current and potential future distances travelled by electric vehicles, on a single charge
  + Current and potential future charging times
  + Access to chargers (i.e. home charging/access to charging overnight)

Based on these findings, the research should then consider what approaches to public charging infrastructure deployment would be able to meet the needs of drivers under peak demand scenarios.

**Extent to which the current options for deploying public charging infrastructure for average demand scenarios are able to support peak demand scenarios charging requirement**

Building off the outcomes from the previous two research questions, determine whether the current options for deploying public charging infrastructure will efficiently be able to support the charging requirements when there is peak travel demand. If these infrastructure approaches are likely to be insufficient, outline what additional infrastructure is required and the timelines for this.

**Charging impacts and requirements under peak demand scenarios**

This research should also aim to identify what the impact on drivers would be in the peak demand scenarios under a distribution of chargepoints optimised for the average demand scenario, for example the longer wait times to access a chargepoint or drivers having to avoid or shift journeys due to difficulty in finding charging. It should then seek to identify, if these impacts are significant, how many additional chargepoints would be required to reduce these impacts to reasonable levels, and where they would most likely be needed.

Any additional costs required to provide the additional charging infrastructure that will meet the needs of drivers under peak travel demand should also be considered. This should cover how much investment would be required, under each scenario, to deploy the necessary infrastructure, including the cost of charging devices, the grid upgrades required and any other capital or operational costs. Wider costs should also be considered, for example, costs to the electricity system where there are peaks in demand and vehicle to grid developments.

It would be useful for the research to discuss what sorts of options might exist to provide such charging infrastructure for days of peak demand. For example, the difference between installing additional permanent capacity versus the potential for deploying mobile ‘roving’ chargers that could complement the existing permanent charging infrastructure at a site on peak demand days. How viable are such approaches, and what would be their relative advantages and disadvantages?

# 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 project should aim to build on previous research outlining the optimal charging network for typical charging demand days, and outline the key differences between this and the optimal charging network that would be needed to meet peak travel demand, identifying additional charging infrastructure required.

Research to build on includes Systra-led consortium research that produced our inter-urban charging model.

The CCC can provide access to the reports and modelling produced by Systra for the CCC in 2018. This includes the inter-urban and parking-based Excel/VBA models. The CCC can also provide access to its Sixth Carbon Budget scenarios for EV uptake and its assumptions for key variables such as EV battery range, along with reports that explain its findings and the recommendations that it has made to Government in this space. In addition, modelling and results from our recent research projects on charging for households without private-off street parking and identifying the charging requirements for vans can be utilised to help inform the practical options for deployment of public charging infrastructure, costs of deployment and scenarios for which peak travel demand might occur.

The starting point of the research will be to develop a set of peak demand scenarios that will be considered, as briefly outlined in Section 2, and a set of assumptions that can be flexed to deliver the scenario. The scenarios should reflect levels of electric vehicle uptake in line with CCC trajectories. The proportion of electric vehicles in the model that are plug-in hybrids and the proportion that are battery electric vehicles should be defined for each scenario. The research should then estimate the charging impacts and requirements under these scenarios.

The latest evidence from CCC work, industry and academia should be assessed to formulate a range of flexible assumptions used to define the scenarios, including but not limited to:

* Current and potential future distances travelled by electric vehicles on a single charge. A couple of different potential future distances travelled by an electric vehicle on a single charge should be defined and the model should be flexible enough that scenarios can be generated for each variation of these input assumptions.
* Current and potential future charging times (which will incorporate assumptions about the power transfer rate in kWh and battery size for both plug-in hybrid vehicles and battery electric vehicles). A couple of different potential future charging times for an electric vehicle should be defined and the model should be flexible enough that scenarios can be generated for each variation of these input assumptions.
* The likelihood of all electric vehicles having the capability to use rapid chargers in future, as currently not all models support rapid charging. (Differing assumptions should be used for plug-in hybrid vehicles and battery electric vehicles). Several different likelihoods should be used and the model should be flexible enough that scenarios can be generated for each variation of these input assumptions.
* The number of chargers required to combat range anxiety and the number of chargers sufficient to provide an effective charging service.
* Service time expectation – how long drivers are prepared to wait to charge their vehicles.

Conclusions and recommendations should be drawn based on the findings of the research. The potential topics listed are examples of the types of questions that the CCC would find valuable to answer, but there may be others that appear of relevance during the course of the research. These conclusions and recommendations should be determined using the project team’s expert judgement based on the findings of the research.

# Outputs Required

The outputs required from the project include:

* Presentation of the interim and final results from the project to members of the CCC Secretariat and other interested parties.
* A summary document explaining the peak demand scenarios that have been considered (including a range of public charging infrastructure models and varying possible views of consumer charging behaviour) and the key differences between the optimal network for the average demand scenario vs. the peak demand scenario.
* A transparent set of tables or Excel spreadsheet (or other appropriate way of visualising the findings) setting out the additional charging infrastructure required in each scenario and an assessment of the options for delivering this and likely associated costs.
* A technical report summarising the research methodology, the outputs and findings, and the key conclusions and recommendations for actions required to deliver effective charging infrastructure, under peak demand, to support a widespread EV rollout.

# Ownership and Publication

The CCC will publish the report to provide an evidenced view of the actions that Government and industry should be taking to provide the infrastructure needed to ensure that the charging network is robustly able to handle periods of peak demand as the UK transitions to widespread EV ownership and use. The CCC intends to use these findings as the basis for monitoring progress towards delivering this transition in an effective and fair manner, including through our annual Progress Reports to Parliament.

# 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:

* Economic 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 5th December | Advertise tender |
| 20th January | Deadline for responses to tender |
| w/c 30th January | Interviews (if required) |
| w/c 6th February | Kick-off meeting |
| w/c 13th March | Interim meeting |
| w/c 20th March | Summary document explaining the scenarios that have been considered |
| w/c 17th April | Interim report |
| w/c 15th 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.

Bidders are also able to bid for the tender regarding analysis to understand the costs and impacts of potential approaches to providing electric vehicle charging for households without private off-street parking. Contractors are able to bid for one or both projects.

# Budget

The budget for this project is £35,000 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 35 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 AND SCORING METHODOLOGY**

|  |  |  |
| --- | --- | --- |
| Criterion | **Description** | **Weighting** |
| 1 | RELEVANT EXPERIENCE / DEMONSTRATION OF CABABILITY | 20% |
| 2 | MANAGING YOUR RELATIONSHIP WITH THE CCC | 10% |
| 3 | QUALITY ASSURING THE SERVICES YOU PROVIDE | 10% |
| 4 | MANAGEMENT STRUCTURE | 10% |
| 5 | PROJECT TEAM – SKILLS AND KNOWLEDGE | 20% |
| 6 | METHOD, ABILITY AND TECHNICAL CAPACITY – 10% | 10% |
| 7 | UNDERSTANDING OF REQUIREMENTS | 10% |
| 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. Please see the example below.

Marking proportionate to the lowest price.

Price will be scored as set out 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 as set out below.

Proportionate Pricing scoring example

If 20% = 20 marks

|  |  |  |
| --- | --- | --- |
| Supplier | **Price** | **Marks** |
| 1 (lowest bid) | £25,000 | 20 |
| 2 | £30,000 | 25/30 \* 20 = 16.7 |
| 3 | £35,000 | 25/35 \* 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 on w/c 30th January 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.