THE FUTURE OF TRANSPORT

EV adoption and smart charging for electric vans and commercial fleets

Methodology Report

Completed by TRL Ltd for the Department for Energy Security and Net Zero prior to the recent general election in the United Kingdom in July 2024. As such, any references to government policies, commitments, or initiatives may reflect the stance of the previous administration and were accurate at the time of fieldwork and writing.

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Overview and objectives

The objectives of this research were to understand:

- The driving and charging patterns of commercial van fleets.
- The enablers and barriers commercial van fleet operators and drivers face in installing and using smart charging technologies.
- The enablers and barriers commercial fleet operators and drivers face in adopting electric vans in the first place.

An online survey was conducted with fleet operators to gather quantitative data around driving and charging patterns, including access to infrastructure. These surveys aimed to gain a broad understanding of the fleet landscape, including how electric vehicles and smart charging were currently integrated and used by fleets.

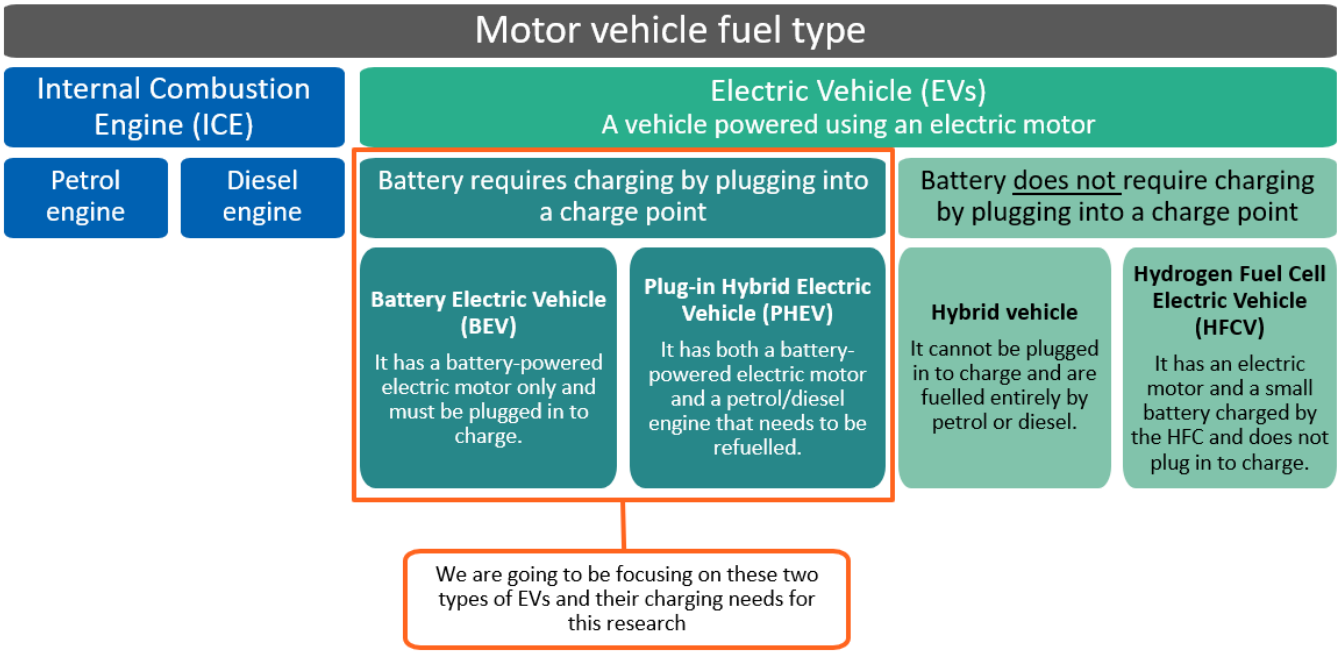
Semi-structured interviews with commercial fleet operators and van drivers were also conducted. These allowed the interviewer to probe deeper into the specific research questions and follow up on relevant leads. The interviews aimed to:

- Gather more in-depth data around driving and charging patterns, including access to charging infrastructure. For fleet operators, these questions were used to sense-check answers from the survey, fill in gaps and gather additional information to explain patterns. This data will add to DESNZ's evidence base on charging patterns and infrastructure access, to inform future modelling.
- Gather an understanding of fleet operators' and van drivers' awareness and attitudes towards electric vans and smart charging infrastructure/technology. This uncovered barriers and enablers to both electric vans and smart charging.

For the purpose of this research, we refer to electric vehicles as vehicles which need to be plugged into a charging point to be charged. This includes battery electric vans and plug-in hybrid vans. All other vehicles were referred to as non-electric vans.

Figure 1 below was presented on all registration forms, surveys, and information sheets to ensure participants were provided with the correct information.

Figure 1: Classification of vehicles based on fuel type



Desk research and sample overview

We conducted desk-based research to define the sample characteristics of fleet operators and van drivers for interview. Given the variety of use cases for commercial vans in the UK, the initial sample specification for fleet operators and van drivers consisted of several variables. This aimed to get the best representation of different viewpoints as possible. The sample was weighted towards those who operated or drove electric vans but, as a point of comparison, also included those who did not:

- Drivers: 31 drove electric vans, thirteen did not.
- Operator interviews: fifteen had electric vans, eight did not.

For electric van operators and drivers, the twelve archetypes developed by Element Energy (2022) (see Table 1) were used as the most important variable informing the recruitment of the sample. Archetypes are a combination of:

- The operating area of the vans (local, regional, national)
- Overnight charging location (public/private)
- Daytime charging preference (public/private)

We aimed to obtain an even split of archetypes during recruitment to ensure the data collected encompassed of a wide range of commercial fleet operators and van drivers. Table 1 outlines how many participants fell into each archetype. All but two archetypes (types 1 and 9) were represented in the sample. It is suggested in the Element Energy research (2022) that these archetypes might predominantly consist of single van users, which were excluded from the study unless they were contracted to work for a fleet. Table 1 also shows that driving between 15-50 miles from the base location was the most common operating area for electric vehicles, with 21 participants falling into this group. Meanwhile, the other two groups were slightly less well represented, with eleven participants operating in an area less than fifteen miles from their base and fourteen operating in an area over 50 miles from their base.

For non-electric van operators/drivers, operating area *only* was taken to be the most important variable influencing recruitment. As with their electric-driving counterparts, participants operated/drove either:

- < 15 miles from their base per day (local)
- Between 15 and 50 miles from their base per day (regional)
- > 50 miles from their base per day (national)

The sample of these participants can be seen in Table 2. Here it can be seen that, in contrast to the participants who drove electric vans, operating over 50 miles from their base was the most common operating area for non-electric van drivers and operators.

Table 1: Archetypes used for the interview recruitment of electric van operators and drivers

Archetype	Operating area	Overnight charging location	Daytime charging location	Sample total
1	Within 15 miles of their base	Residential	Public	0
2	Within 15 miles of their base	Residential	Private	1
3	Within 15 miles of their base	Depot	Public	4
4	Within 15 miles of their base	Depot	Private	6
5	Between 15 and 50 miles of their base	Residential	Public	5
6	Between 15 and 50 miles of their base	Residential	Private	4
7	Between 15 and 50 miles of their base	Depot	Public	6
8	Between 15 and 50 miles of their base	Depot	Private	6
9	Over 50 miles from their base	Residential	Public	0
10	Over 50 miles from their base	Residential	Private	1
11	Over 50 miles from their base	Depot	Public	9
12	Over 50 miles from their base	Depot	Private	4

Table 2: Operating area only used for interview recruitment of non-electric operators and drivers

Operating area	Sample total
Within 15 miles of their base	2
Between 15 and 50 miles of their base	7
Over 50 miles from their base	12

It should be made clear that this sample is not intended to be proportionally representative of the entire population of van drivers or operators, and that findings may not apply to all drivers or operators. It should also be noted that the characteristics of the entire population of van drivers and operators is unknown, and therefore it is challenging to say with confidence which groups were over- or under-represented in this research. While the DfT van driver survey (2021) sets out proportions of archetypes, these proportions are relevant to both fleets and single, self-employed drivers.

The final interview sample of 23 operators and 44 drivers achieved a good mix of different other desirable attributes:

- Fleet size varied, from fleets of less than five to fleets of over 200.
    - Fleets of 200+ was the most common size among van operators and drivers, with 23 participants falling into this category. Fleet sizes of 2-9, 10-50, and 51-200 had fifteen, fourteen, and fourteen participants respectively. There were more operators than drivers in the 200+ category, while there were more drivers than operators in the other three categories.
- Business sectors included a range of activities, such as security patrols, above and beyond the more common couriers and maintenance provider industries.
    - The most common business activities were either courier/postal delivery or transporting goods, which made up 27 of the 67 in the sample (containing twelve and fifteen participants respectively). The next best represented activity was properties maintenance, with fourteen participants. Activities with fewer than five participants represented included roadside assistance, transport infrastructure provider, and security and roadside enforcement.
- The representation of vans operating in different regions of England was fairly well balanced across the North, South, and the Midlands. Wales and Scotland were represented in the sample, but in far fewer numbers.

A more detailed overview of the characteristics of individual respondents from the sample is described in Appendix A of the accompanying Main Findings report.

Operator survey

We conducted an online survey of commercial fleet operators to understand the current driving and charging patterns, as well as attitudes towards and practical experience of using EV infrastructure and smart charging technology.

Design

The survey consisted of 29 questions and asked about the fleet size and characteristics (i.e., the main location of the business, operating area, the number of vehicles within the fleet, and the proportion that are electric vans), typical mileage of their van fleet, electric van charging habits, and questions regarding their knowledge and understanding of smart charging options and benefits. Respondents with no electric vans in their fleet were not asked questions about charging habits.

The survey was reviewed by DESNZ and their steering committee before a final revision. It was piloted with two selected contacts from TRL's ECO Stars scheme to test the understanding of the questions and time taken to complete it.

Recruitment

Participants were sent a link to the survey, which was hosted on Smart Survey. The survey was disseminated through our colleagues to 48 fleet operators in the ECO Stars scheme as well as our associates in relevant trade bodies. Note that the inclusion of ECO Stars members may have led to participants who were more engaged with sustainability practices. On the other hand, only five participants within the survey, and another five within the interviews, were ECO Stars fleet operator members. There is therefore a small amount of bias in the sample which should be taken into account when interpreting the results.

Six trade bodies were also contacted to share the survey link with their members (via emails, newsletters, or social media groups) and send at least two reminders to encourage participation. A cover letter endorsed by DESNZ was attached to increase response rates. While the number of members of these trade bodies was not known, we anticipated that many fleet operators would view the survey link.

Fleet operators who have previously engaged in other TRL projects were also contacted to support with this research. In total we contacted 100+ fleet operators requesting their participation in the survey.

Analysis

There were 53 survey responses in total, of which 33 were complete responses and 20 were partial responses (i.e., the participant had started, but not completed the survey). Of the 33 complete responses, 18 were operators with electric vans and 14 had some or no electric vehicles. One participant was removed from analysis as they only had one vehicle in their fleet that was an electric pool car.

All complete survey responses were anonymised before analysis. Of the incomplete responses, participants stopped at different parts of the survey. Therefore, their responses were analysed for the questions where it was deemed that the question was answered in full. The data analysis was conducted to present an overview of the sample, and to identify any correlations between the proportion of the fleet that is electrified and the following:

- Fleet size
- Operation activities
- Typical milage done by van in fleet
- Operating area (as defined in Table 1)
- Charging time and location (as defined in Table 1)

Limitations

We expected to recruit 100 participants for the survey. While 53 fleet operators answered at least one question, only 33 (62%) fully completed the questionnaire. It is likely that this attrition rate is either due to participants not knowing the specific answers to a question, or due to the length of the survey. Moreover, responses to our initial request to trade bodies suggest that various contacts were out of office due to the peak summer period. This could have caused the low response rate received in the first outreach. Response rates improved after the second outreach.

It would therefore be prudent in future research to keep surveys to a maximum length, and to make them as easy to fill in as possible, especially when the survey is unpaid. It would also be a valuable exercise to follow up with those who did not complete the survey to ask why they did not do so, bearing in mind that they may not have completed the survey due to time constraints. It may be useful to consider the timing of future surveys, to avoid peak periods of anticipated absence.

In addition to the small overall sample size and the even smaller complete response rate, our sample was also a volunteer sample. This means that it contains selection bias, as interested individuals may have provided different responses to those who chose not to take part. This combination of sample characteristics mean that it is likely not representative of all fleet operators and that results therefore cannot be generalised to the wider target population.

Nevertheless, insights obtained via the survey are still useful in the sense that they can provide hypotheses to test in future research with a more robust sample.

Interviews

We also conducted semi-structured interviews with fleet operators and van drivers. The topic guides for the semi-structured interviews were designed with open-ended questions, allowing researchers to probe further into the topic and therefore allowing participants to provide greater insight into the benefits and challenges they have faced in uptake of electric vans and smart charging technologies.

The interview topics focused on understanding the driving practices (e.g., typical journey mileage, operational area, charging times and locations) of the vans within their fleet; the perceived and/or observed benefits and challenges of using electric vehicles in their fleet; and awareness, knowledge, and use of smart charging.

Design

Fleet operator

While the topics covered by both fleet operator and drivers were similar, the fleet operator interviews focused on operational issues and decision-making processes of taking up electric vehicles and smart charging in their fleet. The interviews were used to build on responses from the survey (detailed above), where the participant had already completed the survey.

Two versions of the topic guide were created to guide the interviews – one for fleet operators who had electric vans (in some or all their fleet), and the other for those who had no electric vans in their fleet. We used the non-electric van topic guide for interviews with fleet operators who had no electric vans but did have electric pool cars or HGVs.

Van drivers

The van driver interviews aimed to understand the knowledge and perceptions of van drivers towards electric vehicles and smart charging technologies. The interviews were aimed at van drivers within a fleet only. Two versions of the topic guide were created to guide the interviews – one for drivers who drove electric vans (some or all the time), and the other for those who drove a non-electric van.

Recruitment

We aimed to recruit 50 drivers and 20 fleet operators. In practice, more fleet operators (23) and fewer drivers (44) were recruited as the fleet operator interviews were providing more relevant content, and the driver interviews reached a saturation point, where no additional insights were arising.

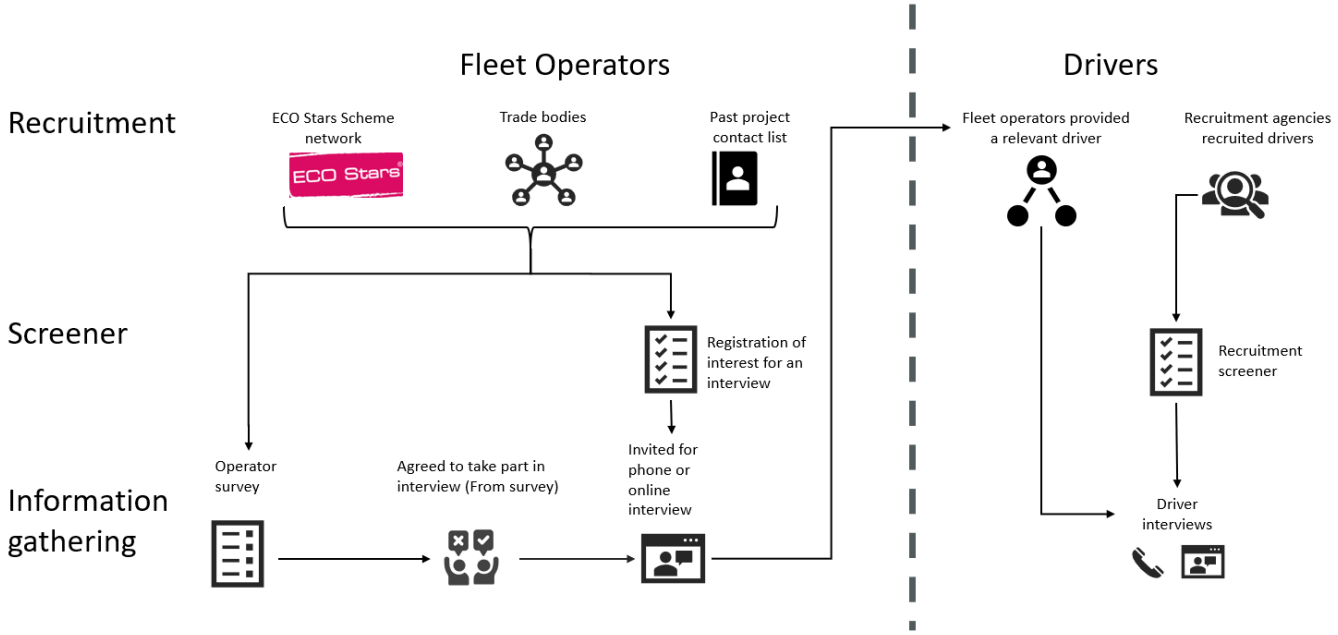


Figure **2** details the steps that were taken in the recruitment process.

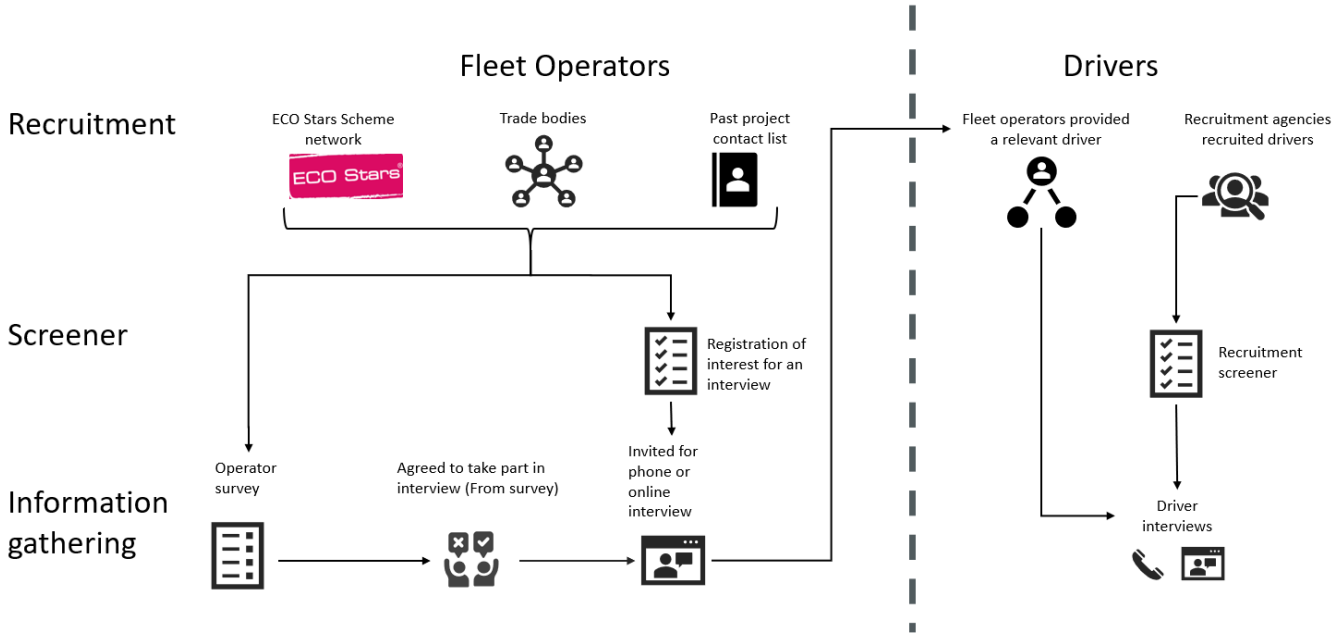


Figure 2: Recruitment of fleet operators and drivers for interview

Fleet operators

Fleet operators were recruited for interviews in the same manner as the fleet operator survey detailed above. Along with an invitation to participate in the survey, recipients were also asked to express their interest in an interview. The registration of interest form collected contact details on the respondent, their role, their organisation, the size of the fleet, and the number of electric vans they had in their fleet.

Similar to the fleet operator survey, the invitation to participate in the study was disseminated through TRL's colleagues in the ECO Stars scheme and our associates at six trade bodies

who distributed the link to their members. Fleet operators that were previously engaged for other TRL projects were also invited via email.

We received a total of 42 expressions of interest – of which 20 were from the completed fleet operator survey, 16 were from partially completed fleet operator surveys, five were from the registration of interest form and one reached out to us via email.

All 42 interested participants were provided timeslots to select a preferred date and time to participate in the interview. They were also asked to indicate their preference for an interview either via phone or Microsoft Teams call. A total of 23 fleet operators responded, with whom interviews were conducted. Only three of these 23 did not complete the fleet operator survey.

Prior to the discussion, interviewees were asked for their consent to take part and for the interview to be recorded. The interviews were recorded while the interviewer also took notes during the call. All interviews took place on Microsoft Teams, which created automated transcripts for each interview, which were referred to during analysis.

Van drivers

The majority of the drivers were recruited via two external agencies – Further Afield and Roots Research. Both agencies were provided with screening questions used to appropriately categorise participants for the interview. The form asked about the organisation the participant worked for and fleet characteristics (i.e., the main location of the business, operating area, number of vehicles in the fleet, and the fuel type used in their vehicle), typical mileage of their van fleet, and the time and location of charging electric vans.

The agencies were asked to provide a spread of participants driving both electric and non-electric vans, and that fell into the archetypes defined in Table 1. We also requested that only one driver from any given organisation was recruited where possible. We recruited drivers where there was more than one van in the fleet. Individuals who owned the van, instead of the organisation they worked for, but worked as a driver as part of a fleet were also recruited. The other characteristics captured in the recruitment screener were used to inform analysis and reporting.

The agencies provided us with a total of 39 participants. We also recruited five drivers via the fleet operators who had completed an interview with us and offered to further support our research efforts. The agencies provided us with eligible participants' responses to the recruitment screener and contact information such as phone number and email address to conduct the interviews. Driver interviews were conducted over the phone or via Microsoft Teams call and were provided with £50 compensation for their time.

The final driver sample consisted of 44 van drivers, 13 of whom drove a non-electric van and the remaining 31 drove an electric van.

Analytical framework

All interview notes taken by researchers were recorded on a Word document and the files were named with the assigned participant ID to anonymise the responses.

Interview data were analysed using Thematic Content Analysis to identify common themes and important insights. We used an analysis grid – a Microsoft Excel document which noted key details from each interview against specific headings (e.g., current approach to charging, motivations for using smart charging, barriers for electrifying fleet, etc.) – to make it easier to systematically record interview responses by topic, compare experiences, and group them into themes. Themes were explored further by seeking to identify similarities and differences across user groups. Findings were also compared with data from external studies to identify whether they were consistent or not.

After the first week of interviews, the spreadsheet was reviewed to identify any gaps in responses collected or the type of responses received to evaluate if the researchers needed to focus on certain topics or if the topic guide needed to be adjusted. This was done weekly for the first three weeks of interviews. The spreadsheet was then used to consolidate emerging themes or patterns for each topic area for the interim reporting. The themes were also analysed alongside quantitative survey data (operators) and recruitment screener (drivers) to understand if any enablers and barriers were correlated to operational needs such as the fleet size, operation activities, typical milage done by van in fleet, operating area and charging time and location (as defined in Table 1).

Following this, we used the COM-B model of behaviour change to systematically categorise the barriers and enablers and identify which of these categories were most frequently reported by participants (

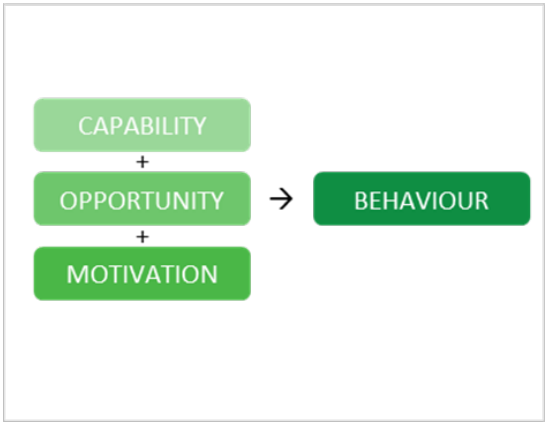
Figure 3). COM-B is a simple but effective model which is frequently used to identify barriers preventing behaviour change and groups barriers into three categories:

- Capability: A person's psychological and physical ability to engage in a behaviour.
- Opportunity: External factors that enable a behaviour.
- Motivation: A person's willingness to engage in a behaviour.

It assumes that all three factors must be present for a behaviour, such as EV adoption, to take place.

From this, we used the Behaviour Change Wheel (Michie et al., 2011) to help identify relevant policy ideas to increase uptake of EVs and smart charging.

Figure 3: The COM-B model



Limitations

While the use of interviews can help to gather in-depth insights, qualitative research comes with a number of limitations which are important to bear in mind when interpreting the results. First, there is limited ability to infer causality in qualitative research. The use of quotations and the COM-B model seeks to strengthen the confidence of why certain operators and drivers either did or did not use electric vans and smart charging technologies. However, while explanations of findings are well-grounded, they ultimately remain untested.

Second, qualitative research is not able to generalise to populations given the purposive nature of the sample, something which would require quantitative research. Nevertheless, the diversity of the sample and the use of thematic coding seeks to generalise the types of barriers and enablers to fleet electrification which are experienced at all.

Finally, the findings of qualitative research are often criticised as being too subjective to be valid. However, a series of measures were undertaken to strengthen the confidence of the findings:

- To strengthen the validity of an interviewer's interpretation of a respondent's answers, follow up clarification questions were asked as appropriate.
- To strengthen inter-researcher reliability when conducting the interviews and analysing the results, regular team meetings were held to compare cross-reference approaches, styles, and findings.
- To strengthen the confidence in the validity of the results, interview findings were cross-referenced with the survey as well as existing research (an approach known as triangulation).

The interview findings, especially with regard to operator interviews, are also limited by practical concerns. Some individuals had restrictions on how much time they could spare to participate in an interview. Whilst most interviews were one hour-in length, some were slightly shorter (with one operator interview in particular only lasting 20 minutes) which meant that not all topics were covered in depth.

References

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