

EV adoption and smart charging for electric vans and commercial fleets

Appendices: research materials

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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Any enquiries regarding this publication should be sent to us at: evsmartenergy@energysecurity.gov.uk

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Appendix B: Information sheet for fleet operator recruitment

Fleet operator information sheet

Thank you for your interest in this research.

TRL are conducting research into adoption of electric vans by commercial fleets – on behalf of the Department for Energy Security and Net Zero (DESNZ)/ Office for Zero Emission Vehicles (OZEV).

We'd really value your involvement in the research, which would include answering an online survey and potentially taking part in a short online interview.

Before you decide whether or not you wish to take part, it is important that you understand why the research is being done and what it will involve. Please read this information carefully and discuss it with others if you wish.

Background to the research

With the deadline for phasing out of new petrol and diesel vans from 2030 approaching, DESNZ/OZEV are keen to understand how to better support commercial fleets to adopt electric vans and, in particular, related smart-charging technology.

We're looking to engage with a range of fleet operators – those who have already adopted electric vans, and those who are yet to do so.

We'd like to understand:

- Current driving patterns (and current charging patterns if electric vans are in use).
- Attitudes towards electric vans/ smart-charging and experiences so far.
- Barriers and enablers to adoption of electric vans/ smart-charging technology.

Your involvement

We'd be grateful if you/someone from your organisation could:

- Complete an online survey. It should take no longer than 10 minutes to complete. The questions are here for reference.
- Take part in an interview with a TRL researcher, lasting no longer than 1 hour. You can express your interest here.
- Nominate 1-2 van drivers to take part in a 30-minute phone interview. They will be compensated for their time.

Benefits of taking part

This research will help DESNZ/OZEV better understand the challenges that commercial fleets face in adopting electric vans and inform future activities to support adoption of electric vehicles. We appreciate your support in helping us to gather this valuable data.

Data management

Results will be presented to DESNZ / OZEV via a project report and presentation. The data you provide will be anonymised before reporting. Data will be reported in anonymised form (e.g., fleet size, operating region, etc.). Individual responses or estimates will not be published and will not be shared with DESNZ/OZEV (unless you give your consent otherwise). Any

information you give on Total Cost of Ownership (TCO) will only be used for internal government use only.

More details about how your data will be stored and used can be found here: [TRL Privacy Notice](#)

Contact details

Please contact Annabel on aknightley@trl.co.uk or Sam on Sam.Denyer@ozev.gov.uk for further information.

Consent for interviews

By taking part in an interview you agree that:

- I confirm that I have read the information sheet, I have had the opportunity to consider the information, ask questions and I have had any questions answered satisfactorily.
- I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason. I understand that if I decide to withdraw, any data that I have provided up to that point may still be included.
- I consent to the processing of my personal information as described in the information sheet and privacy notice.
- I understand that my data will be anonymised and that my anonymised data may be used in future research.
- I understand that the interview will be video/audio recorded.

Appendix C: Information sheet for van driver recruitment

Driver information sheet

Thank you for your interest in this research.

TRL are conducting research into adoption of electric vans by commercial fleets – on behalf of the Department for Energy Security and Net Zero (DESNZ)/ Office for Zero Emission Vehicles (OZEV).

We'd really value your involvement in the research, which would include taking part in a short online interview.

Before you decide whether or not you wish to take part, it is important that you understand why the research is being done and what it will involve. Please read this information carefully and discuss it with others if you wish.

Background to the research

With the deadline for phasing out of new petrol and diesel vans from 2030 approaching, DESNZ/OZEV are keen to understand how to better support commercial fleets to adopt electric vans and, in particular, related smart-charging technology.

We're looking to engage with a range of van drivers – those who have already adopted electric vans, and those who are yet to do so.

We'd like to understand:

- Current driving patterns (and current charging patterns if electric vans are in use).
- Attitudes towards electric vans/ smart-charging and experiences so far.
- Barriers and enablers to adoption of electric vans/ smart-charging technology.

Your involvement

Taking part will involve a 30-minute video/phone interview with a TRL researcher. You will be asked questions about your driving patterns, charging patterns (if applicable), attitudes towards and experiences with electric vans, and your views of smart-charging technology.

You may withdraw at any time without giving a reason. If you withdraw before any reporting to DESNZ, your data will not be included in the reporting.

You will be compensated with a £50 Amazon voucher for your time.

Note that any compensation received is not taxable under PAYE but depending on your personal circumstances, part of the compensation may be chargeable to tax under Self-Assessment, as Miscellaneous Income, if it exceeds the allowance thresholds set by HMRC. Participants are reminded they are responsible for their own tax affairs.

Benefits of taking part

This research will help DESNZ/OZEV better understand the challenges that commercial fleets face in adopting electric vans and inform future activities to support adoption of electric vehicles. We appreciate your support in helping us to gather this valuable data.

Data management

Results will be presented to DESNZ / OZEV via a project report and presentation. The data you provide will be anonymised before reporting (unless you give your consent for your data to be identifiable). Data will be reported in anonymised form (e.g., fleet size, operating region, etc.). Individual responses or estimates will not be published and will not be shared with DESNZ/OZEV. More details about how your data will be stored and used can be found here: [TRL Privacy Notice](#)

Contact details

Please contact Annabel on aknightley@trl.co.uk or Sam on Sam.Denyer@ozev.gov.uk for further information.

Appendix D: Consent form

Consent Form

Thank you for your interest in taking part in this research. Please read this form after you have read the Participant Information Sheet and Privacy Notice. If there is anything you are not happy to say 'Y' to, please contact the research team to discuss.

You will be asked to re-give your consent at the start of the interview.

Please put Y or N against each statement		Yes	No
1	I confirm that I have read the information sheet for the above study, I have had the opportunity to consider the information, ask questions and I have had any questions answered satisfactorily.		
2	I understand that my participation is voluntary and that I am free to withdraw at any time without giving any reason. I understand that if I decide to withdraw, any data that I have provided up to that point may still be included.		
3	I agree to take part in this research project.		
4	I consent to the processing of my personal information as described in the information sheet and privacy notice.		
5	I understand that my data will be anonymised and that my anonymised data may be used in future research.		
6	I understand that the interview will be video/audio recorded		
Participant			
_____	_____	_____	
Name of participant	Signature	Date	
Researcher			
_____	_____	_____	
Name of researcher	Signature	Date	

Appendix E: Driver recruitment screener

Screener questions

Topic area	Question and options [text in red is notes for recruiters]
<p>Section A: defining the archetype</p> <p>Ensure 1-2 drivers in each archetype. Archetype is made up of the following three characteristics – fuel type (EV or non-EV), operating area (local, regional, or national) and charging time/location (private infrastructure, business depot, public infrastructure, residential area)</p>	
<p>Fuel type</p>	<p>Please select the fuel type of the van you drive. [select one only]</p> <ul style="list-style-type: none"> • Diesel or Petrol [code: non-EV] • Hybrid (Diesel or Petrol) - vehicle that cannot be plugged in to charge [code: non-EV] • Plug-in Hybrid Electric Vehicle (PHEV) – it has both a battery-powered electric motor and a petrol/diesel engine that needs to be refuelled [code: EV] • Battery Electric Vehicle (BEV) – it has a battery-powered electric motor only and must be plugged in to charge [code: EV] • Hydrogen Fuel Cell Electric Vehicle (HFCV) – it has an electric motor but does not have a battery and does not plug in to charge [code: EV] • Not sure [exclude]
<p>Operating area</p> <p>Type of road</p>	<p>What is the typical range that you typically drive the van each day for business activities? [select one only]</p> <ul style="list-style-type: none"> • Within 15 miles of their base [code: local] • Between 15 and 50 miles of their base [code: regional] • Over 50 miles from their base [code: national] • International – (mainly outside of UK) [exclude] • Not sure [exclude] <p>How would you describe the roads you primarily drive on for work? [select one only]</p> <ul style="list-style-type: none"> • Urban roads • Rural roads • Motorways • A Roads • Mixture • Not sure

Charging time and location	Where is your vehicle typically charged at the following times of day? Select one option for daytime and one for overnight only. [skip question if non-EV fuel type selected above]		
		Day time (between 7 am – 8pm)	Overnight (between 8pm – 7am)
	Depot – Fleet-owned location, likely to house multiple vehicles	[code: private infrastructure]	[code: business depot]
	Client site – Privately-owned off-street charging belonging to client	[code: private infrastructure]	[code: business depot]
	Commercial zone – Privately-owned charging point within fleet's commercial zone/district	[code: private infrastructure]	[code: business depot]
	Private residential – Privately-owned charging point (e.g. on driveway), anywhere that is not on the streets	[code: private infrastructure]	[code: residential area]
	On-street residential – Public charging point, anywhere on or along the pavement of streets	[code: public infrastructure]	[code: residential area]
	En-route charging – Public charging point on driving route	[code: public infrastructure]	[code: residential area]
Section C: Other fleet/driving details			
Fleet size Aim for drivers within each archetype to not be in the same size fleet	How many vans are there in your organisation's fleet? If you work for more than one organisation, please answer the question thinking about the organisation you predominantly work for. [select one only] <ul style="list-style-type: none"> • One – screen out unless they drive for a large company (e.g. Amazon) • 2-9 • 10-50 • 51-200 • More than 200 • Not sure 		
Ownership Even spread; 17 /18 privately owned and 17 /18 owned by business or other	Who owns the van? [select one only] <ul style="list-style-type: none"> • Myself, as a private individual • It is owned by the business I work for • Other (please specify): _____ 		

<p>Region</p> <p>Aim for drivers within each archetype to not be in the same location</p>	<p>Which region is the van based in? [select one only]</p> <ul style="list-style-type: none"> • North East • North West • Yorkshire and the Humber • East Midlands • West Midlands • East of England • London • South East • South West • Scotland • Wales • Northern Ireland 						
<p>Usage activity/ fleet role</p> <p>Aim for drivers within each archetype to not be doing the same activity</p>	<p>Which of the following activities best describe the business activities the van is used for?</p> <p>If you work for more than one organisation, please answer the question thinking about the organisation you predominantly work for. [select one only]</p> <ul style="list-style-type: none"> • Parcel delivery • Properties maintenance • Home delivery - Supermarket • Roadside assistance • Home infrastructure provider • Home delivery - Other • Transport infrastructure provider • Medical goods delivery • School maintenance • Construction • Deliveries (self-employed) • Removals • Other (please specify): _____ 						
<p>Name of company</p> <p>Ensure no two drivers work for the same company</p>	<p>What is the name of the organisation you work for most often?</p> <p>If you work for more than one organisation, please answer the question thinking about the organisation you predominantly work for.</p>						
<p>Section D: Awareness of smart charging technologies</p>							
<p>Awareness & usage</p> <p>No implication on selection.</p>	<p>To what extent have you heard about the following smart charging options?</p> <table border="1"> <tr> <td style="width: 15%;"></td> <td style="width: 15%;">Never heard of it</td> <td style="width: 15%;">Heard of it but couldn't</td> <td style="width: 15%;">Not used it but could</td> <td style="width: 15%;">Currently being used at</td> <td style="width: 15%;">Currently being used</td> </tr> </table>		Never heard of it	Heard of it but couldn't	Not used it but could	Currently being used at	Currently being used
	Never heard of it	Heard of it but couldn't	Not used it but could	Currently being used at	Currently being used		

			describe it	explain it to someone	my charging point at home	by my organisation
	Static time-of-use energy tariffs					
	Variable (or dynamic) price energy tariffs					
	Supplier-controlled demand management systems					
	Vehicle-to-everything (V2X) or Vehicle-to-grid (V2G) systems					
Section E: Demographics						
No implication on selection.	How long have you driven a van for work? <ul style="list-style-type: none"> • Less than a year • 1 – 3 years • 3 – 5 years • 5 – 10 years • More than 10 years 					

Appendix F: Fleet operator survey

1. Introduction

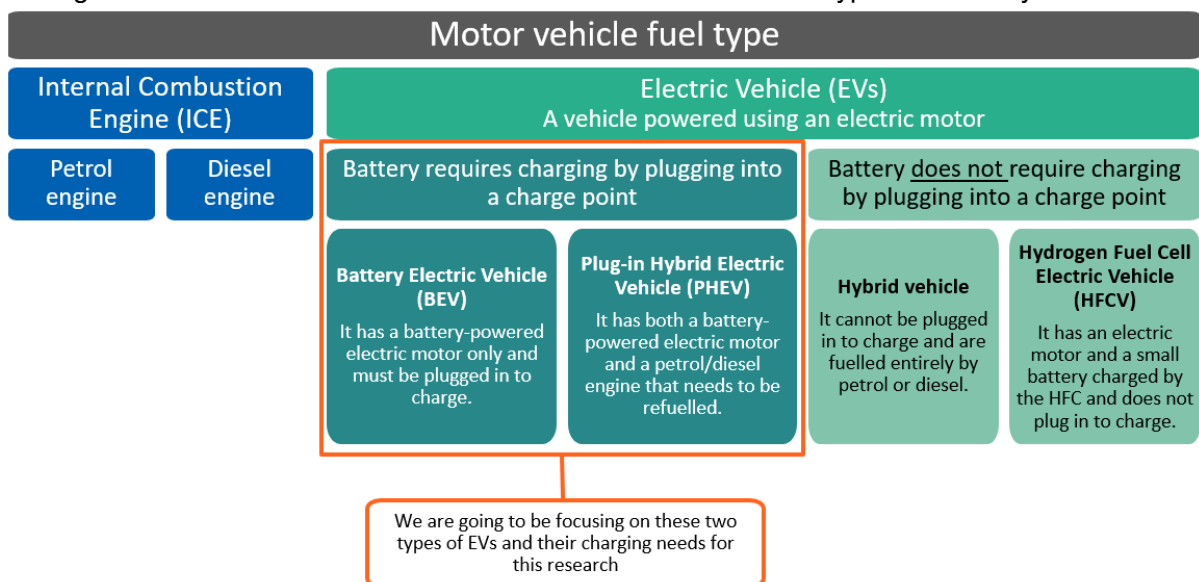
Background to the research

With the phase out of sales of new petrol and diesel vans from 2030, Department for Energy Security and Net Zero (DESNZ) and Office for Zero Emission Vehicles (OZEV) are keen to understand how to better support commercial fleets to adopt electric vans and related smart-charging technology. Researchers at TRL are engaging with both operators who have already adopted electric vans and those who yet to do so.

The objectives of this survey are to:

- Understand the driving and charging patterns
- Understand awareness and use of smart-charging technology, and the degree to which certain barriers and enablers identified in other studies may be applicable to you/your fleet

The figure below shows the different classifications for EV and the types our survey will focus on.



Your involvement

This survey may take around 15-20 minutes depending on the complexity of your organisation. You can view the questions here before starting to survey to help you know the types of information you may need to collect in advance.

You will be asked to leave your contact details at the bottom of the survey if you wish to take part in follow up interviews that will be about 1 hour long. A researcher will be in touch to arrange an appointment for the interview. We appreciate your support in helping us to gather this valuable data.

Benefits of taking part

This research will help DESNZ/OZEV better understand the challenges that commercial fleets face in adopting electric vans and inform future activities to support adoption of electric vehicles. We appreciate your support in helping us to gather this valuable data.

Data management

Results will be presented to DESNZ / OZEV via a project report and presentation. The data you provide will be anonymised before reporting. Data will be reported in anonymised form (e.g., fleet size, operating region,

etc.). Individual responses or estimates will not be published and will not be shared with DESNZ/OZEV (unless you give your consent otherwise). Any information you give on Total Cost of Ownership (TCO) will only be used for internal government use only. Any partial responses to the survey will be used in our reporting where applicable. Please email Annabel on aknightley@trl.co.uk if you wish to withdraw any information provided. More details about how your data will be stored and used can be found here: [TRL Privacy Notice](#)

Please contact Annabel on aknightley@trl.co.uk or Sam on Sam.Denyer@ozev.gov.uk for further information.

1. Please answer *

	Yes	No
I confirm that I have read and understood the information above and have had the opportunity to ask questions.	<input type="checkbox"/>	<input type="checkbox"/>
I understand that my participation is voluntary and that I am free to withdraw at any time, without giving reason.	<input type="checkbox"/>	<input type="checkbox"/>
I understand that I can email aknightley@trl.co.uk or Sam.Denyer@ozev.gov.uk for further information about the study.	<input type="checkbox"/>	<input type="checkbox"/>
I agree to the use of anonymised responses in reports.	<input type="checkbox"/>	<input type="checkbox"/>
I agree to take part in the study as outlined above.	<input type="checkbox"/>	<input type="checkbox"/>

2. Please provide the following information. *

Name: *

Role: *

Organisation: *

Email address: *

3. As part of this research into adoption of electric vans by commercial fleets, we are also looking to engage with fleet operators, such as yourselves, to conduct in-depth interviews regarding your experiences of electrifying part of or all of your fleet, as well as your views and experiences of using smart charging technologies.

We'd be grateful if you/someone from your organisation could take part in an interview with a TRL researcher. You can express your interest here.

Would you like to be contacted for an interview as described above? *

- Yes
- No

4. Are you answering this survey on behalf of a specific branch/region or on behalf of the whole organisation? *

- Branch
- Region
- Whole organisation

Please specify which branch or region

5. Which of the following best represents your business? *

- We have one main geographical base
- We have more than one main base. Please indicate how many bases you have in the UK:

6. Where is your organisation based? *

- North East
- North West
- Yorkshire and the Humber
- East Midlands
- West Midlands
- East of England
- London
- South East
- South West
- Scotland
- Wales
- Northern Ireland

7. Where is your organisation based? You may select more than one. *

- North East
- North West
- Yorkshire and the Humber
- East Midlands
- West Midlands
- East of England
- London
- South East

- South West
- Scotland
- Wales
- Northern Ireland

8. How many vehicles (all types of vehicles in your fleet) are registered to your organisation in total?

*

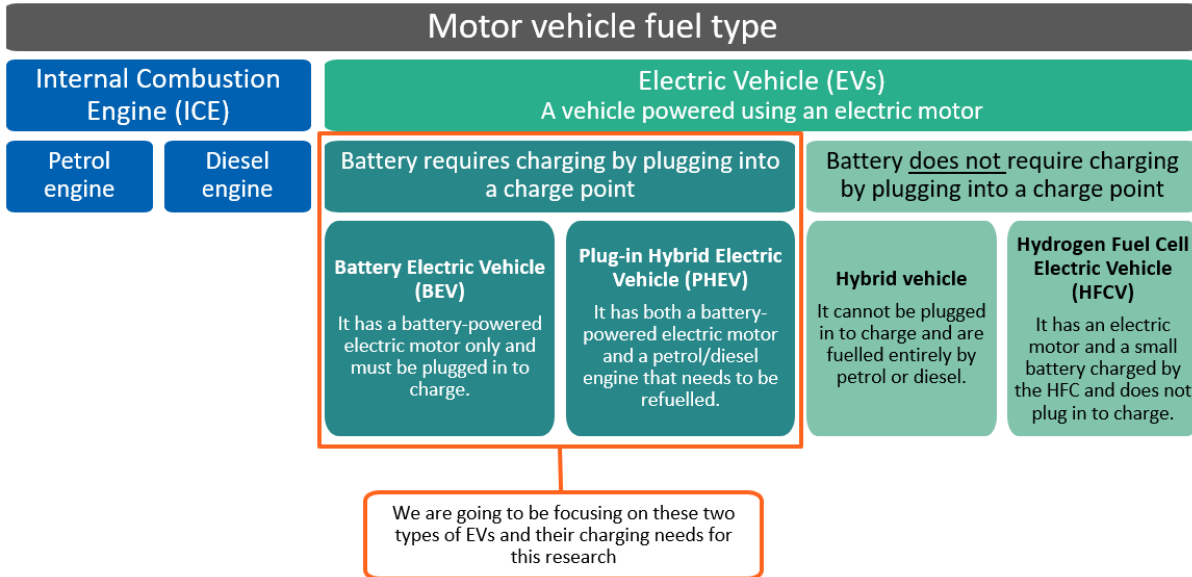
9. Which of the following activities best describe the business activities the vans in your fleet are used for? *

- Parcel delivery
- Properties maintenance
- Home delivery - Supermarket
- Roadside assistance
- Home infrastructure provider
- Home delivery - Other
- Transport infrastructure provider
- Medical goods delivery
- School maintenance
- Construction
- Deliveries (self-employed)
- Removals
- Other (please specify):

10. Please indicate the number of vehicles in your fleet which use the following fuel type.

	Pool Cars	HGVs	Vans
Petrol or Diesel	<input type="text"/>	<input type="text"/>	<input type="text"/>
Hybrid vehicle that cannot be plugged in to charge	<input type="text"/>	<input type="text"/>	<input type="text"/>
Plug-in Hybrid Electric Vehicle (PHEV) (has both a battery-powered electric motor and a petrol/diesel engine that needs to be refuelled)	<input type="text"/>	<input type="text"/>	<input type="text"/>
Battery Electric Vehicle (BEV) (has a battery-powered electric motor only and must be plugged in to charge)	<input type="text"/>	<input type="text"/>	<input type="text"/>

	Pool Cars	HGVs	Vans
Hydrogen Fuel Cell Electric Vehicle (HFCV) (has an electric motor but does not have a battery and does not plug in to charge)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Not sure	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



For questions from this point forward, please count your battery electric vehicle (BEV) and plug-in hybrid electric vehicle (PHEV) under electric vehicles (EVs) and all other type of vehicles under non-EVs.

11. How far do the majority of your vans travel from their base location each day? Please provide your best estimate. *

	Within 15 miles of their base	Between 15 and 50 miles of their base	Over 50 miles from their base (excludes international journeys)	International (mainly outside of UK)	N.A. - no vehicles of this type
EVs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Non-EVs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

12. How often do your vans (all types) travel on rural roads for part or all of their journey? Please provide your best estimate.

- Never
- Rarely
- Sometimes
- Often
- Always

13. Please indicate the typical weekly mileage for a van in your van fleet:

14. For the above question, please select the metrics you have used.

- Kilometers (km)
 Miles (mi.)

15. Where are your non-EV vans typically parked at the following times of day? Please consider all vans that do not require charging as non-EVs. Select one option for daytime and one for overnight only.

	Day time (between 7 am – 8pm)	Overnight (between 8pm – 7am)
Depot – Fleet-owned location, likely to house multiple vehicles	<input type="checkbox"/>	<input type="checkbox"/>
At the driver’s home or residential carpark	<input type="checkbox"/>	<input type="checkbox"/>
Other locations (please specify in the comment box below)	<input type="checkbox"/>	<input type="checkbox"/>

Comments:

Please skip this page if you have no EVs in your fleet.

16. Thinking about their main charging points, where are your electric vans typically plugged in at the following times of day? Select one option for daytime and one for overnight only.

	Day time (between 7am – 8pm)	Overnight (between 8pm – 7am)
Depot – Fleet-owned location, likely to house multiple vehicles	<input type="checkbox"/>	<input type="checkbox"/>
Client site – Privately-owned off-street charging belonging to client	<input type="checkbox"/>	<input type="checkbox"/>
Commercial zone – Privately-owned charging point within fleet's commercial zone/district	<input type="checkbox"/>	<input type="checkbox"/>
Private residential – Privately-owned charging point, anywhere that is not on the streets	<input type="checkbox"/>	<input type="checkbox"/>
On-street residential – Public charging point, anywhere on or along the pavement of streets	<input type="checkbox"/>	<input type="checkbox"/>
En-route charging – Public charging point on driving route	<input type="checkbox"/>	<input type="checkbox"/>
Not charged at this time of the day	<input type="checkbox"/>	<input type="checkbox"/>
Other	<input type="checkbox"/>	<input type="checkbox"/>
Not sure	<input type="checkbox"/>	<input type="checkbox"/>

17. When not charging at their main charging point (selected above), where are your electric vans plugged in at other times? Select all that apply.

	Day time (between 7am – 8pm)	Overnight (between 8pm – 7am)
Depot – Fleet-owned location, likely to house multiple vehicles	<input type="checkbox"/>	<input type="checkbox"/>
Client site – Privately-owned off-street charging belonging to client	<input type="checkbox"/>	<input type="checkbox"/>
Commercial zone – Privately-owned charging point within fleet's commercial zone/district	<input type="checkbox"/>	<input type="checkbox"/>
Private residential – Privately-owned charging point, anywhere that is not on the streets	<input type="checkbox"/>	<input type="checkbox"/>
On-street residential – Public charging point, anywhere on or along the pavement of streets	<input type="checkbox"/>	<input type="checkbox"/>
En-route charging – Public charging point on driving route	<input type="checkbox"/>	<input type="checkbox"/>
Not charged at this time of the day	<input type="checkbox"/>	<input type="checkbox"/>
Other	<input type="checkbox"/>	<input type="checkbox"/>
Not sure	<input type="checkbox"/>	<input type="checkbox"/>

The following questions are in relation to the charging points and electric vans owned by your organisation.

18. How many of the following types of charging points do you have at your depot(s)/base(s)?

Please include count of charge points only, regardless of whether they have a single or multiple sockets.

	Number of charging points
Low speed 0 – < 3.7 kW	<input type="text"/>
Standard 3.7 kW – <8 kW	<input type="text"/>
Fast 8 kW – 49 kW	<input type="text"/>
Rapid 50 kW – 149 kW	<input type="text"/>
Ultra-rapid 150 kW and over	<input type="text"/>
Other (please describe in text box below)	<input type="text"/>

Comments:

19. What portion of your EV charging points are smart charging enabled (i.e., charge points with connectivity, either via WiFi or ethernet to broadband)?

Smart charging enabled points (%)

Regular charge points (%)

20. On average, how many times a day is a typical electric van plugged in?



21. During which time slots below are the vehicles typically plugged-in? During which time slots below are the vehicles typically charging? These might be the same (e.g., if you don't have smart-charging capability). Please tick all that apply.

	Van is plugged in	Van is charging
00:00 – 01:00	<input type="checkbox"/>	<input type="checkbox"/>
01:00 – 02:00	<input type="checkbox"/>	<input type="checkbox"/>
02:00 – 03:00	<input type="checkbox"/>	<input type="checkbox"/>
03:00 – 04:00	<input type="checkbox"/>	<input type="checkbox"/>
04:00 – 05:00	<input type="checkbox"/>	<input type="checkbox"/>
05:00 – 06:00	<input type="checkbox"/>	<input type="checkbox"/>
06:00 – 07:00	<input type="checkbox"/>	<input type="checkbox"/>
07:00 – 08:00	<input type="checkbox"/>	<input type="checkbox"/>
08:00 – 09:00	<input type="checkbox"/>	<input type="checkbox"/>
09:00 – 10:00	<input type="checkbox"/>	<input type="checkbox"/>
10:00 – 11:00	<input type="checkbox"/>	<input type="checkbox"/>
11:00 – 12:00	<input type="checkbox"/>	<input type="checkbox"/>
12:00 – 13:00	<input type="checkbox"/>	<input type="checkbox"/>
13:00 – 14:00	<input type="checkbox"/>	<input type="checkbox"/>
14:00 – 15:00	<input type="checkbox"/>	<input type="checkbox"/>
15:00 – 16:00	<input type="checkbox"/>	<input type="checkbox"/>
16:00 – 17:00	<input type="checkbox"/>	<input type="checkbox"/>
17:00 – 18:00	<input type="checkbox"/>	<input type="checkbox"/>
18:00 – 19:00	<input type="checkbox"/>	<input type="checkbox"/>
19:00 – 20:00	<input type="checkbox"/>	<input type="checkbox"/>
20:00 – 21:00	<input type="checkbox"/>	<input type="checkbox"/>
21:00 – 22:00	<input type="checkbox"/>	<input type="checkbox"/>
22:00 – 23:00	<input type="checkbox"/>	<input type="checkbox"/>
23:00 – 00:00	<input type="checkbox"/>	<input type="checkbox"/>

22. On average, what is the state of charge (battery percentage) of the electric vans at plug in and after a typical charging session?

At plug in (%)

After charging session (%)

23. What is the typical battery size (in KW) of your electric vans? Please provide a range if it varies.

24. How would you describe your experience of installing charging points at your depot?

	Very difficult	Difficult	Neither difficult nor easy	Easy	Very easy	I was not involved in this	N.A. - we do not own any charge points
Installing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Connecting	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

25. How are drivers who use a charging point away from the depot reimbursed for the cost of charging?

Drivers using charge points at home

Drivers using charge points at any other location

Others, if any, (please describe)

26. To what extent have you heard about the following smart charging options? *

	Never heard of it before today	Heard of it but couldn't describe it	Yes, I've heard of it before
Static time-of-use energy tariffs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Variable (or dynamic) price energy tariffs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Supplier-controlled demand management systems	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Vehicle-to-everything (V2X) or Vehicle-to-grid (V2G) systems	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

27. Here are the different smart charging options:

Static time of use tariff: These tariffs charge a different price for electricity depending on the time of day, day of the week, or season. These prices are fixed and users can find out in advance what prices will be charged at certain times.

Dynamic time of use tariff: Similar to static time-of-use tariffs, prices for electricity depend on the time of day, day of the week, or season. However, dynamic tariffs do not have fixed prices, meaning that electricity is not always the same price at the same time of day.

Third party charge management schemes: These schemes allow a third party such as an energy supplier to control the timing and speed of EV charging in order to avoid times when the demand for electricity is high. This control can be overridden.

Vehicle-to-everything (V2X): With V2X services, users can return energy stored in their EV batteries to things such as the national grid, a home, or a building when electricity is in high demand. This can either save or earn consumers money.

Mandatory managed charging: This allows third parties such as energy suppliers to slow down or pause EV charging in last resort situations to avoid localised blackouts. In these situations, EV drivers would not be able to override these actions.

Do you use any of the following smart charging options in your organisation? *

	Not used but interested to use at my organisation	Not used and not interested to use at my organisation	Currently being used at my organisation
Static time-of-use energy tariffs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Variable (or dynamic) price energy tariffs	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Supplier-controlled demand management systems	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Vehicle-to-everything (V2X) or Vehicle-to-grid (V2G) systems	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

If V2X, which type do you use?

28. To what extent do you agree or disagree with the following statements? *

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	Unsure
Using smart charging technology simplifies/ would simplify the process of reimbursing drivers who charge their vans at home or public charge points.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Using smart charging technologies enables collection of data on charging times which means decisions can be made about driving patterns/rotation to take advantage of lower energy costs.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Smart charging has reduced/ would reduce our fleet operating costs.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

29. To what extent to you agree or disagree with the following statements about smart-charging. *

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	Unsure
The process of installing and setting up smart charging points at the depot would be too complex and time consuming.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
The area where our depot/base is located has poor signal which makes using smart charging challenging.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
It is unclear how transitioning to smart charging would impact our costs.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am concerned about the potential impact of charging and discharging on the electric vehicle's battery health.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I am concerned that vehicles would not be fully charged when we need to use them	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

	Strongly agree	Agree	Neither agree nor disagree	Disagree	Strongly disagree	Unsure
because simply plugging it in does not always mean it is charging. I am concerned about the potential impact, if any, of using smart charging technology on the privacy/security of the organisation's data.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

30. Please provide your best estimate on how much you have saved on operational costs in a year from using smart charging.

31. Based on your recent and current operational needs, how long would it take for the organisation to achieve 100% returns on purchasing EVs and smart charging technologies?

32. Are you happy for you or your organisation to be contacted for future research done by Department for Energy Security and Net Zero or TRL relating to fleets? If you select yes, your data will be kept according to the respective privacy policy stated.

DESNZ Privacy Notice
TRL Privacy Notice *

	Yes	No
Department for Energy Security and Net Zero (DESNZ)	<input type="checkbox"/>	<input type="checkbox"/>
Transport Research Laboratory (TRL)	<input type="checkbox"/>	<input type="checkbox"/>

33. If you selected yes for any of the above, please provide the relevant contact information for future studies if this contact is not you.

Name

Role

Email

Appendix G: Interview topic guides

EV fleet operator

Introduction (to be read by facilitator)

Thanks for agreeing to take part in this interview – we appreciate you taking the time to talk to us. Today we would like to discuss your experiences of electrifying part of or all of your fleet, as well as your views and experiences of using smart charging technologies. TRL is carrying out this research on behalf of the Department for Energy Security and Net Zero.

Our discussion will last approximately 60 minutes, and we will work through a list of questions – if there are any that you can't, or don't want to answer, please just say and we will move on to the next question. There are no right or wrong answers: we want to learn about your own thoughts, in your own words. Anything you do say will be treated confidentially, and your responses will not be linked to your identity, or the identity of your business.

Please could you confirm whether you have read all of the information that was sent to you about different smart charging technologies. We will discuss these in detail during the conversation.

[If participant has not read the materials, or has any questions, briefly talk them through the slides.]

[If consent form has not been completed via email:]

I would like to talk you through a consent form.

- I confirm that I have read and understood the information sheet and have had the opportunity to ask questions – Y/N
- I understand that my participation is voluntary and that I am free to withdraw at any time, without giving reason – Y/N
- I agree to the interview being audio recorded – Y/N
- I agree to the use of anonymised quotes in reports – Y/N
- I agree to take part in the study as outlined above – Y/N

1) Business overview (5-10 mins)

Researcher note: If fleet operator has already completed the survey, review those answers and adjust these questions as appropriate, depending on what is known already.

- 1) Please could you give me a brief description of your business' fleet activities and your role at the company? **E.g., postal delivery, supermarket delivery, medical goods delivery, home maintenance etc.**
- 2) Could you tell me a little more about the makeup of your fleet?
 - a) How many vans does your business have in your fleet? Do you have other road vehicles?
 - i. **If so**, what proportions of your fleet do they both make up?
 - ii. Does this vary at all, **e.g., by region or area of the business?**
 - b) What is the proportion split between electric vans and non-electric vans?
 - i. Does this vary at all, **e.g., by region or area of the business?**
 - c) What type of EVs does your business use? **E.g., battery electric, plug-in hybrid?**
 - d) **If at all**, does your fleet have a most common make and model of van?
- 3) What is the average number of working hours for an employee per shift?
 - a. What is the most common structure and timings of these shifts? **E.g., 9-5/ night shifts**
 - i. How many shifts a week does this translate to?
 - ii. Do these shifts vary in start/end time? **If so**, how?
 - iii. Which days of the week are these – weekdays, weekends, or a mixture?
 - b. What is the average mileage an employee will drive per shift?

- i. Does this mileage vary across shifts? What is the smallest mileage, what is the largest?
- ii. What types of journeys make up this mileage? **E.g., one long journey, or stop and start journeys making drop offs etc.?**

Smart charging triage questions – optional, based on whether this information is known before the interview

To help me ask the most relevant questions during this interview, I'd like to briefly ask you about smart charging. Have you heard about smart charging technology?

- c. **If so**, what do you know about it?
- d. **If so**, do you use smart charging for your fleets?

Thank you. We'll talk a bit more about smart- charging later on.

To ensure consistent understanding going forward: *Smart Charging means you can intelligently manage how your electric vehicle charges.*

When a vehicle is 'smart charging', the charger is essentially 'communicating' with your car, the charging operator and the utility company through data connections.

This technology enables things like charging when energy prices are lower, or sharing energy from the vehicle battery to a building or back to the grid.

2) Electrification (5-10 mins)

- 1) Why did your organisation decide to invest in EVs? What did you see as the benefits? **e.g., financial incentive, financial savings, suitability of EVs for the business, reputation, regulation, operational performance benefits, safety, etc.**
 - a) Where did your organisation get your information on potential benefits from?
 - b) Were these benefits realised in reality?
- 2) Did your organisation have any concerns about electrifying your fleet before doing so? **If so**, what were the barriers you anticipated encountering? **e.g., purchase/operating cost, suitability of EVs for business, reputation, lack of support, EV availability, lack of charging points, range anxiety, operational performance detriments, safety, etc.**
 - a) Where or how did these concerns arise? **E.g., word of mouth, business network, elsewhere?**
 - b) Were these barriers and/or other unforeseen barriers actually encountered?
 - c) **If so**, how has your organisation overcome them?
- 3) How does the total running/ownership costs of EVs compare with running ICEs previously?
If reluctant to say, researcher to stress that comments are treated as confidential, and will be used for internal government purposes only. On request, they will not be linked to themselves or their business.
- 4) Does your business have any plans to expand your EV fleet in the future?
 - a) **If so**, how does your business plan to expand? To what scale?
 - b) **If so**, are the motivations for expansion the same as the motivations for uptake, or have these changed?

- c) **If so**, does your business anticipate encountering any barriers, either when expanding or as a result of expanding, and are these different to those initially expected before electrification?
- d) **If not**, why not?
- e) To what extent might government incentives change your feelings about this? What type of incentives would help?
- f) Would EV ownership be more attractive if V2X was more widely available?

3) Charging requirements, preferences, and practices (20-25 mins)

- 1) What are the charging needs of your vehicles?
 - a) What is the typical battery size of your electric vans?
 - b) Where do your vehicles – both vans and other types of fleet vehicles – park and charge...?
 - i. Overnight?
 - ii. During the day, **if at all**?
 - iii. Who decides this? Is it an operational choice or driver choice?
 - iv. **If off-site**, what proportion of drivers have access to off-street parking at home?
 - v. If at home, what challenges does this present?
 - c) Does your business collect data on and monitor the charging patterns of your fleet? **If so**, how?
 - i. What time of the day are the vehicles typically plugged-in and plugged out?
 - ii. On average, what is the state of charge of the vehicles at plug-in and plug-out (state of charge means battery percentage)?
 - iii. How often are the vehicles charged and how long is a typical charge session? Do these charging needs vary **e.g., across the year/seasonally**?
 - iv. Does your business rotate when vehicles are charged or at which charging points?
 - v. What challenges have you experienced with this, **if any**?
- 2) What charging points does your business have?
 - a) Are any of the charging points smart charging enabled? (i.e., charging points with connectivity, either via Wi-Fi, or ethernet or broadband)?
Note: Regular charge points don't have connectivity (either via Wifi, ethernet, or broadband) but the energy prices will vary according to the tariff set by the charge point owner.
 - b) How did your business choose? Are there particular sources of information or organisations you turn to when making decisions surrounding charging?
 - c) What is the charging power of the charging points in KW?
 - d) Does your business have any additional charging infrastructure?
 - i. **If so**, what is it and how is it used?
 - e) What has your business' experience been with getting charging points installed at your site(s)?
 - i. Did the process go as expected in practice?
 - ii. Were there any key challenges your business encountered and how did your business overcome them?
 - f) Who operates the charging points at the depot/site/office?

- i. **If at all**, what upskilling has your business undertaken to enable your drivers to use the charging points?
 - ii. Has your business encountered any challenges and how has your business managed to overcome them?
 - iii. Have they fed back their experience of charging?
- 3) **If known**, what charging points do your drivers have access to at home?
 - a) Are any of the charging points smart chargers?
 - b) Who chose this?
 - c) How were these financed?
 - d) Who installed it? Did this come with challenges?
 - e) How does your business reimburse drivers for the cost of charging fleet vehicles using public or home chargers, if at all?
 - i. Does this come with any challenges and how did your business manage to overcome them?
- 4) What are your biggest frustrations / practical issues when it comes to charging your fleet?
 - a) Were these expected?
 - b) How do your business manage these?
- 5) What are your opinions towards the shared use of private charging points **e.g., at client sites**?
 - a) Is this desirable?
 - b) Is it practical? What barriers would need to be overcome to achieve this?
 - c) Do you have any suggestions on how this could be achieved?

4) Smart charging (20 mins)

Smart Charging means you can intelligently manage how your electric vehicle charges. When a vehicle is 'smart charging', the charger is essentially 'communicating' with your car, the charging operator and the utility company through data connections. This technology enables things like charging when energy prices are lower, or sharing energy from the vehicle battery to a building or back to the grid.

- 1) What do you see as the benefits of smart charging? For your business? For others/society?

It is beneficial to the consumer because if they charge at off-peak times, they can have access to cheaper energy. As more consumers transition from internal-combustion engine vehicles to EVs, smart charging will increase in importance as it helps to prevent unwanted intervals of extremely high demand for electricity from the grid, therefore avoiding grid instability.

- 2) Does your business use any smart charging approaches?
 - a) If so, which do your business use?
 - i. Static time-of-use energy tariffs
 - ii. Variable (or dynamic) price energy tariffs
 - iii. Supplier-controlled demand management systems
 - iv. Vehicle-to-everything (V2X) systems

V2X, where “X” stands for everything, is the umbrella for all forms of technology whereby the EV battery can export electricity back from the car to something else, such as a home, building, or the grid. These services require the user to have a V2X-enabled vehicle and charge point.

- b) Has your business benefited using smart charging, even if you don't use any of the approaches above? E.g. used the data to negotiate better energy contract with supplier, even if it's not a time-of-use tariff

If no, proceed straight to Q5. If yes to any, proceed to Q3. If yes to iv., proceed to Q3 and Q4.

3) Static time of use tariffs & Variable (or dynamic) price energy tariffs & Supplier/Third-party charge management schemes

- a) Can you tell me more about the tariff your business is on?
- i. Why did your business pick this tariff?
 - ii. What are the costs at different times of day?
 - iii. How did your business first hear about this?
 - i. What was appealing?
 - ii. What was concerning?
- b) In practice,
- i. How did your business find setting this system up? Were there any challenges?
 - ii. What are the benefits of a tariff like this?
 - iii. What are the drawbacks of a tariff like this? How has your business overcome any challenges?
- c) Which products / apps does your business use to manage the charging, **if any**?
- i. How did your business first hear about this charging management app/product?
 - ii. What was appealing?
 - iii. What was concerning, and how did your business overcome this?
- d) In practice,
- i. Can you talk me through how this works?
 - ii. Does your business manage charging manually or is it managed by the app/automatically or in another way (by a third party)?
 - iii. **If by a third party**, does your business ever need to override their schedule? **If yes**, what are the main reasons for doing so? **If no**, how do you ensure you get enough charge for when you need it?
 - iv. How did your business find setting this system up?
 - v. What are the benefits of this product / app?
 - vi. What are the drawbacks of this product / app? How could these be avoided / improved?
 - vii. To what extent does your business track how much electricity your vehicles are using and at what times? How does your business use this information, **e.g., to reimburse drivers, track energy usage**?
- e) What are your overall opinions about this smart-charging approach? Have the benefits been worth the investment?
- i. What would you say to another business thinking of using a similar system?

4) Vehicle-to-everything (V2X) or Vehicle-to-grid (V2G) systems

- a) Can you tell me more about the type of V2X your business uses? E.g., V2G, V2H etc.
 - i. Why did your business pick this approach?
 - ii. How did your business first hear about this?
 - iii. What was appealing?
 - iv. What was concerning?
 - b) In practice,
 - i. How did your business find setting this system up? Were there any challenges?
 - ii. What are the benefits of this approach?
 - iii. What are the drawbacks of this approach? How has your business overcome any challenges?
 - c) Which products / apps does your business use to manage the charging, **if any**?
 - i. How did your business first hear about this charging management app/product?
 - ii. What was appealing?
 - iii. What was concerning, and how did your business overcome this?
 - d) In practice,
 - i. Can you talk me through how this works?
 - ii. Does your business manage charging manually or is it managed by the app/automatically or in another way (by a third party)?
 - iii. **If by a third party**, does your business ever need to override their schedule? **If yes**, what are the main reasons for doing so?
 - iv. How did your business find setting this system up?
 - v. What are the benefits of this product / app?
 - vi. What are the drawbacks of this product / app? How could these be avoided / improved?
 - vii. To what extent does your business track how much electricity your vehicles are using and at what times? How does your business use this information, **e.g., to reimburse drivers, track energy usage**?
 - e) What are your overall opinions about this smart-charging approach? Have the benefits been worth the investment?
 - i. What would you say to another business thinking of using a similar system?
- 5) Now I'd like to ask you some questions about your awareness of and opinions about [other/different] types of smart charging technologies.
- **If participants have answered questions 3 and 4, only ask about other types they do not currently use, if there is time**
 - **If participants have answered question 3 but not question 4, focus question 5 on V2G and V2X**
 - **If participants do not currently use smart charging at all, interviewer to move through all questions for a specific charging technology before repeating the questions for a new technology**

(See table below for question prompts)

5) Close

Do you have any **drivers** we can talk to please?

We're also wanting to get the perspective of drivers. 30 minute interview, covering:

- Their experience of driving an electric van / their interest in driving an electric van
- Any benefits or challenges they have experienced / they perceive
- Whether they are aware of or use smart-charging

We can send you an email with some info that you can send on to your drivers.

Question prompts	Static time of use energy tariffs	Dynamic time of use energy tariffs	Third-party charge management schemes	V2X services	Mandatory managed charging
Were you previously aware of this type of smart charging? How would you describe the extent of your knowledge? Where did you acquire this awareness?					
What do you like about it? Do you see any advantages of using this type of smart charging? Would this be an acceptable approach for your business? Why/why not?					
What do you dislike about it? Do you see any barriers or challenges to using this type of smart charging? E.g., timing of price bands, level of user interaction required, potential for savings, state of charge guarantees. Would anything make this option unacceptable?					
What, if anything, might encourage your business to adopt this type of smart charging? E.g., cost savings, improved usability, environmental benefits, better control of fleet charging etc.					

Non-EV fleet operator

Introduction (to be read by facilitator)

Thanks for agreeing to take part in this interview – we appreciate you taking the time to talk to us. Today we would like to discuss your opinions about electrifying part of or all of your fleet, as well as your understanding and views on smart charging technologies. TRL is carrying out this research on behalf of the Department for Energy Security and Net Zero.

Our discussion will last approximately 60 minutes, and we will work through a list of questions – if there are any that you can't, or don't want to answer, please just say and we will move on to the next question. There are no right or wrong answers: we want to learn about your own thoughts, in your own words. Anything you do say will be treated confidentially, and your responses will not be linked to your identity, or the identity of your business.

Please could you confirm whether you have read all of the information that was sent to you about different smart charging technologies. We will discuss these in detail during the conversation.

[If participant has not read the materials, or has any questions, briefly talk them through the slides at the appropriate point during the interview.]

[If consent form has not been completed via email:]

I would like to talk you through a consent form.

- I confirm that I have read and understood the information sheet and have had the opportunity to ask questions – Y/N
- I understand that my participation is voluntary and that I am free to withdraw at any time, without giving reason – Y/N
- I agree to the interview being audio recorded – Y/N
- I agree to the use of anonymised quotes in reports – Y/N
- I agree to take part in the study as outlined above – Y/N

1 Business overview (5-10 mins)

Researcher note: If fleet operator has already completed the survey, review those answers and adjust these questions as appropriate, depending on what is known already.

- 1) Please could you give me a brief description of your business' fleet activities and your role at the company? **E.g., postal delivery, supermarket delivery, medical goods delivery, home maintenance etc.**
- 2) Could you tell me a little more about the makeup of your fleet?
 - a) How many vans do you have in your fleet? Do you have other road vehicles?
 - i. **If so**, what proportions of your fleet do they both make up?
 - ii. Does this vary at all, **e.g., by region or area of the business?**
 - b) **If at all**, does your fleet have a most common make and model of van?
- 3) What is the average number of working hours for an employee per shift?
 - a. What is the most common structure and timings of these shifts? **E.g., 9-5/ night shifts**

- i. How many shifts a week does this translate to?
 - ii. Do these shifts vary in start/end time? **If so**, how?
 - iii. Which days of the week are these – weekdays, weekends, or a mixture?
- 4) What is the average mileage an employee will drive per shift?
 - i. Does this mileage vary across shifts? What is the smallest mileage, what is the largest?
 - ii. What types of journeys make up this mileage? **E.g., one long journey, or stop and start journeys making drop offs etc.?**

2 Parking requirements, preferences, and practices (5-10 mins)

- 1) Where do your business' vehicles – both vans and other types of fleet vehicles – park...?
 - a) Overnight?
 - b) During the day?
 - c) Who decides this? Is it an operational choice or driver choice?
 - d) **If off-site**, what proportion of drivers have access to off-street parking at home?
- 2) How does your business reimburse drivers for any expenses they make to refuel their vans?
- 3) Do you collect data on and monitor the driving patterns of your fleet? If so, how?
 - a) What challenges have you experienced with this, if any?

3 Electrification (20-25 mins)

- 1) Have you ever considered investing in electric vans?
 - a) **If so**,
 - i. What steps have you taken, if any? What's been your experience so far?
 - ii. What do you see as the benefits? e.g., financial incentive, financial savings, suitability of EVs for the business, reputation, regulation, operational performance benefits, safety, etc.
 - iii. Do you have any concerns about electrification of your vans? If so, what are the barriers you anticipate encountering? e.g., purchase/operating cost, suitability of EVs for business, reputation, lack of support, EV availability, lack of charging points, range anxiety, operational performance detriments, safety, etc.
 - iv. What information sources do you use / have you found useful?
 - v. What type of charging infrastructure could be suitable to your fleet? **E.g., depot, at home, public?** What is your opinion about sharing charging infrastructure with others?
 - vi. **If interviewee has actively decided against fleet electrification for the time being**, what made your business make the decision not to electrify at this point? What was the most important reason or dealbreaker? How might this change as we get closer to 2030/35?
 - b) **If not**, why not? **e.g., not been introduced to the concept, not enough time?**
 - c) What would have to change to make you make the shift to electric vans?
 - i. Are you aware of any government incentives for electrification of van fleets? **E.g., the plug-in van grant**
 - ii. What incentives would you want which would make you more likely to switch to an EV now, or to switch more quickly?

4 Smart charging (20 mins)

- 1) Have you heard of smart charging? What do you know about it?

Smart Charging means you can intelligently manage how your electric vehicle charges. When a vehicle is 'smart charging', the charger is essentially 'communicating' with your car, the charging operator and the utility company through data connections. This technology enables things like charging when energy prices are lower, or sharing energy from the vehicle battery to a building or back to the grid.

- 2) What do you see as the benefits of smart charging? For your business? For others/society? **e.g. savings on electricity costs, benefits for society/grid in terms of levelling out demand across the day**
- 3) Now I'd like to ask you some questions about your awareness of and opinions about [other/different] types of smart charging technologies.
Interviewer to move through all questions for a specific charging technology before repeating the questions for a new technology.

(See below table for prompts)

5 Close

Do you have any **drivers** we can talk to please?

We're also wanting to get the perspective of drivers. 30 minute interview, covering:

- Their experience of driving an electric van / their interest in driving an electric van
- Any benefits or challenges they have experienced / they perceive
- Whether they are aware of or use smart-charging

Question prompts	Static time of use energy tariffs	Dynamic time of use energy tariffs	Third-party charge management schemes	V2X services	Mandatory managed charging
Were you previously aware of this type of smart charging? How would you describe the extent of your knowledge? Where did you acquire this awareness?					
What do you like about it? Do you see any advantages of using this type of technology? Would this be an acceptable option for your business? Why/why not?					
What do you dislike about it? Do you see any barriers or challenges to using this type of technology? E.g., timing of price bands, level of user interaction required, potential for savings, state of charge guarantees. Would anything make this option unacceptable?					
What, if anything, might encourage your business to adopt this technology? E.g., cost savings, improved usability, environmental benefits, better control of fleet charging etc.					

Electric van driver

Introduction (to be read by facilitator)

Thanks for agreeing to take part in this interview – we appreciate you taking the time to talk to us. Today we would like to discuss your experiences as a driver within a fleet, as well as your views and experiences of using electric vehicles and smart charging technologies. TRL is carrying out this research on behalf of the Department for Energy Security and Net Zero.

Our discussion will last approximately 30 minutes, and we will work through a list of questions – if there are any that you can't, or don't want to answer, please just say and we will move on to the next question.

As we're tight on time, we may move you onto the next question so that we can cover everything.

There are no right or wrong answers: we want to learn about your own thoughts, in your own words. Anything you do say will be treated confidentially, and your responses will not be linked to your identity, or the identity of your business.

Please could you confirm whether you have read all of the information that was sent to you about different smart charging technologies. We will discuss these in detail during the conversation.

[If participant has not read the materials, or has any questions, briefly talk them through the slides at the appropriate time in the interview.]

[If consent form has not been completed via email:]

I would like to talk you through a consent form.

- I confirm that I have read and understood the information sheet and have had the opportunity to ask questions – Y/N
- I understand that my participation is voluntary and that I am free to withdraw at any time, without giving reason – Y/N
- I agree to the interview being audio recorded – Y/N
- I agree to the use of anonymised quotes in reports – Y/N
- I agree to take part in the study as outlined above – Y/N

1 Driving overview (5 mins)

- 1) Please could you give me a brief description of your driving activities for work? What would a typical day look like?
 - a) How many hours do you work for per shift/day? What hours of the day?
 - b) What is the average mileage you drive per shift/day?
 - i. Does this mileage vary across shifts? What is the smallest mileage, what is the largest?
 - ii. What types of journeys make up this mileage? **E.g., one long journey, or stop and start journeys making drop offs etc.?**
 - c) How many days a week do you work?
 - i. Which days of the week are these – weekdays, weekends, or a mixture?
- 2) Could you tell me a little more about the van/s you drive?

- a) What is the make/model?
- b) What type of EV do you use? **E.g., battery electric, plug-in hybrid?**
- c) Was this vehicle given to you by the fleet operator, or is it yours?
- d) How many electric vans are there in the fleet?

Smart charging triage questions – optional, based on whether this information is known before the interview

To help me ask the most relevant questions during this interview, I'd like to briefly ask you about smart charging. Have you heard about smart charging technology?

- a. **If so**, what do you know about it?
- b. **If so**, do you use smart charging for your work vehicle?

Thank you. We'll talk a bit more about smart- charging later on.

To ensure consistent understanding going forward: *Smart Charging means you can intelligently manage how your electric vehicle charges.*

When a vehicle is 'smart charging', the charger is essentially 'communicating' with your car, the charging operator and the utility company through data connections.

This technology enables things like charging when energy prices are lower, or sharing energy from the vehicle battery to a building or back to the grid.

2 Electrification (5 mins)

- 1) How long have you been driving an electric van?
 - a. Who owns it? **E.g., yourself, or your employer?**
- 2) Why did you chose an electric van/do you know why your employer chose an electric van?
 - a. Before acquiring it, what were the potential benefits you/ they were thinking about?
 - b. Before you started driving an electric van, did you have any concerns? If so, what were the barriers you anticipated encountering? **(prompts if needed after initial answer-> e.g., purchase/operating cost, suitability of EVs for business, reputation, lack of support, EV availability, lack of charging points, range anxiety, operational performance detriments, safety, etc.)**
 - i. Have you experienced any of these issues? Which ones? Did you experience any other issues?
 - ii. **If so**, how have you overcome them?
- 3) What has your experience of driving an electric van been like?
 - c) What are the benefits? **(prompts if needed after initial answer-> e.g., financial incentive, financial savings, suitability of EVs for the business, reputation, regulation, operational performance benefits, safety, etc.)**
 - d) What are the challenges?
 - e) How does the total running/ownership costs of EVs compare with driving an ICE previously?

3 Charging requirements, preferences, and practices (10 mins)

- 1) Where do you park and charge your van...?
 - a) Overnight?

- i. **If charges at home**, whose decision was it to do so?
 - ii. **If charges at home**, who installed your charging point?
 - iii. **If charges at home**, who financed your charging point?
 - iv. **If charges at home**, is the charger smart-enabled?
 - v. **If charges at home**, how are you reimbursed for charging at home?
 - vi. **If charges at home**, have you experienced any challenges?
 - vii. **If no home charger**, how do you charge your van?
 - viii. **If no home charge**, how do you locate charging points? (e.g., app) and how easy/difficult is this?
 - ix.
 - b) During the day?
 - i. How often do you charge it? When do you typically charge it?
 - ii. How do you locate the charging points? (e.g., app) and how easy or difficult is this?
 - iii. Do you always use the same charging points?
 - iv. How long is a typical charging session?
 - v. Do you need to re-park in a non-charging location after you have finished charging, or are you free to use a charging space even after you have finished charging?
 - vi. (How) are you reimbursed for charging expenses?
 - vii. Have you experienced any challenges?
 - c) What are the charging needs of the van?
 - i. What is the battery size of your electric van?
 - ii. Do these charging needs vary **e.g., across the year/seasonally?**
- 2) What (if any) charging points does your business have? How many?
 - a) What is the charging power of the charging points in KW?
 - b) Who operates any depot charging points?
 - c) Have you had to receive any training to use the charging points?
 - d) Are any of the charging points smart charging enabled? (i.e., charging points with connectivity, either via Wi-Fi, or ethernet or broadband)?
- 3) Do you or your business collect data on and monitor the charging of your van? If so, how?
 - a) What challenges have you experienced with this, if any?
 - b) How is the data used, if at all?
- 4) What are your biggest frustrations / practical issues when it comes to charging your van?
- 5) What are your opinions towards the shared use of private charging points **e.g., at client sites?**
 - a) Is this desirable?
 - b) Is it practical? What barriers would need to be overcome to achieve this?
 - c) Do you have any suggestions on how this could be achieved?

4 Smart charging (10 mins)

- 1) Have you heard of smart charging? What do you know about it?

Smart Charging means you can intelligently manage how your electric vehicle charges.

When a vehicle is 'smart charging', the charger is essentially 'communicating' with your car, the charging operator and the utility company through data connections. This technology enables things like charging when energy prices are lower, or sharing energy from the vehicle battery to a building or back to the grid.

- 2) What do you see as the benefits of smart charging? For you? For your business? For others/society?

It is beneficial to the consumer because if they charge at off-peak times, they can have access to cheaper energy. As more consumers transition from internal-combustion engine vehicles to EVs, smart charging will increase in importance as it helps to prevent unwanted intervals of extremely high demand for electricity from the grid, therefore avoiding grid instability.

- 3) Does your business use any smart charging approaches?
a) If so, which do they use?

- i. Static time-of-use energy tariffs
- ii. Variable (or dynamic) price energy tariffs
- iii. Supplier-controlled demand management systems
- iv. Vehicle-to-everything (V2X) or Vehicle-to-grid (V2G) systems

V2X, where "X" stands for everything, is the umbrella for all forms of technology whereby the EV battery can export electricity back from the car to something else, such as a home, building, or the grid. These services require the user to have a V2X-enabled vehicle and charge point.

If no, proceed straight to Q6. If yes to any, proceed to Q4. If yes to iv., proceed to Q4 and Q5.

- 4) Static time of use tariffs & Variable (or dynamic) price energy tariffs & Supplier/Third-party charge management schemes

- a) Can you tell me more about the tariff you are on?
 - i. Where does the tariff apply? **E.g., on-site or off-site or both?**
 - ii. What are the costs at different times of day?
- b) In practice,
 - i. What are the benefits of a tariff like this?
 - ii. What are the drawbacks of a tariff like this? How have you overcome any challenges?
- c) Which products / apps do you use to manage the charging, **if any?**
 - i. How did you first hear about this charging management app/ product?
 - ii. What was appealing?
 - iii. What was concerning, and how did you overcome this?
- d) In practice,
 - i. Can you talk me through how this works?
 - ii. Do you manage charging manually or is it managed by the app/automatically or in another way (by a third party)?
 - iii. **If by a third party**, do you ever need to override their schedule? **If yes**, what are the main reasons for doing so?
 - iv. How did you find setting this system up?
 - v. What are the benefits of this product / app?
 - vi. What are the drawbacks of this product / app? How could these be avoided / improved?

- vii. To what extent do you track how much electricity your vehicles are using and at what times? How do you use this information, e.g., to reimburse drivers, track energy usage?
- e) What are your overall opinions about this smart-charging approach? Have the benefits been worth the investment?
 - i. What would you say to another driver thinking of using a similar system?

5) Vehicle-to-everything (V2X) or Vehicle-to-grid (V2G) systems

- a) Can you tell me more about the type of V2X you use? E.g., V2G, V2H etc.
 - i. Why did you pick this approach?
 - ii. How did you first hear about this?
 - v. What was appealing?
 - vi. What was concerning?
- b) In practice,
 - i. How did you find setting this system up? Were there any challenges?
 - ii. What are the benefits of this approach?
 - iii. What are the drawbacks of this approach? How have you overcome any challenges?
- c) Which products / apps do you use to manage the charging, if any?
 - i. How did you first hear about this charging management app/ product?
 - ii. What was appealing?
 - iii. What was concerning, and how did you overcome this?
- d) In practice,
 - i. Can you talk me through how this works?
 - ii. Do you manage charging manually or is it managed by the app/automatically or in another way (by a third party)?
 - iii. If by a third party, do you ever need to override their schedule? If yes, what are the main reasons for doing so?
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 - v. What are the benefits of this product / app?
 - vi. What are the drawbacks of this product / app? How could these be avoided / improved?
 - vii. To what extent do you track how much electricity your vehicles are using and at what times? How do you use this information, e.g., to reimburse drivers, track energy usage?
- e) What are your overall opinions about this smart-charging approach? Have the benefits been worth the investment?
 - i. What would you say to another business thinking of using a similar system?

6) Now I'd like to ask you some questions about your awareness of and opinions about [other/different] types of smart charging technologies.

- If participants have answered questions 4 and 5, only ask about other types they do not currently use, if there is time
 - If participants have answered question 4 but not question 5, focus question 6 on V2G and V2X
 - If participants do not currently use smart charging at all, interviewer to move through all questions for a specific charging technology before repeating the questions for a new technology
- (See below table for prompts)

Question prompts	Static time of use energy tariffs (Prompt about app)	Dynamic time of use energy tariffs (Prompt about app)	Third-party charge management schemes	V2X services	Mandatory managed charging
Were you previously aware of this type of smart charging? How would you describe the extent of your knowledge? Where did you acquire this awareness?					
What do you like about it? Do you see any advantages of using this type of smart charging? Would this be an acceptable approach for your business? Why/why not?					
What do you dislike about it? Do you see any barriers or challenges to using this type of smart charging? E.g., timing of price bands, level of user interaction required, potential for savings, state of charge guarantees. Would anything make this option unacceptable?					
What, if anything, might encourage you to adopt this technology? E.g., cost savings, improved usability, environmental benefits, better control of fleet charging etc.					
What sort of questions do you have? What other information would you like to know about this?					

Non-electric van driver

Introduction (to be read by facilitator)

Thanks for agreeing to take part in this interview – we appreciate you taking the time to talk to us. Today we would like to discuss your experiences as a driver within a fleet, as well as your views and perceptions of electric vehicles and smart charging technologies. TRL is carrying out this research on behalf of the Department for Energy Security and Net Zero.

Our discussion will last approximately 30 minutes, and we will work through a list of questions – if there are any that you can't, or don't want to answer, please just say and we will move on to the next question. There are no right or wrong answers: we want to learn about your own thoughts, in your own words. Anything you do say will be treated confidentially, and your responses will not be linked to your identity, or the identity of your business.

Please could you confirm whether you have read all of the information that was sent to you about different smart charging technologies. We will discuss these in detail during the conversation.

[If participant has not read the materials, or has any questions, briefly talk them through the slides at the appropriate time in the interview.]

[If consent form has not been completed via email:]

I would like to talk you through a consent form.

- I confirm that I have read and understood the information sheet and have had the opportunity to ask questions – Y/N
- I understand that my participation is voluntary and that I am free to withdraw at any time, without giving reason – Y/N
- I agree to the interview being audio recorded – Y/N
- I agree to the use of anonymised quotes in reports – Y/N
- I agree to take part in the study as outlined above – Y/N

1 Driving overview (5 mins)

- 1) Please could you give me a brief description of your driving activities for work? What would a typical day look like?
 - a) How many hours do you work for per shift/day? What hours of the day?
 - b) What is the average mileage you drive per shift/day?
 - i. Does this mileage vary across shifts? What is the smallest mileage, what is the largest?
 - ii. What types of journeys make up this mileage? **E.g., one long journey, or stop and start journeys making drop offs etc.?**
 - c) How many days a week do you work?
 - i. Which days of the week are these – weekdays, weekends, or a mixture?
- 2) Could you tell me a little more about the van/s you drive?
 - a) What is the make/model?
 - b) Was this vehicle given to you by the fleet operator, or is it yours?

- c) Why did you choose an ICE van/do you know why your employer chose an ICE van?

2 Parking requirements, preferences, and practices (5 mins)

- 1) Where do you park your van overnight and during the day?
 - a) Who decides this? Is it an operational choice or driver choice?
- 2) How often do you refuel with petrol/diesel?
 - a) How are you reimbursed for any expenses you make when refuelling your van at petrol stations, if at all?

3 Electrification (10 mins)

- 1) Have you ever driven an EV, either for business or personal use?
 - a. If so, was it **battery electric or plug-in hybrid**?
- 2) What do you think the benefits are of driving an electric vehicle? **(prompts if needed after initial answer-> e.g., financial incentive, financial savings, suitability of EVs for the business, reputation, regulation, operational performance benefits, safety, etc.)**
 - a. Where did you hear about these benefits?
 - b. Do you think you will drive an EV van in the future for work?
 - i. **If so**, when do you expect this to happen?
- 3) What would be the main barrier(s) to you buying/your employer giving you an electric van?
 - a) What would be the challenges in operating an electric van?
(prompts if needed after initial answers-> e.g., purchase/operating cost, suitability of EVs for business, reputation, lack of support, EV availability, lack of charging infrastructure, range anxiety, operational performance detriments, safety, access to suitably-sized on-street charging bays etc.)
 - b) Could you use an EV van to perform the tasks you need to do at work?
 - i. **If not**, what things would you be unable to do with an electric van?
 - c) Do you know of anything that would encourage you/your business to purchase an electric vehicle?
 - d) Would you have space at home/ at the depot for an electric charge point?

4 Smart charging (10 mins)

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- 2) What do you see as the benefits of smart charging? For you? For your business? For others/society?
e.g. savings on electricity costs
Benefits for society/Grid in terms of levelling out demand across the day

- 3) Now I'd like to ask you some questions about your awareness of and opinions about different types of smart charging technologies.

Are you aware of any of the following smart charging approaches?

- a) Static time-of-use energy tariffs
- b) Variable (or dynamic) price energy tariffs
- c) Supplier-controlled demand management systems
- d) Vehicle-to-everything (V2X) or Vehicle-to-grid (V2G) systems

Researcher to read out definition of a smart-charging approach.

- 4) What do you think about this approach?
- a) What are the advantages? What's appealing?
 - b) What might the challenges be in using this approach?
- 5) Now I'd like to ask you some questions about your awareness of and opinions about [other/different] types of smart charging technologies.
- Interviewer to move through all questions for a specific charging technology before repeating the questions for a new technology

(See below table for prompts)

Question prompts	Static time of use energy tariffs (Prompt about app)	Dynamic time of use energy tariffs (Prompt about app)	Third-party charge management schemes	V2X services	Mandatory managed charging
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What do you like about it? Do you see any advantages of using this type of smart charging? Would this be an acceptable approach for your business? Why/why not?					
What do you dislike about it? Do you see any barriers or challenges to using this type of smart charging? E.g., timing of price bands, level of user interaction required, potential for savings, state of charge guarantees. Would anything make this option unacceptable?					
What, if anything, might encourage you to adopt this technology? E.g., cost savings, improved usability, environmental benefits, better control of fleet charging etc.					

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