Britainthinks
Insight & Strategy

Department for Transport

Public Electric Vehicle Charging Infrastructure

Deliberative and quantitative research with drivers without access to off-street parking

Research report

February 2022

Contents

1. Executive Summary

The Department for Transport (DfT) commissioned BritainThinks to conduct research exploring the future electric vehicle (EV) charging needs and preferences of **drivers without access to off-street parking**. BritainThinks designed two phases of work to explore current consumer attitudes and motivations in relation to future chargepoint needs.

The first phase involved a **large-scale deliberative project** with 90 UK drivers without access to off-street parking at home, including a mix of 61 non-EV (i.e. conventional petrol and diesel) drivers and 29 battery electric vehicle (BEV) drivers. Fieldwork took place online over three weeks between 16th June and 21st July 2021.

The second phase complements the deliberative research with a **quantitative survey** of 1,006 UK non-EV drivers only without access to off-street parking, covering current behaviours and perceptions of electric vehicles. Fieldwork took place online between 2nd and 15th September 2021.

This research has highlighted a series of key themes among drivers without off-street parking, relating to driving and parking behaviours and perceptions of how charging a BEV would fit into existing habits. Non-EV drivers without off-street parking are strongly wedded to their current driving and parking behaviours – particularly rural drivers, parents of young children and drivers with mobility issues. **There is a perception that a BEV would not fit well with existing driving and parking habits.** The perceived difficulty and subsequent inconvenience of charging a BEV is seen to diminish the door-to-door nature, autonomy, and flexibility that people currently enjoy about driving.

These views are exacerbated by low awareness, poor knowledge, and some misconceptions about BEV charging, costs and electric driving range. There was a common misconception amongst non-EV drivers without access to off-street parking that charging a BEV would be more expensive than refuelling an internal combustion engine vehicle (ICEV). For many, there is confusion about how often a BEV will need to be charged, and how long it takes. The concept of 'topping up' a battery's charge rather than charging a full battery was difficult to envisage. For example, of the non-EV drivers without off-street parking surveyed, 41% believed a BEV needs to be charged every day. These misconceptions all contribute to range anxiety.

Findings from the deliberative research suggest that **the appeal of potential options for charging relates primarily to convenience and how closely they could fit into existing driving and parking habits.** The vast majority (69%) of non-EV drivers without off street parking surveyed said they habitually park their car in front of or near their house every night. Moreover, almost four in five (79%) reported their walking time to typically be less than two minutes, and almost all (95%) reported a walk of 10 minutes or less. Consequently, future overnight charging solutions that require parking further away from home (e.g. in council car parks or local hubs further away) would require a significant change in behaviour and are less appealing to non-EV drivers.

Figure 1: Summary of future charging scenarios tested in the deliberative research

Of the potential charging options tested in the research, **near-home charging was most appealing and desired as the primary charging solution in future**. 'Rapid charging as you go' and 'charge where you are' (i.e. charging at destinations where people regularly park their car), whilst also appealing, were generally seen as 'back up' or secondary options to support charging near home.

Charging at workplaces, places of education and destinations such as supermarkets are appealing for most current BEV drivers without off-street parking as well as non-EV drivers with compatible routines. Up to 49% of non-EV drivers surveyed reported parking at a workplace or place of education at least once a week**.** As these drivers reported parking at these locations for a long time, workplace/place of education charging could therefore be an effective and convenient solution for many. This, however, still leaves a substantial proportion of non-EV drivers who reportedly park at their workplace/place of education less than once a week (5%) or never (47%).

The vast majority of non-EV drivers (68%) reported parking at a supermarket once a week or more frequently, with an average length of stay of just 53 minutes. However, BEV and non-EV drivers in the deliberative research indicated changes in their habits as a result of Covid-19 (i.e. switching to remote working, online shopping) and for some, there was a lack of clarity about behaviours and routines in the longer term. This uncertainty makes it unclear what proportion of drivers will perceive these types of destination charging solutions as appropriate or appealing in the future.

The research also suggests that more exposure to BEVs and associated charging behaviour could help non-EV drivers see a bigger role for some potential solutions, making them more appealing. Whilst generally appealing, the use of destination charging is not viewed as a sufficient, standalone option for charging in future, even in locations where drivers park frequently and regularly. This is due to its perceived inconvenience compared to near-home charging and partly because non-EV drivers do not know enough about the possibility of speedier charging and/or the role of 'topping up'.

However, the research indicates that current BEV drivers regularly top up their charge in addition to fully charging once a week and before any long trip. Consequently, current BEV drivers would welcome additional charge points at destinations. This suggests that, upon making the transition to a BEV, some non-EV drivers may similarly not feel the need to exclusively fit charging into their existing driving and parking habits.

The research also found that **many of the issues that non-EV drivers anticipate around charging, including the expected impact on current routines, align with actual experiences of current BEV drivers without access to off-street parking**. These include charging taking too long, the limited range of BEVs, and public chargepoints not yet being widespread. BEV drivers have (somewhat grudgingly) adapted and find they can usually work around common issues by planning ahead, identifying multiple chargepoint options in case they are not working or already occupied (either by another BEV or being wrongfully occupied by a petrol or diesel vehicle), and factoring more time into their journeys.

However, there are some challenges that they did not anticipate prior to switching to driving a BEV – including not having access to correct information about chargepoint availability/working status and having to navigate a wide variety of specific payment methods and apps. In addition, lack of availability of chargepoints on arrival at destinations was also identified as an issue that could be addressed to improve charging experiences in future.

During the deliberative research, non-EV drivers without access to off-street parking concluded that, in addition to fitting with existing habit and proximity, **reliability and dependability of charging solutions are essential aspects when considering switching to a BEV**. The research also found that BEV drivers would rather travel some distance to have guaranteed charging, than be 'caught out' in urgent situations with unreliable charging points.

Current BEV drivers without off-street parking have adapted their behaviours to fit charging into their journey planning; however, while they are currently willing to plan ahead and factor in more journey time to enable charging, they would prefer to see charging more seamlessly integrated into driving and parking behaviours in the longer term. Meanwhile, for many non-EV drivers without access to off-street parking, hesitance in transitioning to a BEV is linked strongly to the combination of 'range anxiety' and concerns about driving on longer journeys or in unfamiliar areas where they may not be able to find a charging point. For this segment of consumers, seeing evidence of how charging can align with existing driving and parking behaviours will be vital in making the switch to electric.

Continuously evolving consumer habits, charging preferences and innovative technologies will affect future BEV charging infrastructure provision and needs. This research provides in-depth insight into drivers without off-street parking at an early stage of the EV market. This research identifies the importance of reliable charging close to where vehicles are regularly parked, for both current and future BEV drivers, and offers views on how charging a BEV could best fit into people's current lives.

2. Background and objectives

2.1. Introduction

The Government has committed to delivering an EV Infrastructure Strategy, as set out in the National Infrastructure Strategy. The EV Infrastructure Strategy will set out the vision for charging infrastructure rollout needed to successfully achieve the 2030/35 phase out of petrol and diesel vehicles, and to accelerate the transition to a zero-emission car and van fleet. Understanding consumers' needs is central to the strategy, to identify how to overcome current barriers to EV uptake.

Existing data indicates that at-home charging accounts for 75% of current EV charging demand. However, just under a quarter (24%) of households in England do not have access to off-street parking and will not be able to take advantage of home charging as most EV drivers currently do. This makes charging a significant barrier to EV uptake for this segment of the population, especially since public charging provision is currently unevenly distributed across the country.

In June 2021, the Department for Transport (DfT) commissioned BritainThinks to conduct a deliberative research project exploring the future charging needs and preferences of drivers without access to off-street parking, and to understand whether increased provision of specific charging options would encourage future uptake of battery electric vehicles (BEVs) amongst this audience.

2.2. Research objectives

Specifically, the research sought to understand:

- BEV and non-EV drivers' current driving and parking behaviours and attitudes
- BEV drivers' current charging behaviours and how they plan journeys around charging; for non-EV drivers, how they anticipate charging would impact journey planning
- BEV drivers' concerns or issues, if any, with current public charging provisions
- BEV and non-EV drivers' views on different charging options and locations, including the extent to which expectations change when becoming a BEV driver and what triggers these changes
- Non-EV drivers' priorities and dealbreakers for charging when considering switching to a BEV
- Extent to which non-EV drivers could imagine driving a BEV in their current circumstances, including perceived and actual barriers to switching
- What is possible and feasible for existing and future BEV charging and parking solutions, including identifying the criteria for feasibility (i.e., what do people need from a solution for it to work?)

- Testing appetite for future BEV charging solutions (i.e., in 5 years' time)

2.3. Glossary of terms used in this report

2.3.1. Vehicle types

- **Electric Vehicle (EV):** A vehicle powered using an electric motor. This includes battery electric vehicles (BEVs) and hydrogen fuel cell vehicles (FCVs). Sometimes vehicles that are partially powered by electric motors, such as plug-in hybrids (PHEVs), are included in this category.
- **Battery electric vehicle (BEV):** A vehicle that runs on a battery-powered electric motor only. BEVs are recharged by plugging the vehicle into a source of electricity (charging point). When people talk about 'pure electric', 'fully electric', or 'all-electric' vehicles, they are normally talking about BEVs.
- **Plug-In hybrids (PHEVs):** Has both a battery-powered electric motor and an internal combustion engine (ICE). Can travel medium distances (up to c.40 miles) on just electric power.
- **Internal Combustion Engine Vehicle (ICEV):** A vehicle that uses only petrol or diesel to fuel an engine. Currently, most cars in the UK are ICEVs.

2.3.2. Charge point types

- **Slow charging:** Slow charging points usually operate at 3kW – 7kW and take 10-12 hours to fully charge.
- **Fast charging:** Fast charging points usually operate up to 22kW and take 4-6 hours to fully charge.
- **Rapid charging:** Rapid charging points usually operate at around 43kW and take 30min -1 hour to fully charge.

2.4. What is deliberative research?

Deliberative research is an established method of generating in-depth insight to inform decision-making. It is a technique that helps to enable productive conversations on complicated or uncertain subjects.

In deliberative approaches, participants learn about a topic that they might know little about or may not typically think about in much depth in their day-to-day lives. Participants engage with information, evidence, and expert opinion, (including written descriptions, images, and videos) as well as reflecting on their current habits. This enables them to develop informed views on complex topics that cannot be suitably covered in traditional research (such as focus groups or surveys).

Deliberative approaches seek to understand the public's values and explore how they make difficult trade-offs, after weighing up different evidence and information. It is also an opportunity to see why seemingly 'logical' solutions might be rejected.

A Specialist Group provided expert views to inform the information that was provided to participants, as well as to ensure that the discussions built on existing industry knowledge and academic thought as far as possible.

We would like to thank each member of the Specialist Group for their valuable contribution.

Professor Tim Schwanen
Christopher Allwinter
Stephen Skippon
Jacob Roberts
Melanie Shufflebotham
Rolle Nieminen
Lauren Pamma
Matthew Ledbury

We would also like to thank EVA England and New AutoMotive for their support with recruiting research participants.

3. Methodology

To address the research objectives, BritainThinks designed a **large-scale deliberative project** with 90 UK drivers without access to off-street parking at home, including 61 non-EV drivers and 29 BEV drivers. The deliberative research was complemented by a **quantitative survey** of 1,006 non-EV drivers without access to off-street parking.

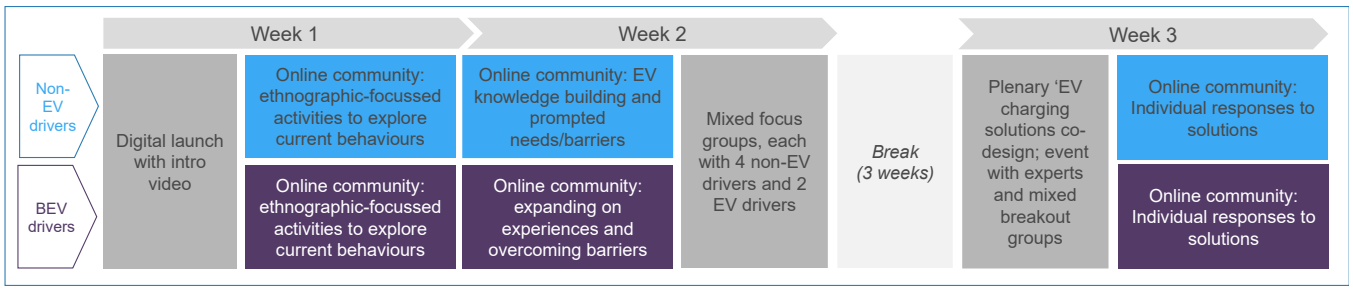
[Alongside this research, a quantitative survey with 800+ EV drivers including those with and without off street parking was also commissioned to a later delivery. Findings from this work will be published separately in 2022, once complete.]

3.1. Deliberative research

While there is no 'set' method of conducting deliberative research, traditionally it is typically conducted face-to-face, in reconvened workshops with relatively large groups of the public. However, since the Covid-19 pandemic, BritainThinks have been undertaking deliberative research using an innovative approach to 'digital deliberation'.

At the core of this approach was a three-week online community accompanied by regular online focus groups for all participants, with a three-week participant break built in between after Week 2 to enable earlier findings to feed into materials design for Week 3. Throughout the deliberative programme, participants therefore engaged in a combination of live and 'asynchronous' (i.e., completed in participants' own time) activities. This allowed them to build their knowledge over the course of the research and have time to reflect and absorb information in a natural way.

Figure 2: Approach to the deliberative research



3.1.1. Structure

Digital launch with introductory video for all participants, delivered via the online community platform. Video (1min 48sec) provided background to the research and was delivered by OZEV.

Online community for all participants, on which participants accessed and completed a variety of activities before and in between the live events. Participants submitted responses to the activities by text, video and pictures, and the community was actively moderated by research to probe responses and challenge participants.

There was a total of 10 activities over the three weeks of fieldwork.

- Week 1: Ethnographic-focussed activities exploring current driving behaviours including journey types, parking habits, refuelling/recharging habits, attitudes to BEVs, attitudes to technology more broadly.
- Week 2: For the non-EV driver audience, activities focussed on BEV knowledge building and prompted needs/barriers related to BEV charging. For the BEV driver audience, activities focussed on expanding on their BEV charging experiences and how they overcome any barriers.
- Week 3: Activities focussed on ascertaining individual responses to potential future BEV charging solutions introduced in the co-design event (see below) and the impact of these potential future solutions on anticipated uptake of BEVs amongst the non-EV driver audience.

Online focus groups for all participants, in smaller groups of up to 6 participants. Groups were mixed, with 4 non-EV drivers and 1-2 BEV drivers per group, to help generate discussion and bring in BEV drivers' first-hand perspectives of charging to challenge non-EV drivers with low prior knowledge.

- Focus groups, Week 2: 15 live online focus groups run in parallel, lasting 90mins each. Discussions sought to understand in more detail the assumptions (amongst the non-EV driver audience) and experiences (amongst the BEV driver audiences) of BEV charging, perceived barriers, perceived responsibility for provision of public charging infrastructure, and awareness and perceptions of current BEV schemes.
- Co-design live event, Week 3: Live event lasting 2 hours, bringing together participants and experts to explore and workshop future potential charging solutions. This event consisted of an initial plenary session, followed by 15 simultaneous break out groups (group configuration was the same as for the previous focus groups in Week 2).

Fieldwork took place between 16th June and 21st July 2021, with a three-week participant break between 25th June and 14th July.

3.1.2. Sample

Participants were recruited to provide an inclusive sample reflective of UK drivers, including:

- A spread of locations, including minimum quotas for people residing in each of the devolved nations and across Government Office Regions (GORs).
- A spread of demographics, including gender, age, ethnicity, rural/urban, disability, mobility impairments and socio-economic groups.
- A range of attitudes and behaviours in relation to travel, modal use, and technology.
- It should be noted that BEV drivers without access to off-street parking were difficult to recruit into the study due to the low incidence of this audience in the wider UK population, resulting in less of a spread of locations, demographics and attitudes/behaviours being achieved than for the non-EV driver audience.

Each participant went through the whole research process, allowing us to learn about their 'starting position', and then slowly build their knowledge and understanding to enable them to comment on complex and unfamiliar concepts around travel choices and scenarios.

The full sample recruitment specification is available under Appendix 10.1.

3.2. Quantitative research

BritainThinks ran an online survey of 1,006 non-EV drivers without access to off-street parking – all of whom were UK adults aged 18+ - to complement and supplement findings from the deliberative research. A single question was run on an online omnibus study to establish the incidence of non-EV drivers without access to off-street parking in the population, and in line with this the sample was weighted to be representative of this audience by age, gender, income and region. Details of the final sample are shown in Appendix 10.2. of this report.

Fieldwork was conducted via an online panel using a 31-question survey, covering a range of topics. The questions relevant to the qualitative research strand include:

- Frequency of undertaking different journey types by driving, and typical distance travelled for each
- Attitudes and behaviours related to overnight parking, including walking distance between where vehicles are parked and home
- Attitudes and behaviours related to destination parking during the day
- Intention to replace the main vehicle used in future, including when this would happen, intended replacement vehicle type (i.e., ICEV / PHEV / BEV), and whether the replacement vehicle would be purchased/leased new or second-hand
- Attitudes towards EVs and EV charging
- Level of appeal of a series of potential future charging options
- Understanding what would make non-EV drivers more likely to consider purchasing/leasing an EV in future

Fieldwork took place between 2nd and 15th September 2021.

4. A guide to reading this report

- Throughout the report, findings refer to the deliberative research, with survey findings explicitly signposted as quantitative results.
- Verbatim quotations, taken from the deliberative research (live sessions and excerpts from the online community), are included throughout. Attributions refer to whether the participant is a BEV or non-EV driver (without access to off-street parking) and the rurality where they live (urban, suburban, rural).

4.1. Contextualising responses

Throughout the research, non-EV drivers without access to off-street parking were asked to answer questions imagining that they had a BEV or needed to undertake BEV charging themselves. They were always asked to answer these questions in the context of their current circumstances – including where they currently live without access to off-street parking, as well as the types of journeys they currently drive for.

All participants in the research did not have access to off-street parking, and this context should be borne in mind when reading the report. When testing future charging solutions, the term 'near-home charging' was used in the context of participants not having access to off-street parking. Therefore, in this report 'near-home charging' refers to on-street charging solutions in close proximity to home.

4.2. Stimulus and information shown

We have included stimulus and information shown to participants throughout the body of this report to contextualise the findings. Other information provided throughout the research that has not been incorporated into this report can be found in Appendix 10.4 (for the deliberative research) and Appendix 10.5 (for the quantitative survey) for reference.

4.3. Baseline versus informed views

This report primarily focusses on findings from the deliberative research, with key findings from the quantitative research also included where relevant.

Participants developed informed views towards BEV charging during the deliberative process.

- Participants were shown information and evidence about BEV charging, as well as hearing from experts and reflecting on their own experiences. This means that they became more informed and knowledgeable on the topic of BEV charging as they progressed through the research process.

Respondents to the quantitative survey were 'fresh' to the topic of BEV charging compared to the deliberative participants.

- They were not provided with the same level of information that the deliberative participants received and did not have as much time to reflect. Therefore, the quantitative findings should be treated as a less informed baseline for public sentiment towards EV charging.

As a result, occasionally the findings from the deliberative research may differ slightly to those from the quantitative research. We have flagged this where relevant in this report and accounted for it in our analysis and interpretation of the insight.

5. Current behaviour and attitudes towards driving and parking

This section sets the context, providing a framework for understanding how current driving and parking behaviours, and people's perceived ability to be flexible in these, influence their views towards EV charging.

5.1. Driving

Driving is the preferred mode of transport for the vast majority of journeys, particularly routine journeys (those which participants undertake regularly). Participants gave many reasons for choosing to drive for their routine journeys, most of which pointed to **the 'door-to-door' nature of driving as a key perceived benefit.** The main attractions of driving, in order of importance, included:

1. **Autonomy:** The ability to choose what route to take and what time to leave/arrive.
2. **Freedom:** The ability to go anywhere, any time, including to places inaccessible by public transport.
3. **Efficiency:** Driving is faster than the alternatives and is door-to-door.
4. **Ease:** Driving is the easiest option for transporting children, equipment, luggage and tools.
5. **Comfort:** Having private space for time alone, to listen to music and/or to keep as messy or tidy environment within the vehicle as preferred.
6. **Fun:** Many find the experience of driving fun, or enjoy the skill involved.

"I like the freedom to decide when you leave, when to stop and having your own controllable environment when traveling. It is often a lot less stress to know that if you drive you go from door to door without frustrating changeovers in transport." (EV driver, Urban)

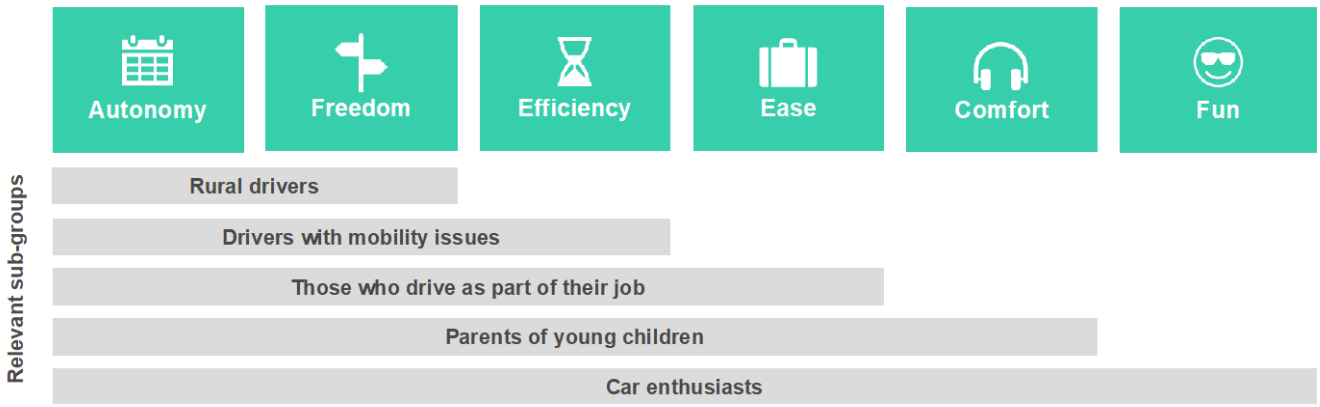
"The biggest one is the independence and freedom driving gives me – I wouldn't be able to reach my job without serious inconvenience if I couldn't drive as I would have to take 2 buses and walk 30 minutes or one bus, a train and the same walk. It would massively restrict my employment opportunities and therefore my aspirations." (Non-EV driver, Suburban)

"I can get from A to B in a comfortable travel environment, I do not need to be around inconsiderate others on public transport, and I can travel often, happy within my own space and undisturbed. I also feel super safe driving which is important as a woman living in London with a child." (Non-EV driver, Urban)

"I enjoy the physical activity of driving, I find it relaxing." (Non-EV driver, Urban)

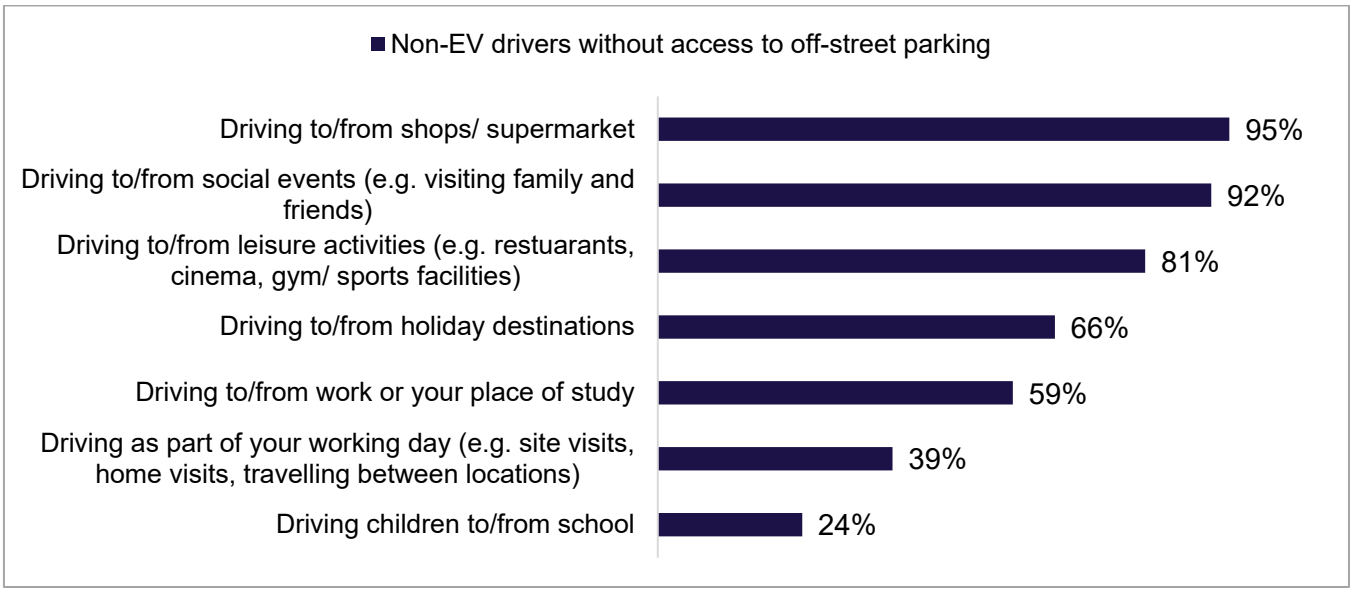
While these attractions of driving were relevant across audiences, some were particularly important to specific sub-groups as shown in Figure 3. Rural drivers and drivers with mobility issues often cited a lack of accessible, viable transport alternatives, making them highly reliant on being able to drive their own vehicle. Similarly, parents of young children and those who drive as part of their job felt that making their journeys would be substantially more difficult if relying on alternative modes of transport to the car.

Figure 3: The attractions of driving for subgroups in the sample



In the quantitative survey with non-EV drivers without access to off-street parking, respondents were asked which journeys they typically made in the main vehicle they use (Figure 4). The vast majority of respondents indicated that they drive to/from the supermarket (95%) as well as to/from social events (92%). Two thirds of participants drive for longer journeys to holiday destinations (66%), and just shy of three in five drive to/from their workplace or place of study (59%). While only 24% of respondents indicate that they drive children to/from school, this increases to 66% of parents with children under the age of 10.

Figure 4: Journeys ever made by driving

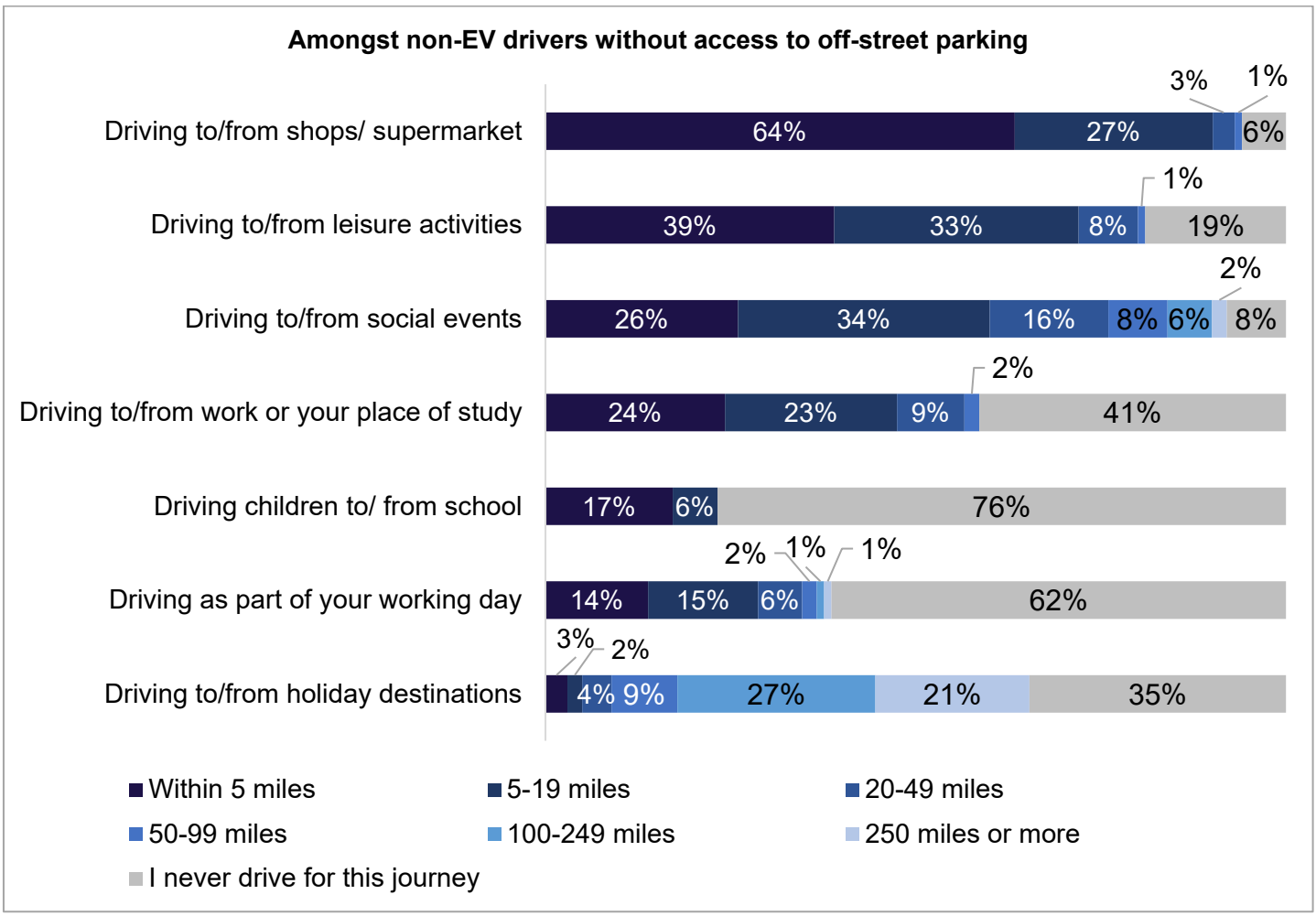


Q.3. Which of the journeys listed below do you ever make in the main vehicle that you use, and what is the typical distance you travel on each trip? (n=1006)

In the quantitative survey with non-EV drivers without access to off-street parking, respondents were also asked the distance typically travelled when undertaking different types of journeys

(Figure 5). Respondents were typically making shorter journeys under 20 miles, particularly when driving for journeys they undertake frequently, such as driving to/from the supermarket (91% of respondents).

Figure 5: Typical journey length for different types of journeys undertaken by driving



Q.3. Which of the journeys listed below do you ever make in the main vehicle that you use, and what is the typical distance you travel on each trip? (n=1006)

5.2. Parking

Parking was considered in terms of 'overnight parking' (i.e., at or close to home) and 'destination parking' during the day.

5.2.1 Overnight parking

When parking overnight, **most aimed to park as close to home as possible as this is a key part of the 'door-to-door' attraction of driving**. Proximity of parking to home is a key consideration for drivers without access to off-street parking when choosing where to park their vehicle overnight, with a common goal to park directly outside the home.

The key reasons why proximity was so important when choosing where to park overnight include:

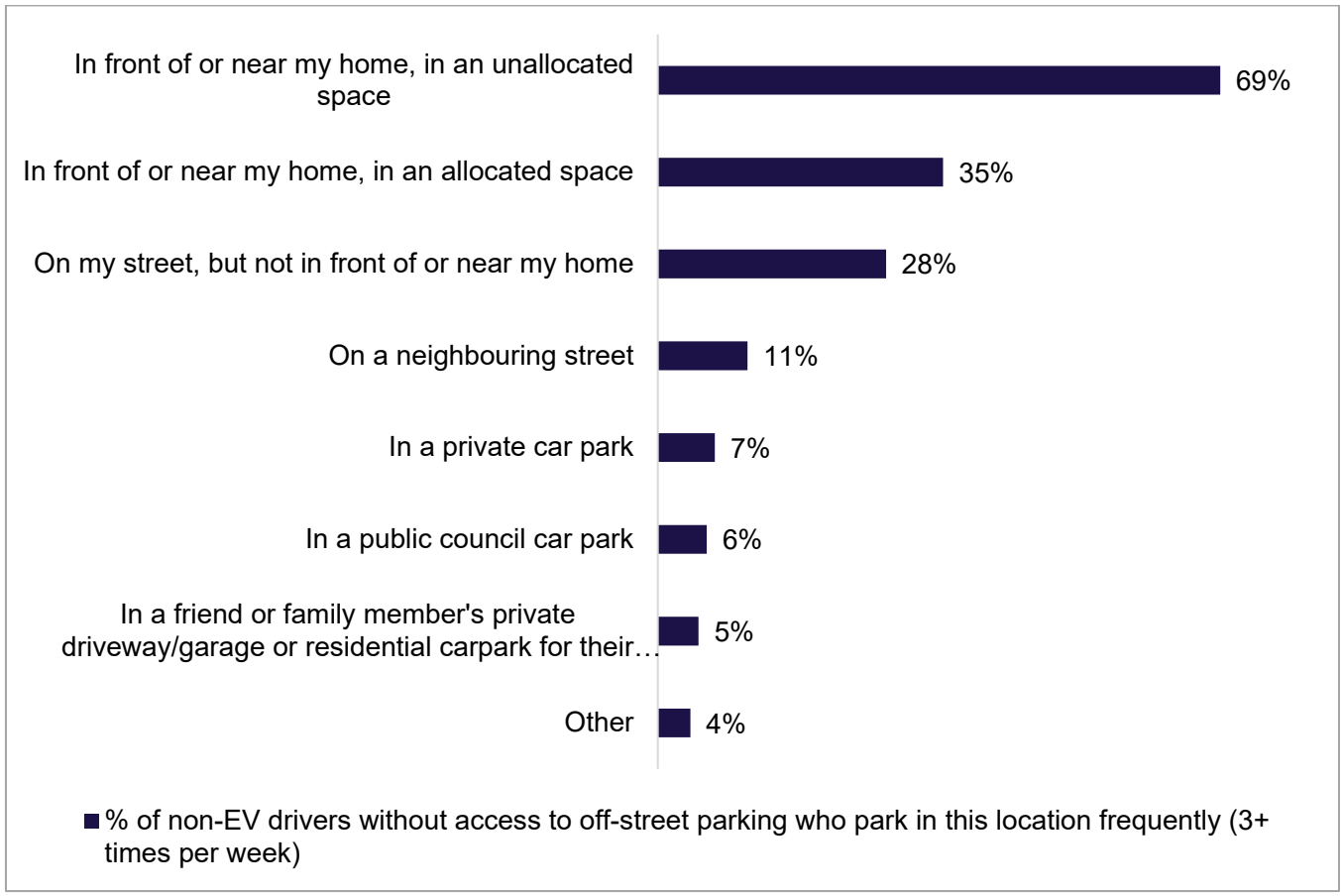
- **Comfort:** Keeping the walking distance (and time) between home and where the vehicle is parked to a minimum is preferred by most, although it is essential for people with mobility issues and/or parents of young children. It is also important across the board when carrying heavy items, such as groceries.
- **Efficiency:** A longer walk between home and where the vehicle is parked extends the total trip time, meaning it is also seen as less efficient than what they expect to achieve when choosing to drive.
- **Safety:** Drivers, particularly women, aim to limit the need to walk to/from their vehicle alone at night, while parents choose parking spots that minimise the risks to their children's safety when getting in and out of the vehicle.
- **Vehicle security:** Being able to see the vehicle from home was reassuring in terms of the safety of the vehicle and preventing damage or theft.

  "Benefits of parking outside my house include being able to safely let the children in and out of the car when outside our door and unloading shopping etc. Downsides if it's parked across the road involve making sure the children cross safely to the door." *(Non-EV driver, Urban)*

Participants described feeling annoyed or frustrated when unable to park overnight in their 'usual spot', especially if they were often able to park directly in front of their home.

In the quantitative survey, non-EV drivers without access to off-street parking reported usually being able to achieve their desired outcome of finding overnight parking in close proximity to home. Respondents were asked how often they parked the main vehicle they use in a variety of locations overnight (Figure 6), with more than two thirds (69%) reportedly parking 'in front of or near my home, in an unallocated space' 'frequently' (3+ times a week), with only 19% indicating they never park in this location.

Figure 6: Overnight parking by location and frequency of parking here

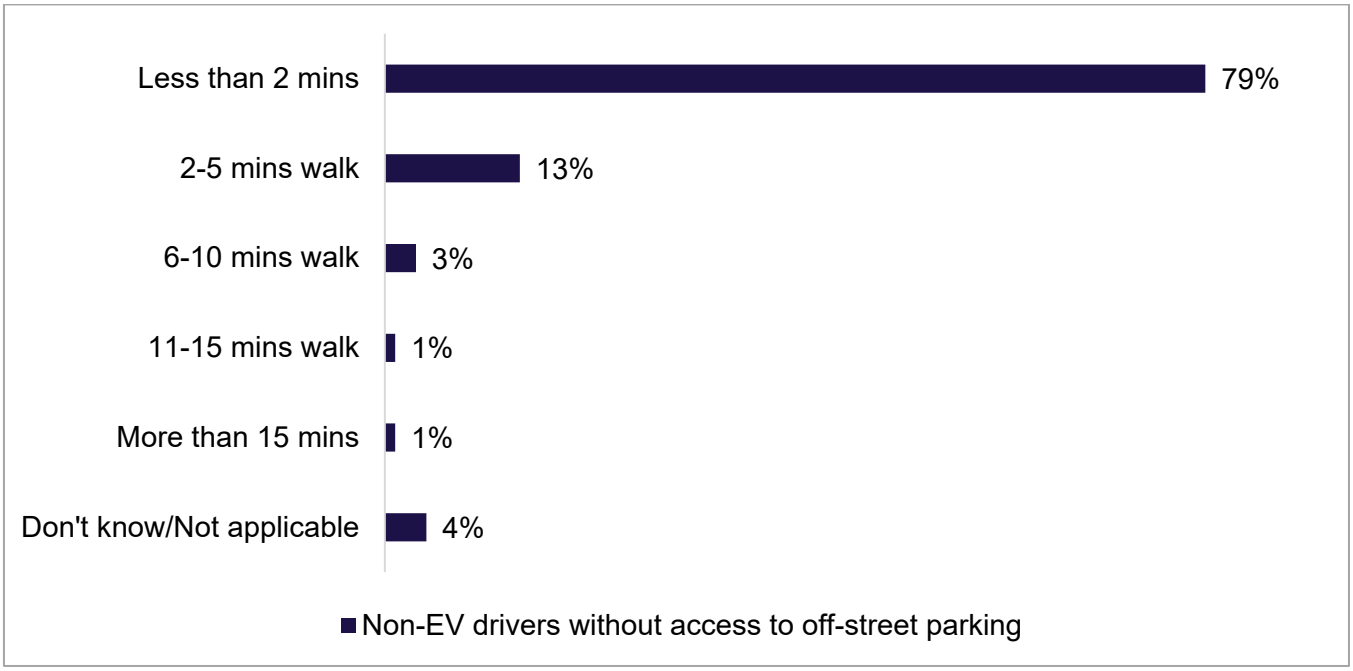


Q4. How often do you park the main vehicle that you use in each of these locations overnight? (n=1006)

Linked to this, the vast majority of respondents in the quantitative survey reported short walking times between their home and where they typically park their main vehicle overnight (Figure 7). Close to four fifths (79%) of non-EV drivers without access to off-street parking who took part in the quantitative survey reported their walking time to typically be less than two minutes, and almost all (95%) reported a walk of 10 minutes or less.

- Younger people aged 18-34 years old were significantly less likely to report usually parking within 2 minutes' walk from home (64%), compared to 84% of those aged 35-54 years old and 87% of those aged 55+ years old.

Figure 7: Distance typically walked between home and overnight parking spot



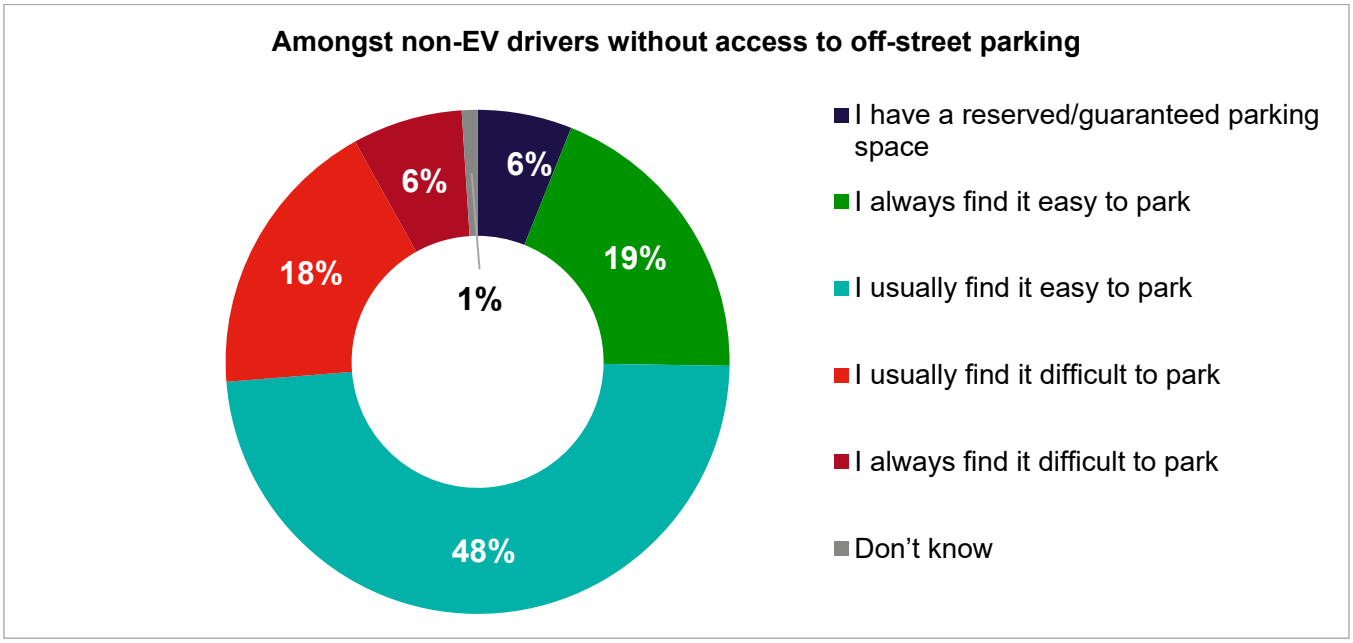
Q6. Still thinking about overnight parking at or near home for the main vehicle that you use… How long does it typically take you to walk home from where you park your main vehicle overnight? (n=1006)

Furthermore, the majority of respondents reported that it is easy to find parking for their main vehicle overnight. The quantitative survey asked non-EV drivers without access to off-street parking how easy or difficult it is to find a parking space for the main vehicle they use when parking overnight. Almost three quarters of respondents (73%) reported that they 'always' or 'usually find it easy to park' compared to almost one quarter (24%) who report to 'always' or 'usually find it difficult to park' (Figure 8).

- Those living in rural areas were significantly more likely to say that they 'always' or 'usually find it easy to park' (80%) compared to those in urban areas (69%).
- Older people aged 65+ were significantly more likely to say they find it easy to find overnight parking (85%) compared to those aged 18-34 (68%).
- Those without children were significantly more likely to say that they 'usually' or 'always find it easy to park' (76%), compared to those with children under 10 years old (67%).

Yet, even among the 24% of non-EV drivers without access to off-street parking who say it is 'usually' or 'always' difficult to park, 56% still say they typically walk less than 2 minutes between their vehicle and home, suggesting that even small distances are perceived as problematic.

Figure 8: Ease of finding overnight parking for main vehicle



Q5. Still thinking about overnight parking at or near home for the main vehicle that you use… To what extent do you typically find it easy or difficult to find a parking space for the main vehicle that you use when parking overnight? (n=1006)

Amongst participants in the deliberative research who did find it difficult to find overnight parking in close proximity to home, the key challenges were:

- Competition for parking spaces from other residents on the street, especially where participants believe many households on the street own more than one car.
- Competition for parking spaces from non-residents using spaces overnight, especially if there are destinations such as restaurants, pubs, shops, other leisure venues or a local high street nearby.
- Parking restrictions in their street reducing the availability of parking.

Conversely, there were a small number of instances in which participants reported actively choosing to park overnight in a spot further away from home. Examples included when there were parking restrictions dictating a time at which the vehicle needed to be moved the following day, and choosing to avoid parking in an area due to security concerns.

> *"I've had cars broken into and repeatedly vandalised on my street – I can't keep my 1967 camper here because the insurance won't cover it on the street at this postcode." (Non-EV driver, Urban)*

5.2.2 Destination parking

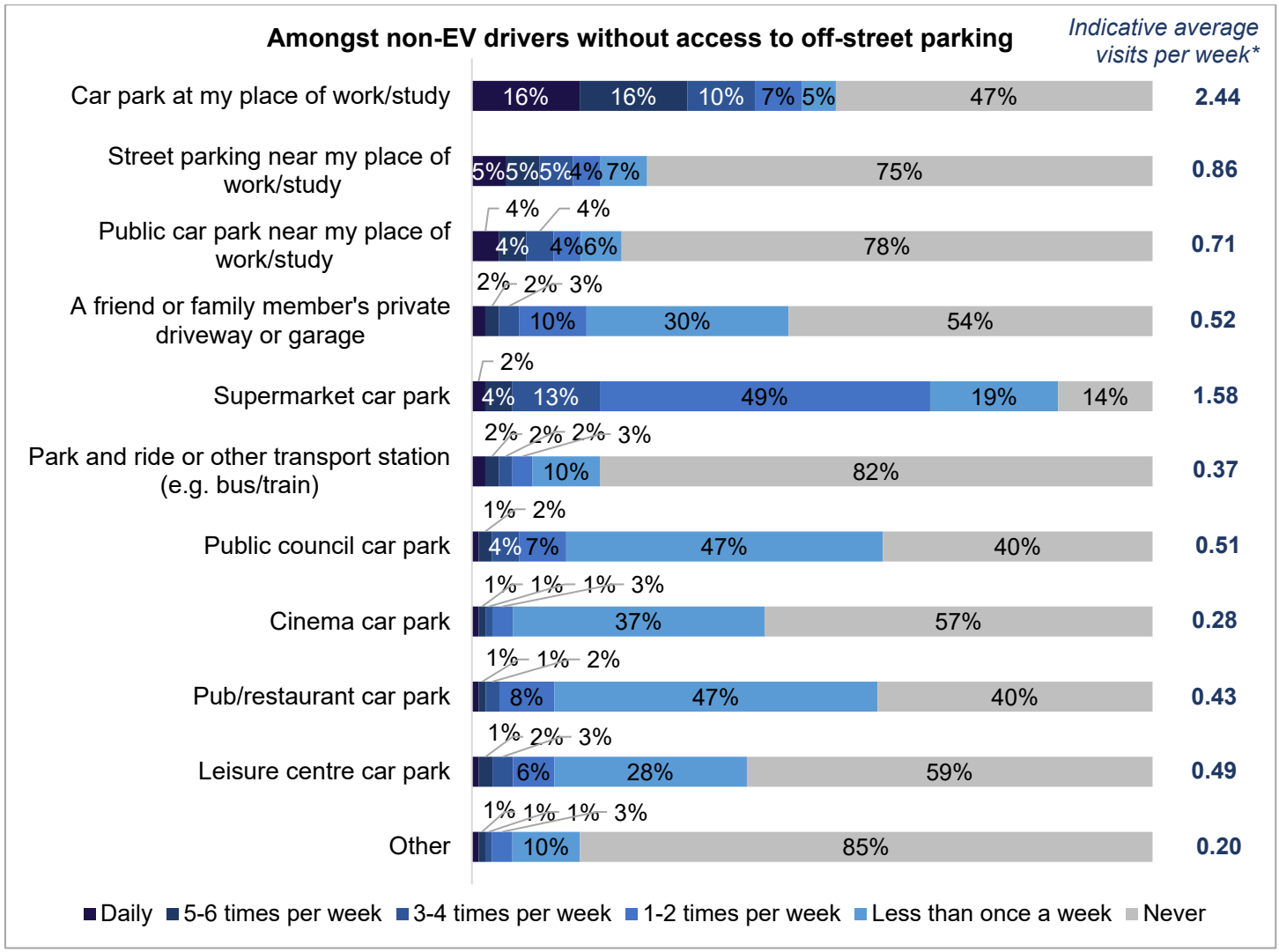
In terms of destination parking during the day, BEV and non-EV drivers without access to off-street parking indicated changes in their behaviour as a result of Covid-19, and for some a lack of clarity about how behaviours and routines will be in the longer term. Examples included working from home for all or part of the working week instead of driving into an office, and limiting the amount of time spent at shops and supermarkets to minimise contact with others.

"I have never willingly spent over 45 minutes in a supermarket and with Covid many more people choose online shopping for their main shop." (BEV driver, Rural)

Yet in the quantitative survey, amongst non-EV drivers without access to off-street parking, the majority were still parking away from home at least once a week. Respondents were asked how often, if at all, they would park the main vehicle they use in each of a variety of locations in a typical week (Figure 9). The most common location respondents reported parking at was supermarket car parks, with more than two thirds of respondents (68%) indicating that they parked here at least once in a typical week. Younger respondents (aged 18-34) were more likely to make more trips to the supermarket by car in a typical week, with 11% reporting travelling there at least 5 times a week, compared to 5% of those aged 35-54 and 3% of those aged 55+. There were no significant differences between urban, suburban and rural respondents in the number of trips to the supermarket made per week by car.

Workplaces/places of education are also popular parking locations, with almost half of respondents (49%) parking in this location at least once a week, and close to a third (32%) parking here five days a week or more. Women were more likely than men to say that they never park at a place of work or study (53%, compared to 40% of men).

Figure 9: Frequency of parking in a variety of locations during the day



Q.7. How often, if at all, would you park the main vehicle that you use in each of the following locations in a typical week? (n=1006)

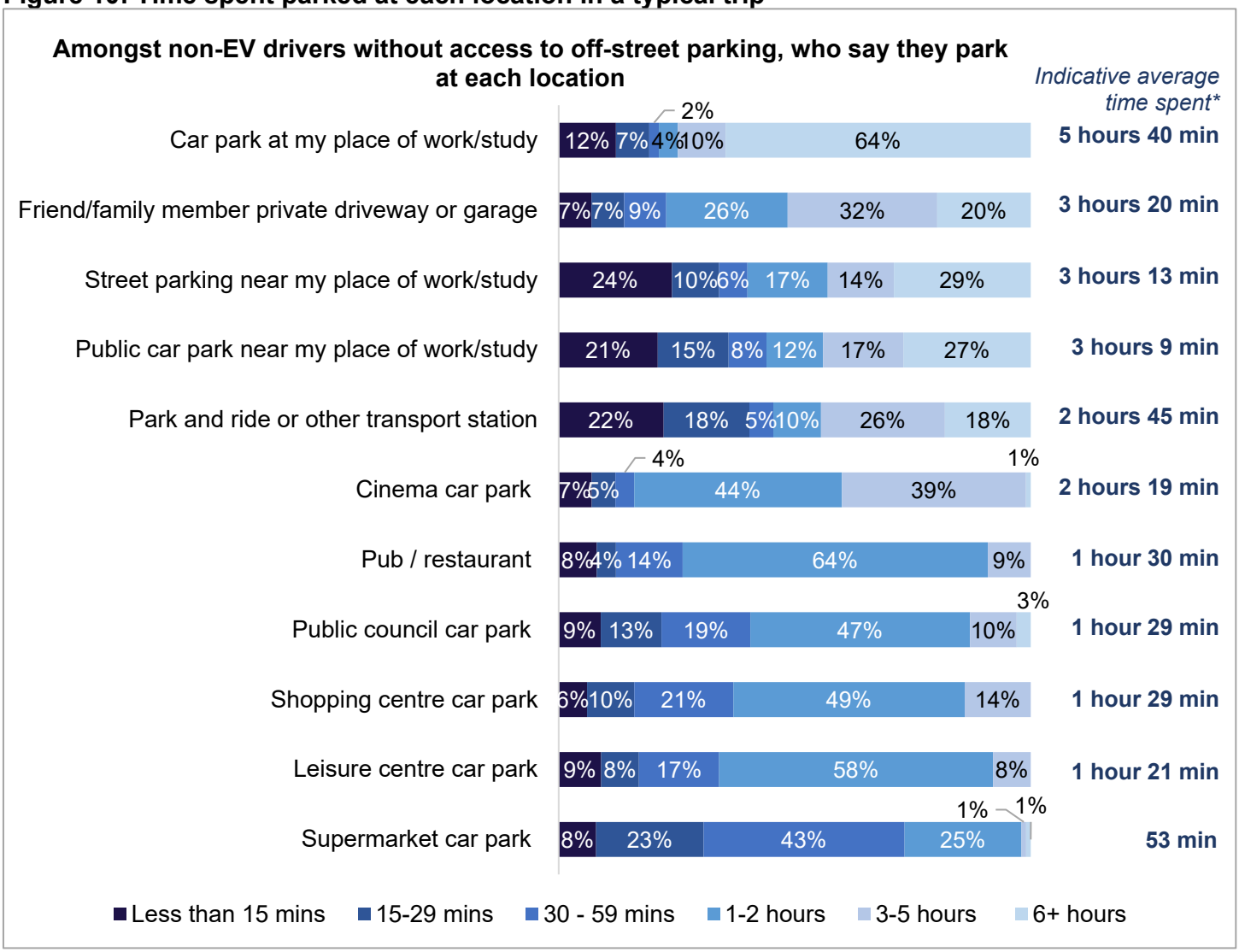
* Indicative average visits per week to each location was calculated by multiplying the mid-point of each answer code (e.g. for 5-6 time per week, the value taken was 5.5) by the number of respondents who selected the code, doing this for all codes for a given location before adding these values together and dividing the sum by the weighted base.

While the majority park at supermarket car parks at least once a week, length of stay is typically short (Figure 10). When asked how long they typically park their vehicle for in each of the locations they ever park at, almost three quarters of respondents (73%) report typically staying less than 1 hour at a supermarket car park.

- Supermarkets had the lowest average time spent parked with a time of 53 minutes, but the most frequent number of visits, suggesting that rapid charging may be useful in this location.

Time spent parked at workplaces/places of education, while used slightly less than supermarket car parks for daytime parking, was unsurprisingly reported to be longer. Almost two thirds of respondents (64%) who ever park in this location report that their typical stay is six hours or longer, with the average time spent parked at these locations being 5 hours and 40 minutes, indicating that slower charging would be sufficient here.

Figure 10: Time spent parked at each location in a typical trip



Q.8 And thinking about parking the main vehicle that you use in each of these locations, how long do you typically park your vehicle for? (Street parking near my place of work/study, n=253; Park and ride or other transport station, n=171; Public car park near my place of work/study, n=214; car park at my place of work/study, n=521; Leisure centre car park, n=406; Public council car park, n=606; Pub/restaurant,

n=585; Supermarket car park, n=869; Friend/family member's private driveway or garage, n=464; Cinema car park, n=430; Shopping centre car park, n=726; Other, n=151)
* Indicative average time spent at each location was calculated by multiplying the mid-point of each answer code (in minutes, e.g. for 1-2 hours, the value taken was 90mins) by the number of respondents who selected the code, doing this for all codes for a given location before adding these values together and dividing the sum by the weighted base.

5.3. Flexibility in current driving and parking behaviours

Understanding the level of flexibility that participants felt they had when it came to their current driving and parking behaviours, and any potential adjustments perceived to be required to transition to a BEV, is key to interpreting BEV and non-EV drivers' attitudes to EV charging in the remaining sections of this report.

Ability to be flexible with driving and parking behaviour is mixed, with some sub-groups better able to be flexible than others. In order of most to least flexible, these sub-groups included:

1. **Most flexible – BEV enthusiasts:** BEV drivers have typically had to change their driving (including journey planning and factoring in extra time for charging en route if necessary – see section 6.2.2. for more detail) and parking behaviour in order to transition to driving a BEV. They describe being motivated either by their love for the way their BEV feels when driving, having the latest 'cutting edge' technology, and/or reducing their carbon footprint. While these participants may still have some characteristics that make a transition to driving a BEV more difficult, such as being parents of young children, they are generally motivated to be flexible to accommodate any necessary changes in behaviour.

2. **Urban drivers:** Compared to rural drivers, urban drivers described having more alternatives to driving (such as public transport) available, though most still chose to travel by car. However, urban drivers do experience more difficulty parking than rural drivers, with 29% of urban drivers saying they find parking difficult, compared to 17% of people living in rural areas).

3. **Rural drivers:** Rural participants felt less able to be flexible on their driving behaviours and routines than urban participants, with many reporting having limited available or accessible alternative modes of transport nearby.

4. **Car enthusiasts:** These non-EV drivers enjoy the feeling of driving and see it as an important and necessary part of their lives. Although some in this group are hesitant about switching to a BEV, most would not rule them out.

5. **Parents of young children:** Drivers with young children described how their choices are limited by busy schedules, making efficient travel by car particularly important. The need to keep their children safe and entertained while travelling restricts their perceived ability to be flexible about parking and driving.

6. **Those who drive as part of their job:** These participants report being constrained by tight schedules requiring the most efficient mode of travel, as well as needing to carry heavy and/or a lot of equipment necessitating being able to park at or very close to their destination.

7. **Least flexible – those with mobility issues:** Some drivers with mobility issues cannot walk long distances. This means they often cannot be flexible with their parking behaviour, as parking as close as possible to home/another destination is essential for

minimising pain or discomfort. Some additionally reported that certain forms of public transport are not accessible to them, further limiting their flexibility.

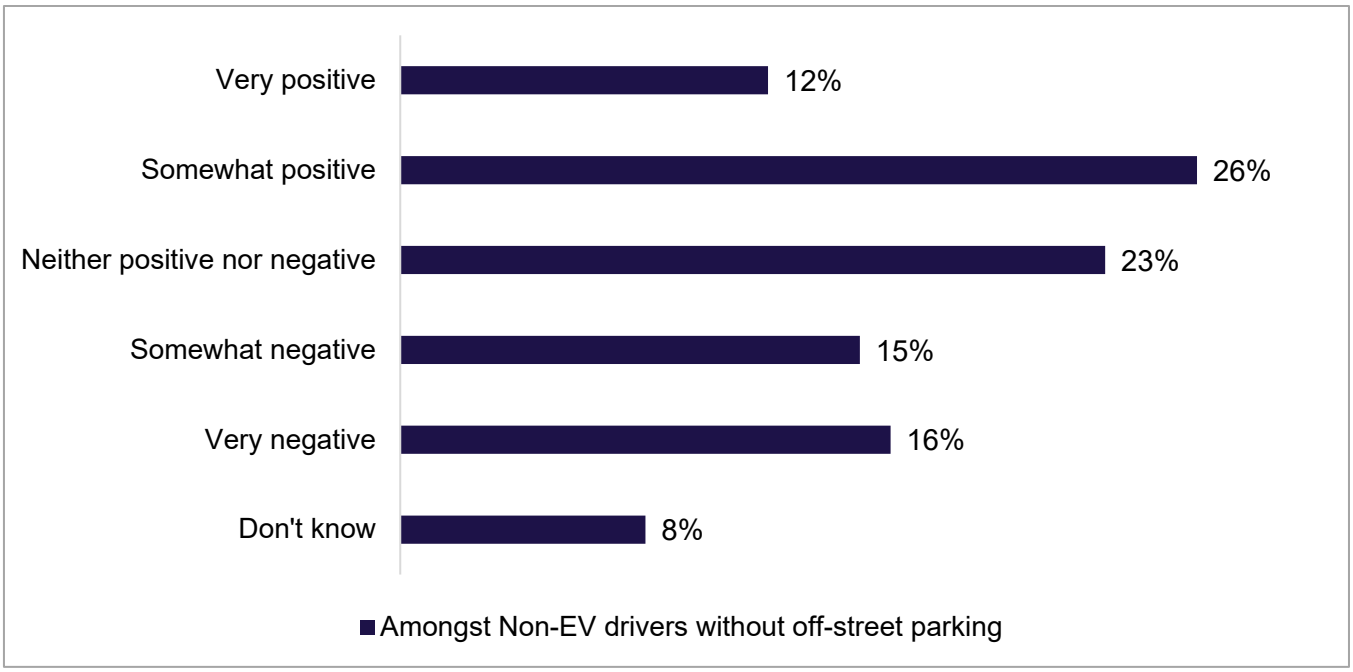
6. Perceptions towards BEVs and current charge point provision

Charging is a top-of-mind barrier to switching to a BEV amongst non-EV drivers without access to off-street parking, and issues of top concern were confirmed by BEV drivers with direct experience. While BEV drivers had some solutions rooted in preparation and routine to overcome these issues, others were more difficult to deal with and require systemic changes to the public charging network to overcome rather than individual adaptability.

6.1. Perceptions of BEVs

In the quantitative survey, when asked about the prospect of using a BEV as their main vehicle in the future, just shy of two in five (38%) non-EV drivers without access to off-street parking felt positive about the idea of using a BEV. A higher proportion of respondents felt positive towards BEVs than negative (30%), however a substantial proportion of respondents indicated that they felt neither positive nor negative (23%) or that they did not know how they felt towards BEVs (8%), indicating that knowledge and awareness of BEVs is low.

Figure 11: Views towards using a BEV as a main vehicle in the future



Q.10 How do you feel about the prospect of using a Battery Electric Vehicle (BEV) as your main vehicle in the future? (n=1006)

Those who were warmest towards BEVs included:

- **Younger adults:** 57% felt positive about BEVs compared to 36% of 35-54 year olds and just 22% of 55+ year olds.

- **Parents of children under 10:** 46% felt positive about BEVs compared to 36% of those without children under 18; although it should be noted that this is likely driven by parents of children under 10 being more likely to be younger, which correlates with younger adults being more positive about BEVs.
- **People living in urban areas:** 46% felt positive about BEVs compared to 28% of those living in rural areas; although it should be noted that this is likely driven by those living in urban areas also being more likely to be younger, which correlates with younger adults being more positive about BEVs.

Non-EV drivers without access to off-street parking spontaneously raise three key concerns that act as substantial barriers to switching to BEVs, including:

- **BEVs being seen as 'future tech':** Broadly speaking, BEVs are seen as a technology of the future and, while a transition is considered inevitable, it is not something that most think they should (or could) be actively considering today.
- **Expensive up-front cost:** For the minority who had already considered switching and/or started looking into BEVs, the cost of purchase is a significant barrier. This is particularly the case for those who usually purchase used vehicles due to the still emerging second-hand market.
- **Concerns about charging:** Perceptions of charging taking too long, limited range of BEVs and public charging infrastructure not being readily available or widespread were all mentioned spontaneously.

  "I'm a bit resistant to new technology in all forms so it's not something I'd willingly embrace until I know it's a definite success really. I like the idea but I'm cautious, I need more convincing that it's the right thing to do." (Non-EV driver, Suburban)

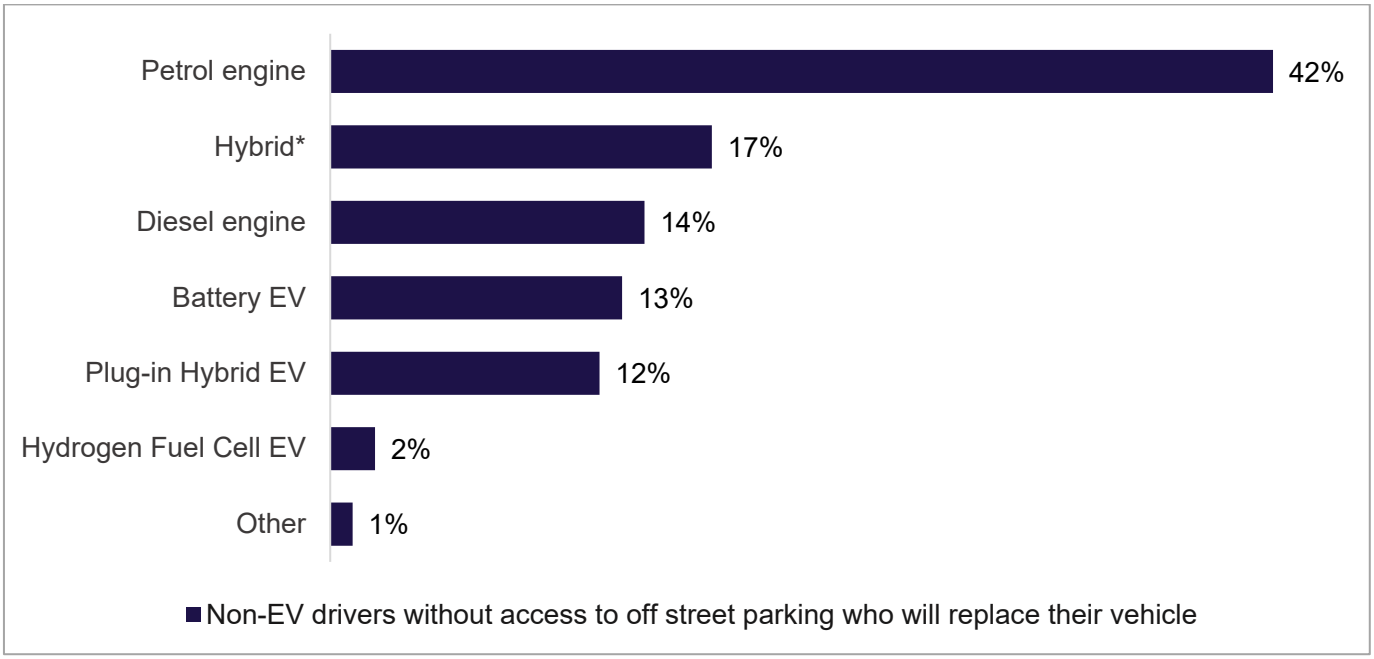
  "I can't see them putting charging points in my village. It would be great to see them everywhere, but I can't see it working at the moment. There's nowhere I could plug it in overnight near my home or work." (Non-EV driver, Rural)

In line with these perceived barriers to switching, the quantitative survey found that among non-EV drivers without access to off-street parking there was limited intention to replace a current vehicle with a BEV in the future (Figure 12). Asked when, if at all, they thought they would replace the main vehicle they currently use and what type of vehicle they would likely replace it with when the time came, almost two fifths (39%) of respondents reported that they would be most likely to choose a petrol or diesel vehicle. Just 9% of respondents indicated that they were most likely to choose a BEV, while 8% indicated that they would most likely opt for a PHEV. Among those who do intend to replace their vehicle in the future, close to two thirds (64%) indicated that they would buy a second-hand vehicle (likely 1-5 years old – 45%) while a quarter reported they would buy their replacement vehicle new (25%).

- Openness to switching to an EV decreased with age, with 25-34 year olds (15%) significantly more likely to report they will choose a BEV in future compared with 35-44 year olds (9%), 45-54 year olds (7%), 55-64 year olds (6%) and 65+ (2%).
- Men (11%) were also significantly more likely to indicate they will opt for a BEV in future than women (7%).

- Non-EV drivers considering purchasing or leasing a new vehicle are significantly more likely to opt for a BEV (44%) than a petrol (19%) or diesel (14%) vehicle.
- However, those who are choosing a second-hand vehicle in the future are more likely to stick with a petrol (73%) or diesel (78%) vehicle. Interestingly, more respondents opt for a PHEV (66%) than a BEV (35%) for second-hand purchase or lease.

Figure 12: Type of vehicle most likely to purchase or lease when replacing main vehicle in the future



Q.10. Thinking about the future and replacing the main vehicle you currently use, what type of vehicle do you think you will most likely purchase or lease? (n=681)
*Hybrid refers to a vehicle that recharges while driving and is ultimately fuelled by petrol or diesel – it cannot be plugged in to an external power source

6.2. Perceptions of BEV charging

6.2.1. Anticipated challenges to BEV charging

Non-EV drivers without access to off-street parking perceive a number of barriers to switching to a BEV that specifically relate to charging, including:

- **Charging taking too long:** Perceived long wait times for charging were viewed as inconvenient for many, particularly for those who have busy lives such as parents of young children and those who travel as part of their job.
- **Limited range:** 'Range anxiety' is widespread among non-EV drivers, with subsequent concerns around frequency of charging and charging 'on the go'. This is exacerbated by a lack of accurate understanding of vehicle ranges as well as how frequently charging is required, with many assuming daily overnight charging at a minimum.
- **Public charging infrastructure not yet widespread:** Lack of familiarity with existing charge points gives the impression that there is limited provision, creating concerns around the ability to charge.

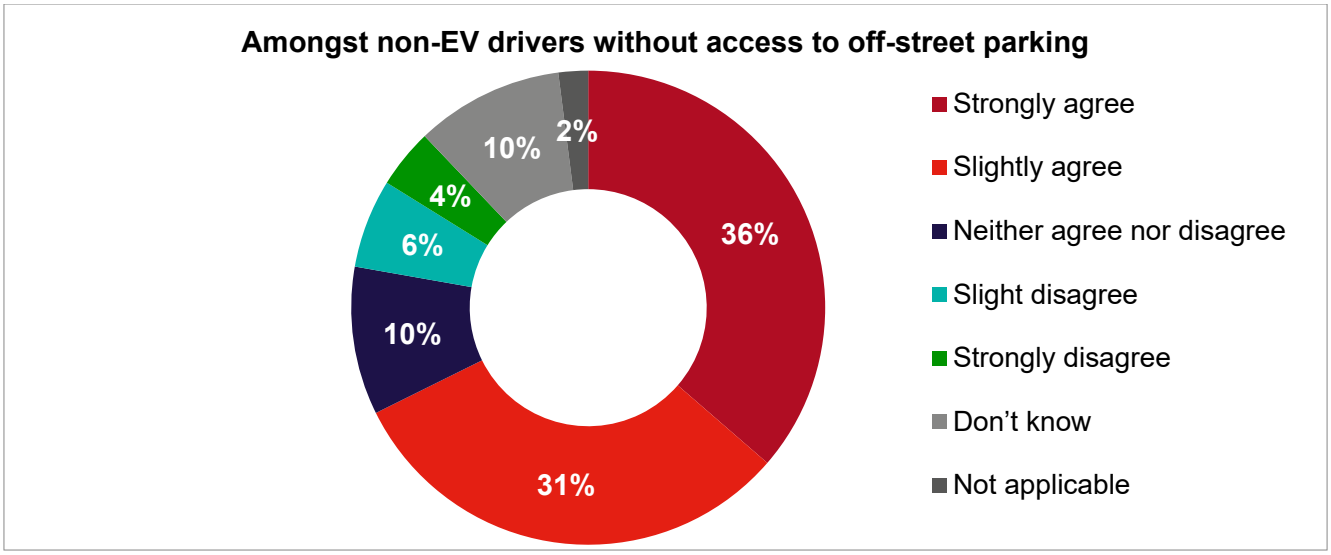
"Having to plan in advance when and where to charge... That goes closely with fitting charging into a busy routine. I'd literally have to leave my car and get a cab." (Non-EV driver, Urban)

"For me the biggest worry would be a lack of available charging points in the local area. If other people get there first and get to the charging points, you've got no options." (Non-EV driver, Urban)

Further, in the quantitative survey with non-EV drivers without access to off-street parking, more than two thirds of respondents (68%) agreed with the statement 'I don't think I would be able to access a BEV charge point when I needed one' (Figure 13).

- Participants aged 35-54 years old (70%) and 55+ years old (75%) were significantly more likely than those aged 18-34 years old (57%) to agree with this statement.
- Respondents with negative views towards BEVs were also significantly more likely to agree with this statement (89%) compared to those who felt more positively towards BEVs (58%).

Figure 13: Extent of agreement with that statement, 'I don't think that I would be able to access a BEV charge point whenever I needed one'



Q.13 To what extent do you personally agree or disagree with each of the following statements about Battery Electric Vehicles (BEVs)? (n=1006)

Charging behaviour is perceived as starkly different to current driving, parking and refuelling behaviour for non-EV drivers without access to off-street parking, making it a particularly big barrier for this audience when thinking about switching to a BEV. There are two facets to this:

- **Physical habits:** Broadly speaking, non-EV drivers without access to off-street parking feel that BEV charging would need to mirror existing driving and parking behaviours as much as possible in order to become a feasible option that they would consider. This includes the convenience of parking 'anywhere' when near home or at another destination, as well as the speed of refuelling at petrol stations.

- **Mental reassurance**: Non-EV drivers without access to off-street parking anticipate that they would need to change their current habits quite dramatically if they transitioned to a BEV, and are looking for reassurance that this change could be minimised or even (ideally) completely avoided. This is a key barrier to uptake that future policy will need to address, educate and reassure drivers on.

  "Owning a car is essentially about convenience, so I want to be able to charge at home, or charge in a way that doesn't interfere with my day. I would also worry about my car and my personal safety if I was charging away from home, so home charging would be my ideal." (Non-EV driver, Urban)

  "It has to accept contactless debit or credit card. It's crazy we still have chargers that don't do that. You go to a petrol station and pay with your card, no reason why you shouldn't be able to with a charger. I don't want to have to sign up with an account." (Non-EV driver, Urban)

  "I live in the middle of nowhere, my closest town is Yeovil and there's a few chargers in supermarkets, but it's hard to know availability of charge points around here. It's very new for us down here… A whole new thing. You don't see an awful lot of BEV's at all." (Non-EV driver, Rural)

It follows that non-EV drivers without access to off-street parking who are least flexible in their current driving, parking and/or refuelling behaviours (see section 4.4 'Flexibility in current driving and parking behaviours', Figure 5) show the greatest resistance to switching to BEVs – namely parents of young children, those who drive as part of their job, and those with mobility issues. The following pen portraits describe some of the perceived challenges for these sub-groups:

Figure 14: Pen portrait 1

Pen portrait 1 – Sam, parent of young children:

Sam juggles his own busy schedule alongside dropping off/picking up his kids for school, sport trainings, and birthday parties on weekends. He feels that a BEV would not suit his busy lifestyle because it would be too difficult for him to have to locate a charger and stop for an hour to charge, particularly with his children in the car.

"I wouldn't want to do a long journey and have kids in the car, then have to spend a couple of hours and spending money in services having to keep them entertained." (Non-EV driver, Urban)

Figure 15: Pen portrait 2

Pen portrait 2 – Alma, drives as part of their job:

Alma's job involves driving to new locations daily, often with little warning. She feels that a BEV would not work for her because she is often visiting unfamiliar areas where she thinks charge points are not guaranteed, and without enough advance warning to plan ahead. Alma is often in a location for 2-3 hours, which she doesn't think is enough time to charge.

"It would be considerably more difficult, constantly having to think about 'where is the next charging point?' and having to add time into the journey and my plans." (Non-EV driver, Urban)

Figure 16: Pen portrait 3

Pen portrait 3 – Sanjay, wheelchair user:

Sanjay is a wheelchair user, and requires convenient parking when he goes out. Although he is interested in BEVs and what they can do, he feels that current charging facilities do not meet his needs and that he would find them difficult to use. Sanjay needs to be able to park as close to his destination as possible and does not feel this would be possible.

"I'm disabled, so getting out and trying to plug in an EV would be a trip hazard for me." (Non-EV driver, Urban)

'Top up' vs. full charging

While neither strand of the research explicitly explored drivers' views towards 'top up' versus full charging, in the deliberative research BEV drivers without access to off-street parking often spontaneously mentioned that they 'top up' when they can to reduce how often they need to do a full charge as well as boost their available driving range.

However, for non-EV drivers without access to off-street parking, 'topping up' was a novel idea upon hearing about it from BEV drivers in the discussions. A key misconception, which lingered even after learning more about 'topping up', was that BEVs need to be fully charged

every time. This misconception could have influenced the views of non-EV drivers in the research, in relation to:

- Their general openness to BEVs
- Their specific requirements and expectations for charging provision
- How charging would fit into their existing driving, parking, and journey planning routines
- The possible charging solutions that they found most appealing in the research

In particular, the idea of charging at destinations where they are likely to spend a short amount of time, such as supermarkets or motorway services, was hard for non-EV drivers without access to off-street parking to envisage. If they accepted that they could charge in such places, then they assumed they would need to 'fill the time' taken to (fully) charge their vehicle, with some worrying about the need to spend money while they wait (for example in a café), creating further barriers around unnecessary costs. Many also assumed that rapid charging would have to be offered at these places to enable them to charge fully in as short a time as possible.

But even with rapid charging in place, full BEV charging was often considered more disruptive to existing habits than non-EV drivers were willing to accommodate. When thinking about the concept of rapid charging at local 'stations' (similar to current petrol stations), non-EV drivers again assumed that they would need to do a full charge and that, even with the rapid option, this would take considerably longer than filling up with petrol or diesel would take today. The idea of doing a faster 'top up' in this case was rarely considered.

With charging infrastructure not as ubiquitous as petrol stations are currently, it was difficult for participants to shift away from the idea of a BEV battery running so low that they could be stranded. It was also difficult for participants to conceptualise how quickly they would use up BEV battery charge in different driving scenarios, meaning that knowing about the option to 'top up' is not enough to fully address 'range anxiety'.

The fact that non-EV drivers find it difficult to apply what they learnt about 'topping up' suggests that their current beliefs about BEV charging will be difficult to shift until they have more experience of BEV charging. However, BEV drivers are already 'topping up' their vehicles which indicates that this is something non-EV drivers could be more open to once they transition to driving a BEV. More research is required to fully understand drivers' perceptions towards topping up and the role it could play in shaping future public charging infrastructure.

6.2.2. BEV driver charging experiences

While BEV drivers without access to off-street parking do experience the charging difficulties that non-EV drivers fear, they have typically been able to be more flexible in their driving and parking behaviours and have come to accept a certain degree of inconvenience to accommodate charging.

Above all else, BEV drivers report that preparation and routine are key to tailoring their journeys to accommodate charging and subsequently work around these barriers. Specifically, solutions or workarounds that BEV drivers without access to off-street parking have found for the charging barriers identified by non-EV drivers include:

- To overcome the barrier of **charging taking too long**, BEV drivers 'top up' their charge often, usually at locations that they visit anyway such as supermarkets and workplaces, which they report minimises how often a longer full charge is required.
- To overcome the barrier of **limited range,** BEV drivers report that charging to full battery once a week is typically enough to prepare them for the week ahead. A full charge is also always done before longer journeys, and research is done ahead of time to identify charge point options before visiting a new location or undertaking a long journey.
- To overcome the barrier of **charge points not being widespread**, BEV drivers plan ahead to use public charge points overnight or on weekends as these times are less busy, making it easier to access a preferred charge point option or location.

  "ABC – 'Always Be Charging', even if it's just for just 10 minutes. Always plan your route, and be notified when you get down to 25% battery, so you have enough range to access a charger" (BEV driver, Urban)

  "There's not enough charging points as it stands... I normally add about 25% onto all my long journey times; if I think it's going to be 3 hours, I'll plan for it to be 4." (BEV driver, Urban)

However, in addition to these barriers, BEV drivers without access to off-street parking also reported some charging issues which were not anticipated by the non-EV driver audience and which they found harder to overcome. These issues typically require BEV drivers to seek out their own solutions and workarounds to attempt to manage them:

Table 1: Issues that BEV drivers find harder to overcome, and current solutions/workarounds

Issue	Solution/workaround
Charging apps showing incorrect information or not updating properly, often resulting in BEV drivers turning up to charge points in use that were advertised as available.	Posting reviews and information on apps and forums to alert other BEV drivers to viable charge point locations. *"I do rely on ZapMap, but people are good at putting on the app if the chargers aren't working." (BEV driver, Suburban)*
Charging points having varying, specific payment methods, leading to payment issues such as not having the correct payment app downloaded.	Downloading numerous new apps to access different charge points and payment methods. *"I've got a card, 4 different apps and Zap Map… The biggest pain is that there's not one system you can use across all suppliers… A single system for payment across all suppliers is very important when we're thinking about large scale national rollout." (BEV driver, Urban)*

	"I go to the petrol station, do Tesco Clubcard, do the card, and off I go. Anything more complicated than that and I'll just go elsewhere because I'm such a technophobe." (BEV driver, Rural)
Charge point already occupied on arrival, either by another BEV charging, or sometimes by an ICE vehicle or a BEV not charging.	Driving out of their way to access an available charge point, usually having to visit a café or read a book in their car while they wait. Alternatively, plugging their BEV in at a charge point that is a substantial distance from home, and walking or even taking a taxi back home *"I turn up to a motorway station and if there is one other EV user there, I have to either have to sit and wait for them to finish, or I can move onto the next one if I have sufficient range." (BEV driver, Urban)*
Charge points not in working order, such as not charging as efficiently as possible, or dropping out whilst charging.	Similarly to when charge points are already occupied, these solutions involve BEV drivers driving out of their way to access a reliable charge point. *"You just get used to planning ahead, don't get a BEV if you are a chaotic person!" (BEV driver, Urban)*

For some charging issues, these can be resolved by a driver changing their habits slightly, for example switching where they do their weekly shop to a supermarket which has charge points. However, there are some issues which require flexibility in driving and parking behaviours, something which BEV drivers are more likely to be willing to accommodate than non-EV drivers.

> *"One of the biggest issues is public chargers being unavailable. If this happens, I drive to the next one, and then the next one, until I find one where I can charge." (BEV driver, Urban)*

6.3. Key aspects of charging

The research tested five key aspects of BEV charging with participants, to understand what drivers perceived as more or less important when it considering BEV charging.

These key aspects were:

- ***Cost:*** *The price of energy needed to recharge your BEV. Other considerations also include the payment structure and payment method used.*

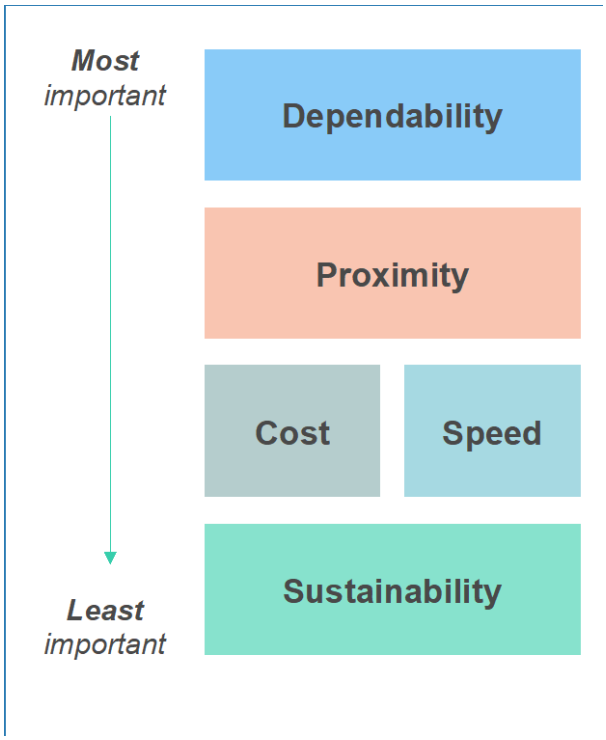
- ***Speed:*** *How quickly the charging point recharges your BEV. Speed requirements for charging could vary according to the time of day, location or other factors.*
- ***Proximity:*** *The distance between a charging point and your location, and the associated convenience of charging there. Your location at any given time could include your home or workplace, another destination, or somewhere along your route during a journey.*
- ***Dependability:*** *The number of charge points located around you, whether charge points are available or occupied at the time that you want to use them, and how reliable charge points are in functioning.*
- ***Sustainability:*** *The energy source being used to charge your BEV, and whether these are renewable or not.*

Full stimulus materials shown to participants can be found in Appendix 10.4.

Overall, as seen in Figure 17, **dependability** and **proximity (to where vehicles are naturally sat)** were considered the most essential aspects of BEV charging.

- **Cost** and **speed** were comparatively less important, particularly amongst BEV drivers without access to off-street parking who had experience of frustration related to dependability and proximity issues.
- However, **cost** and **speed** remained key priorities for non-EV drivers without access to off-street parking, who were particularly keen to replicate the perceived ease of current refuelling habits and expected charging costs to be higher than what they currently experienced for petrol or diesel.
- **Sustainability** was the lowest priority across both BEV and non-EV drivers without access to off-street parking. While it was seen as important, it did not impact attitudes towards charge point provision or (for non-EV drivers) transitioning to BEVs.

Figure 17: Five aspects of charging, ranked from most to least important



6.3.1. Dependability

Dependability was considered the most essential aspect of BEV charging and, subsequently, the viability of BEV ownership, particularly in terms of guaranteeing the reliability of charging points.

- **Essential and important – Sufficient number of charge points being available and working:** Participants felt that owning a BEV would be too difficult if charging points were regularly out of order or occupied, and this was even more important than proximity in terms of the most fundamental requirement for charging infrastructure. For example, drivers would rather travel some distance to access 'guaranteed' charging, rather than risk being caught out in urgent situations by unreliable charging points that were located closer.
- **Important but less essential – Access to 'live' information:** Participants, particularly BEV drivers without access to off-street parking, were interested in having access to 'live' information on charging points that provides updates on whether they are functioning and unoccupied. However, this was felt to be less essential if there were a high volume of charging points in a given local area, as there would likely be a greater number of 'back up' options if one was unavailable or out of order – with this ultimately seen as the goal amongst both BEV and non-EV drivers without access to off-street parking.

  "I'm a bit concerned now I've heard that the charging points don't always work – that feels really worrying, especially if you're going to get stuck somewhere without any charge." (Non-EV driver, Urban)

"I once had a non-EV parked in the electric charging space and that was really annoying." (BEV driver, Urban)

"I think if you had something where you could go on an app or call somebody to see if a charging space was working that would be useful, I have been caught out before." (BEV driver, Urban)

6.3.2. Proximity

Proximity was important in relation to where vehicles are 'naturally sat' (parked); this was particularly the case at or near the home, which was a priority charging location for both BEV and non-EV drivers without access to off-street parking.

- **Essential and important – For residential on street charging, having enough charge point infrastructure installed:** The volume of charging points on residential streets was a key priority in order for drivers to depend on on-street charging infrastructure, particularly when charging overnight. This was seen as particularly important for urban areas where parking spaces are already in short supply on residential streets, and when thinking about BEVs become more widespread in future.

  "I live on a Victorian terraced street with no off-road parking. It's generally very busy with both residents, visitors and sometimes shoppers parking on my end of the road. It's great if you can get parked just outside your house, but it's sometimes difficult and you have to park a fair way down the road, which is especially painful if you have kids/shopping/large items to take in or out." (Non-BEV driver, Suburban)

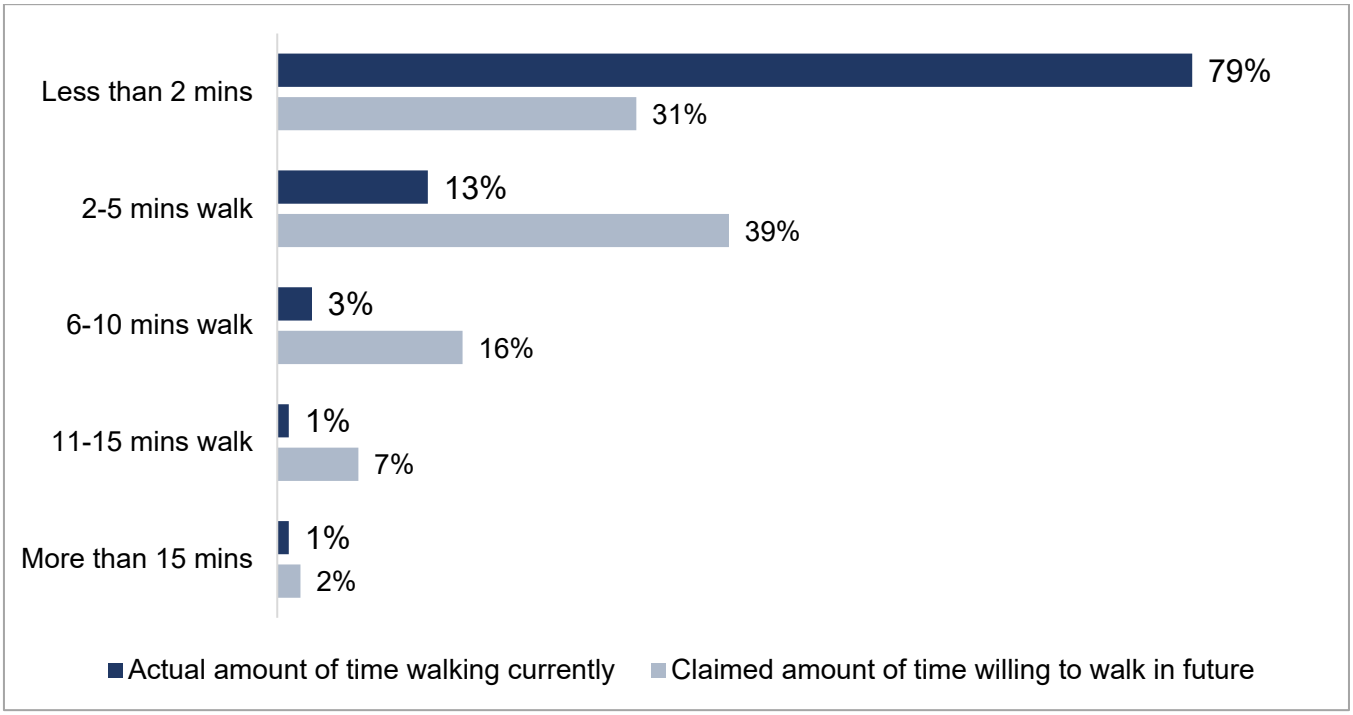
- **Essential and important – Walking distance to charge points:** The distance of charging points from the home, as well as around destinations, was a key consideration for participants; it was considered absolutely essential for charging points to be located within a 5-10 minute walk from these locations. This was particularly important for parents of small children, people with disabilities and women, who felt they need to park as close to home as possible.

- **Important but not essential – Having enough charge points at destinations:** While destination charging was not considered as essential as charging near-home, having a high volume of charging points at destinations was also felt to be somewhat important. This would prevent drivers having to travel out of their way to access charging when charge points are occupied or there are long queues, particularly when undertaking shorter and routine trips in local areas. For non-EV drivers without access to off-street parking, there was a desire for charging points to mirror the volume of petrol stations currently available on most main roads, junctions and driving routes.

When considering charging proximity in relation to overnight charging, it is important to note that **there is a gap between claimed acceptability and current habits**. In the quantitative survey, when non-EV drivers without access to off-street parking were asked about the amount of time they were willing to walk to get home from a parked vehicle when charging overnight, slightly fewer than two in ten respondents (39%) indicated that they were willing to walk 2-5 minutes, while a quarter (25%) indicated that they would be willing to walk 6+ minutes (Figure 18).

However, when looking again at the amount of time it was reported to typically (actually) take respondents to walk home from where they park their main vehicle overnight (also discussed in Section 5.2, Figure 7), almost four in five (79%) indicated it took them less than 2 minutes (Figure 18). Just 13% currently walk 2-5 minutes (despite 39% claiming to be willing to walk this far) and 5% currently walk 6+ minutes (despite 25% claiming to be willing to walk this far). **This indicates that a 5-minute walk could still be too far in reality for some non-EV drivers, given indications throughout the research of their desire to retain current driving and parking behaviours**.

Figure 18: Amount of time people claim to be willing to walk to get home from their parked vehicle when charging overnight vs. how far they currently walk when parking overnight



Q15 What is the most amount of time you would be willing to walk to get home from where you park your vehicle to charge overnight? Base: All respondents (n=1006)
Q6. Still thinking about overnight parking at or near home for the main vehicle that you use… How long does it typically take you to walk home from where you park your main vehicle overnight? (n=1006)

6.3.3. Cost

While cost was less of a priority than dependability and proximity for BEV drivers without access to off-street parking, it was still an area of relative importance for non-EV drivers without access to off-street parking.

The financial rationale for switching to a BEV is important for the non-EV driver audience to establish before they will feel confident in making the transition, however there was a lot of confusion and clarification required for this audience around cost, including in relation to how much BEVs cost to buy and maintain, and the cost of BEV charging compared to refuelling with petrol or diesel (with the assumption made that BEV charging is more expensive, in line with household electricity bills).

- **Essential and important – Clarity on long-term cost savings:** It is essential for non-EV drivers without access to off-street parking to be offered clarity around the long-term cost savings of transitioning to a BEV, and an indication of how comparatively higher

upfront costs (versus ICEVs) can be balanced over time by lower running costs in order to provide a convincing financial rationale for transitioning to a BEV.

- **Essential and important – Greater control and transparency around cost:** Both BEV and non-EV drivers without access to off-street parking are keen for greater control and transparency around cost, both in terms of payment methods and payment structures. BEV drivers, in particular, want to streamline the number of smartphone apps required to pay for charging, with a single universal app preferred, or for apps to be replaced with contactless payment options. They also want to minimise the current variability of charging costs across locations, providers, and payment methods; currently they feel that some charge points overcharge compared with others, and are resistant to financial penalties for using contactless payments or not being part of membership schemes.

- **Important but not essential – Aligning charging costs with household energy:** There was a suggestion of aligning BEV charging with household energy costs in order to avoid financially discriminating against those who must rely on public charging infrastructure rather than being able to connect with their household energy supply through their driveway or garage. Suggestions included using overall payment plans that incorporate both household energy supply and public BEV charging points in some sort of 'bundle'.

6.3.4. Speed

Speed, like cost, was also considered less important for BEV drivers without access to off-street parking, though it was a key priority for non-EV drivers without access to off-street parking who wish to replicate their current refuelling habits as much as possible, particularly in relation to the perceived ease and speed of using petrol stations today. Non-EV drivers' lack of familiarity with BEV charging times and the need for 'topping up' versus fully charging also made it difficult for them to envisage the time requirements of BEV charging (and subsequent impact on their routines).

- **Essential and important – Rapid charging:** Rapid charging is perceived as a 'default' option when charging at destinations, particularly at locations where drivers would not naturally spend more than 30 minutes to 1 hour, such as supermarkets. It is also seen as an important at motorway services for those undertaking longer journeys, where a break is needed but there is resistance to journey times being lengthened further than this.

- **Important but not essential – Slower charging options:** There is still a role for slower charging at certain locations, however it only feels viable in locations where cars would naturally be stationary for several hours, such as at or near home or at workplaces.

  "It needs to be fast if I'm not spending a lot of time there – there's only so many coffees I can have to pass the time, especially somewhere like a petrol station." (Non-EV driver, Urban)

6.3.5. Sustainability

While sustainability is not a key priority compared to other aspects tested when considering transitioning to a BEV, non-EV drivers without access to off-street parking in particular do want reassurances about the green credentials of charging points. Importantly, there is scepticism

around the sustainable production of BEV batteries, as well as the use of fossil fuels to generate electricity for BEV charging. Both of these potentially polluting elements feel contradictory to the 'green' ideals of BEVs, which should instead rely on renewable energy sources.

> *"Sustainability doesn't matter to me when I need a charge. If I have a choice and everything else is equal then this may factor in my decision making, but if a sustainable network is not reliable, not convenient in distance, expensive compared to others, and slow then I wouldn't use it." (BEV driver, Suburban)*

6.4. Knowledge and awareness of EV schemes

Participants in the deliberative research were introduced to a number of Government and Local Authority EV schemes that are currently available, and were asked about their awareness and perceptions towards these.

Broadly speaking, there was low awareness of the Government and Local Authority EV schemes tested in the research, even amongst current BEV drivers who may be eligible. Table 2 gives an overview of perceptions towards the EV schemes tested.

Table 2: Overview of perceptions of Government EV schemes

Government EV scheme	Overview of perceptions towards scheme
EV plug-in grant	The discount of up to £2,500 was seen as 'a drop in the ocean' and not enough to make a meaningful difference. The scheme was therefore seen as unlikely to prompt non-EV drivers to switch without the discount being substantially lifted.
On-street residential chargepoint scheme	There was little faith in local authorities and in particular funding, and this scepticism made it hard to believe that this scheme would eventuate at all.
Workplace charging scheme	Non-EV drivers without access to off-street parking felt this scheme had potential to encourage them to make a switch. However, there was a sense that there were terms and conditions attached to this scheme, or provisions that had to be met to be eligible.

Local Authority EV policies	Overview of perceptions towards policy
Free/discount EV parking Congestion charging exemption	These policies were appealing as they provided tangible, realistic benefits which could be implemented immediately, although the congestion charging exemption felt less relevant to those who lived outside of London. However, there were some concerns about equality if those who are unable to afford, or choose not to switch to, a BEV have to pay more to drive and park.
Installation of residential charge points	Although considered a good idea in principle, participants felt that requests for the installation of charge points would likely not be acted upon by their local authority, with delivery of the policy therefore perceived as unrealistic.

6.5. Responsibility for provision of public charging infrastructure

In providing future public charging infrastructure, participants want to see Government, Local Authorities and private companies all getting involved and working together. However, there are specific responsibilities that are considered relevant to each group:

- **The Government** is seen by participants as holding overall responsibility for setting the charging infrastructure strategy, and offering incentive schemes and benefits at a national level. They are also seen as having the authority to establish specific requirements and regulations for the infrastructure itself and supporting functions, such as payment systems.
- **Local Authorities** are seen by participants as responsible for actually implementing and planning the charging infrastructure 'on the ground'. This is considered to involve consultations with members of the public, residents and businesses in order to plan the execution of the Government's charging strategy.
- **Private companies,** such as energy and technology companies, are seen by participants as responsible for undertaking the actual design, construction, installation and maintenance of charging points. They are considered the 'experts' in this field, who should be relied upon to keep the charging infrastructure running.

  "The responsibility lies with the Government because they are the ones looking to phase out ICE [internal combustion engine] vehicles. If they want this, they need to bring up BEV infrastructure to at least the level of ICE infrastructure to encourage people to do this." (Non-EV driver, Suburban)

  "The responsibility lies with companies and councils, because providing and installing charging points is the responsibility of the companies but the councils have to give them permission to install them." (Non-EV driver, Suburban)

However, participants raised concerns about the anticipated effectiveness of initiatives to develop a national BEV charging infrastructure. Specific concerns relating to each player were highlighted:

- **The Government:** There is some scepticism about the impact that Government incentive schemes and benefits would have on encouraging non-EV drivers to transition to a BEV. Currently, the financial incentives do not feel substantial enough to make the transition feel 'worthwhile'. There were also concerns around the longevity of the incentive schemes currently available, such as 'lump sum' payments to contribute to the purchase of BEVs. As more people transition to BEVs, and demand increases, it is felt that such schemes will become less feasible going forward.
- **Local Authorities:** There is some cynicism about Local Authorities fulfilling the promises of BEV policies and schemes. This detracted from the appeal that these schemes held, with some who were aware of them pointing out that they had seen little evidence of follow through.

- **Private companies:** There were concerns about private companies profiteering from playing a role in developing the national charging infrastructure. There was a perceived risk of companies building a competitive landscape that exploits drivers, such as over-charging and increasing prices, with participants referring to examples of energy companies in relation to household energy supplies. There was also a broader scepticism about the compatibility of capitalist structures with public interest, and the risks associated with introducing profit-driven organisation into public services.

  "I don't have much faith in local authorities to actually get this done effectively – they've made a real mess of other local initiatives." (Non-EV driver, Suburban)

  "I'd be concerned about the competition that would come of this – being held at the mercy of a big capitalist system." (BEV driver, Suburban)

7. Preferences for public BEV charging infrastructure in the future

When outlining preferences for future BEV charging infrastructure provision, there was a strong preference for overnight charging at home, with destination charging options seen as supplementary to this. However even after providing information and testing potential future scenarios, concerns remained about the feasibility of charging within existing routines, as the proposed solutions felt far removed from current driving, parking and refuelling behaviours for non-EV drivers without access to off-street parking. This ultimately resulted in a question: how can public charging solutions best tap into current behaviours to best encourage people to transition to a BEV?

When exploring preferences for future public BEV charging infrastructure in the deliberative research, we took participants through a process of informing them about what this future could potentially involve.

- First, we explored participants' **spontaneous** perceptions and preferences for future BEV charging infrastructure in order to ascertain their key starting priorities and attitudes, as well as any potential misconceptions.
- Then, to explore participants' **more informed views**, we provided them with information about options for charging locations, charge point types, payment methods, and route planning.
- Finally, we tested reactions to a series of specific **scenarios outlining potential future BEV charging solutions**. These scenarios were a way to understand participants' preferences and priorities for BEV charging in the future; they were designed as research tools and do not represent government policy.

Respondents to the quantitative survey were also shown versions of these specific **scenarios for potential future BEV charging solutions**. However, unlike participants in the deliberative research, due to the quantitative survey format, non-EV drivers without access to off-street parking who took part were unable to be provided with the same level of preceding information and were not exposed to the views of current BEV drivers as those in the deliberative research were.

This means that quantitative rankings of these potential future scenarios represent **baseline views** for public sentiment towards future BEV charging solutions, while rankings from the deliberative research can be considered **informed views**.

7.1. Overview of preferences for future BEV charging solutions

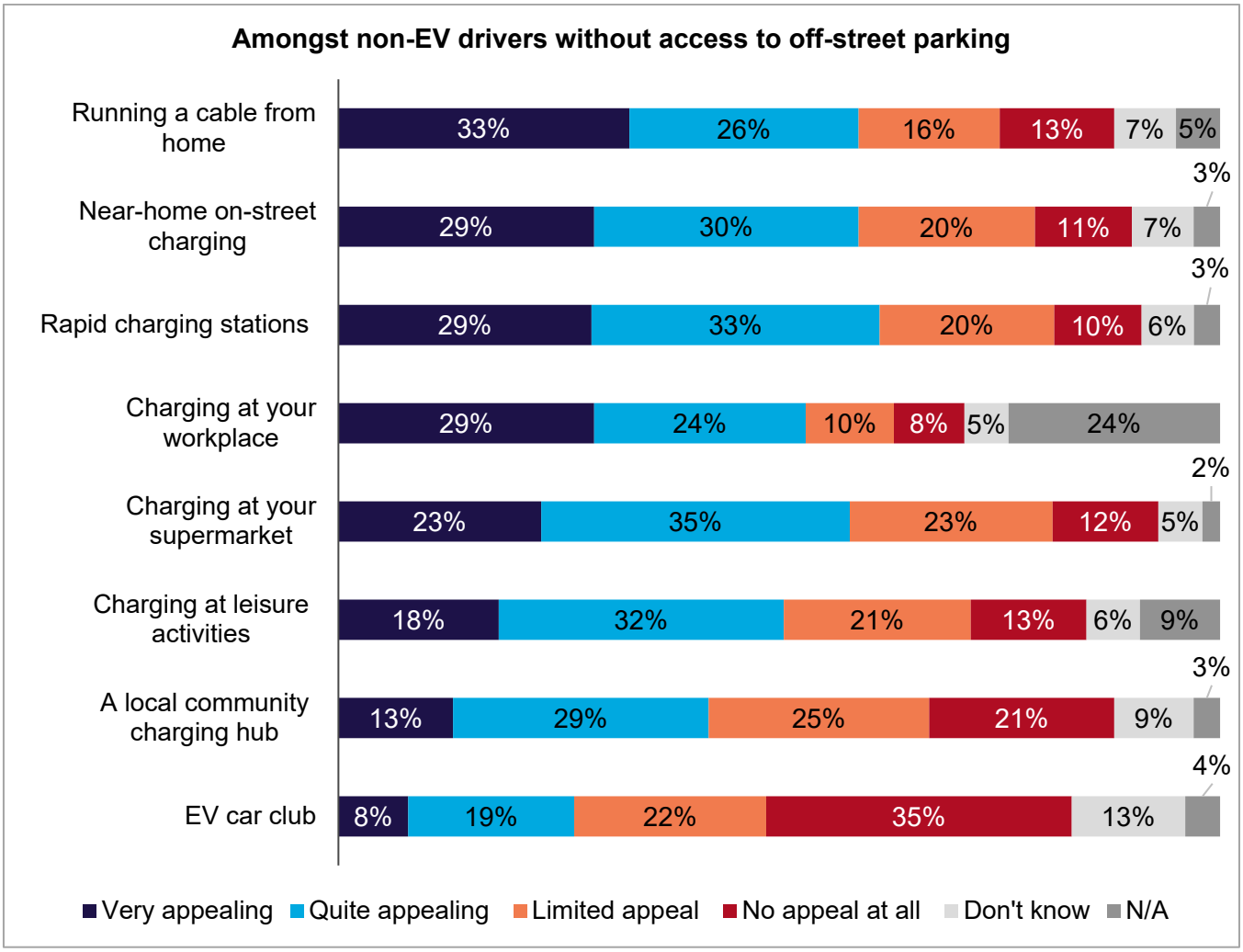
7.1.1. Baseline views – quantitative survey results

Rapid charging stations, overnight charging options, and options for destination parking were the most popular future charging solutions amongst non-EV drivers without access to off-street

parking who took part in the quantitative survey (Figure 19). When asked how they personally felt about eight potential future charging options, 'rapid charging stations' (62%), 'on-street charge points near home' (60%), 'running a cable from home' (59%), and 'charging at your supermarket' (58%) were reported as having quite similar, high levels of net appeal ('very' + 'quite appealing'). There was also a strong level of appeal for 'charging at your workplace' (53%) however almost a quarter of respondents indicated that this was not an option for them.

By far the least appealing options were using a local community charging hub (42% 'very' + 'quite' appealing) and the EV car club (27% 'very' + 'quite' appealing).

Figure 19: Appeal of potential future BEV charging options



Q14. How would you feel personally about the charging options listed below? Base: all respondents (n=1006)

There were some sub-groups who were warmer to the idea of BEVs and subsequently warmer to the concept of BEV charging in the future, and this was reflected in their ratings of the potential future charging options. The quantitative survey found that **all** potential future charging options had significantly higher net appeal ('very' + 'quite appealing') for:

- **Younger adults:** Across all options, 42-77% of those aged 18-34 years old reported the options to be appealing ('very' + quite appealing') compared to 12-55% of those aged 55+ years old.

- **Parents of young children:** Across all options, 38-71% of parents of children under 10 reported the options to be appealing ('very' + 'quite appealing') compared to 22-59% of those without children aged under 18.
- **People living in urban areas:** Across all options, 36-68% of those living in urban areas reported the options to be appealing ('very' + 'quite appealing') compared to 13-54% of those living in rural areas.

Detailed breakdowns of level appeal for these sub-groups can be found in Appendix 4.

Linking current and anticipated future behaviour

As seen earlier in the report (Section 5.2.2, Figure 9), among non-EV drivers without access to off-street parking who responded to the quantitative survey, a substantial proportion of respondents reported 'never' parking their vehicle at leisure centres (59%), cinemas (57%), or pubs or restaurants (40%). It is therefore unsurprising that 'charging at leisure activities' and using 'a local community charging hub' were comparatively less appealing than other options, as they require more deviation from current parking and refuelling behaviours – which we know from the deliberative research is a major barrier when thinking about transitioning to a BEV.

7.1.2. Informed views – deliberative research summary

When informed participants considered the potential future BEV charging scenarios, 'near-home charging' (lamp post charging overnight in close proximity to home) was the most appealing and was strongly preferred as the **primary option for charging BEVs** in the future.

While there was a desire for overnight charging near-home to be the primary charging solution in future, participants indicated that an ideal balance would involve a combination of regular overnight charging on their residential street with less regular charging away from home either at destinations ('charge where you are' scenario) or, for longer journeys, rapid charging hubs at motorway services ('rapid charging as you go' scenario). While this was the broader preference, it is important to note that lingering difficulties with the concept of 'topping up' could have influenced some non-EV drivers to find these options less appealing than they may have otherwise.

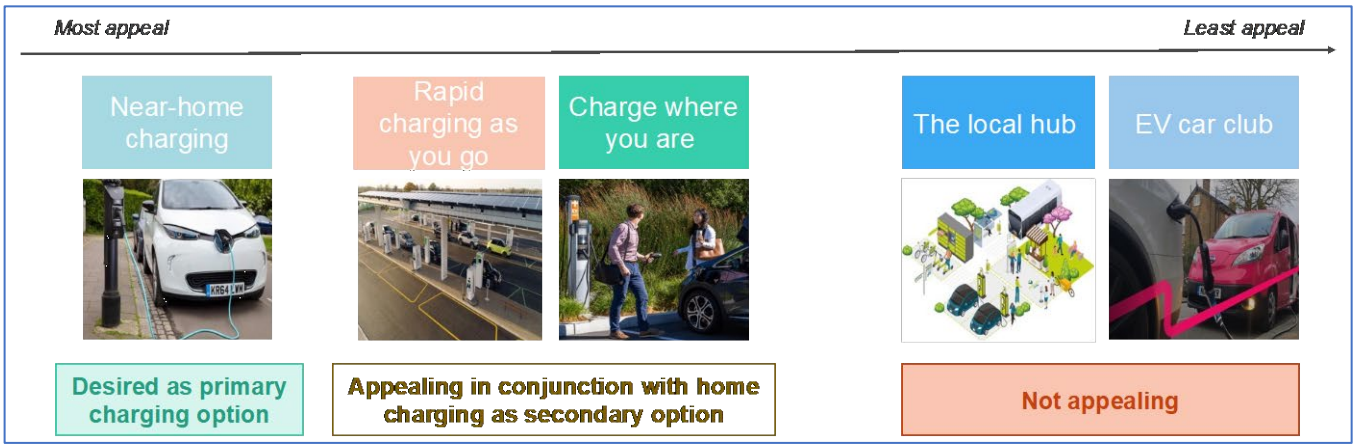
> *"I think parking near my home and charging, along with rapid charging and charging where I am, would be a good combination. Charging at home would be my preference though."* (Non-EV driver, Urban)

> *"I think it would be home charging and then a toss-up between rapid charging as you go in petrol stations and charge as you go. Rapid charging as you go is similar to what we have for petrol and diesel cars."* (Non-EV driver, Urban)

The 'local hub' had some appeal in that could contribute to a sense of community. However, ultimately, the 'local hub' and 'EV valet service' scenarios had limited appeal due to practical and logistical concerns around safety, as well as negative perceptions of shared mobility (particularly post-Covid).

> *"I don't think where I live people would be willing to get themselves to a local hub and then walk/bus back as it seems like an extra journey that people would begin to despise because it's just not convenient for anybody." (BEV driver, Suburban)*

Figure 20: Potential future charging scenarios, ranked from most to least appealing according to the deliberative research



Key features that appealed across all scenarios

There were a number of key features that were positively received across the potential future scenarios tested, ranging from essential requirements to features that were more 'nice to have' but not essential. In order from essential through to 'nice to have' (see Figure 21), these included:

- **The provision of BEV-dedicated infrastructure:** Providing additional charging spaces and dedicated infrastructure is considered to be essential in encouraging non-EV drivers without access to off-street parking to consider transitioning to a BEV, and to improve the experience of owning and charging a BEV for current BEV drivers without access to off-street parking too.
- **Being able to charge vehicles where they are 'naturally sat':** Charging BEVs on residential streets, in close proximity to home, had widespread appeal among an overwhelming majority, while charging at destinations such as supermarkets and work had mixed views but predominately appealed more for those who often visit these locations and leave their vehicle for a substantial amount of time.
- **Providing rapid charging at destinations:** While rapid charging was seen as inherently more convenient, and subsequently highly desirable in all locations, it was perceived to be particularly important in locations where drivers would not typically spend more than 30 minutes to an hour (e.g. supermarkets) as well as at motorway services to provide charging facilities during longer journeys. More broadly, rapid charging was especially important for participants with busy routines, and parents of young children who often need to make spontaneous trips.
- **Providing the option to book charging slots, via an app:** This option gave reassurance about being able to charge BEVs seamlessly to many BEV drivers without access to off-street parking, as well as some non-BEV drivers without access to off-street parking (e.g. giving confidence that charging points would not be occupied and/or out of service on arrival). However, the idea of having to plan ahead to pre-book a charging slot was less congruent with existing parking and refuelling behaviour for most non-BEV drivers without access to off-street parking.

- **Comparative costs:** Providing a clear benchmark of recharging costs versus refuelling helped to mitigate concerns about charging being more expensive than petrol and diesel for some non-EV drivers, however others still found it difficult to conceptualise costs. While this was less important for current BEV drivers due to their first-hand experience and awareness of charging costs, they still felt it was essential information for non-EV drivers when thinking about making the transition to BEVs. Yet it should be noted that all participants tended to focus more on the practicalities of accessing charging infrastructure in the first instance (i.e. cost can be considered once the infrastructure is in place).
- **Sustainability:** The provision of charging solutions that are holistically 'green' is an expected hygiene factor, particularly concerning the production of BEV batteries. However, while this was described as a 'nice to have', it did not appear to be an essential requirement for encouraging non-EV drivers to transition to a BEV. Sustainability was often more top of mind for those that were more conscious about impact pollution is having on the environment, but this audience was made up with a range of demographics.

  "I didn't know much about rapid charging, but this is important for me, and I am sure most people would need this to even consider switching to an electric vehicle in the future." (Non-EV driver, Suburban)

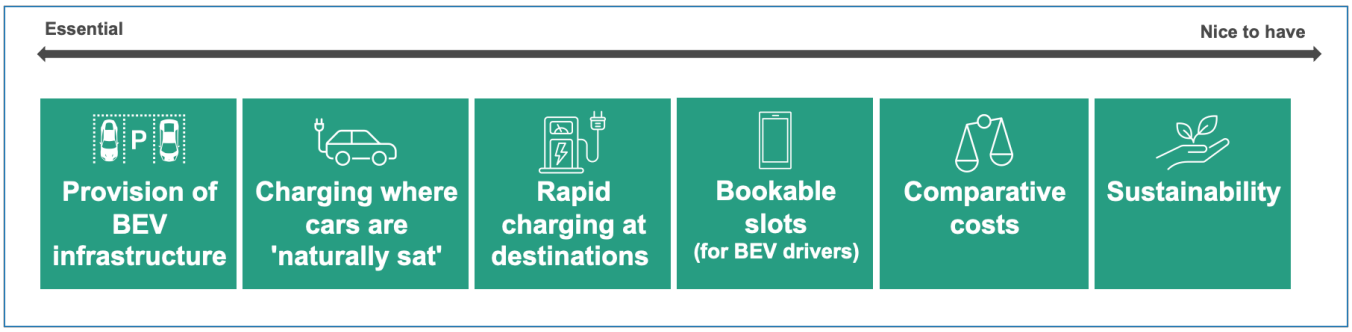
  "The primary concern of driving an EV is 'when do I need to charge next and will it be available'. Booking slots seem good to overcome this – charging on residential streets near home would be ideal." (BEV driver, Urban)

  "Being able to understand the costs more is very helpful and useful." (Non-EV driver, Urban)

  "There would need to be more charging infrastructure in place that actually works [in order] for me to consider even having an electric vehicle." (Non-EV driver, Rural)

  "I work on site, so workplace charging is a relevant option to for me as my car is sat there for a long amount of time, but if you work more remotely it would not be appropriate for these types of workers." (BEV driver, Urban)

Figure 21: Features of potential future charging scenarios that were positively received, ranked from essential through to 'nice to have'



Key barriers that persisted across all scenarios

While many aspects of the scenarios were appealing in principle, there were three key barriers across all of the future charging scenarios that continued to exist. These were:

- **Charging spaces that are occupied and/or not working:** BEV drivers without access to off-street parking frequently mentioned experiences of having been 'caught out' and unable to charge their vehicle upon arrival at a charge point. The proposed scenarios needed to go further to address this challenge, with suggestions including providing 'live' updates via ZapMap about whether charging facilities are in service and/or out of service, and issuing fines to deter petrol and diesel drivers from using these spaces.

- **Additional journey time required to travel between home and overnight charging facilities:** Participants disliked the prospect of adding time on to their journey to travel between home and a charging facility when charging their vehicle overnight. While some scenarios tested charging infrastructure located up to a 15-minute walk from home, participants typically reported a 5-minute walk to be the upper limit of acceptability (although most were currently walking no more than 2 minutes between home and where they typically parked their vehicle overnight). Participants residing in rural locations thought it would be particularly difficult for charging infrastructure to be provided in close proximity to their home due to the lower density of housing.

- **Vehicles being parked too far away from home when charging overnight:** Parking vehicles further away from home to charge overnight was seen to erode the freedom and autonomy that non-EV drivers without access to off-street parking currently value about driving. The door-to-door nature of driving is highly valued and preferred, particularly among parents of young children, people with mobility issues, and women who have safety concerns. While some current BEV drivers mentioned they occasionally need to charge their car away from home overnight, they typically described this as an inconvenience. Further, there was general discomfort about the risk of vandalism and theft of vehicles, especially when the vehicle was 'out of sight' (i.e. not parked in a place visible from the home).

  "I still think a lot more needs to be done for me to feel comfortable. I would worry I wouldn't be able to charge my car because of the lack of spaces and I wouldn't want to drive out of my way to find one." (Non-EV driver, Rural)

  "I like knowing that my car is outside. You never know when you need to make a trip when you have children. I wouldn't want to leave my car some place else to charge, it might get stolen." (Non-EV driver, Suburban)

  "The top priority should be solutions that provide charging as close to home as possible. I don't want to change my routine to be able to own an EV, we should all wait for it to be more convenient than our ICE car ownership not less. Everything else at the moment is just inconvenient." (BEV driver, Urban)

Participant-defined principles for future BEV charging solutions

The deliberative research has shown that any future public charging solutions need to tap into current refuelling and parking behaviours to ensure feasibility. Participants expect public charging provision to reach a level of density and dependability that does not require any pre-planning behaviours or deviation from current routines in order to accommodate charging.

Therefore, according to participants in the deliberative, the principles that should be applied to public charging infrastructure provision include:

- **Increased provision and availability** of BEV charging facilities in the public charging network.
- **Match charging speed to the average time** at a location and/or the activity being undertaken (and increase awareness among non-EV drivers about the option to top-up versus complete a full charge).
- **Optimise the location of charge points in residential areas and at destinations,** to maximise the number of drivers who can access charging with close walking distance (particularly for overnight charging – walking distance of 2-5 minutes between charge point and home would be the ideal).

  "My main piece of advice is to create high volumes of charging point facilities that work." (Non-EV driver, Suburban)

  "I wouldn't walk more than 5 minutes for charging my car, it's a nuisance if you ask me. If it [charging] was on my street I should be able to get to my car in a minute or two, anything else is too far from what I do now." (Non-EV driver, Rural)

  "Charging at the supermarket, does that mean that I would have to stay longer in the supermarket to wait for my car to charge? I would want it charged by the time I complete my shop. I don't have time to wait around." (Non-EV driver, Urban)

However, while current BEV drivers without access to off-street parking also want to reach a point where BEV charging does not require the pre-planning they are currently undertaking, they are more open to solutions that require some level of planning ahead in the short term to address existing difficulties they are experiencing. Consequently, the research has shown that the following principles could also be applied to public charging infrastructure provision in the short term:

- **Clear identification** of charge points on street signs and apps (e.g. ZapMap).
- The **ability to book** charging slots ahead of time, via an app.
- Provision of **live maintenance and availability updates** via apps (e.g. ZapMap).

  "There is a need to add a lot more charging points around local areas that can easily be located by having clear signs and on the apps that we already use, although ideally it will be one universal app for everything." (BEV driver, Suburban)

  "Using an app will not suit everybody but it will make sure that I don't turn up to a charging point that isn't working and having to drive miles to find that out." (BEV driver, Urban)

  "I think having something that tells you when a charging point is working would be useful." (BEV driver, Urban)

7.2. Detailed perceptions of overnight charging

Spontaneously and throughout the deliberative process, the overwhelming majority of participants expressed a preference for overnight charging near home, which was underpinned by a desire for existing driving and parking habits to continue.

- This was true for both BEV and non-EV drivers without access to off-street parking, though it was particularly difficult for non-EV drivers to consider changing their current routines. A lack of familiarity with BEV battery capacities, mileage and associated charging times and frequency also made it difficult for non-EV drivers to envisage the tangible routines and requirements of owning a BEV.
- While BEV drivers without access to off-street parking already had some experience of adapting their driving and parking behaviour to accommodate charging, they ultimately wanted to achieve the same goal of having their BEV charging re-aligned with their previous driving and parking habits.

When specifically shown information and asked to consider **on-street charging** as a possible charging location (stimulus can be found in Appendix 4), the deliberative research found that not being able to access parking directly outside the home (e.g. lamp post charging points located further away or on nearby roads) was a significant barrier to transitioning to a BEV for three specific groups of non-EV drivers:

- **Parents with small children,** who need to minimise travel from their car to their doorstep for efficiency, ease and safety when juggling children and possessions.
- **People with mobility issues,** who need to minimise the distance required to travel from their vehicle to their home due to discomfort or difficulty walking.
- **Women,** who have safety concerns about walking home (particularly in the dark), and for whom cars give them the peace of mind of 'door-to-door' transport.

  "Anything besides parking and charging near my home doesn't appeal to me, it sounds like a lot of hassle and would not suit my lifestyle with a young family." (Non-EV driver, Rural)

  "I am in a wheelchair so anything that is as close to my house as possible would be ideal, I wouldn't be able to travel too far." (Non-EV driver, Rural)

  "I am sometimes scared if I have to walk home when it is dark so charging close to my home is more reasonable for me." (BEV driver, Urban)

BEV drivers without access to off-street parking reported currently having to charge their vehicle away from home overnight due to the lack of charge points provided near their home. Despite being willing to undertake this behaviour in order to charge their vehicle, this was considered inconvenient and resulted in these drivers having to walk, or even take a taxi, home from the charging location (and back again the next day).

> *"I recently moved from somewhere that had a dedicated charging point to somewhere that doesn't. Previously I did plug the car in overnight most nights to keep it topped up, but now I have to take a trip to the local park and ride once or twice a week to use the rapid charger. This never takes too long, maybe a 45-*

minutes round trip with 30 minutes charging, so I usually read a book or go for a walk while it's plugged in." (BEV driver, Suburban)

Participants in the deliberative research were also shown information and asked about **lamp post charging** specifically as a means of delivering on-street charging infrastructure (stimulus can be found in Appendix 4). This was considered an appealing option because:

- Charging as close to home as possible, when considering overnight charging, allows for the highly valued 'door-to-door' nature of driving to be retained.
- Home is the location where both drivers and their vehicles naturally spend the most time; charging at or near home means that charging can be completed with minimal impact on journey planning and/or daily routines.
- It makes good use of existing infrastructure and has minimal impact on streetscape.

Potential future charging scenarios for overnight charging

A series of scenarios describing potential future charging solutions were tested in both the quantitative survey and the deliberative research. Scenarios tested in the deliberative research that relate to overnight charging were (NB. these are summarised versions of the scenarios tested; full versions can be found in Appendix 5):

- ***Near-home charging:*** *Street has BEV chargers installed in lampposts, with 1 charge point for every 5 parking spaces. Routine with neighbours for who charges overnight and when. WhatsApp group to coordinate. Will occasionally have to move car in the evening to ensure everyone gets a turn. A full charge in this scenario costs £6.50.*
- ***The local hub:*** *A community charging hub installed by the local authority, located a 15min walk away. Twice weekly scheduled slots for overnight charging and an app to book a shorter slot for a top up if needed. Bus stop and hire bikes located nearby if needed. A full charge in this scenario costs £6.50.*
- ***EV car club:*** *Car club that exclusively provides electric vehicles, instead of owning your own private vehicle. Provider monitors vehicle charge levels remotely and tops up overnight while the vehicle is not in use. Provider guarantees at least a 60% charge on collection, which is more than enough for a full day at work. This service is a different pricing model from the other scenarios, however yearly spend would be broadly equal to owning an EV and charging it yourself.*

Scenarios tested in the quantitative research broadly align with the above descriptions, however full versions of these options can be found in Appendix 6. As a reminder, these scenarios were designed as research tools and do not represent government policy.

Near-home charging

In the deliberative research, 'near-home charging' was found to be extremely appealing as it most closely described a charging scenario that could slot into existing driving and parking routines, without diminishing the autonomy and flexibility that they currently enjoy about driving, while also retaining the core door-to-door appeal of driving. Non-EV drivers' misconceptions around the need to charge fully every time (rather than having the option to

'top up') also likely impacts perceptions of near-home charging versus other options (see Section 6.2.1. for more detail). The concept of running a cable from home to charge was not explicitly tested in the deliberative research.

> *"This would make it visibly easier for people to make the change [to a BEV]. If you knew you could charge your car while you sleep, this would definitely win more people over as it's the most convenient and it has the same benefits as somebody that does have parking." (BEV driver, Suburban)*

> *"Not everybody would be able to charge at work or in supermarkets, home charging is the most appealing because it just makes sense and doesn't require too much effort." (Non-EV driver, Rural)*

However, while there was positivity about the prospect of being able to charge in close proximity to home, upon consideration many participants in the deliberative research found it difficult to envisage how this would work if there were not enough spaces to cater for every car on a residential street. Consequently, these participants had lingering concerns about how a near-home charging solution would work in practice, specifically because:

- **The availability of parking spaces on residential streets is already limited**: Both BEV drivers and non-BEV drivers without access to off-street parking mentioned instances (frequent or occasional) when finding a parking space in close proximity to their home was more difficult, and not having enough charge points would further limit the options at these times.
- **There is a need to manage charging rotas with neighbours:** This was an uncomfortable prospect for most, with concerns around the tensions that this might introduce in local neighbourhoods if some residents were seen to be using the available charge points more than their fair share of the time.
- **Infrastructure is limited**: Participants who reside in urban locations were sceptical about how many charge points would be able to fit onto a residential road, and therefore how many people this option could realistically cater for.
- **Charging spaces are not clearly marked/lack of consequences for 'ICE-ing':** There were concerns among both BEV drivers and non-EV drivers without access to off-street parking about how this scenario would work in practice as petrol and diesel vehicles competed for available parking spaces. Parking spaces would need to be clearly marked and there would need to be consequences (e.g. fines) for parking petrol and diesel vehicles in parking spaces with a charge point ('ICE-ing').

  > *"There are a lack of lampposts and facilities for charging where I live so I don't know how many people would benefit from this." (Non EV driver, Suburban)*

  > *"I would be concerned that other drivers would park in these spaces even though it is only meant for electric vehicles when they need to charge." (BEV driver, Urban)*

  > *"I think I am too concerned with talking to neighbours and agreeing slots, this to me would be confrontational." (Non-EV driver, Urban)*

"I already struggle to find a parking space so I am not sure how this would work." (BEV driver, Rural)

When considering the 'near-home charging' potential future scenario and how to implement it, there were some important considerations for improvement that participants felt would increase the likelihood of non-EV drivers to transition to BEVs as well as improve the experience for existing BEV drivers. These included ensuring that:

- **A good range of BEV-dedicated parking and charging spaces are provided,** to avoid further difficulty parking during busy times.
- **Petrol and diesel drivers are deterred from using the spaces,** including ensuring that parking spaces with charge points are clearly parked, and enforcing consequences such as fines if petrol and/or diesel drivers park in these spaces.
- **There is the option to book a parking/charging slot in advance via an app;** while this has more appeal to current BEV drivers, it does help to overcome concerns of spaces being occupied as well as the need to manage charging rotas with neighbours among non-EV drivers without access to off-street parking.

  "This would only work if the infrastructure was in place and there were enough spaces, otherwise this won't get rid of the problem about spaces being occupied." (BEV driver, Suburban)

  "I would like to have the option to book a slot for charging but would expect that I do not have to move my car." (BEV driver, Urban)

  "Fines should be issued if people use these spaces, and they are not meant to." (Non-EV driver, Rural)

The local hub

This scenario was similarly unpopular in the deliberative research. A number of practical and logistical concerns were raised by participants:

- **Making long journeys to and from the hub**: Walking more than 2-5 minutes was considered 'too long' for most participants, let alone walking up to 15 minutes as indicated in this scenario. Longer walking distances were particularly problematic for parents with young children, those who have busy routines, those who transport equipment as part of their job, those with mobility issues who are unable to travel long distances from and to home, and women who have safety concerns walking to/from their vehicle in the dark.
- **The need to use public transport or shared transport options to complete the journey:** The availability of bikes and buses in this scenario implied to participants that they would need to use public transport or shared transport options in order to complete their journey, which undermines the autonomy and doo-to-door nature of driving that they highly value. Using public transport or shared transport options was particularly unappealing for parents of young children, those who transport equipment as part of their job, and those with mobility issues.

- **Fear of vandalism and theft of vehicles:** Both BEV and non-EV drivers without access to off-street parking reported concerns about leaving their vehicle far from home to charge overnight, with being able to see their vehicle parked outside their home deemed to minimise the risk of damage to it. Further, the association of local hubs with public car parks leading to discomfort about the security of their vehicle.

- **Planning ahead and booking slots:** While this did provide both BEV and non-EV drivers without access to off-street parking with reassurance that they would be able to charge their car when needed, this was seen as a big deviation from current parking and refuelling behaviours which are much more spontaneous. This was particularly unappealing for parents of young children who indicated that having a pre-booked slot would not be convenient if they needed to make a spontaneous trip or if an emergency occurred.

- **Less suited to rural areas:** Those who reside in rural locations were sceptical about being able to access the local charging hub if it was located too far from home, due to the lack of public transport links. The lack of appeal among participants from rural villages was further highlighted in the quantitative survey, in which non-EV drivers without access to off-street parking were asked how they personally felt about this charging solution; only 32% of respondents from rural villages indicated that it was appealing ('very' or 'quiet appealing') in comparison to 51% who resided in urban locations.

  "I often need my car to get door to door. I never know when I'll need it, my life doesn't follow a regular pattern – I wouldn't want to leave my car away from home for security reasons and I often have a lot of stuff to carry back and forth to home." (Non-EV driver, Urban)

  "I don't like the idea of leaving a very expensive car at a hub overnight. The convenience and safety aspects are problematic – it's not ideal for certain people walking home or to the hub on dark mornings or evenings." (Non-EV driver, Rural)

  "I don't think where I live people would be willing to get themselves to a local hub and then walk/bus back as it seems like an extra journey that people would begin to despise because it's just not convenient for anybody." (BEV driver, Suburban)

Despite this, a small number of positive aspects were identified, including:

- Having a centralised gathering spot for charging in local areas, which was seen to foster a sense of community.

- Having the option to book charging slots by using an app, which provided reassurance particularly to BEV drivers without access to off-street parking about being able to plan around charging spaces that are occupied or out of use.

- That this charging solution was felt to be similar to BEV drivers' current overnight charging habits.

  "I think the option to book slots would overcome concerns about being ICE'd [a petrol or diesel vehicle parking in a designated EV charging space] and the

charging points not working. It would be nice for my local area." (BEV driver, Urban)

"I already leave my car overnight so it's not a big change, but I would be concerned about how safe my car was, and how far away it is." (BEV driver, Urban)

There were some important considerations for improvement of the 'local hub' scenario that participants felt would increase the likelihood of non-EV drivers to transition to BEVs as well as improve the experience for existing BEV drivers. These included ensuring that:

- **Ensure local hubs are a 2-5-minute walk (or less) from home:** The majority of participants reported that the proximity of charging points should be a 2-5-minute walk (or less) to and from people's homes so those that are less able to make long journeys and/or use public transport are accounted for – this was especially applicable to overnight charging facilities that are not in close proximity to home.
- **Provide rapid and slow charging speeds;** this will address concerns about leaving BEVs to charge away from home overnight. While the research has shown that some BEV drivers currently do this, most would prefer the option to charge their car quickly if they have to leave their car overnight.
- **Ensure booking apps are easy to use**; and partner with other suppliers and/or make a universal app to reduce cognitive strain for those that would consider using the local hub in combination with other charging solutions.

  "I would only use the hub if it was a couple of minutes away – anything more than that is not that practical." (Non-EV driver, Urban)

  "I think the hub should have an option of different charging speeds, so I don't have to leave my car there if I don't want to." (BEV driver, Suburban)

  "I enjoy driving my BEV, but it is tricky finding available parking and apps will make this easier. They just need to make these easy to use." (BEV driver, Urban)

EV car club

In the deliberative research it was found that, broadly speaking, the charging aspect of the 'EV car club' was overshadowed by negative perceptions of car sharing. The shared scheme itself was a key drawback to this option and is unable to compete with private vehicle ownership, as it presents a sizeable shift away from current driving and parking behaviours – even more so than the need behaviour change required to accommodate BEV charging. There were particular concerns around:

- **Lack of autonomy:** Car sharing is perceived to impede the ability to make spontaneous trips, keep personal belongings in the vehicle, or be able choose which vehicle to drive.
- **Safety and liability:** Both BEV and non-EV drivers without access to off-street parking were concerned about not having oversight of when the vehicles last had an MOT, what insurance policies they would be covered by as a driver, and when the car was last

cleaned (especially in the context of Covid-19). Some also expressed concerns about being wrongly accused of car damages, or others not treating the car with enough care and therefore impacting the usability of the service.

- **Proximity:** The distance between the drop off point for the vehicle and home was of concern as many assumed it would require travelling further than they currently do when parking their vehicle at or near home overnight. This was an especially pertinent concern for those living in rural areas where there was an assumption that it would not be in walking distance.

  "I don't want to share; I want to own my car. This sounds like a hassle and needing to book things in advance." (Non-EV driver, Rural)

  "Seems more expensive and I would rather have the availability of my own car and being able to access it 24/7. Also, I tend to keep things in my car that make my life easier. With a car club I would have to go with and take everything I needed per trip, seems more hassle." (BEV driver, Suburban)

  "How close would it be parked near my home? I wouldn't want to walk to get there." (Non-EV driver, Rural)

  "For me it is not an option, I would rather know that a car is there and I have the keys with me, especially being on the move and having to depend on a car all the time be it for school drop off, pick up, shopping trips etc." (Non-EV driver, Urban)

In terms of the charging offer with this solution, there were mixed views towards costs and practicalities. Shorter, more routine journeys were felt to be cost-effective and potentially a hassle-free solution for younger participants. However, for longer or last-minute bookings there was a perception that higher costs would accumulate for both the booking of the vehicle and charging itself.

"This would probably be better for short journeys as it's already charged, but I think there would be hidden costs for long journeys." (BEV driver, Urban)

"I think this would be good if somebody doesn't drive all of the time and just needs to make a quick trip. I think it will be useful for those people." (Non-EV driver, Suburban)

However, it should be noted that this scenario had some appeal for those who do not have engrained habits around driving their own private vehicle, and/or those who own a single vehicle but do have occasional need for a second.

"I'd prefer to own our main vehicle, but I wouldn't be against a car club for a second vehicle in our household if we need it." (Non-EV driver, Rural)

"I don't drive all of the time, so I think something like this would be good if I was going on a trip or something." (Non-EV driver, Urban)

There were some important considerations for improvement of the 'EV car club' scenario that participants felt would increase the likelihood of non-EV drivers to transition to BEVs as well as improve the experience for existing BEV drivers. These included ensuring that:

- **Live updates are provided** about the availability of vehicles, and how long they will take to be delivered. Consider providing an option for a vehicle to be delivered in a specified shorter timeframe for emergencies and busier situations.
- **Safety and liability concerns are addressed** by outlining information about insurance and when the car last had an MOT (and other safety checks), as well as information about when the car was last cleaned. This detail could be included in the app used to book the service.
- **Drop off and pick up points are no more than 2-5 minute walk away, or ideally closer;** charging solutions are not considered to be viable if they are inconvenient to reach by walking.

  "I would need to know when the vehicle would be delivered, but it wouldn't be practical for an emergency as it would take too long." (Non-EV driver, Rural)

  "They would need to provide information about the insurance and when it last had an MOT, I would not want to be liable for damages and that would put a lot of people off." (BEV driver, Urban)

  "I wouldn't want to walk more than a couple of minutes, but I don't think they would deliver it close to me as I live in a village." (Non-EV driver, Rural)

7.3. Detailed perceptions of destination charging

The appeal of charging locations other than near-home (overnight) was dependent on how well the location fit with participants' broader habits and daily routines. For example, it was perceived as important for charging points to be located at places that drivers would regularly visit and spend time at – enabling them to charge wherever their vehicle is 'naturally sat'. This was seen as limiting the need for drivers to change ingrained routines or have to plan ahead to charge, making it easier and more appealing for non-EV drivers to transition to a BEV.

In the deliberative research, participants were asked to consider a variety of charging locations. Participants were shown descriptions of different charging locations as follows (full stimulus can be found in Appendix 5):

Workplace charging points: *Charging points located at workplace parking areas (slow and fast speed options ranging from 4-12 hours to fully charge).*

- Charging at the workplace was seen as a practical alternative to overnight charging at home for those who already drive to, and park at, work. However, the appeal of workplace charging was limited for many in the context of increased working from home as a result of the Covid-19 pandemic; many indicated that they planned to work from home some, or most, of the time in the future.
- For current BEV drivers without access to off-street parking, who tended to have a greater understanding of charging speeds and time requirements, workplaces provided a valuable opportunity to slow charge over longer periods of time. However, they were conscious that charge points are currently only available at very few workplaces.

"I think if people can charge at work, it would make it so much easier for those who could not charge at home." (BEV driver, Urban)

"Parking at work is good for those that still go into the office, but my parking space isn't big, and people already struggle to find parking if they drive in." (BEV driver, Suburban)

Petrol station charging points: *Charging points located at petrol stations (typically rapid chargers, 30min-1hr to fully charge).*

- Rapid charging was considered essential at motorway service centres to prevent vehicles from running out of charge on longer journeys. This was particularly important in reassuring those who regularly drive longer distances or between towns and cities, particularly those who do so as part of their job.
- While there was some concern about this adding to journey times if needing to travel 'out of the way' in order charge, participants were broadly happy to align this charging on longer journeys with taking necessary breaks anyway.

  "This [rapid charging] is good for me because I am always in my car. It's similar to motorway charging." (Non-EV driver, Urban)

  "Rapid charging is great for long journeys; slower charging is sometimes okay for overnight charging but rapid charging is more reliable." (BEV driver, Suburban)

  "On longer journeys the minimum requirement for me would be speed – you want it to get charged quickly you don't want to be there for ages." (Non-EV driver, Rural)

Other destination charging points: *Charging points located at parking areas for leisure and entertainment destinations e.g. supermarkets, restaurants, shopping centres (typically a mix of rapid and fast charge points, ranging from 30 minutes – 6 hours to fully charge).*

- There was openness to charging at destinations, such as supermarkets, that most drivers visit on a weekly basis. However, there was some mention of Covid-19 impacting shopping habits, including spending less time at shopping centres or switching to online shopping instead.
- Non-EV drivers without access to off-street parking saw it as important to offer rapid charging at destinations in order to make charging feasible. This was likely influenced by misconceptions about needing to complete a full charge each time, rather than just 'topping up' (see Section 6.2.1. for more detail). This audience were therefore often concerned about having to 'fill the time' it takes to charge their vehicle if they ran out of useful or necessary errands to complete. However, even those who better understood the possibility of 'topping up' versus full charge felt that spending 10-20 minutes to do so was too long.
- Current BEV drivers were often already using charge points at destinations when available, with some even reporting changing where they do their supermarket shopping to go somewhere that offers charging while they shop. Making destination charging more widespread was very appealing to this audience.

> *"Rapid charging at destinations is ideal when you're away from home and it should be provided." (BEV driver, Suburban)*

> *"Half an hour for rapid charging kind of puts that hesitation in again – how long am I actually going to sit somewhere to wait? This puts an obstacle in the way again." (Non-EV driver, Rural)*

Across all charging locations, a key concern raised by BEV drivers was the reliable availability of charging points in the future, as BEVs become more widespread. There was a strong desire for reassurances about this as the charging infrastructure grows to meet demand.

> *"When the whole market is going to be saturated when every car is electric, and I just have a vision of loads of queues." (Non-EV driver, Urban)*

> *"I think the infrastructure would be less of a priority in rural areas which makes me think there wouldn't be that many charging points." (Non-EV driver, Rural)*

In addition to thinking about a variety of charging locations, participants were asked to consider different charging point types. Participants were shown information about rapid charging points and wireless charging points, as follows (stimulus can be found in Appendix 5):

Rapid charging points: *Charging points specifically offering rapid charging (30 minutes – 1 hour to fully charge) for shorter stays or when travelling e.g. destinations, motorways, on-street.*

- Rapid charging points were felt to be important, particularly at destinations where drivers would be spending shorter periods of time to charge, such as supermarkets, and local and motorway service stations.

Wireless charging points: *Charging points using resonant magnetic induction to transfer energy between a pad on the ground and another on the underside of the car.*

- Wireless charging was appealing as an 'easy to use' option, that requires minimal physical effort for drivers and also fits unobtrusively into streetscapes and parking facilities. However, there were doubts as to whether this technology was currently available and feasible across all locations and BEV types.

Potential future charging scenarios for destination charging

A series of scenarios describing potential future charging solutions were tested in both the quantitative survey and the deliberative research. Scenarios tested in the deliberative research that relate to destination charging were (NB. these are summarised versions of the scenarios tested; full versions can be found in Appendix 5):

- ***Rapid charging as you go:*** *Charging station network, mostly on old petrol station sites, with 3-4 charging stations between home, the office and nearby towns. Rapid charging available as standard, with a full charge taking about 30mins or can stop in for a shorter (e.g. 10mins) top up charge. Stations have a shop and/or café. A full charge in this scenario costs £11.*

- ***Charge where you are:*** *Great range of public charging infrastructure, including charge points in the car park at work, at the supermarket and near coffee shops etc. Because*

there are so many places to charge, don't need to think much about it. Cost of charging varies, but a full charge in this scenario costs £8.50 on average.

Scenarios tested in the quantitative research broadly align with the above descriptions, however full versions of these options can be found in Appendix 6. As a reminder, these scenarios were designed as research tools and do not represent government policy.

Rapid charging as you go

Overall, in the deliberative research, rapid charging was viewed positively and was considered important in minimising the potential inconvenience and disruption to current driving routines that BEV charging is seen to pose.

However, although the concept of a rapid charging station network was considered to be similar to existing service stations supplying petrol and diesel, upon consideration in the deliberative research, non-EV drivers without access to off-street parking felt that these would add too much time to their shorter, routine journeys. Therefore, the rapid 'refuelling-style' charging behaviour was perceived as more suitable for motorway stops when a longer rest is required anyway, making this scenario particularly appealing for longer journeys.

- This perception is underpinned by non-EV drivers without access to off-street parking finding it difficult to conceptualise charging times, with most assuming they would need to wait for the full 30 minutes to charge a BEV from 0-100% battery before they could continue with their journey.

  "Waiting for 30 minutes would be too long, I don't have that time to wait, and it will eat into my journey time." (Non-EV driver, Rural)

  "This [rapid charging as you go] seems similar to service stations. So, I think this would be easier for some people." (BEV driver, Urban)

With this in mind, the 'rapid charging as you go' scenario was considered appealing but with the caveat that it should be a secondary charging approach, delivered alongside charging in close proximity to home as a back-up for longer journeys.

Both non-BEV and BEV drivers without access to off-street parking did have some lingering concerns about the 'rapid charging as you go' scenario, including:

- **Lack of availability resulting in long wait times**: Even if rapid charging stations were as widely available as petrol stations are today, participants still anticipated there being queues for charge points (as there are for pumps today). Then, at 30 minutes per full charge, there was concern about charging taking too long if having to wait for others to finish charging before being able to charge themselves.
- **Higher costs:** There was an assumption that rapid charging would be an expensive option. Even when shown pricing information, some non-EV drivers without access to off-street parking still found it difficult to comparatively assess the cost of charging compared with current petrol or diesel expenses because this information did not always cut through. Therefore, some non-EV drivers often defaulted to their preconception of charging being more expensive than petrol and diesel.

- **The presence of shops and cafes:** This was not seen as a solution to overcome the perceived additional time required to charge versus refuel at a local service station, and received pushback due to the perceived high cost of products and obligation to spend more money. This was particularly the case among parents who were frustrated that they would need to keep their children entertained for a long duration of time while charging (compared to refuelling).

  "There would need to be plenty of charge points otherwise people would just be waiting to charge which is not ideal." (BEV driver, Suburban)

  "I don't want to spend time waiting at a shop, I will just want to get on with my journey. Having young children, this could get expensive." (Non-EV driver, Urban)

There were some important considerations for improvement of the 'rapid charging as you go' scenario that participants felt would increase the likelihood of non-EV drivers to transition to BEVs as well as improve the experience for existing BEV drivers. These included ensuring that:

- **Concerns about charging times are addressed,** including making it clear that people do not need to wait the full 30 minutes to charge every time (e.g., 'spend 10 minutes to top up to arrive to your destination').
- **Price comparisons to petrol/diesel are clearly provided,** including increasing awareness of the actual costs of charging to challenge common perceptions that charging is more expensive than refuelling among non-EV drivers (e.g., making it clear that even the 'more expensive' charging options are still cheaper or the same in cost as petrol/diesel).
- **Rapid charging stations can be clearly identified**, and there is a high density and availability of charging points, to ensure that commercial charging stations can be easily accessed in all locations with limited pre-planning. ZapMap and road signage could be used to achieve this.

  "30 minutes is fine for a long journey, but a bit odd if part of a regular routine and you just need to hang around and wait – they should offer something that means you don't have to wait around." (Non-EV driver, Rural)

  "Having a clear understanding of prices is really important because I always thought this [charging] would be more expensive." (Non-EV driver, Urban)

Charge where you are

In the deliberative research, the 'charge where you are' destination charging scenario was ultimately perceived to be an appealing solution **for BEV drivers** without access to off-street parking because it mirrors, and has the potential to improve, their existing charging behaviours and routines.

"Workplace charging has to be second to home charging, presuming the person is there routinely enough. It does work at my place of work as there are 20+ chargers available." (BEV driver, Urban)

> *"This seems like it would be the least disruptive method of charging (besides home charging) and most people will want their charging to be efficient and to be able to be productive whilst their car is charging. This is similar to what I do when I go to my supermarket to charge my car." (BEV driver, Suburban)*

By contrast, upon consideration in the deliberative research, destination charging was seen to deviate from **non-EV drivers'** current refuelling behaviours, making it difficult for this audience to understand the feasibility of this option in their current circumstances. Non-EV drivers without access to off-street parking anticipated that their trips would need to be tailored to align with the time required to charge, rather than the other way around, especially because uncertainty remained about needing to charge a BEV from 0-100% each time. In addition, this audience had lingering concerns about charge point availability on arrival at their destination. Many also reported that their driving behaviours had changed as a result of the Covid-19 pandemic, and they were driving less frequently to work and spending less time at the shops.

> *"I only spend 15 minutes when I go to the supermarket, I would not spend an hour there waiting for my car to charge. It's just not practical." (Non-EV driver, Rural).*

> *"I don't think charging at work would work for a lot of people as more people are working from home." (Non-EV driver, Urban)*

Despite this, upon discussion, informed participants could see a role for destination charging **as a back-up** to charging in close proximity to home.

There were some important considerations for improvement of the 'charge where you are' scenario that participants felt would increase the likelihood of non-EV drivers to transition to BEVs as well as improve the experience for existing BEV drivers. These included ensuring that:

- **Live updates are provided about charge point availability**, including updates through an app when a charge point is occupied or out of order.
- **Non-EV drivers are deterred from using charging spaces**, including implementing consequences (such as fines) if petrol and diesel vehicles are parked in charging spaces.
- **Both rapid and slower charging options are provided,** with the appropriate charge speed utilised at different locations to address concerns about needing to tailor trips around charging (e.g., slower charging at workplaces where vehicles are sat for 8 hours; rapid charging at supermarket car parks where vehicles are parked for 30 minutes to an hour).
- **Charging at other locations is introduced as well** to seamlessly integrate charging into current routines and behaviours (e.g., restaurants, cinemas, gyms). While the quantitative survey indicated that charging at leisure facilities had comparatively less appeal than other locations, those that have limited access to supermarkets or do not visit once a week mentioned this would be a good alternative.

  > ***"**I think there should be an option for different charging speeds to suit people's situations. They shouldn't automatically be provided with the more or least expensive option, they should have a choice." (BEV driver, Urban)*

> *"I would want to know if a charging space wasn't working, before I got there. After hearing they [other respondents] have needed to charge but have been unable to, it worries me." (Non-EV driver, Rural)*

> *"It would be nice if there were more charging facilities in places where people visit a lot. I don't visit the supermarket a lot so this wouldn't work for me." (Non-EV driver, Suburban)*

7.4. Payment methods

Participants were asked to consider different payment methods that could potentially be used to pay at charging points. Participants were shown the following descriptions of a variety of different options:

- ***Contactless payment:*** *Contactless credit or debit card payment.*
- ***Smartphone app payment:*** *Payment through an EV charging focused app provided by different charging operators e.g. locating chargers and facilitating payment through QR code scanning.*
- ***Radio Frequency Identification Card (RFID) payment:*** *Uniquely linking to driver accounts through a secure network.*

Stimulus shown can be found in full in Appendix 4.

Overall, the most appealing payment methods were those perceived as facilitating a seamless charging experience. This meant allowing drivers to make payments quickly and with minimal required information and equipment (e.g., downloading a new app, logging into or creating a new account, using a card reader).

Both contactless payment and smartphone app payment options were appealing as easy methods that deliver the desired 'charge and go' approach. While this was desirable for both BEV and non-EV drivers without access to off-street parking, it was seen as particularly important by BEV drivers due to their real experiences of frustrating, complex payment processes.

> *"Contactless payment would be the one that is most easy to use for most people – myself included." (Non-EV driver, Suburban)*

> *"They should have something like ApplePay where it's linked to your account and it will debit you." (Non-EV driver, Urban)*

However, while participants were warm to the idea of using smartphone apps, there were concerns about the need to download multiple smartphone apps to facilitate payment across different charging point types and/or providers. This was a frustration that the BEV drivers currently experience, and with non-EV drivers sympathetic to this concern upon hearing about it.

> *"The number of different cards, apps and accounts you need is harrowing. My wife refuses to learn how to charge the car as it's so complicated." (BE*V driver, Suburban)

> *"Having 10 different apps is just absurd and then you have 2-3 different physical cards and they don't all accept the same payment. It's just a mess and is not ideal." (BEV driver, Urban)*

> *"I wouldn't want to download so many apps on my phone just to make a payment – this sounds like too much stress." (Non-EV driver, Urban)*

There was low awareness and understanding of RFID card payment amongst non-EV drivers without access to off-street parking. However, the idea of holding an individual account that is recognised across charging points is appealing; this would help to deliver a seamless payment experience with minimal hassle and input required from drivers at the time of payment. However, a minority of BEV drivers without access to off-street parking had heard of technological advances that used the BEV itself as a substitute for RFID cards and therefore felt that this was an option technology that would become quickly outdated.

> *"I hadn't really thought of RFID before. I like the idea of it and think it would be good to have as little hassle as possible." (Non-EV driver, Rural)*

> *"Apps and RFIDs are definitely better and more popular at the moment, because contactless is quite expensive so they try to make the charge points cost effective. But on that basis, I think that could be improved in the future as it will be quickly outdated. They should have this inside the car – payment should just happen automatically." (BEV driver, Rural)*

7.5. Route planning and finding information

Participants were also asked to consider charging support services, specifically route planning and information services. Participants were shown the following description alongside three screenshots of the ZapMap route planner app (see Appendix 4 for full stimulus shown):

- ***Route planner app:*** *Live data on charging point locations and availability e.g., ZapMap app, auto-makers own apps (e.g. VW, Tesla).*

The ZapMap app is currently used by many BEV drivers without access to off-street parking, and is highly valued as a source of reliable charge point information, particularly when planning to drive to a new location or on a longer journey. Some BEV drivers also mention the Tesla route planner, which is considered particularly helpful as it is embedded into the car navigation system and tailored specifically to the needs of Tesla vehicles.

However, while the apps currently available are helpful in alleviating some of the concerns around identifying available and/or working charge points, there was a desire for more 'live' information relating to the dependability of charging points, such as whether they are out of order or currently occupied. BEV drivers who use these apps reported experiences where a charge point had been shown on an app but had not been where indicated, or was occupied or out of order, on arrival – undermining their ability to pre-plan charging.

> *"Applications should accurately reflect availability of chargers, not show them as available when they're not, or not report live status. Apps like ZapMap should be able to pull in the status of all chargers." (BEV driver, Rural)*

> *"ZapMap needs to tell you what kind of charging points are in different places and what chargers are in place. There should be alerts on your phone along your recent routes to help you plan."* (BEV driver, Rural)

For many non-EV drivers without access to off-street parking, hesitance in transitioning to a BEV is linked strongly to the combination of 'range anxiety' and concerns about driving on longer journeys or in unfamiliar areas where they may not be able to find a charging point (either easily or at all). With this in mind, route planning services that offer 'live information' about charge point locations and availability were seen as helpful in alleviating this 'range anxiety'. It was especially helpful to hear about BEV drivers without access to off-street parking making use of these apps today and reporting (primarily) positive experiences.

However, use of an app was still considered a deviation from current parking and refuelling behaviours, and while non-EV drivers without access to off-street parking could see how this could help with pre-planning charging, they still expressed reluctance to do this new pre-planning behaviour at all.

> *"I feel like this is a really good app that I would use if I did have a BEV. I think it's something that would be essential to have if you are someone who goes on journeys on a regular basis that are different and new." (Non-EV driver, Urban)*

> *"I don't think I would use an app; I don't have time with running around and looking after my children, but it would be a good idea if you didn't know where to charge or a charging point wasn't working as I would be scared about this." (Non-EV Driver, Rural)*

8. Conclusions

8.1. Summary of findings

This research highlighted a series of key themes among drivers without off-street parking relating to their driving and parking behaviours and attitudes, and their perceptions of how charging a BEV would fit into their existing habits.

Non-EV drivers without off-street parking are strongly wedded to their current driving and parking behaviours, with **a perception that a BEV would not fit well with their existing driving and parking habits.** The perceived difficulty and subsequent inconvenience of charging a BEV is seen to diminish the door-to-door nature, autonomy, and flexibility that people currently enjoy about driving.

These views are exacerbated by low awareness, poor knowledge, and some misconceptions about BEV charging, costs, and range. This included perceptions amongst non-EV drivers without access to off-street parking that charging a BEV would be more expensive than refuelling a petrol or diesel vehicle, that BEVs need to be charged to full battery daily, and confusion about the concept of 'topping up'.

The appeal of potential options for charging relates primarily to convenience and how closely they could fit into existing driving and parking habits, particularly for non-EV drivers. Of the potential charging options tested in the research, **near-home charging was most appealing and desired as the primary charging solution in future**. In contrast, overnight charging options that required parking further away from home (e.g., in council car parks or local hubs) were least appealing as they would require a significant change in behaviour.

'Rapid charging as you go' and 'charge where you are' (i.e., charging at destinations where people regularly park their car), **whilst also appealing, were generally seen as 'back up' or secondary options.** Charging at workplaces, places of education and destinations such as supermarkets are appealing for most current BEV drivers without off-street parking as well as non-EV drivers with compatible routines. However, ongoing uncertainty about longer term behaviours and routines as a result of Covid-19 makes it unclear what proportion of drivers will perceive destination charging at these locations appealing in the future.

The research suggests that more exposure to BEVs and associated charging behaviour could help non-EV drivers see a bigger role for some potential solutions, making them more appealing. Whilst generally appealing, the use of destination charging is not viewed as a sufficient, standalone option for charging in future, even in locations where drivers park frequently and regularly. This is due to its perceived inconvenience compared to near-home charging and partly because non-EV drivers do not know enough about the possibility of rapid charging and/or the role of 'topping up'.

The research also found that **many of the issues that non-EV drivers anticipated about charging, and the impact these will have on their current routines, do in fact align with actual experiences of current BEV drivers without access to off-street**. These include

charging taking too long, limited range of BEVs, and public chargepoints not yet being widespread. However, **there are some challenges that BEV drivers did not anticipate prior to switching to driving a BEV** – including not having access to correct information about chargepoint availability/working status; having to navigate a wide variety of specific payment methods and apps; and lack of availability of chargepoints on arrival at their destination – which could be addressed to improve their charging experience in future.

Non-EV drivers without access to off-street parking in the deliberative research conclude that, in addition to fitting with existing habit and proximity, **reliability and dependability of charging solutions are essential aspects when considering switching to a BEV**. The research has found that BEV drivers would rather travel some distance to have guaranteed charging, than be 'caught out' in urgent situations with unreliable charging points.

Current BEV drivers without off-street parking have adapted their behaviours to fit charging into their journey planning. However, for many non-EV drivers without access to off-street parking, hesitance in transitioning to a BEV is linked strongly to the combination of 'range anxiety' and concerns about driving on longer journeys or in unfamiliar areas where they may not be able to find a charging point.

8.2. Implications

The following implications do not reflect government policy and should be interpreted as implications based on the research findings with this audience.

There are two key outcomes that are important when developing future provision of a public BEV charging network:

- Encouraging non-EV drivers without access to off-street parking to consider switching to a BEV, and
- Improving the experience of charging for current BEV drivers without access to off-street parking by making it easier and more enjoyable to do.

To achieve these outcomes, the research suggests three key aspects to BEV charging that should be prioritised:

- Minimising the extent to which behaviour change is required to adopt BEVs by offering charging where vehicles are 'naturally sat' (as well as educating drivers about charging requirements).
- Prioritising charging options near home, with destination and rapid charging as secondary options.
- Addressing concerns about dependability and proximity of charge points to where vehicles naturally sit.

8.2.1. Implications per the COM-B framework

To help understand and frame what might encourage non-EV drivers without access to off-street parking to consider switching to a BEV, as well as what could help to improve the experience of charging a BEV for current BEV drivers without access to off-street parking, this

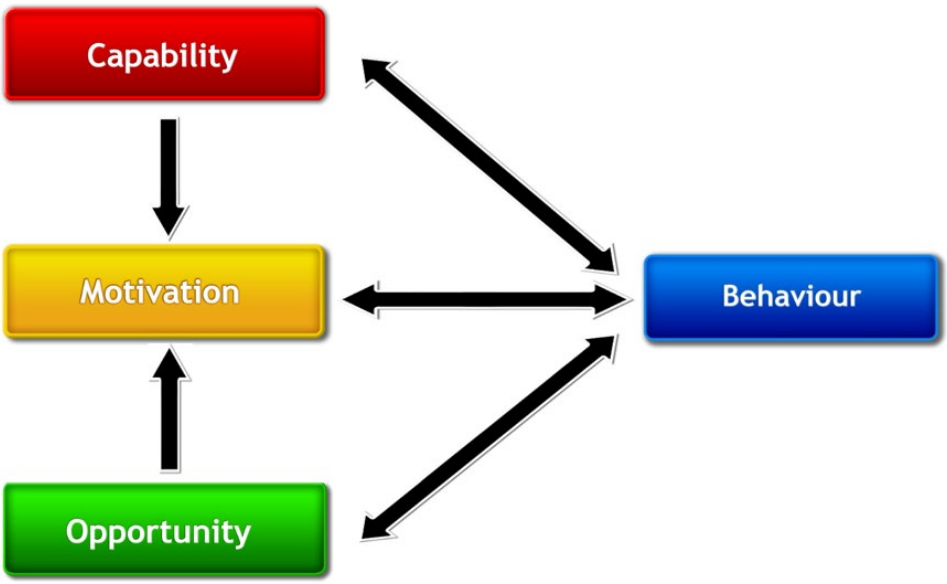
research has drawn upon the 'Capability Opportunity Motivation – Behaviour' model (COM-B model), a key behavioural change theory (Figure 22). According to *'The Behaviour Change Wheel: A Guide to Designing Interventions'* (Susan Michie, Lou Atkins & Robert West, 2014, p. 59-60), the COM-B model dictates that for any behaviour to occur:

1. There must be **capability**; this can be either 'physical' (e.g., physical skills, strength, or stamina) or 'psychological' (having the cognitive skills, strength, or stamina as well as knowledge) to perform the behaviour.

2. There must be **opportunity**; this can be 'physical' (e.g., physically accessible) or 'social' (including cultural norms, interpersonal influences, and social cues).

3. There must be sufficient **motivation**; this can be 'reflective' (involving self-conscious planning and beliefs about what is good or bad), or 'automatic' (processes involving wants and needs, desire, impulses, reflex responses, and habits).

Figure 22: The COM-B model



Source: *'The Behaviour Change Wheel: A Guide to Designing Interventions'* (Susan Michie, Lou Atkins & Robert West, 2014, p. 62)

To encourage non-EV drivers without access to off-street parking to consider switching to a BEV, as well as to improve the experience of charging for current BEV drivers without access to off-street parking, any potential interventions ideally need to ensure that the public are **capable** of carrying out the behaviour and that any physical or psychological barriers are removed. This could include the following:

- **Providing clarity around upfront and longer-term (running) costs of BEVs**, including calculated comparisons of costs over time for different circumstances and contextualising this in terms of current cost of refuelling an ICEV (e.g., comparison of annual costs of refuelling versus slow charging versus fast charging, to cover equal distances).
- **Increasing awareness of EV schemes** to minimise the perceived up-front cost barriers to switching to a BEV, particularly for those who usually buy vehicles at a lower cost

through the second-hand market (as the second-hand BEV market is not yet established).

- **Increasing knowledge and awareness of BEVs' green credentials,** including reassuring on the environmental impact of batteries and demonstrating the extent to which carbon emissions are reduced when driving a BEV versus petrol/diesel vehicle; this is particularly important for those who are more environmentally conscious.
- Encouraging **the use of universal, simple language** across manufacturers when talking about BEVs.

Interventions could also provide **opportunities** for non-EV drivers without access to off-street parking to consider switching to a BEV, as well as for BEV drivers without access to off-street parking to have better charging experiences, such as:

- **Normalising BEVs** through increased visible charging infrastructure, BEVs on the roads, and increased knowledge of the new/second-hand BEV market.
- **Providing a public charging network with a focus on charge point dependability and proximity to where vehicles are naturally sat**, including:
    - Accelerating rollout of on-street charge points (e.g., lamppost charging) on residential streets.
    - Clearly marking parking spaces with a BEV charge point and deterring ICEV drivers from parking their vehicles in these spaces (e.g., by imposing penalties/fines).
    - Allowing advance booking of charge points in busy locations.
    - Providing rapid charging hubs in a similar fashion to motorway services now.
    - Providing destination charging at locations where vehicles are 'naturally sat' e.g., supermarkets, workplaces, cinemas, gyms, restaurants – and aligning charge point speeds with the activity taking place.
- **Simplifying charging payments** by having universal payment methods/apps (at minimum), or 'tap and go' contactless payments at the same rate as payments made through an app (ideally).
- Encouraging the use of **apps with live updates** on available charge points and pricing.
- **Providing commercial infrastructure that makes purchasing a BEV just as easy as purchasing an ICEV** e.g., financial products such as flexible finance, second-hand BEV market, ability to break away from ongoing relationships with dealers/manufacturers.

Interventions which would provide sufficient **motivation** and persuade and incentivise non-EV drivers without access to off-street parking to consider switching to a BEV (NB. BEV drivers without access to off-street parking are already motivated for an improved charging experience) could include:

- **Promoting how great the BEV driving experience is**, including the use of first-hand testimonials from drivers, particularly those who are underrepresented in the public

discourse on BEVs, who have already made the switch – as they often talk extremely positively about the driving experience.

- Conveying the **personal benefits** that a BEV vehicle can provide, that petrol and diesel vehicles cannot.
- **Providing a higher density public charging network that does not require excessive pre-planning to use, minimising the extent to which switching to a BEV requires new driving/parking behaviours to enable charging –** as this will enable the new charging behaviour to be easily 'bolted on' to existing habits.
- **Educating non-EV drivers about actual charging behaviours** and contextualising this within their existing driving/parking habits to minimise the perceived personal impact of switching to a BEV (e.g., being able to charge where you already park and not having to go out of your way for a charge point; the option to do a quick 'top up' rather than a full charge; information about how (in)frequently charging is required and that it is rarely needed every day).

Appendices

A.1. Deliberative sample breakdown

Table 6: Deliberative sample breakdown by demographic criteria

Demographic	Criteria	Total
Age	18-24	3
Age	25-34	26
Age	35-44	29
Age	45-54	20
Age	55-64	9
Age	65+	3
Gender	Men	48
Gender	Women	42
Gender	Other	-
Ethnicity	From an ethnic minority	19
Location	See Table 6 below	See Table 6 below
Socio-economic group	AB	29
Socio-economic group	C1/C2	49
Socio-economic group	DE	12
Vehicle type	BEV	29
Vehicle type	Non-EV	31
Health and disability	Long term health condition, illness, disability or impairment	10
Prior consideration of EVs	Already have a BEV	29
Prior consideration of EVs	Currently considering	11
Prior consideration of EVs	Considered in the past, but not currently considering	18
Prior consideration of EVs	Never considered, but open	32
Vehicle ownership	Own	60
Vehicle ownership	Lease	17
Vehicle ownership	Company	12
Vehicle ownership	Mobility car	1

Table 7: Deliberative sample by location

Location	BAME total per region/nation
London	15
South East	10
South West	9
East England	6
East Midlands	9
West Midlands	7
Yorkshire and the Humber	5
North East	6
North West	6
Wales	6
Scotland	6
Northern Ireland	5

A.2. Quantitative sample breakdown

Table 8: Quantitative sample breakdown by demographic criteria

Factor	Unweighted sample	Weighted sample
Total	**1,006**	**1006**
Male	487	482
Female	517	523
18-34	302	308
35-54	393	391
55+	311	308
ABC1	562	561
C2DE	444	445
Urban	468	474
Suburban	344	335
Rural	194	196
Scotland	109	105
North East	64	56
North West	87	82
Yorkshire & Humberside	77	71
West Midlands	83	75
East Midlands	68	86
Wales	44	45
Eastern	97	108
London	138	135
South East	141	150
South West	76	75
Northern Ireland	22	19

A.3. Questionnaire used for quantitative survey of non-EV drivers without access to off-street parking

Section 1 – Screener Qs

1. [ASK ALL | SINGLE CODE] **Which of the following best describes your access to parking at home?**
    a. I have access to off-street parking such as a private driveway/garage at my home or communal residential carpark for my building/complex, for at least one vehicle [SCREEN OUT]
    b. I have no access to off-street parking at my home [CONTINUE]

2. [ASK ALL | NUMERIC GRID | MULTIPLE RESPONSE] **Please indicate in the table below how many cars your household has continuous use of, according to each of the categories below – as well as whether they are owned, leased or a company car.**

    [SCREEN OUT ALL ANSWERING 1 OR MORE TO OPTION D AND/OR E AND/OR F]
    [SCREEN OUT THOSE WHO SAY NONE TO ALL OPTIONS]

	Own (bought new)	Own (bought second-hand/used)	Lease	Company car	None [NMUL]
a. Petrol engine	I	II	III	IV	V
b. Diesel engine	I	II	III	IV	V
c. Hybrid vehicle that cannot be plugged in to charge	I	II	III	IV	V
d. Plug-in Hybrid Electric Vehicle (PHEV) (has both a battery-powered electric motor and a petrol/diesel engine that needs to be refuelled)	I	II	III	IV	V
e. Battery Electric Vehicle (BEV) (has a battery-powered electric motor only and must be plugged in to charge)	I	II	III	IV	V
f. Hydrogen Fuel Cell Electric Vehicle (HFCV) (has an electric motor	I	II	III	IV	V

but does not have a battery and does not plug in to charge)					
g. Other (please specify)	I	II	III	IV	V

Section 2 – Driving habits

3. [ASK ALL | STATEMENT GRID | SINGLE CODE PER ROW] When answering this question, please think about the main vehicle that you use. If your household has continuous use of more than one vehicle, then this is the vehicle that you use most often.

Which of the journeys listed below do you ever make in the main vehicle that you use, and what is the typical distance you travel on each trip?

[SHOW STATEMENTS IN FIXED ORDER]	Within 5 miles	5-19 miles	20-49 miles	50-99 miles	100-249 miles	250 miles or more	I never drive for this journey
a. Driving to/from work or your place of study	I	II	III	IV	V	VI	VII
b. Driving as part of your working day (e.g. site visits, home visits, travelling between locations)	I	II	III	IV	V	VI	VII
c. Driving to/from shops/ supermarket	I	II	III	IV	V	VI	VII
d. Driving to/from leisure activities (e.g. restaurants, cinema, gym/sports facilities)	I	II	III	IV	V	VI	VII
e. Driving to/from social events (e.g. visiting	I	II	III	IV	V	VI	VII

family and friends)							
f. Driving children to/from school	I	II	III	IV	V	VI	VII
g. Driving to/from holiday destinations	I	II	III	IV	V	VI	VII

4. [ASK ALL | STATEMENT GRID | SINGLE CODE PER ROW] When answering this question, please think about the main vehicle that you use. If your household has continuous use of more than one vehicle, then this is the vehicle that you use most often.

   How often do you park the main vehicle that you use in each of these locations overnight?

[SHOW STATEMENTS IN FIXED ORDER]	Every day	5-6 times per week	3-4 times per week	1-2 times a week	Less than once a week	Never
a. In front of or near my home, in an allocated space	I	II	III	IV	V	VI
b. In front of or near my home, in an unallocated space	I	II	III	IV	V	VI
c. On my street, but not in front of or near my home	I	II	III	IV	V	VI
d. On a neighbouring street	I	II	III	IV	V	VI
e. In a public council car park	I	II	III	IV	V	VI
f. In a private car park	I	II	III	IV	V	VI

g. A friend or family member's private driveway/garage or residential carpark for their building/complex	I	II	III	IV	V	VI
h. Other (please specify)	I	II	III	IV	V	VI

5. [ASK ALL | SINGLE CODE] When answering this question, please think about the main vehicle that you use. If your household has continuous use of more than one vehicle, then this is the vehicle that you use most often.

   Still thinking about overnight parking at or near home for the main vehicle that you use …

   To what extent do you typically find it easy or difficult to find a parking space for the main vehicle that you use when parking overnight?
   a. I have a reserved / guaranteed parking space
   b. I always find it easy to park
   c. I usually find it easy to park
   d. I usually find it difficult to park
   e. I always find it difficult to park
   f. Don't know
   g. Not applicable

6. [ASK ALL | SINGLE CODE] When answering this question, please think about the main vehicle that you use. If your household has continuous use of more than one vehicle, then this is the vehicle that you use most often.

   And still thinking about overnight parking at or near your home for the main vehicle that you use…

   How long does it typically take you to walk home from where you park your main vehicle overnight?
   a. Less than 2 mins walk
   b. 2-5 mins walk
   c. 6-10 mins walk
   d. 11-15 mins walk
   e. More than 15mins
   f. Don't know
   g. Not applicable

7. [ASK ALL | STATEMENT GRID | SINGLE CODE PER ROW] When answering this question, please think about the main vehicle that you use. If your household has continuous use of more than one vehicle, then this is the vehicle that you use most often.

How often, if at all, would you park the main vehicle that you use in each of the following locations in a typical week?

[SHOW STATEMENTS IN FIXED ORDER]	Daily	5-6 times per week	3-4 times per week	1-2 times a week	Less than once a week	Never
a. Car park at my place of work/study	I	II	III	IV	V	VI
b. Public car park near my place of work/study	I	II	III	IV	V	VI
c. Street parking near my place of work/study	I	II	III	IV	V	VI
d. Park and ride or other transport station (e.g. bus/train)	I	II	III	IV	V	VI
e. Supermarket car park	I	II	III	IV	V	VI
f. Shopping centre car park	I	II	III	IV	V	VI
g. Leisure centre car park	I	II	III	IV	V	VI
h. Pub/restaurant car park	I	II	III	IV	V	VI
i. Cinema car park	I	II	III	IV	V	VI
j. Public council car park	I	II	III	IV	V	VI
k. A friend or family member's	I	II	III	IV	V	VI

private driveway or garage						
l. Other (please specify)	I	II	III	IV	V	VI

8. [ASK ALL | STATEMENT GRID | SINGLE CODE PER ROW] When answering this question, please think about the main vehicle that you use. If your household has continuous use of more than one vehicle, then this is the vehicle that you use most often.

And thinking about parking the main vehicle that you use in each of these locations, how long do you typically park your vehicle for?

[SHOW STATEMENTS IF Q7 CODE I-V ONLY – EXCLUDE STATEMENTS ANSWERED VI AT Q7]

[SHOW IN SAME ORDER AS AT Q7]	Less than 15 mins	15-29 mins	30-59 mins	1-2 hours	3-5 hours	6+ hours
a. Car park at my place of work/study	I	II	III	IV	V	VI
b. Public car park near my place of work/study	I	II	III	IV	V	VI
c. Street parking near my place of work/study	I	II	III	IV	V	VI
d. Park and ride or other transport station (e.g. bus/train)	I	II	III	IV	V	VI
e. Supermarket car park	I	II	III	IV	V	VI
f. Shopping centre car park	I	II	III	IV	V	VI
g. Leisure centre car park	I	II	III	IV	V	VI
h. Pub/restaurant car park	I	II	III	IV	V	VI

i. Cinema car park	I	II	III	IV	V	VI
j. Public council car park	I	II	III	IV	V	VI
k. A friend or family member's private driveway or garage	I	II	III	IV	V	VI
l. Other (please specify)	I	II	III	IV	V	VI

Section 3 – Attitudes towards BEVs

9. [ASK ALL | SINGLE CODE] When answering this question, please think about the main vehicle that you use. If your household has continuous use of more than one vehicle, then this is the vehicle that you use most often.

   When, if at all, do you think you will replace the main vehicle you currently use?

   a. Within the next year
   b. In more than 1 year, but up to 2 years
   c. In more than 2 years, but up to 3 years
   d. In more than 3 years, but up to 5 years
   e. More than 5 years
   f. I don't intend to ever replace this vehicle
   g. Don't know

10. [ASK ALL | SINGLE CODE] When answering this question, please think about the main vehicle that you use. If your household has continuous use of more than one vehicle, then this is the vehicle that you use most often.

    Thinking about the future and replacing the main vehicle you currently use, what type of vehicle do you think you will most likely purchase or lease?

    a. Vehicle with a petrol engine
    b. Vehicle with a diesel engine
    c. Hybrid vehicle that cannot be plugged in to charge
    d. Plug-in Hybrid Electric Vehicle (PHEV) (has both a battery-powered electric motor and a petrol/diesel engine that needs to be refuelled)
    e. Battery Electric Vehicle (BEV) (has a battery-powered electric motor only and must be plugged in to charge)
    f. Hydrogen Fuel Cell Electric Vehicle (HFCV) (has an electric motor but does not have a battery and does not plug in to charge)
    g. Other (please specify)
    h. Don't know

i. I will not replace the main vehicle I currently use

11. [ASK ALL | SINGLE CODE] **You said that in future you would replace the main vehicle you currently use with [INSERT ANSWER AT Q10]. Would you purchase this vehicle new or second-hand/used?**
    a. New
    b. Second-hand/used – 1-5 year old vehicle
    c. Second-hand/used – 6-10 year old vehicle
    d. Second-hand/used – 11+ year old vehicle
    e. Don't know

12. [ASK ALL | SINGLE CODE] **How do you feel about the prospect of using a Battery Electric Vehicle (BEV) as your main vehicle in the future?**
    A Battery Electric Vehicle (BEV) has a battery-powered electric motor only and must be plugged in to charge.
    a. Very positive
    b. Somewhat positive
    c. Neither positive nor negative
    d. Somewhat negative
    e. Very negative
    f. Don't know

13. [ASK ALL | STATEMENT GRID | SINGLE CODE PER ROW] **To what extent do you personally agree or disagree with each of the following statements about Battery Electric Vehicles (BEVs)?**

[RANDOMISE STATEMENT ORDER]	Strongly agree	Slightly agree	Neither agree nor disagree	Slightly disagree	Strongly disagree	Don't know	N/A
a. I think it would be easy to charge a BEV overnight using public charge points near my home (e.g. on-street, in local car parks)	I	II	III	IV	V	VI	VII
b. I think it would be easy to charge a BEV	I	II	III	IV	V	VI	VII

using public charge points when doing everyday local trips (e.g. at supermarkets)							
c. I think it would be easy to charge a BEV using public charge points when travelling somewhere new	I	II	III	IV	V	VI	VII
d. I think that charging a BEV would be more expensive than re-fuelling my current vehicle	I	II	III	IV	V	VI	VII
e. I think a BEV needs to be charged every day	I	II	III	IV	V	VI	VII
f. I don't think that I would be able to access a BEV charge point whenever I needed one	I	II	III	IV	V	VI	VII
g. I don't think it would be practical to make a long-distance trip (250+ miles) in a BEV	I	II	III	IV	V	VI	VII

14. [ASK ALL | STATEMENT GRID | SINGLE CODE PER ROW] People who drive Battery Electric Vehicles (BEVs) today but, like you, do not have access to off-street parking, tend to use a mix of charging options to charge their vehicle, including options with different speeds and prices. They can use these options to do a full charge or just a top up as needed.

- **Slow chargepoints** can take 10-12 hours to fully charge and cost approx. £7 for a 100-mile charge. They are found on-street in residential areas where people might want to charge their vehicle overnight.
- **Fast chargepoints** can take 4-6 hours to fully charge and cost approx. £9 for a 100-mile charge. They are typically found in workplace parking areas or supermarket carparks.
- **Rapid and ultra-rapid chargepoints** can take 30mins-1 hour to fully charge and cost approx. £14 for a 100-mile charge. They are found in supermarket carparks or highway services where people might need to charge and go.

- Despite these different prices for different charging options, charging a BEV tends to be cheaper than refuelling a petrol or diesel vehicle.

Please imagine that you are using a BEV as your main vehicle in your current circumstances – including where you currently live without access to off-street parking, as well as the types of journeys you currently drive for.

How would you feel personally about each of the charging options listed below?

[RANDOMISE STATEMENT ORDER]	Very appealing	Quite appealing	Limited appeal	No appeal at all	Don't know	N/A
a. **A local community charging hub:** You would be able to book two regular weekly slots to charge overnight at a hub near your home, plus have the option to book additional shorter slots as needed.	I	II	III	IV	V	VI
b. **Charging at your workplace:** You would be able to do a full charge during the day while at work. A full charge would take 6-8 hours.	I	II	III	IV	V	VI
c. **Charging at your supermarket:** You would be able to do a full charge while doing your weekly	I	II	III	IV	V	VI

shop. A full charge would take 1-2 hours.						
d. **Charging at leisure activities:** You would be able to do a full charge while out and about for leisure activities, for example visiting a restaurant, the cinema, or a gym or sports centre. A full charge would take 1-2 hours.	I	II	III	IV	V	VI
e. **Rapid charging stations:** There are a network of rapid charging stations in your town. These are similar to petrol stations, and you would be able to do a full charge in 30 minutes. Most have a café or shop to use while charging.	I	II	III	IV	V	VI
f. **On-street charging at home:** There are chargers installed on your street for you to share with your neighbours, to charge your car overnight or during the day.	I	II	III	IV	V	VI
g. [ASK IF I, II, III OR IV AT Q4A AND/OR B] **Charging from home:** You run a charging cable safely from your						

home to the kerbside through a channel in (or under) the pavement, and charge your BEV overnight using your home energy tariff.						
h. **EV car club:** Instead of owning or leasing your BEV, you use a car club that exclusively provides electric vehicles. You would use an app to book your vehicle and pick it up locally, with the option to drop it off anywhere in a 50-mile radius. Vehicles are guaranteed to have at least 60% charge on pick up, and you would not need to worry about charging the vehicle at the end of the day as the car club would take care of this for you.	I	II	III	IV	V	VI
i. [FIXED POSITION – ALWAYS SHOW LAST] For any of the charging options described above, **an official app/website to book your charging slots ahead of time**	I	II	III	IV	V	VI

15. [ASK ALL | SINGLE CODE] Still imagining that you are using a BEV as your <u>main vehicle</u> in your <u>current circumstances</u>, please think now about finding overnight charging near your home…

What is the most amount of time you would be willing to walk to get home from where you park your vehicle to charge overnight?

a. Less than 2 mins walk
b. 2-5 mins walk
c. 6-10 mins walk
d. 11-15 mins walk
e. More than 15mins
f. Don't know
g. Not applicable

16. [ASK ALL | OPEN TEXT RESPONSE] **Imagine that in 5 years' time you had to replace the main vehicle that you currently use. What, if anything, would make you more likely to purchase or lease a Battery Electric Vehicle (BEV)?**

    [OPEN RESPONSE]

Section 4 – Demographics

17. [ASK ALL | SINGLE CODE] **Thank you for your answers so far. Please answer some final questions about you to wrap up…**

    Do you identify as…?
    a. Male
    b. Female
    c. Non-binary
    d. Prefer not say

18. [ASK ALL | NUMERICAL CODE] **Please enter your age in the box below:**
    a. [Max 99]

19. [ASK ALL | SINGLE CODE] **Which of the following describes where you live?**
    a. Scotland
    b. North East
    c. North West
    d. Yorkshire and the Humber
    e. West Midlands
    f. East Midlands
    g. Wales
    h. East of England
    i. London
    j. South East
    k. South West

l. Northern Ireland

20. [ASK ALL | SINGLE CODE] **Which of the following best describes the type of building you currently live in?**
    a. Detached house
    b. Semi-detached house
    c. Terraced house
    d. Converted flat (i.e. a house that has been converted into flats)
    e. Maisonette (i.e. a flat across two floors)
    f. Flat in a small block of flats (less than 3 floors)
    g. Flat in a tower block / high-rise complex (3+ floors)
    h. Other (please specify)

21. [ASK ALL | SINGLE CODE] **Which of the following best describes the street you live on?**
    a. Mostly terraced houses
    b. Mostly detached or semi-detached houses
    c. Mostly flats (including converted, split level and studio flats)
    d. Other, please specify

22. [ASK ALL | SINGLE CODE] **To which of the following ethnic groups do you consider you belong?**
    a. White
    b. Mixed
    c. Asian / Asian British
    d. Black / African / Caribbean / Black British
    e. Other ethnic group, please specify
    f. Prefer not to answer

23. [ASK ALL | SINGLE CODE] **Do you have a long-term illness, health condition, disability or impairment that limits your daily activities and has an impact on your mobility?**
    This could include physical or mental health conditions.
    Please remember that your answers are always treated confidentially.
    a. Yes - mental condition
    b. Yes - physical condition
    c. Yes - disability
    d. Yes - other
    e. No
    f. Prefer not to answer

24. [ASK ALL | NUMERICAL CODE] **Including yourself how many people in total live in your household?**

a. Max 99

25. [ASK ALL | SINGLE CODE] **Do you have any children aged 18 or under? If so, how old are they?**
    a. No children aged 18 or under
    b. Yes - children aged under 5 years old
    c. Yes - children aged 5 to 10 years old
    d. Yes - children aged 11 to 15 years old
    e. Yes - children aged 16 to 18 years old
    f. Prefer not to answer

26. [ASK ALL | NUMERICAL CODE] **Please enter the first half of your postcode. Please enter the letters in upper case.**

27. ASK ALL | SINGLE CODE] **Which of the following best describes where you live?**
    a. Urban
    b. Small town/Suburban area
    c. Village/fringe of town
    d. Isolated rural area

28. [ASK ALL | SINGLE CODE] **Is the house or flat in which you live...?**
    a. Owned outright - without mortgage
    b. Owned with a mortgage or loan
    c. Rented from the council
    d. Rented from a housing association
    e. Rented from someone else
    f. Rent free

29. [ASK ALL | SINGLE CODE] **Please indicate which of the following best describes your working status**
    a. Currently furloughed / reduced hours / employer imposed temporary leave of absence as a result of the Coronavirus
    b. Working full time - working 30 hours per week or more
    c. Working part-time - working between 8 and 29 hours per week
    d. Self-employed - working 30 hours per week or more
    e. Self-employed - working between 8 and 29 hours per week
    f. Not working but seeking work or temporarily unemployed or sick
    g. Not working and not seeking work
    h. Student
    i. Retired on a state pension only

j. Retired with a private pension
k. House person, housewife, househusband, etc.

30. [ASK ALL | SINGLE CODE] **Are you required to drive as part of your job?**
    a. Very Frequently
    b. Frequently
    c. Occasionally
    d. Rarely
    e. Very Rarely
    f. Never

31. [ASK ALL | SINGLE CODE] **What is the total combined annual salary of your household before tax?**
    a. Up to £7,000
    b. £7,001 to £14,000
    c. £14,001 to £21,000
    d. £21,001 to £28,000
    e. £28,001 to £34,000
    f. £34,001 to £41,000
    g. £41,001 to £48,000
    h. £48,001 to £55,000
    i. £55,001 to £62,000
    j. £62,001 to £69,000
    k. £69,001 to £76,000
    l. £76,001 to £83,000
    m. £83,001 or more
    n. Prefer not to answer

A.4. Qualitative reactions to the EVA scheme

Participants in the deliberative research were introduced to a non-Government EV scheme – EV Approved (EVA) – before being asked about their awareness and perceptions towards this scheme. EVA is a set of standards for all areas of automotive retail (retail, wholesale, aftersales and bodyshops) designed to recognise businesses' excellence in the electric vehicle sector. In this way, the EVA badge of approval enables consumers to identify the businesses at the forefront of electric vehicle retail.

Participants were shown a video about EVA to provide them with information.

Generally, there was low awareness of the EVA scheme amongst participants, even with new BEV drivers who had recently made the switch. This scheme was not seen to offer much in the way of incentivising a BEV purchase, as it was instead seen as more of an assurance scheme. There was some confusion as all vehicles were seen to have to meet certain trade regulations regardless of the EVA, and therefore there was confusion as to why there was a need for this independent regulation.

> *"As someone who bought a new one [BEV] recently, I hadn't heard of this. I don't think it would've made a difference to my choice, it was about cost and quality of service." (BEV driver, Rural)*

> *"Aren't all car sales already regulated? Trade laws, consumer laws – I don't understand. What regulation, where there is no special regulation for EVs or EV consumer rights?" (Non EV driver, Suburban)*

A.5. Quantitative appeal of potential future charging solutions: summary of sub-group differences

The quantitative survey found that the potential future charging options had significantly higher net appeal ('very' + 'quite appealing') for:

- **Younger adults:** All future charging options had significantly higher net appeal amongst younger people aged 18-34 years old than they did for those who were older (Table 2). Younger adults tended to be warmer to the idea of using a BEV in the future (see Section 6.1), which would account for their warmer reactions to the charging options tested.

Table 3: Net appeal ('very' + 'quite appealing') of the future charging scenarios amongst age groups

Scenarios	Total sample	18-34	35-54	55+
Running a cable from home	59%	77%	59%	41%
On street charging at home	60%	77%	57%	45%
Rapid charging stations	62%	76%	64%	45%
Charging at your local supermarket	58%	74%	60%	39%
Charging at workplace	53%	72%	59%	25%
Charging at leisure activities	50%	72%	49%	30%
A local community hub	43%	62%	41%	55%
EV car club	26%	42%	26%	12%

Q14. How would you feel personally about the charging options listed below? Base: all respondents [n=1006]

- **Parents of young children:** The net appeal of all potential future charging options was significantly higher for parents of children under 10 years of age, especially when compared to those without children aged under 18 years old (Table 4). Parents of young children were typically younger in age than those without children aged under 18 years old, which we know correlates with greater warmth towards BEVs and the charging options tested (see Table 3).

Table 4: Net appeal ('very' + 'quite appealing') of the future charging scenarios amongst parents of young children and those without children aged under 18

Scenarios	Total sample	Parents of children under 10	No children aged under 18
Rapid charging	62%	71%	59%
On street charging at home	60%	70%	57%

Running a cable from home	59%	70%	55%
Charging at your local supermarket	58%	68%	55%
Charging at leisure activities	50%	67%	44%
Charging at workplace	53%	64%	49%
A local community hub	43%	51%	40%
EV car club	26%	38%	22%

Q14. How would you feel personally about the charging options listed below? Base: all respondents [n=1006]

- **People living in urban areas:** All of the future scenarios had significantly higher net appeal for those residing in urban areas compared to those that live in suburban or rural areas (exception was charging at workplaces, which had no significant differences between urban and suburban respondents) (Table 5). However, those living in urban areas were again more likely to be younger in age than those in suburban or rural areas, correlating with warmer sentiment towards BEVs and BEV charging (see Table 3).

Table 5: Net appeal ('very' + 'quite appealing') of the future charging solutions based on rurality

Scenarios	Total sample	Urban	Suburban	Rural
Rapid charging stations	62%	68%	58%	53%
On street charging at home	60%	65%	55%	54%
Running a cable from home	59%	65%	53%	53%
Charging at your local supermarket	58%	65%	50%	54%
Charging at workplace	53%	57%	52%	45%
Charging at leisure activities	50%	57%	45%	43%
A local community hub	43%	51%	37%	32%
EV car club	26%	36%	21%	13%

Q14. How would you feel personally about the charging options listed below? Base: all respondents [n=1006]

The quantitative survey indicated that 3% of respondents did not find any of the tested options appealing, however this audience was too small to be able to confidently determine any sub-group differences.

A.6. Stimulus shown in the deliberative research

A.6.1. Online community weeks 1 & 2

Figure 23: Types of EV

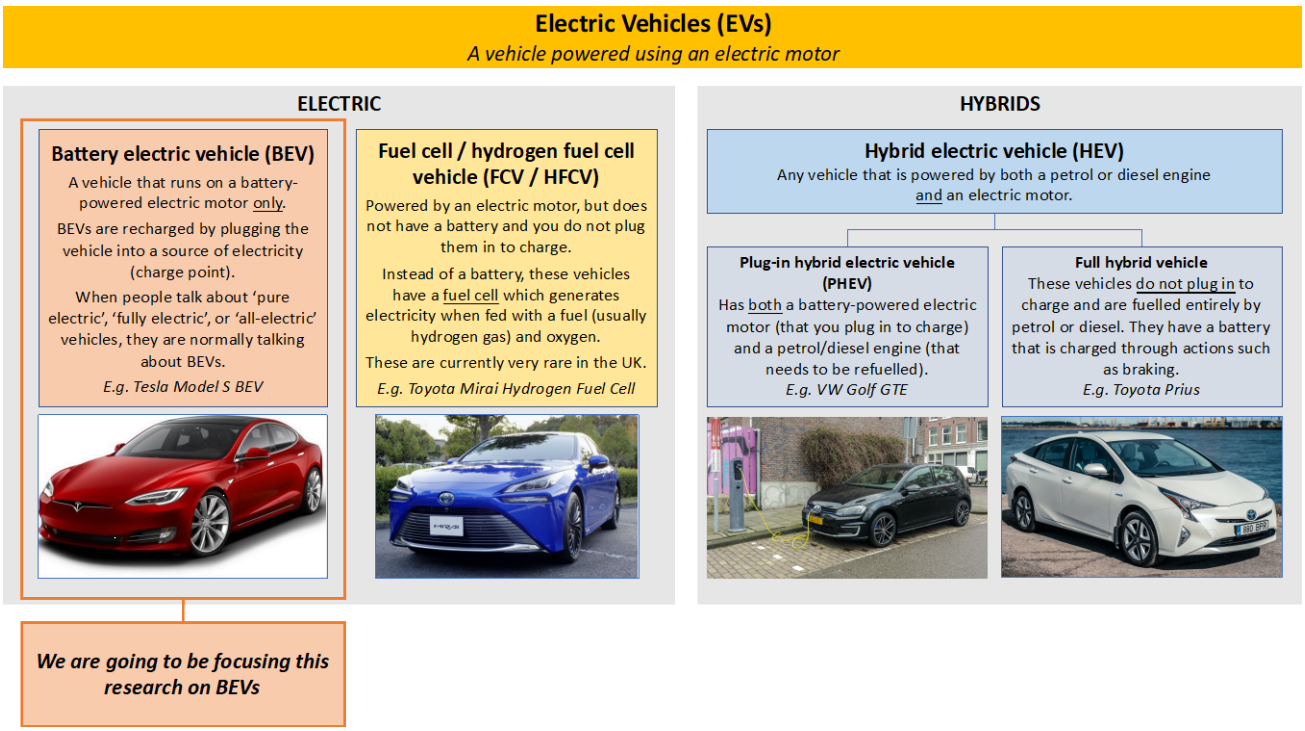


Figure 24: Charge point types

On-street charging points
Public charging points, offering both fast (4-6 hours) and slower charging (10-12 hours)

Lamp post charging points
Adapting existing lamp post columns to provide charging points on residential streets (slower charging taking 10-12hrs)

Workplace charging points
Charging points located at workplace parking areas (slow and fast speed options ranging from 4-12hrs)

Destination charging points
Charging points located at parking areas for leisure and entertainment destinations e.g. supermarkets, restaurants, shopping centres (typically a mix of rapid and fast charge points, ranging from 30min-6hrs)

Petrol station charging points
Charging points located at petrol stations (typically rapid chargers, 30min-1hr)

Rapid charging points
Charging points specifically offering rapid charging (30min-1hr) for shorter stays or when travelling e.g. destinations, motorways, on-street

Wireless charging pads
Charging points using resonant magnetic induction to transfer energy between a pad on the ground and another on the underside of the car

Figure 25: Payment methods

Contactless payment

Contactless credit or debit card payment

RFID card payment

Radio Frequency Identification Card (RFID) payment, uniquely linking to driver accounts through a secure network

Smartphone app enabled

Payment through an EV charging focused app provided by different charging operators e.g. locating chargers and facilitating payment through QR code scanning

Figure 26: Route planner

Route planner

Live data on charging point locations and availability e.g. ZapMap app, auto-makers own apps (e.g. VW, Tesla)

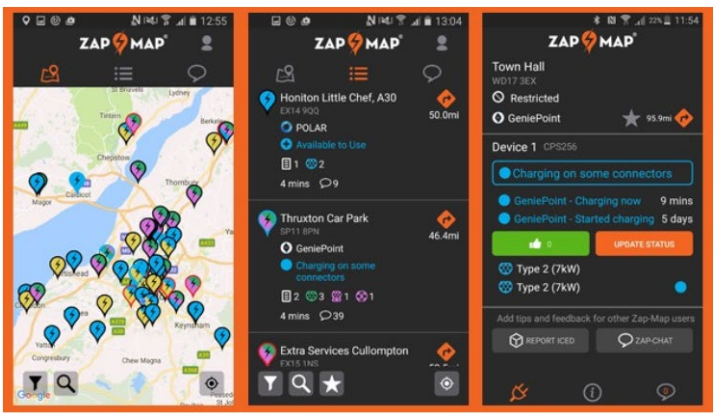


Figure 27: 'Cost' in relation to EV charging

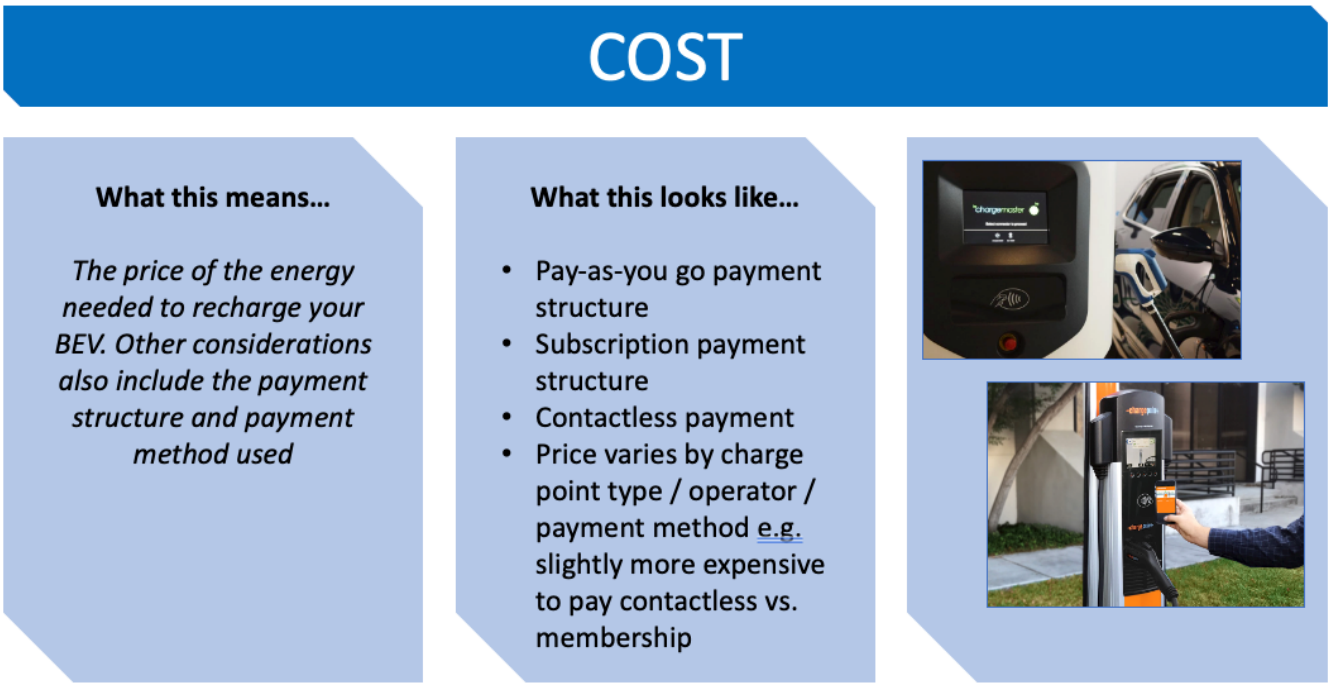


Figure 28: 'Dependability' in relation to EV charging

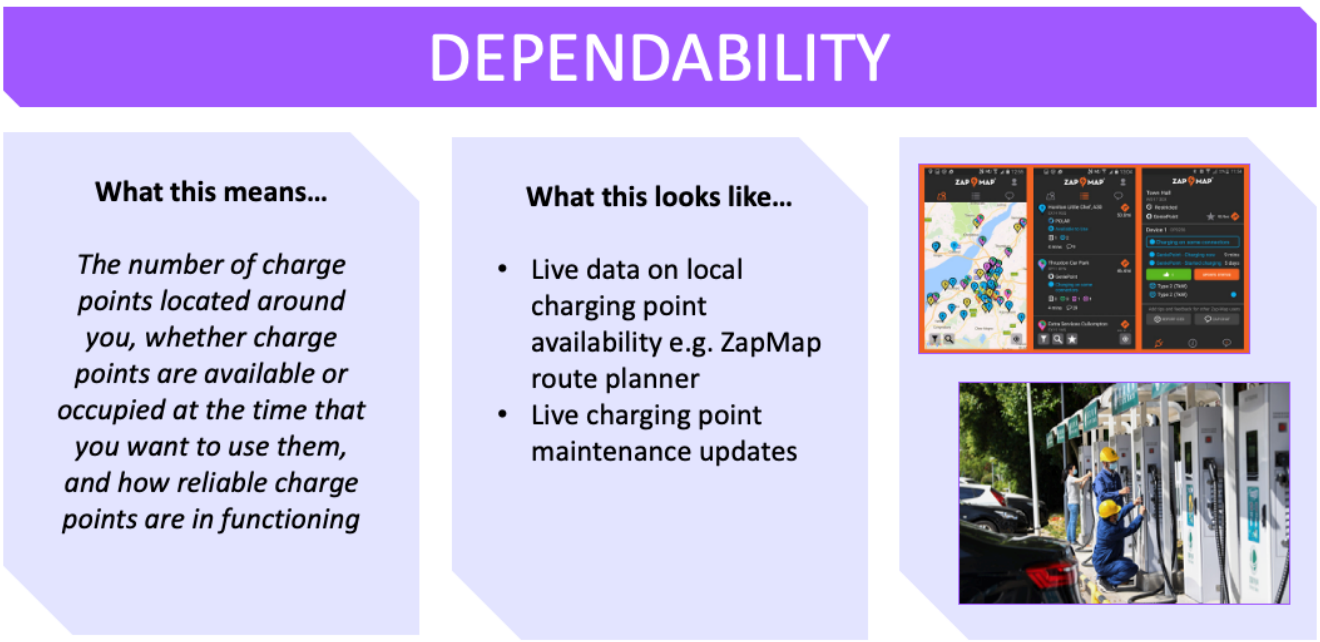


Figure 29: 'Proximity' in relation to EV charging

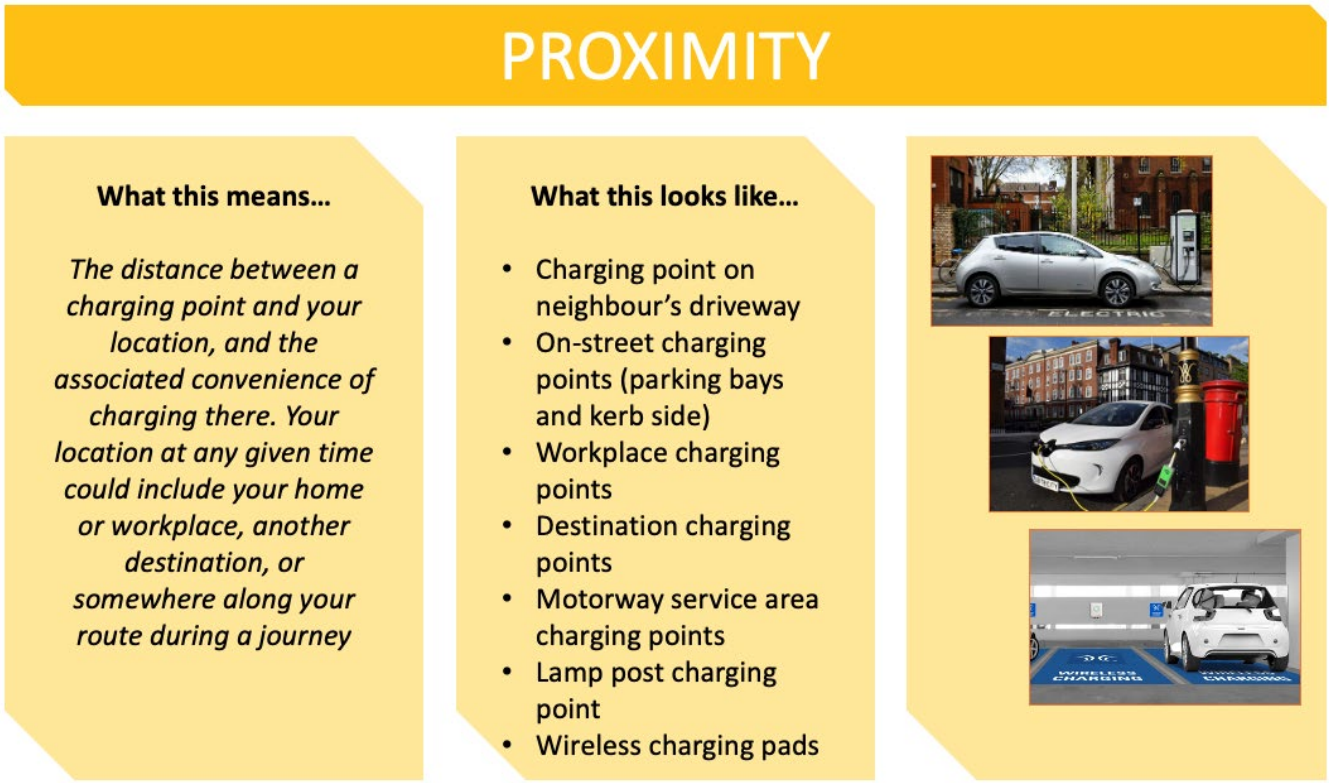


Figure 30: 'Speed' in relation to EV charging

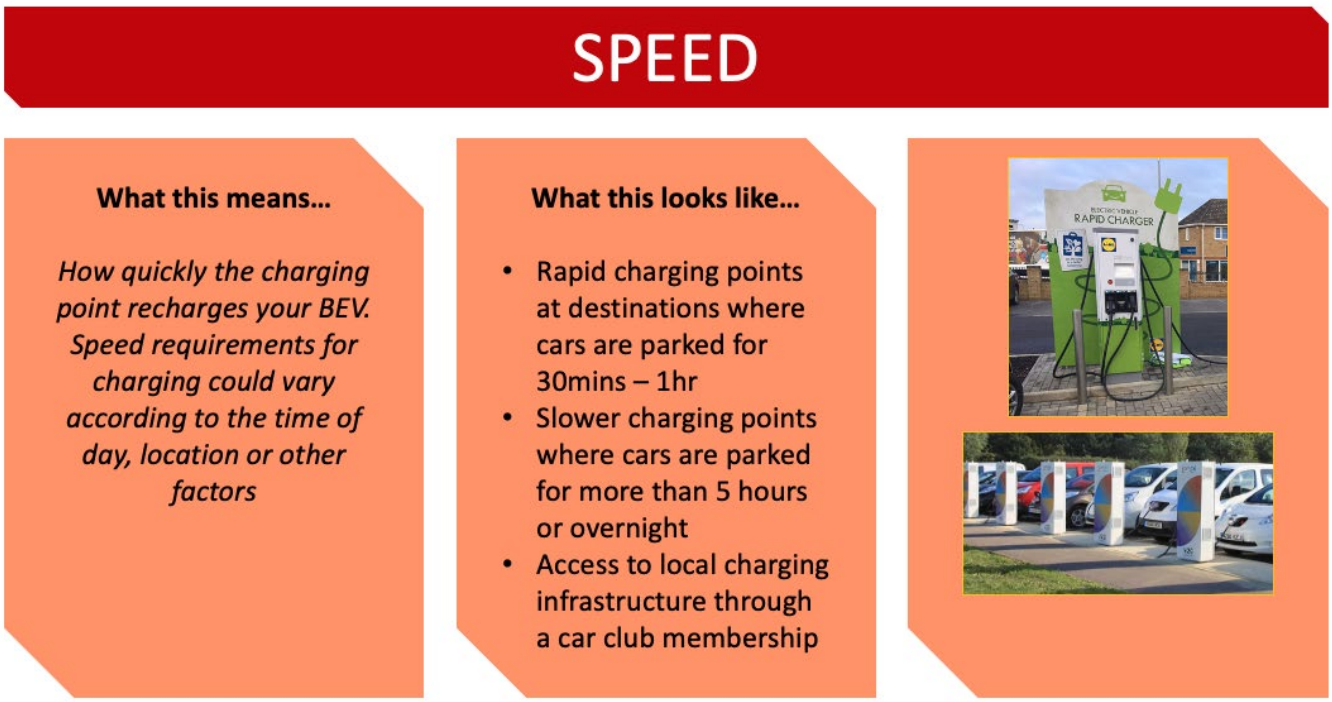
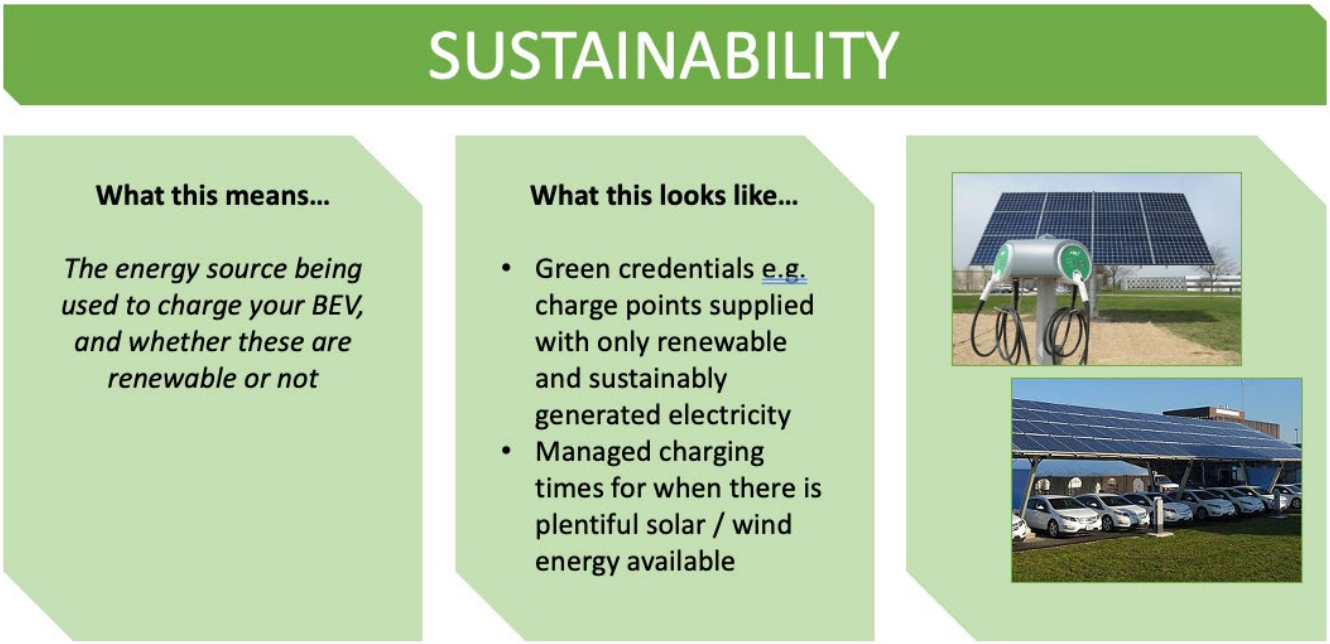


Figure 31: 'Sustainability' in relation to EV charging



A.6.2. Focus groups

Figure 32: Potential charging issues raised by non-EV drivers in the online community

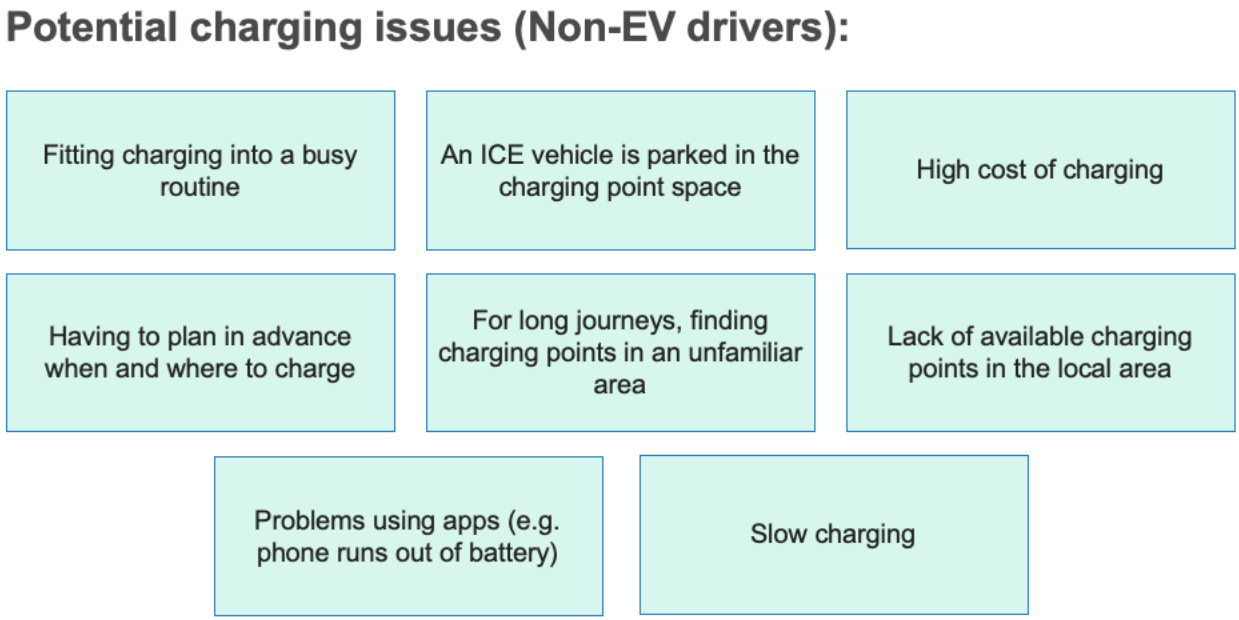


Figure 33: Actual charging issues raised by BEV drivers in the online community

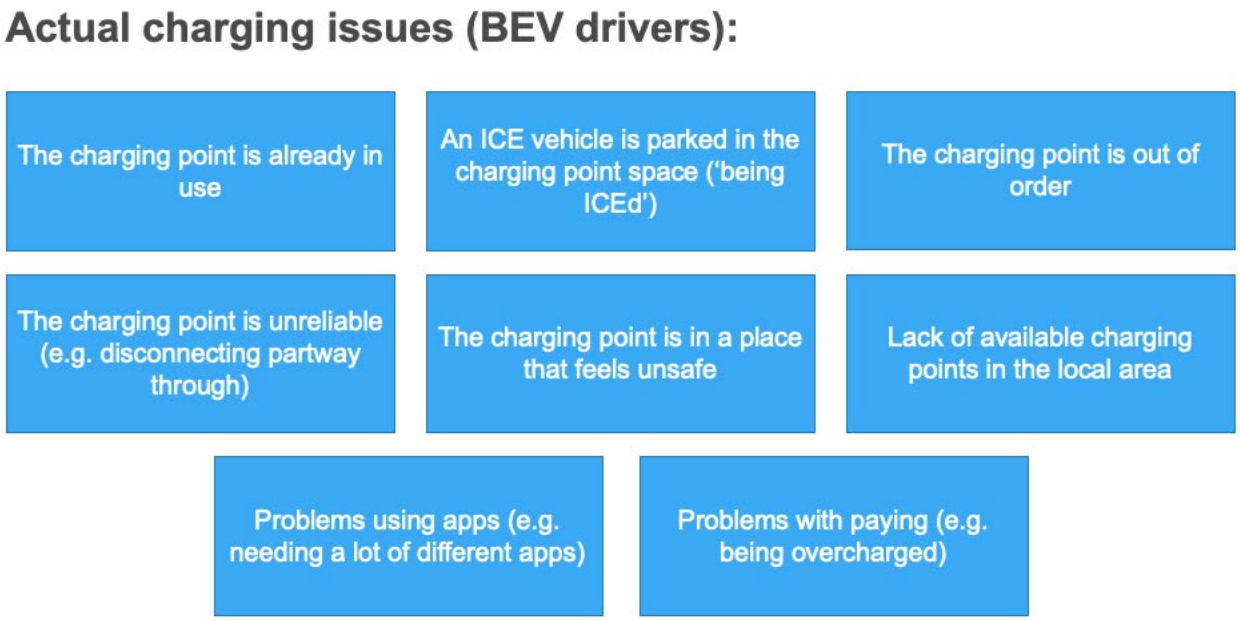


Figure 34: Government EV schemes

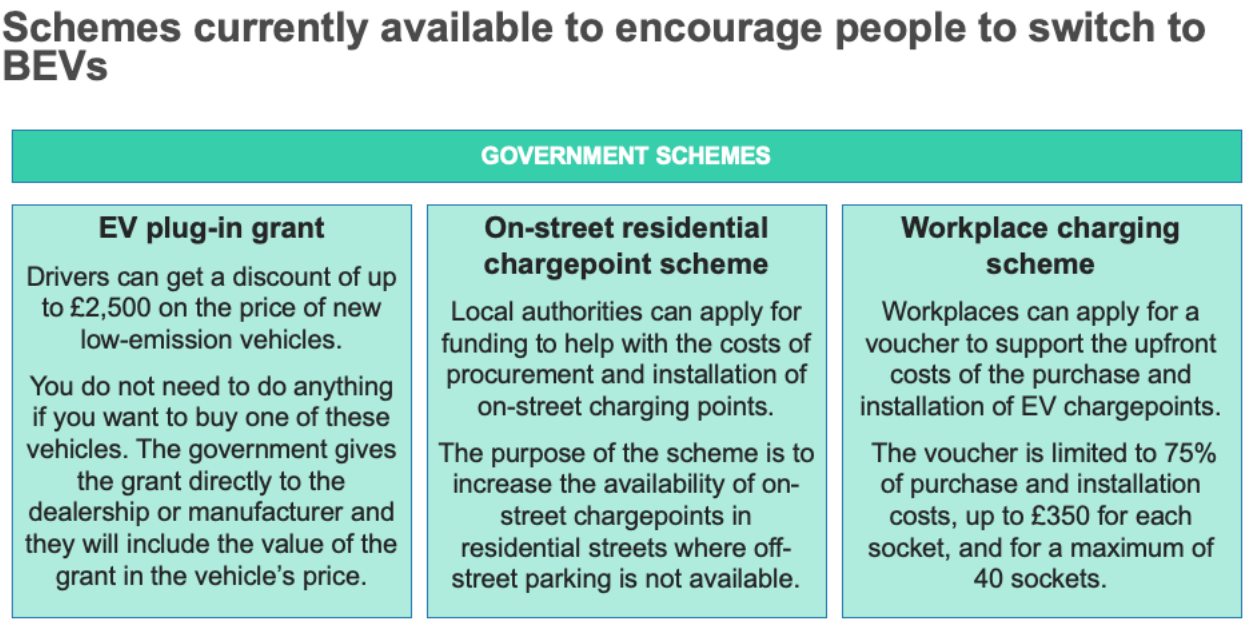


Figure 35: Non-Government EV schemes

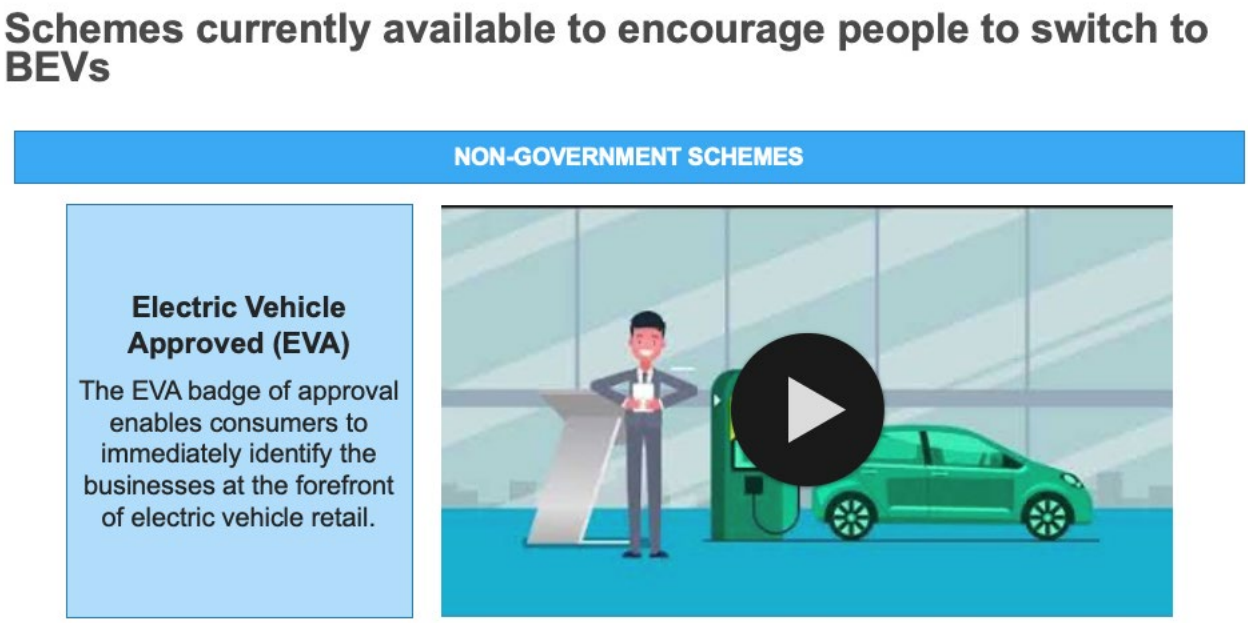
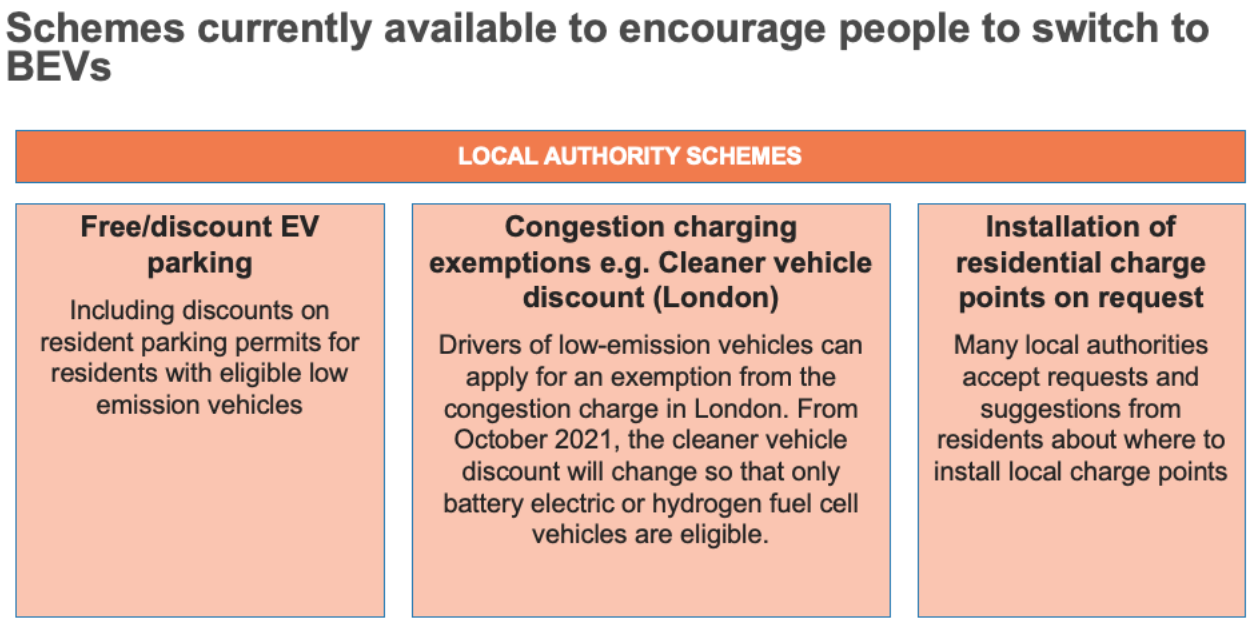


Figure 36: Local Authority EV schemes



A.6.3. Plenary and co-design event

Figure 37: Pen portrait - context for future charging scenarios

5.15-5.30 Set-up | 5.30-6.00 Plenary session | 6.00-7.30 Breakout groups

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Introducing Fatima…

Fatima lives in a ground floor flat on a terraced street. It's a great home, and she loves the area, but it doesn't come with a parking space so she can't charge her BEV at home.

Fatima has a 5-door hatchback BEV (similar in size to a VW Golf) that she uses for work, driving between appointments with clients most days, but also stopping in at head office a couple of times a week. Her mileage varies a fair bit, but she typically drives about 40 miles a day, so she needs to do a full charge three times a week.

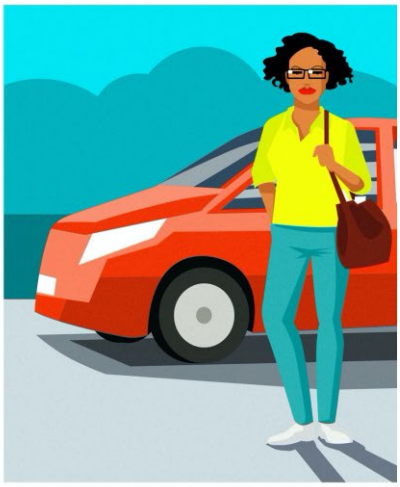

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Figure 38: Potential future charging scenario 1 – 'the local hub'

1. The local hub

Public charging, close to home

Fatima has a **local community charging hub** that was built by the local authority to help residents in the area who do not have access to off-street parking and enable them to charge their electric vehicles.

She has two scheduled weekly slots at the charging hub when she leaves her car overnight for a full charge, which costs about £6.50 each time. And there's an app where she can book a shorter slot for a top up if she needs it too. It took a bit of getting used to, but now she's into a routine, she looks forward to charging day – at least she doesn't have to fight for a parking space on her street! It's about a fifteen-minute walk to the hub, but it's conveniently located next to a bus stop if it's raining, and there are hire bikes too, which Fatima uses if she's meeting a friend in the evening and doesn't want to drive into town.

Note: In this scenario, a full charge (120miles) would cost £6.50. To refuel a similarly sized petrol/diesel car to cover the same distance would cost approx. £18 today.

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Figure 39: Potential future charging scenario 2 – 'charge where you are'

2. Charge where you are

Public charging at work, shops and pubs

Note: In this scenario, a full charge (120miles) would cost £8.50. To refuel a similarly sized petrol/diesel car to cover the same distance would cost approx. £18 today.

Fatima can't charge her BEV at home, but that really isn't a problem because the nearest town, where she works and shops, has **a great range of public charging infrastructure**.

When she's in the office it's really easy because there are charge points in the car park so she can just plug in while she's in meetings. There are charge points in the supermarket where she does her weekly shop, and the car park near the coffee shop where she often has lunch with colleagues.

Because there are so many places to charge, she doesn't really think much about it. The only exception is if she's got a busy weekend planned, then she'll try and get a longer charge in on the Friday, either leaving the car at the office and doing a couple of client visits on a hire e-bike, or leaving the car for an hour after work while she grabs a coffee with a friend. The cost of charging can vary depending on where she chooses to plug in, but typically averages out at around £8.50 for a full charge.

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Figure 40: Potential future charging scenario 3 – 'rapid charging as you go'

3. Rapid charging as you go

A network of commercial charging stations

Not having off-street parking might have been a problem for Fatima charging her BEV a few years ago, but now the **charging station network** is up and running.

Between home, the office, and the various towns where she sees clients, there are three or four charging stations, mostly on old petrol station sites. Rapid charging is available as standard, and she gets a full charge in about 30 minutes, which costs around £11. But if she knows she's got an early start she might do a ten-minute charge on the way home too. Most of the charging stations have a shop, or café, so she can grab lunch or a bit of shopping while her BEV is charging.

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Note: In this scenario, a full charge (120miles) would cost £11. To refuel a similarly sized petrol/diesel car to cover the same distance would cost approx. £18 today.

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Figure 41: Potential future charging scenario 4 – 'home charging' (NB. called 'near-home charging' in this report)

4. Home charging

Shared home charging solutions

Fatima's street has **BEV chargers installed in the lampposts**. There is one charge point for every 5 parking spaces on her street, although not everyone living in the street has a car and some people do have their own off-street parking.

Fatima gets on well with her neighbours, and they have a bit of a routine going for who charges overnight. Sunday night there can be a bit of a backlog as people charge up for the week, so she'll occasionally have to move her car in the evening to ensure everyone gets to have a turn. She and her neighbours have set up their own WhatsApp group to coordinate and let each other know when the closest charge points are available to use. To do a full charge in this way usually costs Fatima around £6.50.

Note: In this scenario, a full charge (120miles) would cost £6.50. To refuel a similarly sized petrol/diesel car to cover the same distance would cost approx. £18 today.

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A.6.4. Online community week 3

Figure 42: Potential future charging scenario 5 – 'the EV valet service' (NB. called 'EV car club' in this report)

5. The EV Valet service

An electric car club with a doorstep charging service

Instead of a personal car Fatima uses EV Valet: a car club that exclusively provides electric vehicles and has a network of vehicles available in the area she lives and works. She books a car when she needs it through the app, and collects the nearest vehicle. If she books the day before she can reliably get a vehicle within a five minute walk, but if it's short notice she might have to go a bit further, maybe 15 minutes. But she can drop the car off anywhere in the local area whenever she's finished with it, as long as it's parked legally, so she always parks outside her house, and some days she picks the same vehicle up right where she left it.

The best thing about the service is that Fatima hardly ever has to charge the car at all. The provider monitors the charge remotely and tops up overnight while the car isn't in use. They guarantee that vehicles have at least 60% charge when you collect them, which is more than enough for a full day at work. If she does drive further than that, for example if she's going away for the weekend, she just selects 'long distance' on her booking and pays for her own charging at charge station on route. She can use a car club vehicle at her destination too, as they have national coverage.

The car service is a different pricing model to the other scenarios, but Fatima spends about the same amount over the course of a year as she would if she owned an EV and charged it while she was out and about (e.g. a supermarket or at work).

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Figure 43: Alternatives to lamp post charging for the scenario 4

A.7. Stimulus shown in the quantitative survey

Figure 44: Information provided at Q14: 'How would you feel personally about each of the charging options listed below?'

Slow chargepoints	Fast chargepoints	Rapid and ultra-rapid chargepoints
These can take 10-12 hours to fully charge.	These can take 4-6 hours to fully charge.	These can take 30 mins - 1 hour to fully charge.
Approx. £7 for a 100-mile charge.	Approx. £9 for a 100-mile charge.	Approx. £14 for a 100-mile charge.
They are found on-street in residential areas where people might want to charge their vehicle overnight.	They are typically found in workplace parking areas or supermarket carparks.	They are found in supermarket carparks or highway services where people might need to charge and go.

Figure 45: Scenarios tested at Q14: 'How would you feel personally about each of the charging options listed below?'

Local community charging hub
You would be able to book two regular weekly slots to charge overnight at a hub near your home, plus have the option to book additional shorter slots as needed.

Workplace charging points
You would be able to do a full charge during the day while at work. A full charge would take 6-8 hours.

Rapid charging stations
There are a network of rapid charging stations in your town. These are similar to petrol stations, and you would be able to do a full charge in 30 minutes. Most have a café or shop to use while charging.

Supermarket charging points
You would be able to do a full charge while doing your weekly shop. A full charge would take 1-2 hours.

Charging at leisure activities:
You would be able to do a full charge while out and about for leisure activities, for example visiting a restaurant, the cinema, or a gym or sports centre. A full charge would take 1-2 hours. .

On-street charging at home
There are chargers installed on your street for you to share with your neighbours, to charge your car overnight or during the day.

Charging from home
You run a charging cable safely from your home to the kerbside through a channel in (or under) the pavement, and charge your BEV overnight using your home energy tariff.

EV car club
Instead of owning or leasing your BEV, you use a car club that exclusively provides electric vehicles. You would use an app to book your vehicle and pick it up locally, with the option to drop it off anywhere in a 50-mile radius. Vehicles are guaranteed to have at least 60% charge on pick up, and you would not need to worry about charging the vehicle at the end of the day as the car club would take care of this for you.

N.B. 'Charging from home' referred to as 'running a cable from home' in this report
NB. 'On-street charging at home' referred to as 'near-home on-street parking' in this report