Electric vehicle smart charging: consumer understanding / awareness - Annexes

Contents

Annex A - Messaging Frameworks

This chapter details the key findings for each consumer group who took part in the research (combining both current and prospective drivers for each group) and the pertinent findings for developing messages for each group; along with example messages for each category of messages.

Current and prospective owners

Overview

Current and prospective owners of electric vehicles were both primarily motivated to smart charge by financial savings, followed by convenience and environment benefits; mirroring their motivations for getting an electric vehicle in the first place.

Current owners

Understanding of the word “smart” (and associated words and phrases) was mixed; though most people understood the concept when explained; and many already used EV tariffs and followed smart charging principles, without necessarily knowing it was called “smart charging”.

Owners found benefits to smart charging around cost savings and convenience (especially compared to going to the petrol station). Most had a charging routine although sometimes forgot to plug-in.

Prospective owners

Understanding of the word “smart” was low, though most understood the concept when explained, and many were already exploring EV tariffs and planned to use smart charging principles, without necessarily knowing it was called “smart charging”.

This group had more concerns about smart charging than current owners, due to lack of familiarity with “how” to charge – they were more worried about being “caught short” (while current owners were more likely to appreciate that they never let their cars get that low in the first place) and so were more reticent about dynamic options and wanted certainty that their car would be ready whenever needed.

This group will need more explaining on the “basics” of charging e.g. having to plug the car in (some confusion about wireless/induction charging).

All

Both current and prospective owners preferred messages that were simple and clear. It was important for both groups to highlight that smart charging would not make their life harder. Messages highlighting financial benefits were well received by both groups, as well as environmental messages (which was seen as a "nice bonus" on top of financial savings). Simple explanations of the different tariffs were well received and helped to underpin the idea of smart charging; participants in both groups suggested visuals or flow-charts might aid understanding. Safety and security concerns were raised by a minority of participants across all groups, though most felt that it was sufficient to know that safeguards are in place, rather than needing lengthy messages reassuring them.

The following table acts as a set of guiding principles for developing messages to support and encourage smart charging amongst consumers who drive EVs, or who are exploring EVs, and will be predominantly charging their vehicles at home. This is based on the insights gathered from 30 interviews and 6 Focus Groups with consumers to understand what resonates with them.

Category	**Dos**	**Don'ts**	**Example messages**
Introduction to smart charging ("how it works")	For all: Clear language. Highlight benefits (esp. cost).	Avoid too technical language, jargon and acronyms. Words such as, "grid", and "demand" were well understood, but phrases like "demand-side response" were not).	"If you've got an EV smart chargepoint and a smart meter, you will have access to many EV tariffs that could save you money on charging your car by offering cheaper rates when demand is

	For prospective/new owners, a step-by-step process could be useful. For prospective owners, cover the basics: even stating the need to plug the car in.	Be wary of comparisons to other smart tech (e.g. smart thermostats) as not all are familiar.	low, throughout the day and overnight." "Smart charging is a way of charging your electric vehicle (EV) at times when demand for electricity is lower or when there is lots of renewable energy on the grid. This can be done through a chargepoint, an app or a timer on the car. By smart charging on an EV tariff, you could save money on your energy bill."
Financial	Highlight the cost savings from EV tariffs (with costed examples for different tariffs). Comparison to "off-peak" train tickets well understood. Include proportional savings (e.g. 3x more) if evidenced	Avoid savings figures without reference point or proof of "working". Case studies could be misleading if not clear what mileage they refer to. Price per mile could be helpful.	"Switching to an EV tariff is the best way to help save money on your energy bill with your electric car." "Just as you save on train or bus fares during off-peak hours, smart charging allows you to benefit from cheaper energy prices during off-

			peak times throughout the day and overnight. It could save you money while supporting a greener energy grid." "Charging your car on a non-EV tariff could cost you over three times more than smart charging with an EV tariff!" OR "Charging your car to full on a non-EV tariff could cost £X compared to £X with an EV tariff"
Tariffs	Consider visuals, or flow-charts/decision trees to make it easier to understand different tariffs. Make it clear that charging is automatic – no need to plug car in and out at different times to get different rates	Don't underestimate importance of understanding tariff options – for many this underpins understanding of smart charging concept.	"Ready to take advantage of potential savings and environmental benefits with smart charging for your EV? Step 1: Get a smart meter.

			Step 2: Install a smart charger and download the app. Step 3: Explore smart charging energy tariffs to maximise your financial benefits and charge in a greener way. Step 4: Set your tailored charging schedule and get smart charging.” OR “Did you know you can choose different EV tariff options? Dynamic tariffs adjust based on real-time energy supply, so electricity prices vary per day or per hour and smart charging allows you to take advantage of when energy is cheapest and greenest.

			Two-rate tariffs offer two different electricity rates depending on the time of day, with much lower rates at night. Type of use tariffs offer one rate for your EV and another rate for your home electricity, regardless of when you charge your car. Select the option that best suits your charging needs and lifestyle.”
Reliability/Convenience/Confidence	Make clear that it is automatic (no manual plugging/unplugging needed). Highlight that the schedule can be simple e.g. “Keep it as simple as you want or tweak as you wish”. Remembering to plug in is a common barrier – examples of reminders (e.g. putting a reminder on keyrings) can be helpful.	Avoid making it sound inconvenient (e.g. not having to programme the app/chargepoint each time) – participants hate “faff”! Avoid confusing financial charging and charging your vehicle within the same message (i.e. you are charged £10 for charging	“All chargepoints are required to have smart functionality, allowing you to charge and travel with confidence. Keep it as simple as you want. Through your app, your car, or your chargepoint, set a schedule which can run automatically, or be tweaked as you wish. You

	Make clear that minimum charge levels can be kept for emergencies ("whenever you need it" more effective than "when" you need it), especially for prospective owners who have more "range anxiety" than current owners.	your car) – using words like range, mileage; and price, cost might help differentiate.	can also set minimum charge levels, guaranteeing that your EV is charged whenever you need it." "Emma and Harry have both just got a new EV and chosen an EV tariff that gives them cheap charging overnight. To make sure they make the most of this, Emma has a note on her keyring to remind her to plug in when she locks the doors before going to bed and Harry always plugs in the moment he gets home. Whatever your routine, smart charging takes care of the rest - making sure the car starts charging when the cheap rate kicks in."
Environment	Highlight the benefits to the environment – although not primary motivation, this is motivating. "Win-win" messages resonate.	Be cautious of comparisons with strain on the grid during peak times (e.g. boiling kettles). Participants worried that	"Smart charging technology ensures your EV charges when there is a lot of renewable energy available and when

		charging overnight would become the “new peak”. Be cautious of discussing infrastructure upgrades. Some participants felt the grid needed to be invested in anyway.	demand is low, easing strain on the grid during peak hours. Help us move towards a greener, more stable energy future with smart charging.”
Safety and Security	Messages around safety and privacy did not add to concern but weren’t felt to be necessary as long as included in the “small-print” – sign-posting to manufacturer is sufficient.	Messages on safety shouldn’t “over-promise” or “guarantee” safety, as accidents can always happen.	“Your privacy matters. Rest assured, smart chargepoints meet strict security regulations, ensuring your data remains protected when smart charging. To find out more, read your chargepoint privacy notice.”

Current and prospective drivers who can charge in the workplace

Overview

Smart charging at work was not common amongst respondents, due to lack of chargepoint functionality and logistics (e.g. more cars than chargepoints and so cars could not stay on long enough to make the most of smart charging, or shifts dictating that they would be on-site solely during “peak” hours). Both current and prospective drivers were positive towards the idea of smart charging and would do it if there was an incentive to do so (through reduced costs), though this incentive was limited as many were offered free charging. Some felt that for it to be implemented at their workplaces, the officer manager or site manager would need to organise it, and it wasn’t really within the employee's control.

There were minimal differences between current and prospective drivers when discussing workplace charging, as neither group was currently doing it; therefore, the principles given below apply to both groups.

Many current drivers also charged at home (and prospective drivers planned to), so some messages resonated more when they were considered in a domestic setting where respondents felt it was more in their control; these insights have been included in the Domestic framework.

Category	**Dos**	**Don’ts**	**Example messages**
Introduction to smart charging (“how it works”)	Clear language. Highlight benefits (esp. cost where applicable). Make clear that smart charging could work during the day (with dynamic options).	Avoid too technical language, jargon and acronyms (however, “grid” is fine).	“Smart charging is a way of charging your electric vehicle (EV) at times when demand for electricity is lower, throughout the day and overnight, or when there is lots of renewable energy on the grid. This can be done through a chargepoint, an app or a timer on the car. By smart charging on an EV tariff, you could save money on your energy bill.”

Financial	Highlight the cost savings; though these have to be passed on to the individual to be motivating. Financial messages might resonate with office managers, where charging is offered to employees for free. Include proportional savings (e.g. 3x more) if evidenced	Avoid savings figures without reference point or proof of "working". Avoid mentioning "off-peak" as this is synonymous with overnight, and leads to many discounting smart charging at work during the day.	"Save money by smart charging your vehicle at work! With strategic charging during working hours, you could lower your charging costs while contributing to a greener energy grid. It's a win-win for your company and the environment!" "Charging your car without an EV tariff could cost three times more than smart charging with an EV tariff!" OR "Charging your car to full on a non-EV tariff could cost £X compared to £X with an EV tariff"
Tariffs	Although employees don't decide workplace tariffs, descriptions did help conceptualise smart charging. Many employees also charge at home, so do	Displaying this message with the use of visual aids such as tables, flow-charts or visuals could help explain different tariffs (especially dynamic).	"Ready to take advantage of potential savings and environmental benefits with smart charging for your EV? Step 1: Get a smart meter. Step 2: Install a smart charger and download the app.

	include these messages for this group.		Step 3: Explore smart charging energy tariffs to maximise your financial benefits and charge in a greener way. Step 4: Set your tailored charging schedule and get smart charging." OR "Did you know you can choose different EV tariff options? Dynamic tariffs adjust based on real-time energy supply, so electricity prices vary per day or per hour and smart charging allows you to take advantage of when energy is cheapest and greenest. Two-rate tariffs offer two different electricity rates depending on the time of day, with much lower rates at night. Type of use tariffs offer one rate for your EV and another rate for your home electricity,

			regardless of when you charge your car. Select the option that best suits your charging needs and lifestyle.”
Reliability/Convenience/Confidence	Make clear that it is automatic, and that default settings mean that you don’t have to go into the app every time. Reassurance that the car will be charged enough to get back home is key. Make clear that minimum charge levels can be kept (“whenever you need it” more effective than “when” you need it), especially for people whose job requires site visits, or unexpected outings.	Avoid making it sound inconvenient (e.g. not having to programme the app/chargepoint each time) – participants hate “faff”. Avoid confusing financial charging and charging your vehicle – using words like range, mileage; and price, cost might help differentiate.	“Set minimum charge levels to ensure your EV is always ready to go. This will run automatically or can be tweaked as you wish. With this feature, smart charging provides peace of mind, knowing that you'll have the necessary range for any situation.” “With smart charging, your vehicle will always be prepared, with the added benefit of setting minimum charge levels to suit your mileage needs.” “Emma has just got a new EV and wants to make the most of charging at work. Her employer has installed smart chargers. All Emma needs to do is remember to plug in when she arrives at work and set the time

			she needs her car charged by. Emma has a note on her work pass to remind her to plug in before she goes into the office. Smart charging takes care of the rest, making sure her car charges when there is more renewable energy on the grid, saving Emma and her employer money.”
Environment	Highlight the benefits to the environment – although not primary motivation, this is motivating. “Win-win” messages resonate.	Avoid messages that are unnecessarily wordy and have too much “fluff”.	“Smart charging technology ensures your EV charges when there is a lot of renewable energy available and when demand is low, easing strain on the grid during peak hours. As well as contributing to a greener grid, you could lower your charging costs. It's a win-win for your business and the environment!”
Safety and Security	Messages around safety and privacy were reassuring for “prospective owners”, who were more worried about this. For others, they assumed there would be strict safety and data regulations in place	Avoid overpromising on safety/security. Signposting to manufacturer was felt to be sufficient.	“Your privacy matters. Rest assured, smart chargepoints meet strict security regulations, ensuring your data remains protected when smart charging. To find out more, read your chargepoint privacy notice.”

	so felt that these messages would make them feel there was something to worry about.		

Current and prospective fleet managers

Overview

Fleet managers were motivated to switch their vehicles to electric for mainly financial reasons, as well as meeting net zero policies and enhancing brand image. Some were resistant to this change as felt that it had been “forced” upon them, making overall views on messages somewhat more negative than with other audiences. Therefore, highlighting the financial benefits of smart charging, and potential to recoup costs will be important.

Different fleets operated in different ways, with some vehicles parked at the depot between shifts (usually overnight) while others went home with the drivers. Some fleet managers were reticent to try and influence how employees charged their vehicles at home, feeling that it wasn’t their place to tell them what kind of tariffs to use; though smaller businesses were more likely to have explored this in conversation with their employees and suggested/recommended tariffs. This had brought down their fuel reimbursement costs.

Business tariffs for EVs weren’t widely known, which meant that those who parked and charged overnight at a depot or office were not getting a financial benefit for charging overnight. It was also noted that businesses’ electricity rates during the day can be very high, and so a tariff would have to reflect this as well.

In terms of messages, both current and prospective groups valued clear, straight-forward messages that highlighted financial benefits. Environmental messages were received well when tied into company’s net zero goals, but environmental benefits were not an intrinsic motivation for most of the participants.

There were few differences between current and prospective owners. Many of the current owners had only recently switched, or only switched a few vehicles, so the concepts were quite new to both groups. However, some prospective owners were still debating switching to electric vehicles, and the cost savings associated with smart charging could be an influencing factor that would motivate them to make the switch.

Category	**Dos**	**Don’ts**	**Example messages**
Introduction to smart charging (“how it works”)	Clear language Highlight benefits (especially cost)	Avoid too technical language Avoid assuming all fleets operate the same – many different fleet models mean	“Unlike conventional charging methods, smart charging makes the most of when there is excess energy supply on the

	Need to be clear that you can “delay start”, the vehicle (but not the driver) have to be on site to smart charge.	smart charging would work differently for different businesses (e.g. charging at office, depot, or home) Avoid focusing solely on overnight charging – dynamic charging during the day can work for some workplaces	grid. This allows your vehicles to charge on EV tariffs between shifts - overnight or during the day - ready for when they need to hit the road again. This leads to a greener footprint and potentially lower costs.”
Financial	Savings and “bottom line” are top priority for fleet managers, so highlight this. Recouping the cost from EV purchase is motivating. For prospective owners, demonstrating price against petrol could motivate switch to EV. If drivers are charging at home, the benefit to them needs to be made clear, as managers reticent to ask employees to change energy tariffs. Consider creating case studies with detailed cost breakdowns.	Avoid savings figures without reference point/proof of “working” (price per mile would be helpful). Aggregators are not well understood, this needs to be explained in simple language.	“Are you switching your fleet to electric vehicles? Maximise savings on your fleet charging expenses, and recoup cost from your vehicle investment, with smart charging technology. Set automatic charging schedules and take advantage of lower rates, ensuring cost-efficiency across your entire fleet.”

Tariffs	Consider visuals, or flow-charts/decision trees to make it easier to understand different tariffs. Step-by-step process useful for prospectives and those early in journey Make it clear that charging is automatic – no need to plug car in and out at different times to get different rates. Adapt messages to be relevant to commercial/business tariffs where appropriate. Messages should clearly differentiate between time and type of use tariffs, as businesses may prefer one over the other.	Many businesses have high electricity usage in the day so don't assume that time of use tariffs would suit all businesses. Type of use, or dynamic tariffs, might be better.. Managers are reticent to ask employees to change energy tariffs, so messages highlighting savings to business would not resonate. Highlighting personal benefits (e.g. cheaper electric beyond just car charging) to employee could be key.	"Have you thought about smart charging for your electric fleet? If you charge your vehicles at a depot, you could take advantage of off-peak rates, throughout the day and overnight, by smart charging your vehicles. If your drivers charge at home, and they have a smart meter installed, they could benefit from an EV tariff which gives cheaper rates for off-peak charging - potentially saving both you, and them, money."
Reliability/Convenience/Confidence	"Peace of mind" (i.e. knowing drivers will have enough range to do their job) is key. Pre-set/default start times is reassuring, so drivers can	Avoid making it sound inconvenient – having pre-set/default options that can be controlled on a company level is appealing.	"All new chargepoints on the market are required to have smart functionality, allowing you to charge and travel with confidence. Keep it as simple

	plug in whenever they return from shift. Vehicle handover checklists are often completed; reminders to plug-in could be added to these.	Caution using the word “fleet”. Managers of smaller fleets consider “vehicles” better describes their fleet. Avoid over-complicating or trying to make it sound more exciting than it is; latest tech isn’t a big motivator for this group	as you want. Through your app or your chargepoint, set a schedule which can run automatically, or be tweaked as you wish. You can also set minimum charge levels, guaranteeing that your vehicles are charged whenever you need them.” “Enjoy peace of mind knowing your electric fleet vehicles will be ready to go whenever your fleet drivers are.” “Enhance your EV charging experience with smart charging - it's as simple as plug in and go! With intuitive app interfaces and automated scheduling, smart charging takes the complexity out of managing your fleet’s EV charging needs.” “Take full control of your fleet’s EV charging with smart charging. Set personalised minimum and maximum charge levels, tailored to your fleet’s

			specific needs and preferences.”
Environment	Highlight the benefits to the environment and therefore to the company’s net zero credentials.	Avoid ESG/CSR and other acronyms. “Net Zero”, and “environment policies” were better understood. Be cautious with environmental/grid messages – some fleet managers felt “forced” to go electric and felt resentment.	“Smart charging technology ensures your fleet vehicles charge when there is a lot of renewable energy available and when demand is low, easing strain on the grid during peak hours. As well as lowering your charging costs, you will also be contributing towards a greener grid and demonstrating your company’s green credentials.”

Annex B – Rapid Evidence Assessment: Identifying consumer needs and messages

Consumer understanding of smart charging

The definitions for smart charging can be overly complex and only understood by some EV users; there can be confusion over the meaning of the word “smart” in relation to EV charging. Octopus Energy uses the specific phrase “Smart EV Charging”[1], possibly to address difference between EV charging and monetary charging of customers.

The Energy Saving Trust’s definition of smart charging is consumer focused and doesn’t use technical jargon. It also clearly links smart charging with EVs: “Smart charging is a safe and convenient way of charging your electric vehicle (EV) at times when demand for electricity is lower, for example at night, or when there is lots of renewable energy on the grid.”[2]

Chargepoint providers and EV sites typically cover briefly what smart charging is, its benefits and some EV tariff comparisons[3]. It is suggested that independent sites need to offer broader information, independent comparisons and lifestyle type advice with steps on how to use smart chargepoints/apps.

Unless you are an EV user, there is poor general awareness of smart charging[4], exacerbated by convoluted public information[5]. There’s a need to raise this basic awareness for potential users before discussing tariffs and features. Greater provision of consistent and repeated information from government/independent sources is needed for this.

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[1] What Is Smart EV Charging? (octopusev.com)
[2] Smart charging for electric vehicles - Energy Saving Trust
[3] The providers and websites with specific smart charging definitions include: What Is Smart EV Charging? (octopusev.com); What Is Smart Charging? (With Videos) | Wallbox; What is smart charging and why our energy systems need it? (virta.global); What is Smart EV Charging? | Driivz; Smart Charging of Electric Vehicles: the Ultimate Guide ⚡ (virta.global); What are smart EV chargers and how does Smart charging work? | EVBox; What is smart charging? – gridX.
[4] Phase 1 EV publication v2.pdf (ofgem.gov.uk); Ricardo Smart Charging Process Evaluation (2023) (unpublished); Energy Saving Trust Smart Charging Consumer Advice Research (2021) (not publicly available); https://delta.lcp.com/podcasts/smart-ev-charging/.
[5] Web sources with smart charging information include: Switch energy supplier or tariff - Citizens Advice; The Future of Smart Charging - Energy UK (energy-uk.org.uk); Electric comparisons. Choose an EV home charger and plug in to greener, cheaper home energy. | Love my EV; EVA England | The Voice for EV Drivers : EVA England; Smart charging - Fully Charged Show; The Dictionary | Electric and Hybrid Cars Explained | Electrifying; EV Chargers and EV Charger Installation (smarthomecharge.co.uk); What Is Smart EV Charging? (octopusev.com); EV charger: Smart EV charger installation | OVO (ovoenergy.com); Smart charging for electric vehicles - Energy Saving Trust.

For those with EVs and familiar with smart charging concepts, additional information preferences include[6]:

- Ease and accessibility of smart charging schemes.
- Personalisation and control over settings and preferences.
- Protections and guarantees on financial and technological aspects (flagging of smart charging regulations may solve this).
- Be confident smart charging is reliable.
- Reassured the vehicle will be charged to a sufficient level for immediate use when needed.
- Understand and clearly see the cost saving benefits of smart charging tariffs.

Energy Saving Trust research into smart charging consumer advice[7] identified a range of smart charging advice gaps show in "Figure 2" below:

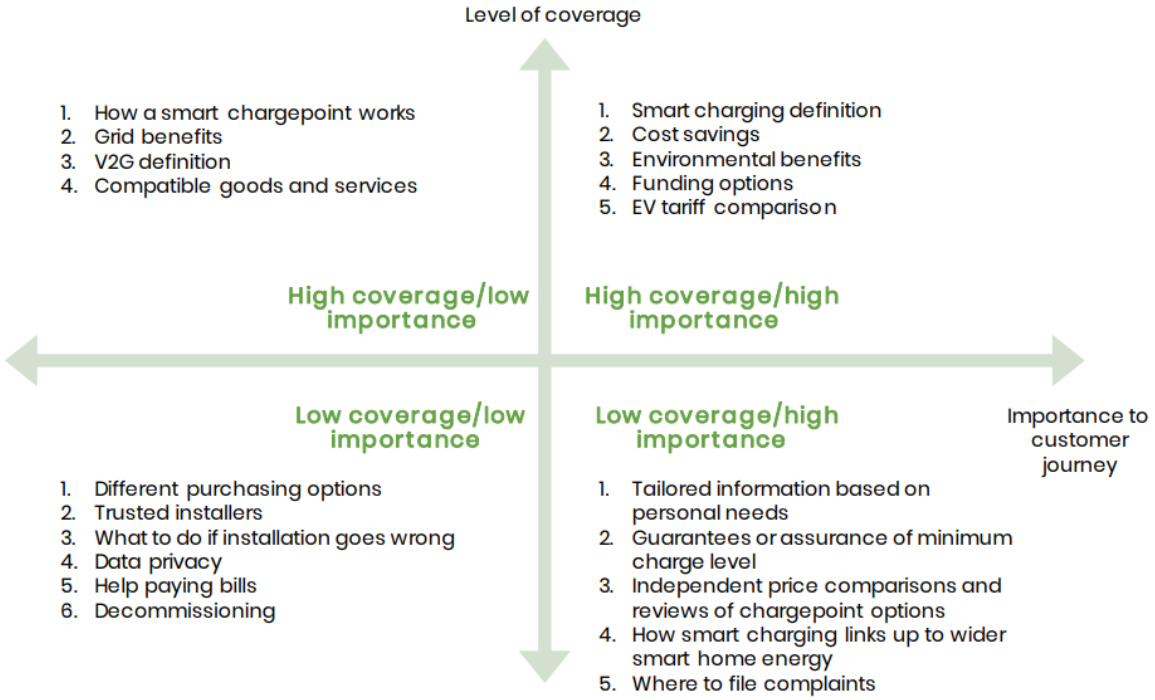

Figure 2: Smart charging consumer advice gaps mapping exercise. The level of coverage was assessed by the research into current provision of information and advice, and how often each type of information was covered across the different delivery channels. The level of importance to the customer journey was determined by how critical the research deemed each type of information to be to consumers considering smart charging options (ie what provides consumers with information that is persuasive of the benefits, and to find smart charging goods, and services that will work for their specific needs).

[6] Phase 1 EV publication v2.pdf (ofgem.gov.uk); Ricardo Smart Charging Process Evaluation (2023) (unpublished); Energy Saving Trust Smart Charging Consumer Advice Research (2021) (not publicly available).
[7] Energy Saving Trust Smart Charging Consumer Advice Research (2021) (not publicly available)

Smart charging benefits

Users in the waiting and purchasing part of the EV adoption journey want to be clearly informed about the benefits of smart charging. The upfront price and financial incentives, features and aesthetics are important motivators for domestic users. Only a small number of early EV adopters seek smart chargers for their money saving potential through off-peak tariffs[8].

Energy Saving Trust suggest the benefits of smart charging for consumers are cost savings, convenience, environmental benefits, and the balancing of grid electricity demand[9], although it is unclear to what extent these benefits resonate with people. Cost savings may be seen as the biggest benefit as there is an expectation from consumers that EV running costs are 25-33% of the cost of non-EVs[10]. Explaining the benefits of smart charging may be more important for potential smart chargepoint users to give them reasons to investigate the technology further and actively engage with smart charging information[11].

When experienced, smart charging users are generally positive, suggesting little need to communicate general benefits to EV or smart charging users. However, users may not necessarily associate their experiences with "smart" charging specifically[12]. In fact, many EV users with chargepoints aren't using smart features at all as they are unaware of the opportunities/functionalities associated with them[13].

Motivations for businesses to adopt EVs and look into smart charging are related to ESG compliance and whole life cost and cost savings, but the business benefits of smart charging in relation to these is unclear. Awareness and understanding of smart charging for employees is similarly low. Employed drivers struggle to see how smart charging would benefit them individually[14].

Smart charging settings and tariffs

Rather than override smart charging features, domestic users are more likely to not engage with smart charging at all[15]. There is a perception that there is a lack of EV tariffs or that EV tariffs are immature[16] (possibly amplified by recent advice that

[8] Ricardo Smart Charging Process Evaluation (2023) (unpublished)
[9] Smart charging for electric vehicles - Energy Saving Trust
[10] Electric Vehicle Customer Experience Journey Mapping (energex.com.au)
[11] Ricardo Smart Charging Process Evaluation (2023) (unpublished)
[12] Ricardo Smart Charging Process Evaluation (2023) (unpublished)
[13] Electric Vehicle Smart Chargepoint Survey 2022 (publishing.service.gov.uk)
[14] TRL EV adoption and smart charging for electric vans and commercial fleets (2023) (unpublished); Ricardo Smart Charging Process Evaluation (2023) (unpublished); findings also observed by Fleet Advice and Consultancy team at Energy Saving Trust.
[15] Electric Vehicle Smart Chargepoint Survey 2022 (publishing.service.gov.uk)
[16] Electric Vehicle Customer Experience Journey Mapping (energex.com.au)

consumers should not switch tariffs/suppliers as a result of the Energy Crisis[17]). Smart charging users need more information to make informed decisions about how their charging aligns with their energy tariffs[18].

The financial incentives of EV tariffs may not be perceived to be enough to persuade users to switch, on top of the upfront cost of chargepoint and perceived inflexibility of tariffs/energy suppliers. For most, getting an EV does not change what they look for in energy tariffs and association between smart charging and EVs may not be immediate[19].

In addition, businesses and employees are concerned that smart charging will require significant effort to set up and operate day-to-day in additional to existing workloads, which outweighs any potential cost benefits offered by smart charging[20].

Demand Side Response (DSR)

EV and smart chargepoint owners develop greater energy literacy over time and are able to associate charging time and costs and understand concepts such as kW and kWh[21]. However, whilst V2X (vehicle-to-everything, less so Demand Side Response) information is available, the level of public understanding is uncertain (and very likely minimal)[22]. It cannot be assumed that EV owners are familiar with energy demand side response, nor in some cases smart charging generally just because they have EV experience[23].

Whilst widely adopted smart charging could reduce the required UK investment in grid capacity upgrades, this doesn't necessarily resonate with consumers[24].

Myths and misconceptions

Word of mouth can be very effective to confirm consumers' pre-existing thinking (including misconceptions), and smart charging messaging is too inconsistent and confusing to compete. In addition, some of those with low trust in government do not believe in challenges with balancing the grid and are resistant to using smart chargers more widely due to privacy or the need the use an app/technology[25].

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[17] For example, Energy Saving Trust featured guidance on their smart charging and energy tariff webpages as follows: **Update January 2022* We do not currently recommend that you switch to an EV tariff. With the ongoing UK energy crisis, many cheaper EV tariffs have either been increased or removed for new customers. We would therefore recommend you stay with your current provider until the situation changes.*

[18] Phase 1 EV publication v2.pdf (ofgem.gov.uk)

[19] Ricardo Smart Charging Process Evaluation (2023) (unpublished)

[20] TRL EV adoption and smart charging for electric vans and commercial fleets (2023) (unpublished); Ricardo Smart Charging Process Evaluation (2023) (unpublished).

[21] Electric Vehicle Customer Experience Journey Mapping (energex.com.au)

[22] Intro-to-Innovative-charging-2.pdf (cenex.co.uk)

[23] Phase 1 EV publication v2.pdf (ofgem.gov.uk)

[24] Lessons Learned From Norway's EV Infrastructure | Current

[25] Ricardo Smart Charging Process Evaluation (2023) (unpublished)

EV users generally find EVs meet their expectations and typically become EV advocates. This audience may be less susceptible to misconceptions. However potential EV users may be more at risk to misconceptions. To address myths and misconceptions, it may be more effective to prioritise adoption of EVs over adoption and use of smart charging, in particular for potential EV users.

Annex C – Rapid Evidence Assessment: Effective public messaging

Summary and key points

The approach to smart charging messaging will be slightly different for EV drivers and potentials. A rapid evidence assessment of recent public messaging campaigns and effective messaging research highlights some key factors important for effective messaging.

1. **Public messaging should be community-focused and emphasise personal responsibility.**
2. **Message content should be clear, concise and specific.**
3. **Messaging (and messengers) should be credible and consistent.**

Other key points relevant to EV and smart charging messaging:

- Any imagery associated with the messaging should be consistent, easily recognisable and relevant to the subject matter.
- Emphasise technology, EV owners may view their car as an extension of their modern, technology-orientated lifestyle.
- A perceived urgency may support the message, e.g. 2030 ban on petrol/diesel cars.
- Warning against misinformation using reliable sources/data can help to undermine it but be careful not to indirectly reinforce misinformation by repeating it.
- The UK public are generally on board with net zero policy and energy saving until lifestyle and cost implications are presented. When co-benefits (personal or community) are identified, support increases.

Smart charging advice and delivery channels[26]

Consumers often seek advice from their social networks. However, smart charging is a relatively complex subject so it can be hard to find an 'expert' within social networks. It is therefore important to build a community of users who are familiar with the messaging and can relay it to their social networks.

As a result, consumers are likely to seek technical advice from suppliers and service providers, although expect poor treatment and dishonesty from these messengers. Fewer are likely to seek advice from independent sources, although are likely to report positive experiences with them.

The greater the consumers understanding of smart charging is the more appealing they find it to be. In addition, consumers want throughout and accurate advice offered by impartial organisations and delivered in a variety of styles and formats.

[26] Energy Saving Trust Smart Charging Consumer Advice Research (2021) (not publicly available)

Public messaging should be community-based and emphasise personal responsibility

It should be clear to the reader how understanding the message, or taking personal action in response to the message, would benefit the community or wider society. Users should perceive that most people do (or should) understand the message or be actioning the message - a sense of unity and reflection of societal values. Therefore, the message should suggest that the community's perception is that users should understand or action the message, and that the community expects compliance.[27]

Examples of this include:

1. **COVID 19 messaging**

   "STAY HOME > PROTECT THE NHS > SAVE LIVES" COVID 19 messaging emphasised personal responsibility to protect a widely recognised and universally respected asset (the NHS) for which the public generally believe it is society's duty to protect in addition to saving lives generally.

   "COVID 19 is a **public** health emergency"

   "Avoid spreading coronavirus" (community), rather than "avoid getting coronavirus" (individual)

2. **Welsh Government's "Get ready for 20mph"[28]**

   This public messaging is focused on a community approach using words like "our", "the NHS", "our communities" and "future generations".

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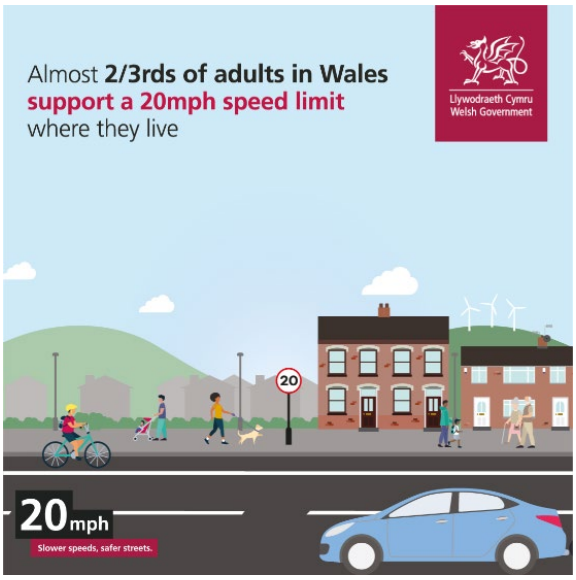
[27] COVID19 Conversation Lines – NHS England – lines are personal and community focused, getting across that protective action is in everyone's best interest; PsyArXiv Preprints | A checklist for prosocial messaging campaigns such as COVID-19 prevention appeals - communicate the benefit to the community and generate the impression that other people expect compliance; What influences people's responses to public health messages for managing risks and preventing infectious diseases? A rapid systematic review of the evidence and recommendations | BMJ Open – frame messages as socially responsible and within an individual's personal control; Effective Messaging Strategies: A Review of the Evidence - Communicating to Advance the Public's Health - NCBI Bookshelf (nih.gov) – population health messages that reflect important societal values may be more persuasive; relate health issues and personal responsibility to important national, cultural and societal values; Making messages work (health.org.uk) – is the message compatible with personal beliefs, do other people believe it?; Driving and accelerating the adoption of electric vehicles in the UK (publishing.service.gov.uk) – use information highlighting the prevalence or popularity if the desirable behaviour (e.g. increasing EV ownership);
DfT's Local Authority Toolkit Community Engagement and Behaviour Change (2023) (unpublished) – work with communities to identify their vision of the future and clearly convey this local (popular) vision in messaging; community engagement helps persuade that messaging is widely supported.

[28] WG46198 20mph Local Authority Communications Toolkit (gov.wales)

“The Welsh Government is making this change for a number of reasons:

- reducing the number of collisions and reducing the number of severe injuries (and also reduce the impact on the NHS to treat the people who are injured)
- it will encourage more people to walk and cycle in our communities
- helping to improve our health and wellbeing
- making our streets safer; and
- safeguarding the environment for future generations”

The graphics used focus on community support for the change and local community imagery:



Clear, concise and specific message content

The desired actions communicated by the message are easy to comply with and unambiguous. There should be no doubt about whether a person has properly understood or actioned the message. Clear instructions foster trust and satisfaction, and consistent and non-technical language should be used which can be easily repeated. Any actions that are taken in response to the message must have a

perceived certain and/or immediate (positive) consequence for the individual and wider community.[29]

Examples of this include:

1. "Wash your hands with soap for 20 seconds (to 'Happy Birthday' is even better)", rather than "wash your hands thoroughly".

2. Rule of three in COVID messaging is concise and can be easily repeated, making the message clear:
   - STAY HOME > PROTECT THE NHS > SAVE LIVES
   - HANDS > FACE > SPACE

   For EV drivers "HANDS > FACE > SPACE" has little meaning without the COVID 19 context, but is clear, concise and specific for those aware of the situation. EV drivers will likely be more aware of smart charging and messaging may be able to assume some existing context for this audience.

   For potentials raising awareness only may not be sufficient to induce action for this audience, so the message should give unfamiliar users a clear action, ideally something easy but impactful. For example, "STAY HOME > PROTECT THE NHS > SAVE LIVES" is clear but the message is basic, unambiguous and can be understood by all.

Credible and consistent messaging and messengers

The message should be delivered and endorsed by individuals or groups perceived to be credible within the community; ideally by those perceived to have similar beliefs to audience. These credible messages and messengers should use facts and figures that are relevant to the audience. They should be accurate and transparent in what they are communicating.[30]

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[29] PsyArXiv Preprints | A checklist for prosocial messaging campaigns such as COVID-19 prevention appeals – make the ask unambiguous, categorical and concise to eliminate plausible deniability; What influences people's responses to public health messages for managing risks and preventing infectious diseases? A rapid systematic review of the evidence and recommendations | BMJ Open – consistent, clear core message within timepoints; clear instructions are more memorable; Making messages work (health.org.uk) – repetition; coherent step by step explanations in plain English with graphics and accessible text; Microsoft PowerPoint - WHO_SCF_Presentation_21March17 slides for public website.pptx – actionable messages, understand relevant knowledge level, attitudes and behaviours of audience; understandable non-technical messaging; Driving and accelerating the adoption of electric vehicles in the UK (publishing.service.gov.uk) personalised information relevant to audience; clear comparisons between ICE and EV; consistent and clear chargepoint signage; The Power of Words Crafting Effective Messages for EV Charging Station Signs (energy5.com) – clear and concise information; essential (relevant) information; consistent branding and communications; clear instructions will foster trust and satisfaction.

[30] The Power of Words Crafting Effective Messages for EV Charging Station Signs (energy5.com) – consistent branding and communications; What influences people's responses to public health

Examples of this include:

1. Working with groups such as charities, campaign groups and community organisations or leaders who may have greater knowledge and experience of local engagement and messaging.

2. School children can be good messengers as they tend to be technologically competent and have influence over parents, family and friends.

3. “STAY ALERT > CONTROL THE VIRUS > SAVE LIVES” was not as effective as it was non-specific, no longer unifying, and disrupted the consistency of previous messages. Its ambiguity affected credibility.

4. Consistently branded New Zealand COVID messaging focused on unity:

5. Wales Government 20mph campaign uses facts and figures:

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messages for managing risks and preventing infectious diseases? A rapid systematic review of the evidence and recommendations | BMJ Open – involve community leaders and others perceived as credible sources within the community; consistent core messaging; Effective Messaging Strategies: A Review of the Evidence - Communicating to Advance the Public's Health - NCBI Bookshelf (nih.gov) – messages should come from people/groups who are perceived to be credible (this may or may not be Government or the Media), ideally local community representatives, or unexpected endorsements; Microsoft PowerPoint - WHO_SCF_Presentation_21March17 slides for public website.pptx – credible and trusted, decision makers and communication channels must trust the message and organisation; messaging to be accurate and transparent; Driving and accelerating the adoption of electric vehicles in the UK (publishing.service.gov.uk) – identify the most effective messengers (school children for example); DfT’s Local Authority Toolkit Community Engagement and Behaviour Change work (unpublished) – work with communities to identify their vision of the future; publicly address uncertainties and challenges (transparency); find trusted voices including known and trusted community figures; lean on experts (such as academics) to add credibility; messaging can benefit from partnering with prominent, respected individuals with strong community links and awareness; work with groups such as charities, campaign groups and community organisations or leaders who may have greater knowledge and experience of local engagement and messaging - working with these groups and allowing them to lead where possible can help foster trust, facilitate deeper connections, and increase awareness among less engaged demographic groups.

Additional key points relevant to EV and smart charging messaging[31]

- Any imagery associated with the messaging should be consistent, easily recognisable and relevant to the subject matter.
- Emphasise technology, EV owners may view their car as an extension of their modern, technology-orientated lifestyle.
- A perceived urgency may support the message, e.g. 2030 ban on petrol/diesel cars.
- Warning against misinformation using reliable sources/data can help to undermine it, but be careful not to indirectly reinforce misinformation by repeating it. Consider the social context in understanding misinformation susceptibility. EV drivers may be less susceptible than potentials.
- The UK public are generally on board with net zero policy and energy saving until lifestyle and cost implications are presented. When co-benefits (personal or community) are identified, support increases.

[31] Driving and accelerating the adoption of electric vehicles in the UK (publishing.service.gov.uk); Making messages work (health.org.uk); Why EV marketing has shifted gears away from green messaging | The Drum; The persuasive effects of social cues and source effects on misinformation susceptibility | Scientific Reports (nature.com); Net Zero Living (ipsos.com)

Annex D – Demographics

Phase 1 Interviews:

Category	Details
Gender	16 male participants, 14 female participants
Age Range	22 to 62 years
Ethnicity	22 White British
Social Grade	27 ABC1, 3 C2DE
Geographic Distribution	21 England, 5 Scotland, and 4 Wales
Home Ownership	22 owned with a mortgage, 3 owned outright, 5 renting (privately and socially)
Vehicle Ownership/Usage	17 petrol or diesel, 9 full-electric, 4 plug-in hybrid
Workplace Charging Group	3 owned their EVs, 2 had EVs through work
Tariff Types	6 with an EV tariff, 2 with a standard variable tariff
Fleet Managers	1 fully electric fleet (6 vans), other fleets with a mix of ICE and electric vehicles (2-50 vehicles)

Phase 2 Focus groups:

Category	Details
Gender	24 male participants, 19 female participants
Age Range	24 to 70 years
Ethnicity	35 White British
Social Grade	40 ABC1, 2 C2DE

Geographic Distribution	31 England, 10 Scotland, and 2 Wales
Home Ownership	41 owned with or without mortgage, 3 renting privately
Vehicle Ownership/Usage	25 petrol or diesel, 7 full-electric, 11 plug-in hybrid
Workplace Charging Group	All personally owned their EVs or PHEVs
Tariff Types	7 with an EV tariff, remainder with fixed or standard variable tariff
Fleet Managers	1 fully electric fleet (3 EVs), other fleets with a mix of ICE and electric vehicles (2-68 vehicles)

Annex E – Topic guides

EV Smart Charging Topic Guide: EV owners with off-street parking

Background (Do Not Read out - for interviewer context only)

DESNZ Brief: work should consider:

Baselining understanding of smart charging concepts, phrases, and definitions. This should include the benefits of smart charging, default smart charging settings, the implications of overriding default settings, smart static and dynamic tariffs and demand side response.

Understand how current EV drivers interact with their charge points, controls, and tariffs.

Consumer myths, where consumers are misinformed, or have been receiving conflicting or inconsistent information

Research Questions

- *To what extent do EV drivers (and potentials) understand smart charging?*
- *How do EV drivers interact with their charge points, controls and tariffs?*
- *What are individual's perceptions and understanding of different types of tariffs?*
- *What are the barriers and levers for smart charging, in terms of Individual, Social and Material factors? Does this differ at different stages of the customer journey? Does this differ between consumer groups?*
- *What are the prevailing attitudes and perceptions towards smart charging amongst EV drivers and potentials? Does this differ between groups?*
- *What misinformation or myths have consumers heard about smart charging? How do consumers decide which information to trust?*

Interview (Read out)

Introduce yourself/background

Thank you for joining me today. My name is [] and I am from Energy Saving Trust. We've been asked by DESNZ (spell out) to conduct some research looking at peoples' experiences with smart charging electric vehicles. You've been invited along today as you have an EV - is that correct?

Data protection

Before we start, do you mind if I go over a quick statement about how we use your data?

The information that you provide during the course of the interview and any subsequent data collection will be used specifically for the purpose of this research. Any personal data i.e. your name and contact details will be deleted from the research project six months after the end of the project. A report outlining the findings from this evaluation will be produced for Department of Energy Security and Net Zero. You won't be mentioned in the report, although we may use anonymised quotes.

On this basis, can you please confirm that you are happy to continue with the interview?

[Interviewee to confirm]

Recording

Also, I want to ask for your permission to record this interview. It is purely to help with note taking purpose. The recording will only be accessible by Energy Saving Trust research and transport teams and will be deleted at the end of the project. Are you happy if I record the interview?

[Interviewee to confirm]

Thank you.

Warm-up/baselining (15 mins)

- Could you start by telling me a bit about yourself? What do you do for a living?
- Could you start by telling me a bit about yourself and your electric vehicle?
    - How long have you had your car? Is it your first EV?
    - What were your motivations for getting it? (Probe; financial, environmental (carbon/air quality), keeping up with tech, driving experience etc)
- Could you talk me through how you typically charge your car?
    - When/where do you charge?
    - Why do you choose to charge like that? [Note down reasons: cost, comparison to diesel/petrol, convenience etc.)
    - What type of charger do you have? When did you get it (pre-or post end Dec 2022)? Do you know the make/model.
- Have you heard of "smart charging"? What does that phrase mean to you?

    - Do you ever use timers or controls on the charger, or the car?
    - If so, do you ever need to use the override/boost function?
    - Do you use any other “smart tech” in your house?

Energy tariffs (10 mins)

- Do you have a smart meter?
- Are you on a specific energy tariff for charging your car?
    - If so, why? If not, why not?
- If on specific EV tariff, how do you find it? Have you had to adapt your charging routine at all?
- I’m going to talk through a couple of different tariff options – it would be great to get your views on these.
    - **Two rate time of use tariffs: e.g. Octopus Go where it is cheaper to use electricity overnight (usually 12-5am or similar); but the peak price more expensive**
    - **Dynamic time of use tariffs: e.g. intelligent Octopus – where you tell the supplier when your vehicle needs to be charged by, and the supplier then chooses the best time to charge your car. The tariff changes irregularly throughout the day depending on the load on the national grid.**
    - **Type of use tariff: e.g. Ovo charge anytime - where EV charging at anytime during the day is cheaper than other electricity usage.-**
- Probe for each: What do you see as the Pros and cons? How important is the balance between ease, cost saving and control?
- To what extent are/would you be happy for the supplier to control when your vehicle is charged?

Smart charging attitudes, perceptions and myths (10 mins)

- As we were just saying, smart charging is a way of charging your electric vehicle (EV) at times when demand for electricity is lower, for example at night, or when there is lots of renewable energy on the grid.
- [Play back respondents' understanding, e.g. "you seem to already know a bit about it"].
- What do you think of smart charging as a concept?
    - What are the benefits? What about disadvantages? [in general - note down]
    - Why do you think this?

- And what about the following phrases; what do you think they mean? Do these descriptions represent your understanding or views?
    - Default smart charging settings; where the charger automatically sets the car to charge at off-peak times where there is more electricity available (i.e. overnight when there is low electricity demand)
        - What happens if you override these?
    - Demand side response; where you adapt your electricity usage to help "balance" the grid – relieving pressure at peak times, and benefit from cheaper priced electricity at off-peak times.
- Where do you get info on EVs/smart charging from? (Gov.uk, energy companies, vehicle sellers or companies, organisations, newspapers)
    - Probe which kinds of orgs (MSE, EST, Which etc)
    - How do you decide which information to trust on smart charging, or EVs in general?
- Have you heard smart charging, or the concept of charging your car at off-peak times in general, discussed much in the media or is it something your friends and family would talk about?

Smart charging barriers and levers (20 mins)

- We'd like to understand a bit more about why people do or don't chose to "smart charge".
- What do you think are the main reasons people might use smart charging? (probe whether/how they have experienced these themselves)
- What do you think are the main things which might stop people from smart charging?
- Is there anything that help or hinders you or your household smart charging (at all, or sometimes?)
- If not; what about earlier on in your journey, when you'd just got your car, or were setting up your charger/tariff?
    - Probe: Individual factors (values, beliefs, attitudes - refer back to any already mentioned; costs/benefits, emotions, agency (i.e. self-control/confidence), skills/knowledge, habit
    - Probe: Social factors (opinion leaders, institutions, norms, roles/identity, tastes, meanings, networks/relationships)
    - Probe: Material factors (rules/regs, technologies, infrastructure, objects, time/schedules e.g. working patterns)
- At what point did you experience these challenges?

- If already smart charging, what helped overcome these challenges?
- If not smart charging, what do you need to help overcome these challenges?

Overview and wrap-up (5 mins)

- If there was one piece of advice you would give to someone who's just got an EV, in terms of smart charging, what would it be?
- Is there anything else you'd like to mention in terms of smart charging?

Thank for time and close out

EV Smart Charging Topic Guide: Prospective EV owners with off-street parking

Introduction as above

Warm-up/baselining (15 mins)

- Could you start by telling me a bit about yourself? What do you do for a living?
- What kind of car you drive?
    - How long have you had your car?
- And I understand that you're looking at purchasing an electric car. Would it be your first EV?
    - What are your motivations for wanting one? (Probe; financial, environmental (carbon/air quality), keeping up with tech, driving experience etc)
- Have you thought at all about how you will likely charge your car?
    - When/where would you charge?
    - Why do you want to charge like that? [Note down reasons: cost, comparison to petrol/diesel, convenience etc.)
    - Have you looked at getting a charger yet? If so, which one?
- Have you heard of "smart charging"? What does that phrase mean to you?
- Do you use any other "smart tech" in your house?

Energy tariffs (10 mins)

- Do you have a smart meter?
- Have you thought about going on a specific energy tariff for charging your car? If so, why? If not, why not? What kind of tariff are you thinking?

- I’m going to talk through a couple of different tariff options – it would be great to get your views on these.
    - **Two rate time of use tariffs: e.g. Octopus Go where it is cheaper to use electricity overnight (usually 12-5am or similar); but the peak price more expensive**
    - **Dynamic time of use tariffs: e.g. intelligent Octopus – where you tell the supplier when your vehicle needs to be charged by, and the supplier then chooses the best time to charge your car. The tariff changes irregularly throughout the day depending on the load on the grid.**
    - **Type of use tariff: e.g. Ovo charge anytime - where EV charging at anytime during the day is cheaper than other electricity usage.**
- Probe for each: What do you see as the Pros and cons? How important is the balance between ease, cost saving and control?
- To what extent are/would you be happy for the supplier to control when your vehicle is charged?
- Which of these tariffs would you prefer and why?
- Do you think you’ll explore any of them for your new car?

Smart charging attitudes, perceptions and myths (10 mins)

- As we were just saying, smart charging is a way of charging your electric vehicle (EV) at times when demand for electricity is lower, for example at night, or when there is lots of renewable energy on the grid.
- . [Play back respondents' understanding, e.g. "you seem to already know a bit about it"].
- What do you think of smart charging as a concept?
    - What are the benefits? What about disadvantages? [note down]
    - Why do you think this?
- And what about the following phrases; what do you think they mean?
    - Default smart charging settings where the charger automatically sets the car to charge at off-peak times where there is more electricity available (i.e. overnight when there is low electricity demand)
        - What happens if you override these?
    - Demand side response; where you adapt your electricity usage to help “balance” the grid – relieving pressure at peak times, and benefit from cheaper priced electricity at off-peak times

- Where are you looking for info on EVs/smart charging currently? (Gov.uk, energy companies, car sellers or companies, organisations, newspapers)
- Probe which kind of organisations (MSE, Which, EST etc)
- Have you been to dealerships to look at new cars yet? Have they discussed smart charging with you?
    - How do you decide which information to trust on smart charging, or EVs in general?
- Have you heard smart charging discussed much in the media, or is it something your friends and family would talk about?
- Have you heard any myths/misconceptions about smart charging?

Smart charging barriers and levers (20 mins)

- We'd like to understand a bit more about why people do or don't chose to "smart charge".
- What do you think are the main reasons people might use smart charging? (probe motivations based on ISM factors below – do these align with motivations for looking at EVs in general?)
- What do you think are the main things which might stop people from smart charging? Is there anything you worry that you or your household might face?
- Is there anything that might stop you from smart charging (at all, or sometimes?)
    - Probe: Individual factors (values, beliefs, attitudes - refer back to any already mentioned; costs/benefits, emotions, agency (i.e. self-control/confidence), skills/knowledge, habit
    - Probe: Social factors (opinion leaders, institutions, norms, roles/identity, tastes, meanings, networks/relationships)
    - Probe: Material factors (rules/regs, technologies, infrastructure, objects, time/schedules e.g. working patterns)
- What do you think might help overcome some of these challenges?

Overview and wrap-up (5 mins)

- If there was one piece of advice or support you might need to get smart charging, what would it be?
- Is there anything else you'd like to mention in terms of smart charging?

Thank for time and close out

EV Smart Charging Topic Guide: EV drivers who charge at work

Introduction as above

Warm-up/baselining (15 mins)

- Could you start by telling me a bit about yourself? What do you do for a living?
- I understand you drive an EV. Is this one you own personally, or for work? Is this your first EV?
    - How long have you been driving this car?
    - What were your motivations for getting it? (Probe; got through work, personally owned, financial, environmental (carbon/air quality), keeping up with tech, driving experience etc)
- Could you talk me through how you charge your car at work?
- Do you tend to charge primarily at work, or elsewhere?
    - Why do you chose to charge like that? [Note down reasons: cost, convenience etc.)
    - Do you know what type of charger they have at work?
    - Is it a private employee parking space? Is there a dedicated chargepoint; or normal 3-pin plug?
    - Do you pay for charging at work?
    - Do you also charge at home? If so, do you have a chargepoint? If so, what type?
- Have you heard of "smart charging"? What does that phrase mean to you?

Energy tariffs (10 mins) – only ask if charge at home too

- Do you have a smart meter?
- Are you on a specific energy tariff for charging your car?
- If so, why? If not, why not?
- If on specific EV tariff, how do you find it? Have you had to adapt your charging routine at all?
- I'm going to talk through a couple of different tariff options – it would be great to get your views on these.

    - Two rate time of use tariffs: e.g. Octopus Go where it is cheaper to use electricity overnight (usually 12-5am or similar); but the peak price more expensive
    - Dynamic time of use tariffs: e.g. intelligent Octopus – where you tell the supplier when your vehicle needs to be charged by, and the supplier then chooses the best time to charge your car. The tariff changes irregularly throughout the day depending on the load on the grid.
    - Type of use tariff: e.g. Ovo charge anytime - where EV charging at anytime during the day is cheaper than other electricity usage.-
- Probe for each: What do you see as the Pros and cons? How important is the balance between ease, cost saving and control?
- To what extent are/would you be happy for the supplier to control when your vehicle is charged?

Smart charging attitudes, perceptions and myths (10 mins)

- As we were just saying, smart charging is a way of charging your electric vehicle (EV) at times when demand for electricity is lower, for example at night, or when there is lots of renewable energy on the grid. [Play back respondents' understanding, e.g. "you seem to already know a bit about it"].
- What do you think of smart charging as a concept?
    - What are the benefits? What about disadvantages? [in general - note down]
    - Why do you think this? Does this apply to your experiences charging at work? (probe any personal benefits/disadvantages compared to benefits/disadvantages for employee)
- Is that something that the workplace charger allows you to do?
    - Do you ever use timers or controls on the charger, or the car?
    - Does your employer encourage you to charge your vehicle in a certain way or at certain times? Is this something you tend to adhere to? If so, why? If not, why not?
- And what about the following phrases; what do you think they mean?
    - Default smart charging settings; where the charger automatically sets the car to charge at off-peak times where there is more electricity available (i.e. overnight when there is low electricity demand)
        - What happens if you override these?
    - Demand side response, where you adapt your electricity usage to help “balance” the grid – relieving pressure at peak times, and benefit from cheaper priced electricity at off-peak times.

- Where do you get info on EVs/smart charging from? (Gov.uk, energy companies, vehicle sellers/companies, organisations, newspapers)
    - Probe which kinds of orgs (MSE, EST, Which etc)
    - How do you decide which information to trust on smart charging, or EVs in general?
- Have you heard smart charging, or the concept of charging your car at off-peak times in general, discussed much in the media, or is it something your friends and family would talk about?
- Have you heard any myths/misconceptions about smart charging?

Smart charging barriers and levers (20 mins)

- We'd like to understand a bit more about why people do or don't chose to "smart charge".
- What do you think are the main reasons people might use smart charging? (probe both at work and home)
- What do you think are the main barriers to smart charging – particularly in the workplace
- Is there anything that stops you smart charging (at all, or sometimes?)
- Probe: Individual factors (values, beliefs, attitudes - refer back to any already mentioned; costs/benefits, emotions, agency (i.e. self-control/confidence), skills/knowledge, habit
    - Probe: Social factors (opinion leaders, institutions, norms, roles/identity, tastes, meanings, networks/relationships)
    - Probe: Material factors (rules/regs, technologies, infrastructure, objects, time/schedules)
    - Probe re time/schedules in particular – how does charging work with your work schedule? Is this controlled by you, or someone else in the workplace?
- Do you have to balance charging at work and home?
- At what point did you experience these challenges?
- If already smart charging, what helped overcome these challenges?
- If not smart charging, what do you need to help overcome these challenges?

Overview and wrap-up (5 mins)

- If there was one piece of advice you would give to someone who's just got an EV, in terms of smart charging, what would it be?

- Is there anything else you'd like to mention in terms of smart charging?
- Thank for time and close out

EV Smart Charging Topic Guide: Prospective EV drivers who could charge at work

Intro as above

Warm-up/baselining (15 mins)

- Could you start by telling me a bit about yourself? What do you do for a living?
- Could you start by telling me a bit about yourself and what kind of car you drive?
    - How long have you had your car?
- And I understand that you're looking at getting an electric car. Would that be through work, or for you personally?
    - What are your motivations for wanting one? (Probe; financial, environmental (carbon/air quality), keeping up with tech, driving experience etc) Or if they know why their work is getting one/offering them
- Have you thought at all about how you will charge your electric car? Do you think you will charge at work, or elsewhere?
    - Why do you want to charge like that? [Note down reasons: cost, convenience etc.)
    - Do you know what type of charger they have at work?
    - If so, is it a private employee parking space? Is there a dedicated chargepoint or a normal 3-pin plug?
    - Would you also think about charging at home?
- Have you heard of "smart charging"? What does that phrase mean to you?
- Do you know if that is something that the workplace charger allows you to do?
- Is that something that your employer has talked about? Would they encourage you to charge your vehicle at certain times, or in certain ways? What are your thoughts on that?

Energy tariffs (10 mins) – ask if plan to charge at home too

- Have you thought about going on a specific energy tariff for charging your car? If so, what are you thinking?
- I'm going to talk through a couple of different tariff options – it would be great to get your views on these.
    - **Two rate time of use tariffs: e.g. Octopus Go where it is cheaper to use electricity overnight (usually 12-5am or similar); but the peak price more expensive**

    - **Dynamic time of use tariffs: e.g. intelligent Octopus – where you tell the supplier when your vehicle needs to be charged by, and the supplier then chooses the best time to charge your car. The tariff changes irregularly throughout the day depending on the load on the grid.**
    - **Type of use tariff: e.g. Ovo charge anytime - where EV charging at anytime during the day is cheaper than other electricity usage.**
- Probe for each: What do you see as the Pros and cons? How important is the balance between ease, cost saving and control?
- To what extent are/would you be happy for the supplier to control when your vehicle is charged?

Smart charging attitudes, perceptions and myths (10 mins)

- As we were just saying, smart charging is a way of charging your electric vehicle (EV) at times when demand for electricity is lower, for example at night, or when there is lots of renewable energy on the grid. [Play back respondents' understanding, e.g. "you seem to already know a bit about it"].
- What do you think of smart charging as a concept?
    - What are the benefits? What about disadvantages? [note down]
    - Probe benefits specifically related to charging at work – is that a preferable option? (Probe benefits to individual and employer)
    - Why do you think this?
- And what about the following phrases; what do you think they mean?
    - Default smart charging settings where the charger automatically sets the car to charge at off-peak times where there is more electricity available (i.e. overnight when there is low electricity demand)
        - What happens if you override these?
    - Demand side response , where you adapt your electricity usage to help “balance” the grid – relieving pressure at peak times, and benefit from cheaper priced electricity at off-peak times.
- Where do you get info on EVs/smart charging from? (Gov.uk, energy companies, organisations, newspapers)
    - How do you decide which information to trust on smart charging, or EVs in general?
- Have you heard smart charging discussed much in the media, or is it something your friends and family would talk about?
- Have you heard any myths or stories about smart charging?

Smart charging barriers and levers (20 mins)

- We'd like to understand a bit more about why people do or don't chose to "smart charge".
- What do you think are the main reasons people might use smart charging? (probe both at work and home)
- What do you think are the main barriers to smart charging – particularly in the workplace?
- Is there anything that might stop you from smart charging (at all, or sometimes?)
    - Probe: Individual factors (values, beliefs, attitudes - refer back to any already mentioned; costs/benefits, emotions, agency (i.e. self-control/confidence), skills/knowledge, habit
    - Probe: Social factors (opinion leaders, institutions, norms, roles/identity, tastes, meanings, networks/relationships)
    - Probe: Material factors (rules/regs, technologies, infrastructure, objects, time/schedules)
    - Probe re time/schedules in particular – how would charging work with your work schedule? Would this be controlled by you, or someone else in the workplace?
- Will you balance charging at work and home?
- What do you think might help overcome some of these challenges?

Overview and wrap-up (5 mins)

- If there was one piece of advice or support you might need to get smart charging, what would it be?
- Is there anything else you'd like to mention in terms of smart charging?

Thank for time and close out

EV Smart Charging Topic Guide: Fleet managers

Warm-up/baselining (15 mins)

- Could you start by telling me a bit about yourself and your job?
- Could you tell me a bit about your fleet?
    - When did you start switching the fleet to EVs? What proportion of your fleet are EVs?
    - What was the motivation for switching to EVs? (probe whether smart charging was considered as part of switching to EV)
    - What was the process like?
    - How did staff react? Was there any behaviour change needed?
- Could you talk me through how the fleet vehicles are charged?
    - Probe whether employees charge at home, at public chargers, whether there are chargers in the depot/office?
    - If charge at the workplace - what type of chargers do you have? When did have them installed?
    - What is the ownership model for the charge-points, and the vehicles themselves?
- Have you heard of "smart charging"? What does that phrase mean to you?
    - (If have workplace chargers), do you encourage your employees to smart charge? Why/why not?
    - What are your motivations for having smart charging?
    - Do you ever use timers or controls on the charger, or do drivers use controls on the car?
    - Do they ever need to use the override/boost function?
- And what about the following phrases; what do you think they mean?
    - Default smart charging settings where the charger automatically sets the car to charge at off-peak times where there is more electricity available (i.e. overnight when there is low electricity demand)
        - What happens if you override these?
    - Demand side response where you adapt your electricity usage to help “balance” the grid – relieving pressure at peak times, and benefit from cheaper priced electricity at off-peak times.

Tariffs and Aggregators (10 mins)

- Are you on a specific energy tariff for your workplace chargers? If so, what tariff? Why did you chose that tariff? What is your experience of it?
- Have you heard of energy aggregators before? (If not; provide definition)
    - An aggregator is when a 3rd party company pays you to use your fleet as a resource to help balance the grid - so if you charge at times when there is excess power, rather than at peak times, then you get compensated for that. In the future, vehicles might also be able to discharge power back into the grid when needed. The aggregator has control of the vehicles and treats it almost like a battery.
- Have you approached, or been approached by an aggregator?
- If yes: what kind of agreement/deal do you have?
    - How is it working? (probe: financial aspects, behaviour change of employees)
- If not: why not? Do you think your workplace would be interested in this in the future?
- Have you ever used an energy broker? If so, have they spoken to you about EV tariffs?
    - Find and present energy suppliers that will offer your business the best deals.

Smart charging attitudes, perceptions and myths (10 mins)

- As we were just saying, smart charging is a way of charging your electric vehicle (EV) at times when demand for electricity is lower, for example at night, or when there is lots of renewable energy on the grid.
- [Play back respondents' understanding, e.g. "you seem to already know a bit about it"].
- What do you think of smart charging as a concept, particularly for fleets?
    - What are the benefits? What about disadvantages? [note down]
    - Why do you think this?
- Where do you get info on EVs/smart charging from? (Gov.uk, energy companies, organisations, newspapers, industry sources e.g. fleet magazines/communities)
    - How do you decide which information to trust on smart charging, or EVs in general?

- Have you heard smart charging discussed much in the media, or is it something your friends and family, or others in the industry, would talk about? Are there any “myths” you have heard about smart charging?

Smart charging barriers and levers (20 mins)

- We'd like to understand a bit more about why people do or don’t chose to "smart charge".
- What are your main reasons for wanting to smart charge? (probe: financial, meeting ESG commitments, staff benefits?)
- What do you think are the main barriers to smart charging for fleet vehicles and drivers?
- What are the challenges to using time and type of use tariffs in a fleet setting?
- Is there anything else that stops your drivers from smart charging (at all, or sometimes?)
    - Probe: employee behaviour change, education, setting up infrastructure, sharing materials, choosing a tariff that suits the business/is financially viable
    - Probe: Individual factors (values, beliefs, attitudes - refer back to any already mentioned; costs/benefits, emotions, agency (i.e. self-control/confidence), skills/knowledge, habit
    - Probe: Social factors (opinion leaders, institutions, norms, roles/identity, tastes, meanings, networks/relationships)
    - Probe: Material factors (rules/regs, technologies, infrastructure, objects, time/schedules)

Overview and wrap-up (5 mins)

- Is there anything you think in terms of support, advice, or messaging that might help your drivers maximise smart charging?
- What advice would you give to another fleet manager who would be looking at smart charging for their fleet?
- Is there anything else you'd like to mention in terms of smart charging?

Thank for time and close out

EV Smart Charging Topic Guide: Potential fleet managers

Intro as above

Warm-up/baselining (15 mins)

- Could you start by telling me a bit about yourself and your job?
- Could you tell me a bit about your fleet?
    - What is the make-up of vehicle types?
    - Why are you thinking about switching to EV?
    - How many, and which, vehicles are you thinking of switching?
    - Have you tested the plan to switch with staff, if so...how do staff/employees feel about the switch? Will they be on board?
- Have you thought about how the fleet vehicles will be charged?
    - Probe whether employees would charge at home, at public chargers, whether there are chargers in the depot/office, or plans to have chargers put in?
    - If chargers already at the workplace/planned - what type of chargers do you have/plan? When did have them installed?
    - What is the ownership model for the [planned] charge-points and the EVs themselves?
- Have you heard of "smart charging"? What does that phrase mean to you?
    - Is this something you would want to do? If so, why?
    - Have you thought about how smart charging would work with an electric fleet?

Energy tariffs and aggregators (10 mins)

- (If planning workplace chargers) Have you explored any specific energy tariffs for your workplace chargers? Is so, what tariff? What are your motivations for considering this?
- Have you heard of energy aggregators before? (If not; provide definition)
    - “An aggregator is when a 3rd party company pays you to use your fleet as a resource to help balance the grid - so if you charge at times when there is excess power, rather than at peak times, then you get compensated for that. In the future, vehicles might also be able to discharge power back into the grid when needed. The aggregator has control of the vehicles and treats it almost like a battery"

- Have you approached, or been approached by an aggregator? (Or thinking about it?)
- If yes: what kind of agreement/deals have you been exploring?
- If not: Do you think your workplace would be interested in this in the future?
- Have you ever used an energy broker? If so, have they spoken to you about EV tariffs?

Smart charging attitudes, perceptions and myths (10 mins)

- As we were just saying, smart charging is a way of charging your EV at times when demand for electricity is lower, for example at night, or when there is lots of renewable energy on the grid. [Play back respondents' understanding, e.g. "you seem to already know a bit about it"].
- What do you think of smart charging as a concept, particularly for fleets?
    - What are the benefits? What about disadvantages? [note down]
    - Why do you think this?
- And what about the following phrases; what do you think they mean?
    - Default smart charging settings where the charger automatically sets the car to charge at off-peak times where there is more electricity available (i.e. overnight when there is low electricity demand)
        - What happens if you override these?
    - Demand side response where you adapt your electricity usage to help “balance” the grid – relieving pressure at peak times, and benefit from cheaper priced electricity at off-peak times.
- Where do you get info on EVs/smart charging from? (Gov.uk, energy companies, organisations, newspapers, industry sources e.g. fleet magazines/communities)
    - How do you decide which information to trust on smart charging, or EVs in general?
- Have you heard smart charging discussed much in the media, or is it something your friends and family, or others in the industry, would talk about? Are there any “myths” you’ve heard about smart charging?

Smart charging barriers and levers (20 mins)

- We'd like to understand a bit more about why people do or don’t chose to "smart charge".

- What are your main reasons for potentially wanting to smart charge (Probe: financial, meeting ESG commitments, staff benefits?)
- What do you think would be the main barriers to smart charging for fleet vehicles and drivers?
- What would be the challenges in using time and type of use tariffs in a fleet setting?
- Is there anything else that might stop your drivers from smart charging (at all, or sometimes?)
    - Probe: employee behaviour change, education, setting up infrastructure, sharing materials, choosing a tariff that suits the business/is financially viable
    - Probe: Individual factors (values, beliefs, attitudes - refer back to any already mentioned; costs/benefits, emotions, agency (i.e. self-control/confidence), skills/knowledge, habit
    - Probe: Social factors (opinion leaders, institutions, norms, roles/identity, tastes, meanings, networks/relationships)
    - Probe: Material factors (rules/regs, technologies, infrastructure, objects, time/schedules)

Overview and wrap-up (5 mins)

- Is there anything you think in terms of support, advice, or messaging that might help your drivers maximise smart charging when the time comes?
- Is there anything else you'd like to mention in terms of smart charging?
- Thank for time and close out