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Deliverable D3.7
EV users Needs and Concerns – Demonstrators' experience report

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Disclaimer

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[1] https://ev4eu.eu/

Executive Summary

The deliverable D3.7 - *EV users Needs and Concerns – Demonstrators' experience report* presents the work developed in T3.1, which produced and initial deliverable (D3.1 – *EV Users' Needs and Concerns - Preliminary Report*), and now aims to complement findings and focus on demonstrators' user experience.

The goal of this deliverable is to report on findings uncovered during several research studies applied to the project's demonstrators, focused on understanding and measuring user experience in each location. Studies vary from quantitative surveys, interviews with participants and usage measurement logs.

Even though studies were planned and prepared with the intention of applying the same methods to all locations, adjustments were made, applying different studies to each location to accommodate for different demonstrator conditions and barriers.

Conclusions drawn in this document outline main issues and preferences found regarding Electric Vehicle (EV) usage, charging habits and methods, and Vehicle-to-Everything (V2X) knowledge and perceptions. Across all demonstrator sites, results show an overall positive perception regarding these topics, recognising EVs as sustainable, technologically advanced and cost-effective in daily usage. Nevertheless, adoption appears constrained by persistent barriers such as high purchase costs, limited charging infrastructure and concerns about battery longevity. Country-level differences also emerged: while Danish and Slovenian participants tended to be motivated by environmental and innovation-related factors, Greek and Portuguese users placed greater emphasis on financial considerations.

User satisfaction across demonstrators increased when systems were predictable, interfaces were stable and intuitive, and charging processes were transparent. Demonstrator-specific findings highlighted both positive engagement—such as strong enthusiasm in Slovenia and improved charging experiences in Portugal—and operational challenges, including algorithm instability, connectivity issues, and limited opportunities for user feedback in some sites. With respect to V2X technologies, demonstrator participants were generally familiar with the topic, and tended to associate V2X with energy savings, renewable integration, and grid support, while still expressing common concerns about battery degradation and data security.

Next steps proposed include interfaces' enhancement, foster e-mobility and energy literacy, and creation of policy-oriented guidelines for urban planning, e-mobility incentives and smart-charging standardisation. Furthermore, the work carried out so far reinforces the importance of involving citizens early and meaningfully in technology development, as this engagement not only improves system design but also increases acceptance of new charging behaviours and business models.

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Acronyms

EV	Electric Vehicle
EV4EU	Electric Vehicles Management for carbon neutrality in Europe
HEV	Hybrid Electric Vehicle
ICEV	Internal Combustion Engine Vehicle
PHEV	Plug-In Hybrid Electric Vehicle
PV	Photovoltaic
RES	Renewable Energy Sources
SoC	State of Charge
VPP	Virtual Power Plant
V2G	Vehicle-to-Grid
V2H	Vehicle-to-Home
V2P	Vehicle-to-Pedestrian
V2V	Vehicle-to-Vehicle
V2X	Vehicle-to-Everything

1 Introduction

1.1 Scope and Objectives

This report encompasses an analysis done regarding different needs, behaviours and barriers Electric Vehicle' (EV) users face, with a special focus on feedback obtained from EV4EU four demonstrators. Thus, the analysis will present both generic and contextual data, adapted to different scenarios tested and data collection methods available.

1.2 Structure

The document is divided between the following sections:

- A detailed view of the Research Plan applied, with key goals, expected outcomes, methods used, and risk identification, including a sub-section regarding barriers met and adjustments made to mitigate risks;
- Presentation of results collected, analysing said data with a general view, but also including contextual analysis, focusing on societal differences between each demonstrator's location;
- Main conclusions and next steps proposed.

1.3 Relationship with other deliverables

This document is a second step of the user analysis process done in T3.1 – Understand EV Users Needs and Concerns, which started with a preliminary report [1] that mapped current views on e-mobility, EV usage and Vehicle-to-Everything (V2X) concepts, and now furthers that investigation by including analysis on the user experience measured in the project demonstrators.

Deliverables describing each of those demonstrators are used as a basis to convey how user experience was planned and predicted in each location [2], [3], [4], [5], and thus how studies were planned and applied to each location and context, considering possible barriers and constraints that arose.

2 Research Plan

In this section, the research methodologies used will be presented, justifying their applicability, as well as list some barriers met along the process, and how risks were mitigated and methods adjusted to meet research needs.

2.1 Methodologies applied

To study demonstrators' results, a Research Plan was developed. This plan aimed to fulfil the following criteria:

- Aim at understanding user experience and impact on awareness from demonstrators' users;
- Have a structure generic enough to be applicable to all demonstrators;
- Be flexible enough to adapt to specific demonstrator characteristics and limitations;
- Include both quantitative and qualitative data collection.

With these criteria, the Research Plan was defined as presented in Table 1.

Table 1: Research Plan studies prepared

ID	Study	Goals	Countries / Demo sites
#01	Societal Context Survey (Quantitative)	Understand e-mobility views and experiences in a broader way, furthering results reported in D3.1 [1]	All countries
#02	Quick satisfaction survey (Quantitative)	Measure immediate satisfaction with charging session	Denmark (Campus Bornholm site) and Portugal (EDA and LREC sites)
#03	Monthly evaluation survey (Quantitative)	Measure average satisfaction perception over a month of demo usage	Portugal (LREC site and Houses)
#04	Final evaluation survey (Quantitative)	Measure overall satisfaction perception with demo usage	Portugal (Houses)
#05	Interviews [2] with demo participants (Qualitative)	Evaluate experience evolution, expectations met, and demo impacts on routines and knowledge	Greece, Slovenia and Portugal (all sites)
#06	Usage and Help request Measurements (Quantitative)	Measure demo usage, to understand study engagement rates	All demo sites

[2] Script for these interviews available in APPENDIX B: Interview Script.

All studies were proposed to all countries and locations. However, due to a plethora of reasons and constraints, the ones listed above were the only ones prepared and deployed. Some reasons were due to technical limitations to implementing these studies (for example, in Denmark it was not possible to reach frequent demonstrator users for studies 3, 4 and 5, due to difficulties in sending them notifications to do so), others were related to experience concerns (for example, for the Houses in the Portuguese demonstrator, it was opted not to have study 2, since that would increase the time spent on a daily routine, in a moment not convenient to participants). In sections referring results from each country, a context is provided of the conditions available for demonstrator experience analysis, mentioning what was possible to implement, and how. Information for Denmark is available in Section 3.2, Greece in Section 3.3, Portugal in Section 3.4, and Slovenia in Section 3.5.

2.2 Barriers and Adjustments

The previous section states which methodologies were prepared. In this section, a list of barriers encountered is provided, indicating the data that was possible to collect in each country. Analysis in Demonstrators' Results regarding User Experience (Chapter 3) will be based on the data collected, mentioned below, in Table 2.

Table 2: Countries where data was collected for each study

ID	Study	Countries / Demos where data was collected	Countries / Demos where data was not collected	Justification for lack of data
#01	Societal Context Survey (Quantitative)	All countries	-	-
#02	Quick satisfaction survey (Quantitative)	Portugal (EDA site)	Denmark (Campus Bornholm site) and Portugal (LREC site)	Denmark (Campus Bornholm site) did not have users using the app to finish charging sessions, so the survey was never displayed to them. Portugal (LREC site) had no users for the demo, besides the user authorized to use the leased vehicle (that user did not use the app, so they did not see the survey)
#03	Monthly evaluation survey (Quantitative)	Portugal (LREC site and Houses)	-	-
#04	Final evaluation survey (Quantitative)	Portugal (Houses)	-	-
#05	Interviews with demo participants (Qualitative)	Slovenia and Portugal (all sites)	Greece	Greek users were not interviewed because demo was not fully operational in time to be considered for this

				deliverable, due to pending legal and licensing matters.
#06	Usage and Help request Measurements (Quantitative)	Denmark, Portugal	Greece, Slovenia	The Greek demo was not available to real users, and as such was not subject to possible usage reports and support requests. No information was received from the Slovenian demo regarding usage and help requests.

Summarizing, data collected for this deliverable was focused on study ID#01, with extra inputs for demonstrators in Denmark (with ID#06), in Portugal (with ID#02, ID#03, ID#04, ID#05 and ID#06), and in Slovenia (with ID#05).

In the next chapter, conclusions drawn will only focus on results from these studies mentioned above. Further results and conclusion might be drawn in the following months of the project and reported in deliverables corresponding to demonstrators' analysis and results.

3 Demonstrators' Results regarding User Experience

In this chapter, collected data analysed will be presented, with main conclusions and overall results from research study ID#01 (Societal Context Survey) being the main source of information for Section 3.1 - Overall results.

Sections related to each country will address results from research study ID#01, crossed with available data from other studies performed in that country's demonstrator.

3.1 Overall results

For the research study ID#01 (Societal Context Survey), a sample of 802 was analysed[3], characterised as follows:

- Country shares: Slovenia 31.17% (250), Portugal 27.43% (220), Denmark 19.20% (154), Greece 17.58% (141), Other 4.61% (37).
- Average age of 43 years, with respondents mainly in age ranges between 26 and 55 years old across countries.
- Education levels seem relatively high, with big volume of respondents with bachelor's and master's degrees across countries.
- 66.08% of the sample is male, and 31.42% female, with around 3% identifying as "non-binary", "other", or "prefer not to say".
- Respondents largely living in urban and peri-urban areas, with a more even distribution for rural areas in Slovenia.
- Majority of respondents have a private parking space available in their residence.
- Internal Combustion Engine Vehicle (ICEV) ownership is more prominent (64.53%), with EV ownership limited to 15.22%, and vehicles are mostly owned privately by the participants or a family member.
- Bicycles are a largely adopted alternative means of transportation in Denmark and Slovenia, with participants in Greece and Portugal opting by using the subway, buses or taxis as other transportation means, besides the car. Portugal is the country that reports the higher percentage of people not using any other means besides the car (21.00%).

Considering the sample summarised above, conclusions can be drawn regarding the following topics:

1. EV & E-mobility Perceptions
2. Charging Habits & Preferences

[3] Further details and graphic representation of results collected available in APPENDIX A: Societal Context Survey - Results

3. Preferred Scenarios for Public Charging
4. V2X Knowledge & Expectations

EV & E-mobility Perceptions

On EV and e-mobility perceptions, EVs seem to be seen as more efficient, more sustainable, requiring less maintenance, and overall, better for society. However, cost remains the main barrier, with perceptions of high cost to acquire, difficulty to charge, and with a shorter lifespan than ICEVs. These perceptions are seen both in people with and without EVs. These trends are confirmed in all four countries of the project, with Denmark having an overall more positive outlook on EVs than the others.

When asking participants that report having an electric vehicle (EV, Plug-In Hybrid Electric Vehicle, PHEV, or Hybrid Electric Vehicle, HEV) why they chose an electric one, sustainability reasons are the top-of-mind overall, followed by charging costs (which are seen as cheaper than diesel or gasoline). Noise reduction and technology curiosity appear as secondary drivers, as well as state incentives and benefits, especially in Portugal and Slovenia. When looking at participants from each country, charging costs surpass sustainability reasons in Greece, and state incentives and benefits appear as the third reason to choose an electric vehicle in Portugal.

Charging Habits & Preferences

Regarding charging habits and preferences, most EV and PHEV charging seems to happen at home, whenever private parking and domestic charging infrastructure is available. However, in Greece the trend shows more office charging, and some reports of not having enough public infrastructure to charge near the home or place of work.

Apart from Greek participants, office charging seems to be the less available or used option, with public chargers following (both inside public parking lots, and on the street).

Preferred Scenarios for Public Charging

Previous insights are closely related with what is seen regarding preferred scenarios for public charging. To justify low usage of public charging infrastructure, when asked about it, participants mostly indicated the lack of need to use the public network when home-charging is possible (which applies to most respondents), also noting the cost difference between charging at home versus in public chargers, even when they're amply available.

Respondents consistently request chargers in residential areas, mainly those living in urban areas, and the majority seems to agree that each neighbourhood should have enough parking spaces for electric vehicles in use in that area. This can mean a constant monitorisation and forecasting needs for public infrastructure planning. Also, even though the majority of the respondents believes parking spaces with chargers should be exclusive for EVs and PHEVs, this trend is inverted for Denmark, with Danish participants believing there should not exist exclusivity in public parking. In Slovenia, participants seem divided between the two options.

When asked about abusive usage of parking spaces with chargers (parking a vehicle in a spot with a public charger, without the intention of using it), the large majority assumes this is something they disagree with, but a considerable group accepts it in case of emergency. This appears as a very balanced trend across countries.

When questioned about safety regarding public charging during the night, even though the averages seem more towards the agreement of safety, there is a considerable difference in perceptions between Denmark and other countries, with lower trust rates in Greece, Portugal and Slovenia.

Besides residential areas, participants request public chargers in places such as parking lots, office areas, near hotels and hostels, malls and big department stores, and supermarkets, with top priorities varying slightly across countries. Gas stations and hospitals also make it to the top 5 in Denmark. Priorities also vary according to people living in urban areas (top: residential areas), city outskirts (top: parking lots), or rural areas (top: parking lots), as well as variations between car owners (top: parking lots) and participants with no private car (top: residential areas).

V2X Knowledge & Expectations

When looking at V2X knowledge and expectations, only 36% of participants had heard of this concept, and these were mostly people with a higher education level (bachelor's degree or higher). Greece and Slovenia appear to show higher knowledge than average, but this can be due to dissemination technics used to request survey participation, so a further study of more diverse samples would be needed to confirm this.

After a brief description of what Vehicle-to-Grid (V2G) and V2X technologies might entail, participants in the survey were asked *"What kind of everyday uses would be most beneficial to you, considering a future where V2X technology is implemented?"* Answers to this open-ended question were categorised according to keywords and concepts that derived from the answers themselves. Below, a table shows the categories created based on the submissions, as well as the number of occurrences. Also, a quick brief is provided about each one, summing up what people shared related to that topic.

Table 3: Topics mentioned in open-ended question of the Societal Context Survey

Topic	Number of Mentions	Summary
V2X / V2G / Vehicle-to-Vehicle (V2V) / Vehicle-to-Pedestrian (V2P) (etc.)	243	Out of 802 answers, around 30% just answered with acronyms of different examples of technologies mentioned in the description provided. This repetition of mentioned acronyms might point to awareness of the concept but not necessarily an understanding of its application—indicating a knowledge depth gap worth exploring.
Don't know / no answer	107	The second most used category was a lack of response to the question (around 13%), stating they didn't know how to answer the question.
Safety in mobility (for cars and/or pedestrians)	60	About 7.5% of participants mentioned safety in mobility, specifying examples like accident prevention and warning.
Energy savings / Lower electricity costs	47	Some participants mentioned savings in energy costs as a benefit from implementing V2X technologies.
No uses or benefits	46	Around 5.7% believe there are no uses or benefits from V2X technologies. These participants seemed against not only these technologies, but

		some even against all electric mobility aspects, mentioning environmental impacts, high energy prices and surveillance as main concerns.
Energy savings by using EV batteries to power the home	44	Some saw this Vehicle-to-Home (V2H) concept as the main benefit, sometimes also related with RES integration, optimization of energy tariffs (and thus economic savings), and even as a backup power source in emergency scenarios.
Commuting & daily mobility	40	About 5% simply mentioned the main benefit would be related to their daily commute, providing no further details.
Traffic efficiency	40	On the other hand, efficiency of traffic was often used alongside road safety, indicating how these two concepts seem to be related in peoples' mental model of what V2X technologies can bring to their mobility habits.
Monetary benefits	20	A very small number of participants mentioned any kind of economic benefit, either related to selling energy back to the grid or receiving incentives to allow the grid to take energy out of their EVs. People seem more focused on spending less money in energy (by charging when energy is cheaper and using stored energy when its costs are higher), rather than selling it back.
Emergencies & blackouts	19	Around half of these mentions also included energy savings of some kind in their answer, noticing how this concept ends up being related to managing energy consumption in some way.
Grid stability	14	Besides being a topic mentioned very few times, most of these participants have either a M.Sc. or a Ph.D. degree, which might indicate that the understanding of grid implications of using V2X technology might not be clear or made aware.
Renewable Energy Sources (RES) integration	13	Some participants associated V2X technologies with the possibility of integrating solar panels to truly benefit from them. A few even mentioned that it would only make sense if having a solar photovoltaic (PV) system at home was possible.
Energy sharing	12	Mentions of energy sharing seemed very "individualised", focusing on helping friends and family, or getting help in an emergency.
Cheaper, easier and/or faster EV charging	12	Here opinions split between having faster chargers, being able to easily find chargers, and paying less for charging their EVs.

Flexibility services	12	Very few participants mentioned concepts that seem to be related to flexibility services and "electricity trading"[4].
Remote power	8	These participants mainly mentioned being able to use electronic devices plugged to their EV, when no other source of energy is available.
Public, social & environmental benefits	8	Suggestions vary, from public lighting to energy communities, and mentioning air and noise pollution reduction of an increased EV adoption.
Daily uses and benefits	6	These participants simply used words like "daily" or synonyms, which might lead to a message of getting uses of V2X technologies in their daily routines.
Communication	5	Only a handful mentioned communication between vehicles, or between a vehicle and a building, as a benefit from V2X. Other than traffic safety and efficiency, most of other concepts seem related to energy exchange, and here we see a third topic that is focused on data communication.
Random	41	These were submissions not included in any other topic, since they seemed disconnected, even though they were perceptible words and sentences. To highlight the most interesting ones, there was a mention to autonomous driving, and to personalized user experience in EVs.
Invalid	82	About 10% of answers were deemed invalid, since they simply wrote placeholders like "/", "-" or other symbols, or even loose letters with no meaning.

Other issues explored with participants were concerns with EV and V2X massification, as well as compensations expected from V2X scenarios.

Concerns seem evenly distributed among options provided (where participants could choose up to 3), with battery degradation as the most mentioned. Charging times and electricity availability are also relevant, with compensations from the grid using electricity as the least mentioned concern. Only around 2% assumed they would have no concerns at all. This pattern is maintained even if we look at this data divided by countries and by EV/PHEV ownership.

As for the compensations required (participants could only choose one), the two main expectations are a payment for spot energy price when taking energy from their batteries or asking for permission before using energy from their batteries. Discounts and benefits have a lower preference, with some

[4] Expression used by one of the participants.

participants not expecting anything mainly because they do not believe in this scenario and would not even agree with allowing V2X technologies in their assets.

3.2 Results from Danish demo

According to D9.1 [5], the Danish demonstrator is located in both Risø and Campus Bornholm. The first location is a DTU research campus in Roskilde showcasing the "operation of workplace charging infrastructure accessible for employees and visitors", that demonstrates "the coordination of smart EV clusters with distributed energy resources". The Campus Bornholm site, in Rønne, has public access and can be used by students of the campus, employees, residents and tourists. In this site, charging is possible using an app that allows for load balancing of the whole system based on user inputs and requirements (like needed energy and anticipated parking time).

For this demonstrator, the research studies applied were ID#02 and ID#06, a quick satisfaction survey and a usage and help request measurements, respectively.

Study ID#02, the quick satisfaction survey[5], was deployed through the user app developed specifically for demo site in Bornholm. It was also available for submissions in the Risø campus, but the main focus was to evaluate usage experience in the campus where many different user profiles would be able to interact with the chargers. This satisfaction survey mapped where the person was using the demonstrator (Risø or Bornholm), overall satisfaction with the session, collected free-text feedback, and questioned about the participant's profile (student, professor, employee, visitor or project researcher). During the collection period established for this analysis, no submissions were recorded.

ID#06 study is in fact an Excel file where researchers from the Danish demo mapped usage numbers like charging success ratio (compare user charging requests with energy provided), number of charging sessions per month (discriminating between weekdays and weekends), and number of help requests made (including the topic of each request). Results from ID#02 would be cross-checked with usage measurements from ID#06. Table 4 shows the data collected through ID#06.

Table 4: Measurements collected with ID#06 study in Denmark, with data collected from 6th May 2025 to 31st August 2025

Measurement	Information collected		Notes
Charging success ratio	(no data provided)		-
Number of charging sessions per location, per month	**Campus Bornholm:** May: - Week charges: 0 - Weekend charges: 0 June: - Week charges: 4 - Weekend charges: 0 July: - Week charges: 8 - Weekend charges: 0	**Risø:** May: - Week charges: 0 - Weekend charges: 0 June: - Week charges: 41 - Weekend charges: 0 July: - Week charges: 42 - Weekend charges: 0	Total for Bornholm: 17 Total for Risø: 190

[5] Study launched with Survio platform, collecting data from 6th May 2025 to 31st August 2025.

	August: - Week charges: 5 - Weekend charges: 0	August: - Week charges: 106 - Weekend charges: 1	
Number of times help was requested	**Campus Bornholm:** 0	**Risø:** 9	Main issues reported were related to charging difficulties, and all were solved with resetting the chargers.

As seen in the table above, this demonstrator had a lot of users, mainly in the Risø location. As stated, ID#02 study was deployed through the app needed to start the charging session at the demo location. However, people could stop the charging process either with the app, or by just unplugging their EV from the charger. Also, answering the survey was not a mandatory action, but an optional request made after ending each session. By having no submissions during this period, and mainly focusing on the Campus Bornholm site, we can see that the few participants that used that site most likely did not end the session with the app, or were not available to provide feedback, and thus no analysis is possible in this site. As for the Risø site, this was mainly used by EV4EU researchers, and as such, they were instructed not to provide feedback, since it would skewer the results with partial opinions. With such a high usage of this site, we might assume most of them were by project researchers, and so no data was available from independent participants.

3.3 Results from Greek demo

According to Deliverable D8.1 [3], the Greek demonstrator focuses on public charging stations and aims to demonstrate multiple use cases related to grid services, demand response, and user-driven charging activation. For the purpose of this deliverable, the main aspect under analysis concerns the interaction between the system and EV owners, who are notified through the O-V2X Platform[6] about price incentives or other advantageous charging conditions. Based on this information, users can decide whether to charge their vehicles at specific locations and within defined timeframes to take advantage of the offered incentives.

To assess user experience, both ID#05 and ID#06 studies were prepared, namely a script for interviews with demo users and a usage and help request measurements, respectively.

However, due to delays in the deployment of the Greek pilot, associated with pending legal and licensing procedures, the demonstrator was not yet available to public users at the time of this deliverable. As such, the mentioned studies could not be performed. Once the pilot becomes fully operational, Greek partners will conduct the user interviews and report the findings in D8.6 – *Lessons learned in Greek Demonstrator and Services/Tools Marketability report*.

[6] Open-source and web-based charging station management system that supports V2X [6].

3.4 Results from Portuguese demo

According to D6.1 [2], the Portuguese demonstrator is comprised by 3 distinct pilot sites in São Miguel Island, Azores:

- EDA's headquarters (company campus), where employees can charge their EVs, requesting specific charging preferences through a webapp developed for this pilot;

- The LREC office building, where employees and visitors can benefit from the two charging points installed, also through the same app, or by using an authentication card to charge the company's EV (rented by the project);

- 6 private households from EV users that charge at home, where the chargers can be used in "plug and charge" mode or using the same app, in a tailored private format. These participants also enrolled in the Living Energy [7] platform to be able to see their overall electricity consumptions, as well as specific consumption related to EV charging, and also production information (for those with solar PV systems installed at home).

In all these sites, an algorithm developed by the project is implemented, to optimise charging times and balance power usage, adapting priorities of this algorithm according to the use case being tested.

For the Portuguese demonstrator, studies ID#02, ID#03, ID#04, ID#05 and ID#06 were carried out. In this section, an overview of the results of each study is provided, divided by demonstrator location.

Study ID#02 is the quick satisfaction survey, applied in both the EDA and LREC sites. Each site had their own survey deployed[8].

Study ID#03 is the monthly evaluation survey, applied at LREC and private households, as well as study ID#04, which is the final evaluation survey. Together, these two surveys [9] analyse evolution of perceptions and experience in using the demonstrator.

Study ID#05 is the interviews with demonstrator participants, applied in the three Portuguese demonstrator locations. The script used was personalised for private households' interviews.

Finally, study ID#06 is the usage and help request measurements[10], also applied in all locations of the Portuguese demonstrator.

[7] Living Energy is a living lab developed by SEL "consisting of an energy community of living-buildings, such as residential or services, that allows to better understand how people use energy and their preferences in real-life". (Source: https://www.smartenergylab.pt/living-energy/)
[8] Both studies launched with Survio platform, collecting data from 18th June 2025 to 31st August 2025.
[9] Monthly and final survey deployed with Qualtrics platform. ID#03 collected data from 3rd March 2025 to 3rd July 2025 in private households, and from 13th May 2025 to 30th June 2025. ID#04 collected data from 21st to 31st July 2025.
[10] Data collected from 1st April 2025 to 31st August 2025

EDA's headquarters

Focusing on the EDA site of this demonstrator, 37 submissions were collected with study ID#02 during the period defined[11]. All the participants were employees from EDA that charged their personal EV in the demonstrator installed.

In this quick satisfaction survey, besides identifying the participants' profile (employee, visitor, charging own vehicle or fleet vehicle), respondents were requested to provide their satisfaction level after each charging session, and identify the charging point used in the session they are referring to. They could also provide written comments and suggestions if they wanted to.

Looking at Figure 1 and Figure 2, more than half of the participants rated their session as 1 in 5 (being 1 the lowest satisfaction level possible, and 5 the higher). Around 36% attributed a level of 4 or 5 to the session. We can therefore see a negative trend in satisfaction. Even though most charges were done in the unidirectional "faster" chargers, some were also done with the available Schuko plugs. When comparing satisfaction with charger used, no conclusions can be drawn, since both types of chargers were used when sessions were considered either positive or negative.

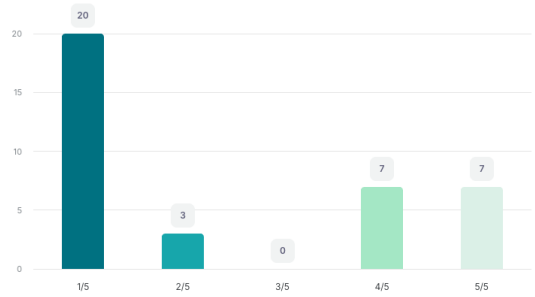

Figure 1: Number of answers for Portuguese demonstrator participants' regarding their satisfaction level with EDA's headquarters demo usage for each session[12]

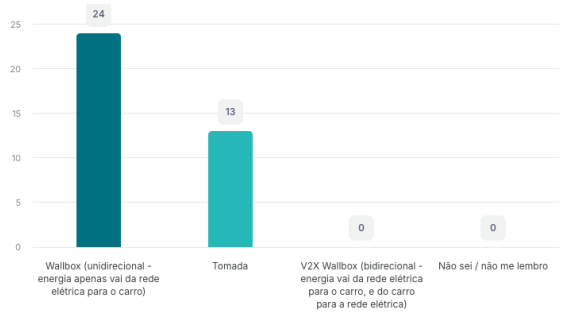

Figure 2: Number of answers for Portuguese demonstrator participants' indicating the charger used at EDA's headquarters demo in each session[13]

Looking at the comments and suggestions provided, only one is related to a "5" satisfaction level, but even that participant mentioned something did not go as planned in the comments, namely the total energy requested was not met. Most refer to problems in starting the session, mentioning the system was not allowing sessions to start correctly. Others mention not receiving as much energy as expected or requested. Overall, people seem dissatisfied with a system that requires an expected energy and time of leave inputs and does not meet those exact values.

[11] Even though analysis for this deliverable will only focus on results until 31st August 2025, this study is still online, and answers collected after this date will be included in D6.4 – Evaluation and lessons learn of the Azores demo, regarding demonstrator results.

[12] Image taken from Survio platform.

[13] Image taken from Survio platform. Text in Portuguese, to address participants in their native language. From left to write, the horizontal axis reads: "Wallbox (unidirectional – energy only goes from the electricity grid to the car)", "Plug" (referring to a Schuko plug), "V2X Wallbox (bidirectional – energy goes from the electricity grid to the car, and from the car to the electricity grid)", "I don't know / I don't remember".

To follow up with these results, study ID#05[14] (interviews with demo participants) was conducted with 9 demonstrator participants. They were selected to be interviewed because they were the ones that used the demonstrator at EDA's headquarters the most, each one between 4 and 10 usages during July and August 2025. All of them are male, with ages ranging from 35 to 62 years old, and working in technical, engineering or IT-related roles within EDA. The group appears to be highly literate in technology and energy topics, something expected from employees at EDA, which might influence their analytical and pragmatical views on EVs and V2X technologies, and thus not reflect opinions of general consumers, but rather those of informed professionals in the sector.

Overall, participants are unanimous in their positive opinions towards EVs, seeing them as the future of mobility, emphasising economic and environmental benefits (reduced fuel and maintenance costs and lower emissions), driving comfort (smoothness and quietness of driving experience), and technological progress (innovative digital systems integrated in the vehicle). Nonetheless, autonomy remains the most frequent concern, with mentions of charging times and infrastructure availability as main issues for this topic. Some also mention battery degradation, vehicle cost, and efficiency lost to due battery weight as other disadvantages of EVs. All participants privately own their EVs, often motivated by economics, innovation curiosity, or environmental awareness. A few combine EVs with combustion vehicles to balance practicality and experimentation.

Most participants charge their EVs mainly at home, using the EDA demonstrator occasionally. They seemed evenly distributed between people with slower options to charge at home (mentioning cycles of 10 hours to charge their EVs), and people with faster chargers, that were equivalent or even "faster" than the ones at EDA (this might be mainly due to energy balancing algorithms present at EDA, that are not usually in place with a domestic EV charger). For those that have slower alternatives at home, they still see it as positive, since it provides more control and autonomy than relying on a shared infrastructure that might not be available when needed.

When using EDA's headquarters demonstrator, and for the majority of participants, charging was easy and met expectations, especially after initial adjustments. First uses often revealed technical issues, communication or software errors, car model not recognised, or charging not starting (which is coherent with study ID#02 results shown above), but these were resolved quickly by the project team, leading to improved later experiences. Most users also reported minor adaptation needs, mainly using the app or understanding charging logic. For most, the demonstrator did not change opinions regarding EVs, in fact, it even confirmed their positive stance. Some reported having to make minor adjustments, like arriving earlier to ensure charger availability. Recommendation ratings range from 2 to 7 (in a scale of 1 to 7, where 1 means "would not recommend at all", and 7 means "definitely would recommend"), with an average around 5.78, reflecting high satisfaction when systems function well. Lower scores seem to relate to technical unreliability (software or communication interruptions). Common suggestions given are to add more chargers, specially the 7.4kW ones (some pointed out that having Schuko plugs in the company's parking lot was not interesting, as it mimics what's possible to have at home, and provides no advantages), to ensure stable communications, to implement a reservation system, and to provide offline charging modes as alternatives to the app to ensure system resilience.

[14] The script for this study was the same across demonstrator sites, apart from private households. For interviews with EDA headquarters demo participants, the script from SEL was used by a project partner at EDA. These interviews occurred both in-person and remotely, between 29th August 2025 and 9th September 2025.

Regarding V2X technologies, most participants had limited prior knowledge (only 1 knew how to explain it, 3 knew about it but could not explain what it is, and the remaining 5 were not familiar with the concept), but all showed interest once the concept was explained. There is a broad consensus that V2X is promising, with the potential to optimise energy management, support and stabilise the grid, and benefit isolated systems (like the Azorean power grid, which is isolated per island). Some participants highlight use cases such as powering equipment off-grid, providing emergency energy supply, sharing energy to charge another EV, and provide energy savings and the possibility to monetize stored energy and provide flexibility. However, main concerns are closely related to battery degradation (most frequently cited) and the impacts on autonomy and daily mobility needs. System reliability and user control seem to be key factors in increasing this technology acceptance. Overall, participants view V2X as inevitable and potentially useful, but not yet mature, being cautiously optimistic about it, and adoption seems to depend on proof of reliability, battery protection, and clear personal benefits.

Finally, looking at results from study ID#06 (usage and help request measurements), it showed that more users preferred the unidirectional chargers available, rather than the Schuko plugs, even though these were the second most used. The bidirectional charger was seldomly used, but this can be related to internal directives from the project to avoid the charger usage, unless by project partners, to prevent issues with impacts on private vehicles. The usage of this last charger was then intended to be solely by EDA's EV fleet with V2X capabilities and done with project partners' supervision. Table 5 shows the data collected through ID#06 at EDA's headquarters.

Table 5: Measurements collected with ID#06 study in EDA, with data collected from 1st June 2025 to 31st August 2025

Measurement	Information collected			Notes
Number of charging sessions at EDA, per charger type and per month	**3 Schuko plugs, 3.7 kW:** June: - Week charges: 2 - Weekend charges: 0 July: - Week charges: 20 - Weekend charges: 0 August: - Week charges: 2 - Weekend charges: 0	**2 Unidirectional chargers, 7.4 kW** June: - Week charges: 5 - Weekend charges: 0 July: - Week charges: 43 - Weekend charges: 1 August: - Week charges: 32 - Weekend charges: 0	**1 Bidirectional charger, 7.4 kW:** June: - Week charges: 0 - Weekend charges: 0 July: - Week charges: 5 - Weekend charges: 0 August: - Week charges: 9 - Weekend charges: 0	Total for Schuko plugs: 24 Total for unidirectional chargers: 81 Total for bidirectional charger: 14
Number of sessions on bidirectional charger, when unidirectional ones were available	2 uses of the bidirectional charger, while the unidirectional chargers were available.			-
Number of times help was requested	10 help requests. Main issues reported were related to charging difficulties, and all were solved with adjustments to the app and the algorithms, or by resetting the system.			-

LREC's office building

For LREC site, and starting with study ID#02[15] (quick satisfaction survey), as mentioned in Table 2, no data was collected, due to demo usage solely by users that did not need to use the app to start the charging sessions.

Studies ID#03 (monthly evaluation survey) and ID#04 (final evaluation survey) had only one participant, which was the person that was responsible for using the rented EV available in the LREC location specifically for the project. This person was also the one interviewed in study ID#05[16].

By joining information from these three studies, we see a steady usage of the demonstrator of around once a week, fitting the mobility needs of a service vehicle. The participant in this demonstrator seems positive towards EVs, having never tried one before. The participant notes as main disadvantage the battery autonomy and charging speed, even though that was not an issue during the demonstrator itself. EVs are still perceived as very expensive to purchase, which appears as a barrier for them personally. Nonetheless, it was mentioned by the participant that they have solar panels and batteries at home, which in their view increases their interest in having an EV. The participant is aware of V2X, and favourable to it if proven effective, as they see it as a way to provide increased efficiency in energy management for individuals and the grid, even though they recognise possible risks with low perceived likelihood.

Finally, looking at data collected from ID#06 (usage and help request measurements), Table 6 shows usage information and help requests made.

Table 6: Measurements collected with ID#06 study in LREC, with data collected from 1st April 2025 to 31st August 2025

Measurement	Information collected	Notes
Number of charging sessions at LREC, per charger type and per month	**2 Unidirectional charger, 7.4 kW** April: - Week charges: 4 - Weekend charges: 0 May: - Week charges: 8 - Weekend charges: 0 June: - Week charges: 3 - Weekend charges: 0 July: - Week charges: 3 - Weekend charges: 0	Total for unidirectional charger: 18

[15] Even though analysis for this deliverable will only focus on results until 31st August 2025, this study is still online, and answers collected after this date will be included in D6.4 – Evaluation and lessons learn of the Azores demo, regarding demonstrator results.

[16] The script for this study was the same across demonstrator sites, apart from private households. For interviews with LREC demo participants, the script from SEL was used by a project partner at DRE. This interview occurred in-person, on 4th September 2025.

	August: - Week charges: no data available - Weekend charges: no data available	
Number of times help was requested	No help requests made	-

As seen in the table, no help was needed for this demonstrator site, and usage was lower than at EDA's headquarters, with only one EV being charged at LREC, which seems in line with information gathered by the demonstrator participant in studies ID#03, ID#04 and ID#05.

Private Households

In private households, experience reports were collected through studies ID#03 (monthly evaluation survey) and ID#04 (final evaluation survey), as well as a wrap-up interview in the end (study ID#05), which had a script tailored to each participant. This personalisation was made based on each participant's answers to ID#03 and ID#04, as well as usage and help request measurements made (ID#06). In this document, all the data from these 4 studies is combined, to provide a summary of individual participant experience, as well as an overview of private households' demonstrator experience as a whole.

From the initial 7 participants in this private household demonstrator, only 6 were actively participating in the project by the time these studies were performed. Below are the lists of main conclusions per participant, using their identification tag given by the Portuguese demonstrator team.

Participant EV4EU-02:

- Oscillating satisfaction towards charger itself, but overall positive outlook. Before the project, they used a Schuko plug, and the shift to a 7.4kW charger accelerated the charging process, which was considered a very positive improvement. They feel their routine stays roughly the same, but there's an increased comfort and trust in the EV's autonomy, since it now reaches maximum state of charge (SoC) more often than before

- There were concerns raised about the algorithm, even though they assume they trust it. Very often, final SoC was not the desired one, and that was creating issues for the participant. Rapid response from the project technical team was an important factor to keep participant engaged in the project.

- Noted that EV autonomy seemed to decrease, with 100% of SoC yielding less driving range than before. In the interview, did not seem very concerned, since they are aware this autonomy calculation can depend on a plethora of factors, but still noted that it is a factor to look out for, mainly due to battery degradation issues. It was even mentioned that the charging routine changed for a while in that autonomy decrease, charging every 2 days, instead of every 3 days.

- Very positive towards Living Energy platform, mentioning having it "always open at work". Assumes that they can draw a lot of useful information from the platform, and even wishes to have more domestic equipment connected to it.

- V2X seems like an interesting topic, that they learned about through the EV4EU project, but it raises questions for its practicality. They seem very aware of grid benefits, but personally seems like a risk for their mobility needs, so they would not consider it for now.

Participant EV4EU-03:

- This participant was not interviewed (study ID#05), due to lack of response from their side, and answers to studies ID#03 and ID#04 were less consistent than other participants. This means there is less data to analyse from this person.

- For the first months analysed, the participant was extremely dissatisfied with their demonstrator experience, even though their perception is that the new charger is considerably better than their previous alternative (they had a Schuko plug and now have a 7.4kW charger).

- Confusing answers regarding the Living Energy platform, ranging from both extremes of the scale, with comment stating lack of opportunity to correctly analyse it, which might mean that data was not being correctly displayed.

Participant EV4EU-04:

- This participant was not interviewed (study ID#05), due to unforeseen personal reasons from their side, and there was no possibility of interviewing them in time for this analysis. The interview is planned to happen in time to be included in Deliverable 6.2 – *Engagement Activities*, linked to the Portuguese demonstrator results. Results shown here are solely related to data collected with studies ID#03, ID#04 and ID#06.

- Satisfaction with the charger seemed to improve by the end of the analysed months, although the algorithm usage appears to have been limited, with a lot of “wating for a fix” periods. Dissatisfaction towards the algorithm appears related to these unresolved issues. This participant has higher expectations than other towards the accuracy of the algorithm, since their mobility needs are considerably higher than the rest.

- Appears neutral towards Living Energy, with uncertainty if they actually used it.

- No changes in their opinion towards EVs and V2X, stating prior knowledge and uncertainty related to lack of further studies about battery degradation in V2X scenarios.

Participants EV4EU-05:

- This participant is consistently satisfied with the charger installed, since they had a Schuko plug before, and now they see this charger as a more powerful and easier way to parameterize charges.

- When looking at the algorithm developed, it was mostly not used by this participant, since they prefer to charge only when they deem it necessary, and to be able to control time and power manually. When that control is not available, the participant even assumed returning to the old method (using the Schuko plug), since that way they are 100% certain of limits they established being assured by the vehicle (they are very adamant in assuring 80% battery SoC is not exceeded).

- Lost some trust in the Living Energy platform, since the few times they checked it, data was not being shown properly (due to lack of correct communication with the server). They assumed being curious about the values shown there, but not concerned since monthly electricity bills stayed consistent, and thus did not raise any red flags to check for with the platform.

- The project did not bring any new learnings or changes in opinion towards EVs and V2X. Stays very positive regarding EVs, and very uncertain about V2X implementation. Even though it is an interesting concept, a lot of questions are raised when looking at battery degradation and economic compensations, which appear as strong barriers to this participant for now.

Participants EV4EU-06:

- This participant already had a 7.4 kW charger at home, so no changes in their installation were needed for the project, the main shift being the integration of the project algorithm, and the use of the Living Energy platform.

- For this person, satisfaction with the charger stayed high throughout, but the algorithm experience had recurring issues of exceeding desired SoC limits and inconsistent results. This inconsistency resulted in very frustrating periods of almost ending their participation in the project.

- Living Energy platform was never working when they checked (due to lack of correct communication with the server), so no real feedback is provided by them.

- No changes towards EVs and V2X, only noting more awareness to charging management. Sees V2X as beneficial at scale, but would not use personally now because their mobility routine does not match service needs.

Participants EV4EU-07:

- This participant already had a 7.4kW charger at home, so no changes in their installation were needed for the project, the main shift being the integration of the project algorithm, and the use of the Living Energy platform.

- Satisfaction with demonstrator experience seems to oscillate, with a lot of problems reported, their solution being to turn off the algorithm control to assure the desired outcomes. They mentioned times when they had to find alternative mobility means, since their EV did not have enough charge for the day, which raised reliability and trust concerns.

- Living Energy platform was extremely useful for this participant, that reported having changed some domestic habits based on consumption diagrams seen on the platform, to optimise their electricity consumption.

- Stayed with a positive opinion towards EVs, reporting new learnings in smart charging benefits and electricity consumption management. V2G was an already known concept, that can bring a lot of benefits, citing grid support, peak consumption reduction and potential monetary gains, but not enough to justify buying a new EV until they need to replace the current one.

Overall, having these chargers installed at home seem to provide a consistently high satisfaction across participants. Nonetheless, this perception changes when considering the use of the algorithm

developed, which raised a lot of issues, and participants even had to stop using it to assure their charging needs were met.

The use of the Living Energy platform was seen as positive for those able to use it, although some participants assumed they did not check it regularly, because the few times they did, it was not working (due to connectivity issues in the demonstrator).

Perceptions towards EVs are largely unchanged after experiences with the demonstrator, with a few mentioning having learned more about smart charging and battery management. V2X was a concept already familiar to most, with positive opinions about system-level potential, but a lot of resistance in adopting it for now, due to uncertain user value for now (economic factors seem intangible), as well as battery health concerns.

3.5 Results from Slovenian demo

According to D7.1 [3], in Slovenia, the practical demonstration takes place at two of GEN-I's office buildings, one in Krško and one in Ljubljana. Both sites have EV chargers installed, for the employees to use daily. Use cases tested are related to virtual power plants (VPPs), among other flexibility topics.

To evaluate experience in the Slovenian demonstrator, only study ID#05[17] (interviews with demo participants) was applied. Four interviews were done, with participants between 25 and 50 years old. All were done in-person, with GEN-I employees that had direct daily access to the demonstrator in Ljubljana (since the chargers installed are on their designated parking spots) and that had varying levels of personal experience with EVs and charging infrastructure. These participants from the Ljubljana demonstration location were selected due to the fact that charging station in Ljubljana were integrated into the system earlier than the ones in Krško.

All seem very positive towards EVs, both from the individual usage perspective, as the overall benefits for the system and sustainability aspects. All participants used the demonstrator regularly, either on a daily basis, or around 2 to 3 times a week. All report being unsure with the first use, but as time goes by, they become more familiar with the process, and implemented improvements have also made the experience smoother. One participant reported a few issues with delays starting the session, which sometimes can be a problem for them (they rely on a full battery for their daily commute), but overall mentions a positive experience.

Using the demonstrator reinforced their positive outlooks on EVs, also providing more confidence with their charging routines. They mention being more trusting of the infrastructure, and more awareness in what planning charges can benefit them, as well as technical information that can affect charging performance. The main benefit drawn from participating was, as mentioned by all, the convenience of charging at work, without the hassle to find an available charger or make an extra stop in their routines. Most gave a score of 6 or 7 (out of 7) to the demonstrator, with one exception, that mentioned a 3.5

[17] The script for this study was the same across demonstrator sites, apart from private households. For interviews with Slovenian demo participants, the script from SEL was used by a project partner at GEN-I. These interviews occurred in-person, between 7th July 2025 and 28th August 2025.

rating from the user perspective, but a 7 regarding the technical point of view. This was the user that relied on a full battery for their commute, and the occasional issues were very frustrating for them.

All participants were familiar with and excited about V2X, although one was less aware of technical details. All mention key benefits like grid stabilization, economic gains, energy efficiency and greater renewable integration. Some also noted contributing to local energy communities and adding smartness to traffic systems as advantages of widespread use of V2X. Nonetheless, when asked about possible barriers or concerns, participants mention four main topics: the need for standardized communication protocols (so that an interconnected system is actually possible), cybersecurity and data privacy issues (since a lot more information will be exchanged in V2X scenarios), the battery health implications of constant charging and discharging cycles (that would be much more frequent than the current use of EVs without V2X), and the need for user trust in the technology (it needs to be reliable and work seamlessly, otherwise the problems might outweigh the benefits).

Overall, all participants were very enthusiastic about being part of this demonstrator and having the opportunity to test and provide feedback for the development of new technologies in the energy sector. They were patient and supportive of prototype issues and valued the importance of user feedback loops.

4 Conclusions

In this section, overall conclusions and challenges will be addressed, as well as suggestions for next steps and future work in this field.

A summary profile is presented for each country's demonstrator evaluated, considering data sources available. A set of generic suggestions are presented, as strategic recommendations to be applied in the upcoming future of e-mobility in Europe.

4.1 Main conclusions

Results obtained with this work indicate that, across all countries and demonstrators, there is a generally positive perception of electric mobility, even though it is combined with an uneven awareness with related technologies like V2X. Furthermore, there is agreement in persisting barriers related to costs, infrastructure availability and systems' reliability.

From the user perspective, EVs are widely perceived as sustainable, economically advantageous when considering their daily operation, and technologically more advanced. However, initial purchasing costs and concerns regarding autonomy and battery longevity remain major adoption barriers. When looking at countries' profiles, Danish and Slovenian participants seem to express stronger environmental and innovation-driven motivations, whereas Greek and Portuguese ones focus more on financial aspects, mainly related to purchase and charging costs.

Home charging is clearly preferred by all, due to price and convenience motivations, and public charging is seen as the acceptable alternative when home charging is not available. Office or workplace charging offer seems limited, and that combined with the fact that some people do not have the possibility to charge at home, that translates into a great barrier for EV adoption.

Across all demonstrators, it was possible to note that participants' satisfaction increased when user-control and system predictability were ensured, by using methods like stable apps, reliable connections, clear SoC tracking, etc. Looking at specific demonstrators' findings, it is possible to note that:

- In Denmark, there was high usage of the Risø site, but much lower usage in Bornholm, related to project researchers' proximity and testing. User feedback was optional, which lowered considerably the amount of user experience information collected.

- Greece had a demonstrator's limited deployment so far, which made user feedback impossible, but contextual survey showed main concern is related with charging infrastructure availability.

- There are mixed satisfaction levels in the Portuguese demonstrator, with home participants appreciating faster home charging and Living Energy platform access, and EDA and LREC participants remarking positive impacts in additional charging points and EV driving experiences. Nevertheless, algorithm instability and connectivity issues reduced participants' trust in the system in EDA and at participants' homes.

- Slovenian participants show strong enthusiasm and high literacy in energy concepts, being very favourable to V2X systems, though concerns about cybersecurity, standardisation and battery health persist.

Regarding V2X knowledge, demonstrators' participants were mostly aware of it, contrary to the tendency noted in the contextual survey, which shows a prior aptitude for technology testing and exploring than most. The ones that were not familiar with the concept, once informed, associated it mainly with energy savings, renewables integration, grid support and home power backup, but battery degradation and data security are common concerns among all. Acceptance of e-mobility technologies seems to increase when user control and transparent compensation schemes are in place.

4.2 Main challenges

Some challenges were met during the research phase of this work, which in some instances compromised data availability and sample confidence. Issues were related with:

- Technical and operational barriers: instabilities in communication protocols, unreliable charging sessions and data transfer issues reduced trust and engagement in some instances. Also, algorithms and platforms used needed stronger validation with real users.
- User feedback in demonstrator sites: feedback collection was limited when app interaction was not mandatory, which reduced the amount of data collected.
- Cross-demonstrator harmonisation: differences in testing methos, sample sizes, data collection timing and communication channels complicated cross-country comparison.

4.3 Next steps and future work

To complete the information available in this report, Greek interviews and Portuguese survey datasets need to be collected, which is expected to be reported in D8.6 and D6.4 respectively. Also, integrating these findings with technical datasets like charger telemetry (energy delivered, session duration, etc.) can provide further insights into demonstrators' experience. This data will be available in each demonstrators' results deliverable.

From the conclusions drawn in this work so far, it is possible to note that some key issues need to be addressed in the future:

- Further enhance user interfaces (whether physical or digital), including clear indicators and optimisation decisions to increase system transparency, and therefore foster trust.
- Strengthen user education in e-mobility topics, namely V2X, addressing concerns on battery degradation and privacy.
- Create local policy-oriented guidance for urban-planning, as well as European level recommendations for e-mobility incentives and smart-charging standardization.

It is also important to reinforce the importance of social studies with the population, since their adoption of new technologies and business models greatly depends on understanding and accepting changes to certain habits or behaviours, and that shift needs to be understood and considered to improve new products and services. With the work developed on task 3.1, participants showed interest in contributing to creating and understanding new ways of dealing with EV charging, and being

included in the discussion made them visibly more accepting of possible changes in their routines, because they now understood the reasons better, and were even allowed to contribute and share opinions and suggestions on how to improve the technology and services implemented.

5 References

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APPENDIX A: Societal Context Survey - Results

The Societal Context Survey study was launched using the Qualtrics[18] platform. Results were collected between March 10th and September 3rd of 2025, with quotas defined for each country, allowing only for a maximum of 250 answers per country of residence of the participant, if that country was one of the four participating in the project (Denmark, Greece, Portugal and Slovenia). A maximum quota of 250 responses was set for participants from all countries other than the four selected.

The survey was shared through different platforms and methodologies, including:

- Sharing within employees of project partners, through internal newsletters or communication channels available
- Include in public newsletters of project partners
- Send requests to companies' client bases
- Request participation during national and international fairs, conferences and exhibitions where project partners were present
- Sharing in both the projects' and researchers' personal social media channels

Although these were the possible sharing methods, the team is aware they might have some influence in answers obtained, since there's no even distribution in vehicle ownership, education levels, ages, genders, and other demographic characteristics.

In total, 802 valid answers were collected, which gives the study an overall 99% confidence level, and a 4.46% margin of error[19]. Values for data collected from each country vary as such:

- Denmark: total of 154 answers, which translates into 95% confidence level and 7.87% margin of error
- Greece: total of 141 answers, which translates into 95% confidence level and 8.22% margin of error
- Portugal: total of 220 answers, which translates into 95% confidence level and 6.57% margin of error
- Slovenia: total of 250 answers, which translates into 95% confidence level and 6.16% margin of error

Processed results are shown below, with charts and tables produced by the Qualtrics platform.

[18] https://www.qualtrics.com/
[19] Values for confidence level and margin of error calculated using the Raosoft Sample Size Calculator: http://www.raosoft.com/samplesize.html

Demographics

Information collected:

- Residence country
- Gender
- Age
- Level of education
- Type of home location (urban, city outskirts, rural or other)

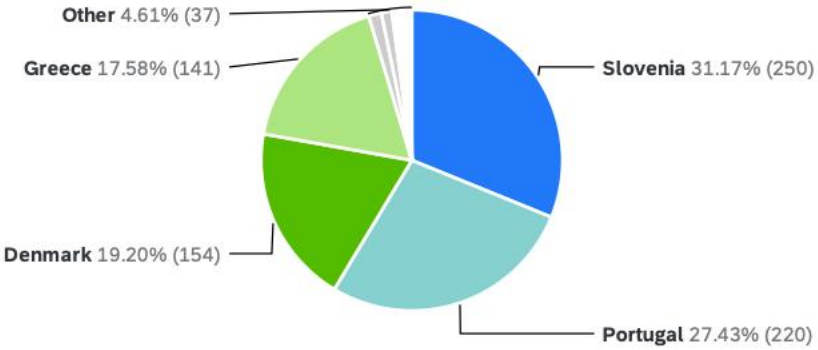

Figure 3: Distribution of answers per country

Other participants were from following countries and global regions:

- Bosnia and Herzegovina – 11 participants
- South America – 9 participants
- United Kingdom – 3 participants
- Belgium – 2 participants
- Finland – 2 participants
- Africa – 1 participant
- Oceania – 1 participant
- Armenia – 1 participant
- Azerbaijan – 1 participant
- Croatia – 1 participant
- Germany – 1 participant
- Netherlands – 1 participant
- Spain – 1 participant
- Sweden – 1 participant
- Switzerland – 1 participant

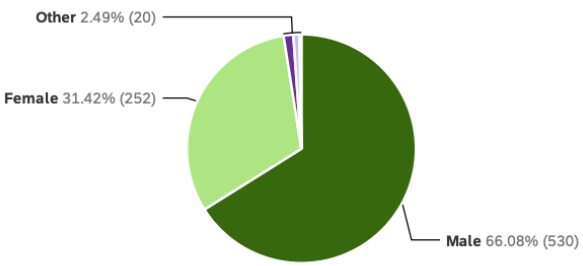

Figure 4: Participants' gender distribution

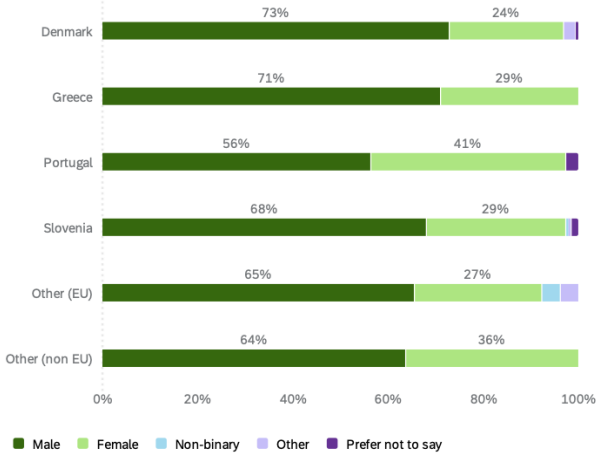

Figure 5: Percentage of participants' gender per country

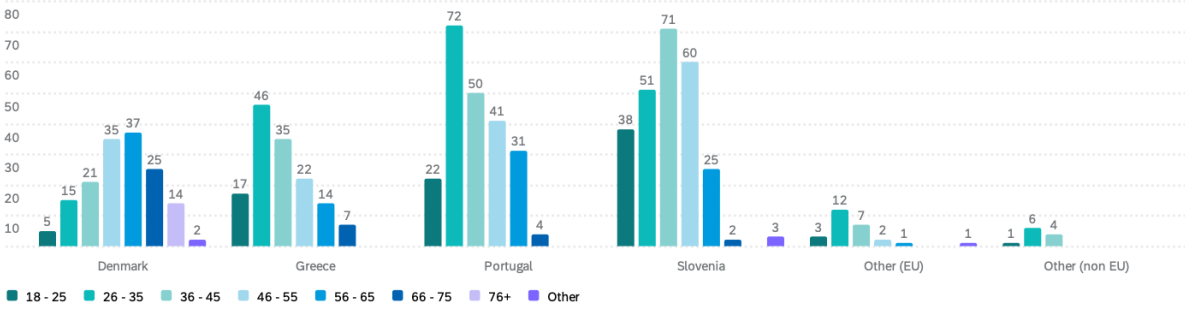

Figure 6: Number of answers in each age group, per country

Average ages:

- Overall: 43 years old
- Denmark: 54 years old
- Greece: 40 years old
- Portugal: 41 years old
- Slovenia: 40 years old

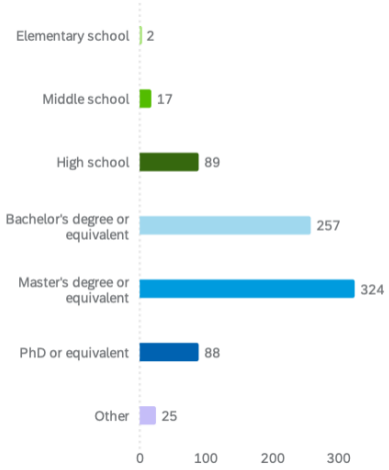

Figure 7: Number of answers for participants' education level

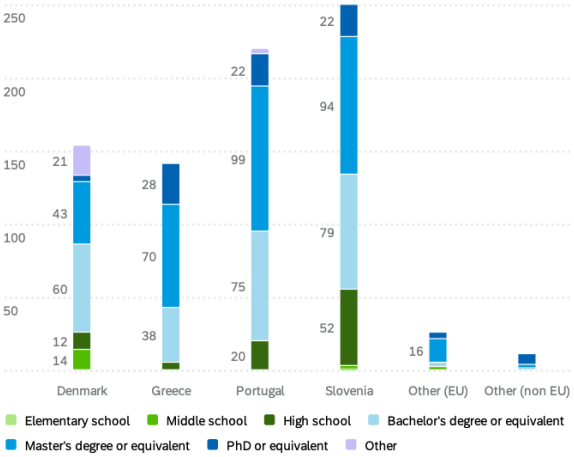

Figure 8: Number of answers for participants' education level, per country

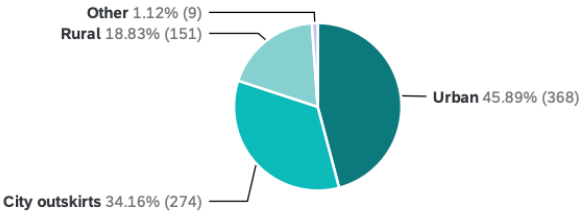

Figure 9: Number of answers for participants' home location type

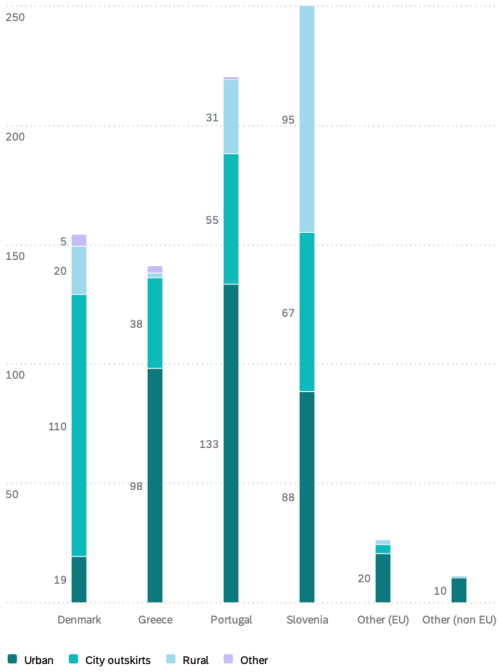

Figure 10: Number of answers for participants' home location type, per country

Vehicle Ownership Characterization & Mobility Habits

Information collected:

- Home parking arrangements

- Vehicles owned
- Type of vehicle ownership (private, company car, leasing or other)
- Other transportation means used
- Purposes for using other transportation means

Options presented for home parking arrangements:

- "I have a private parking place, where I have (or could have) a private charger for an electric vehicle"
- "I have a private parking space in a shared garage, and I need permission from the condominium to have a charger for an electric vehicle"
- "There's a zone reserved for cars in my building, but no reserved spaces for each person"
- "There's no reserved parking area near my home, I have to park on the street."
- "Other:" (with request to describe other arrangements)

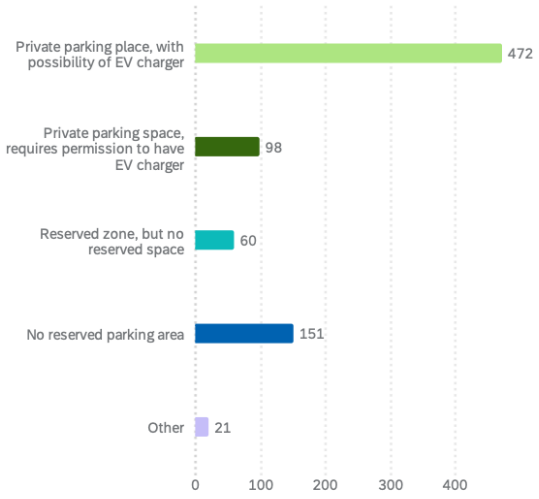

Figure 11: Number of answers for participants' home parking arrangements

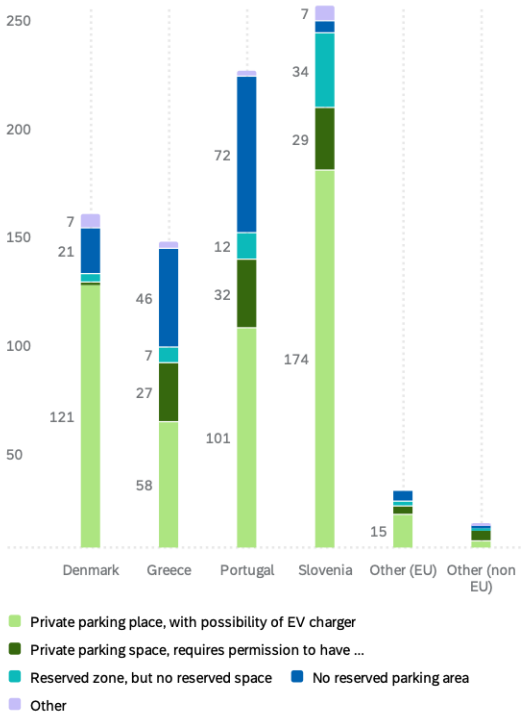

Figure 12: Number of answers for participants' home parking arrangements, per country

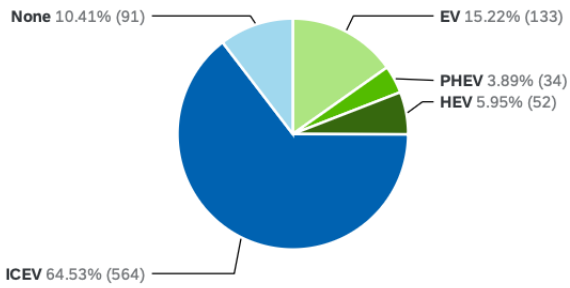

Figure 13: Number of answers for participants' type of owned vehicles

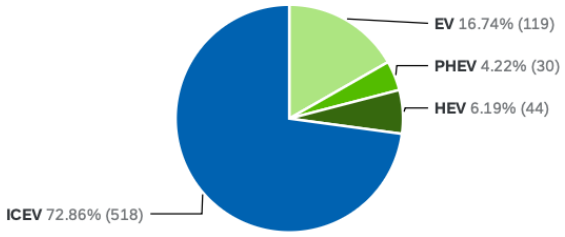

Figure 14: Number of answers for participants' type of most used vehicle

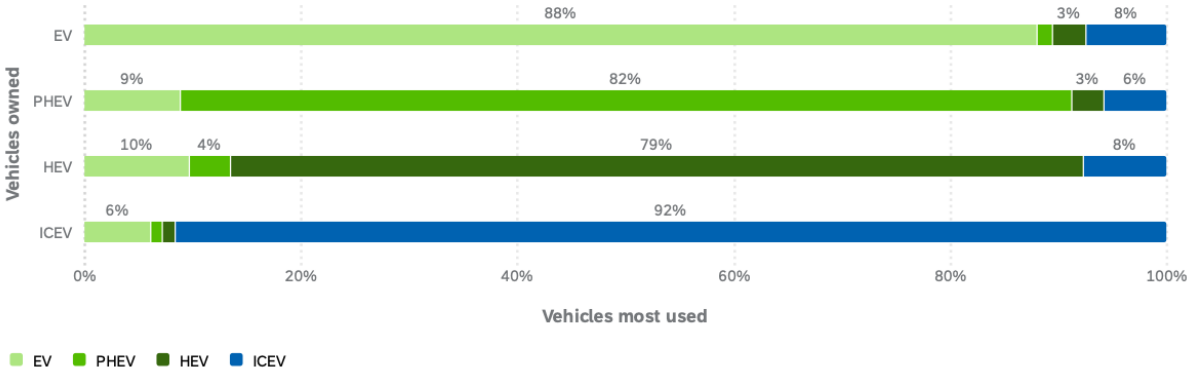

Figure 15: Relation between participants' vehicles owned, and most used one

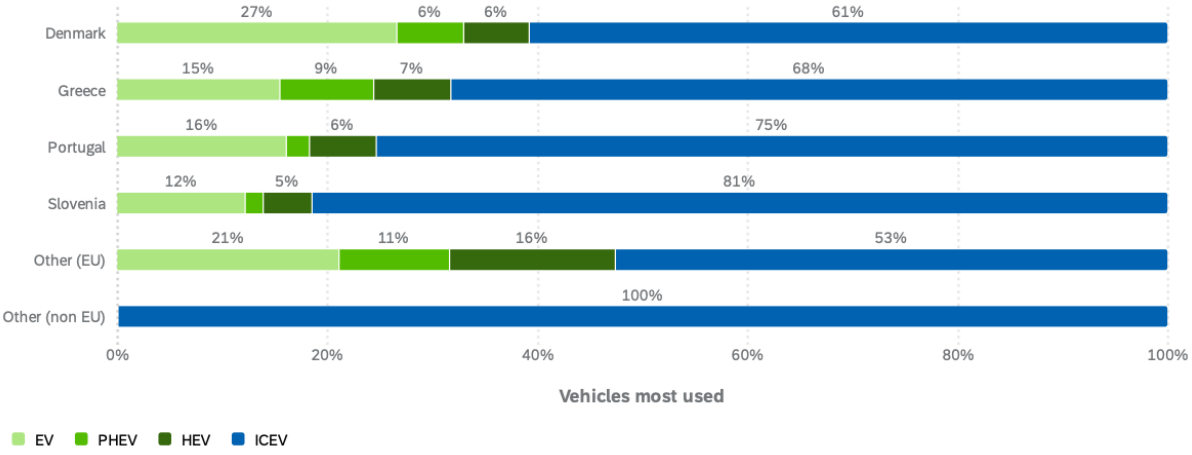

Figure 16: Percentage of participants' type of most used vehicle, by country

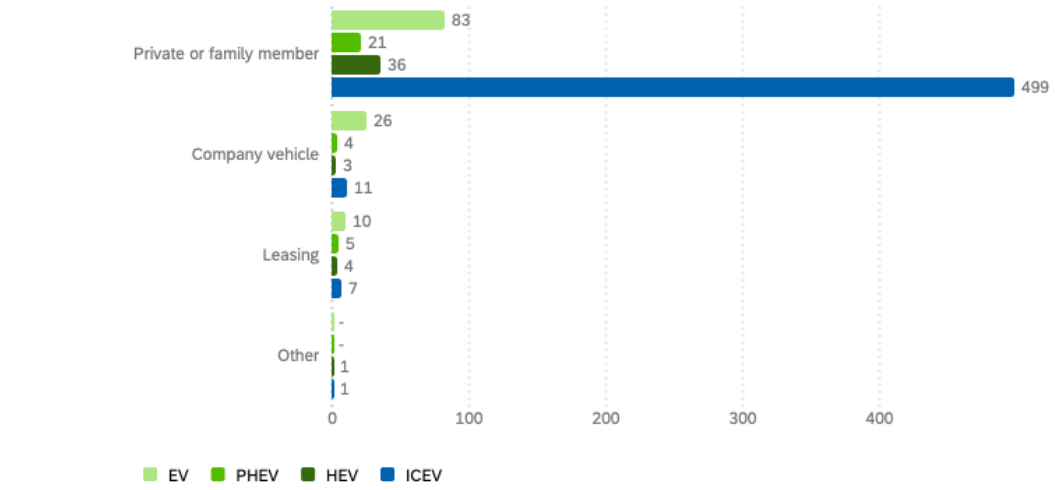

Figure 17: Number of participants' most used vehicles ownership model, by vehicle type

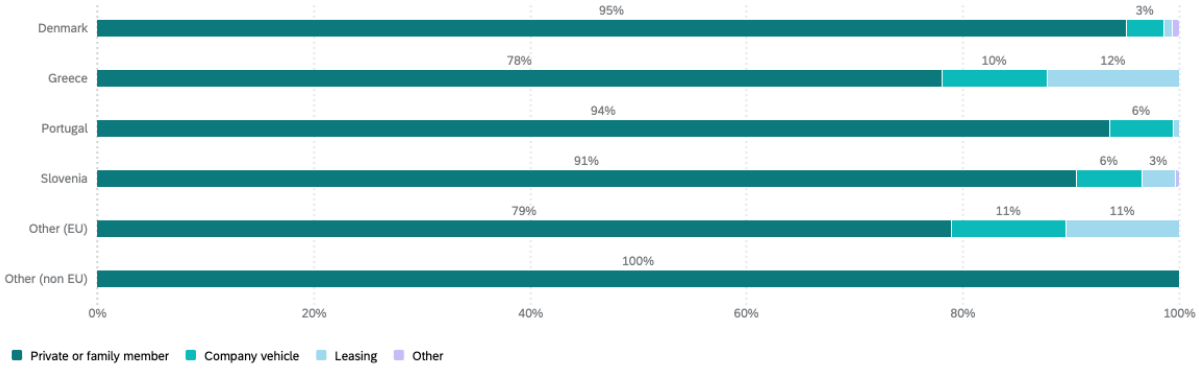

Figure 18: Percentage of participants' most used vehicles ownership model, by country

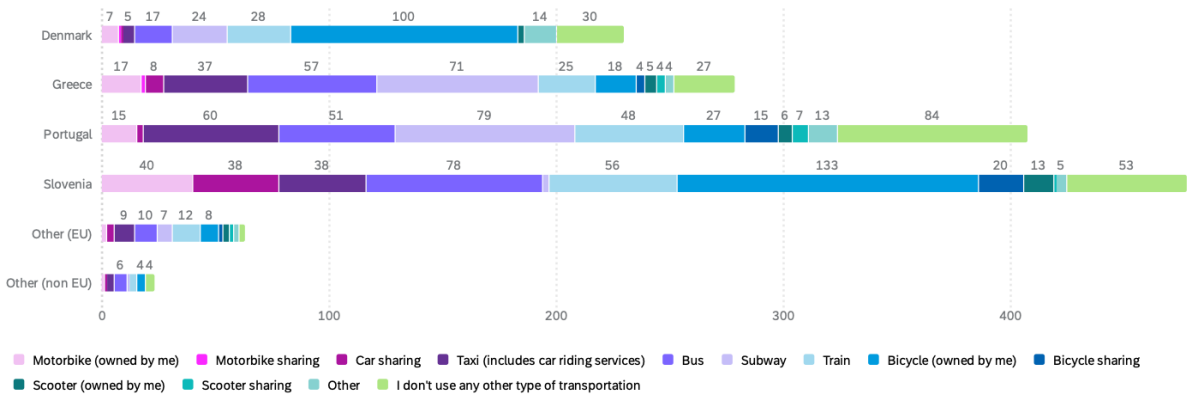

Figure 19: Number of participants' alternative transportation means besides car, by country

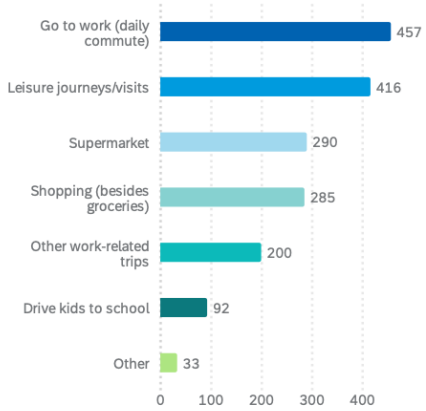

Figure 20: Number of participants' purpose for using alternative transportation means besides car

Perceptions about EVs

Information collected:

- Opinions regarding EVs, when compared to ICEVs
- Importance of EV ownership incentives
- Reasons to have an EV

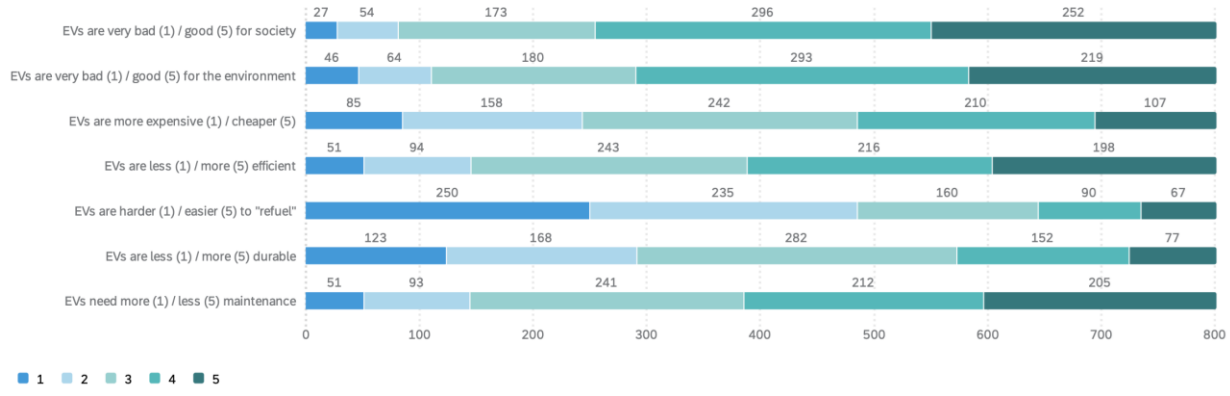

Figure 21: Number of answers for participants' opinions about EVs, compared to ICEVs

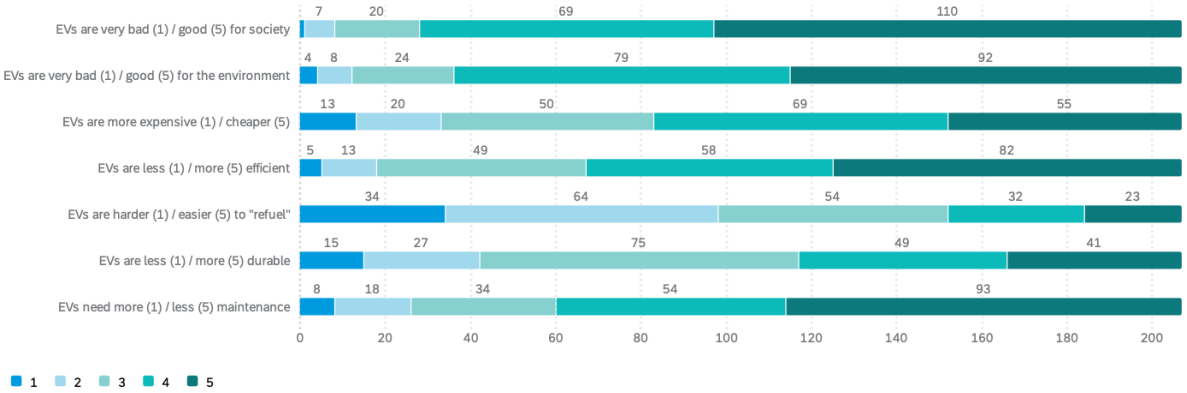

Figure 22: Number of answers for EV/PHEV/HEV owner participants' opinions about EVs, compared to ICEVs

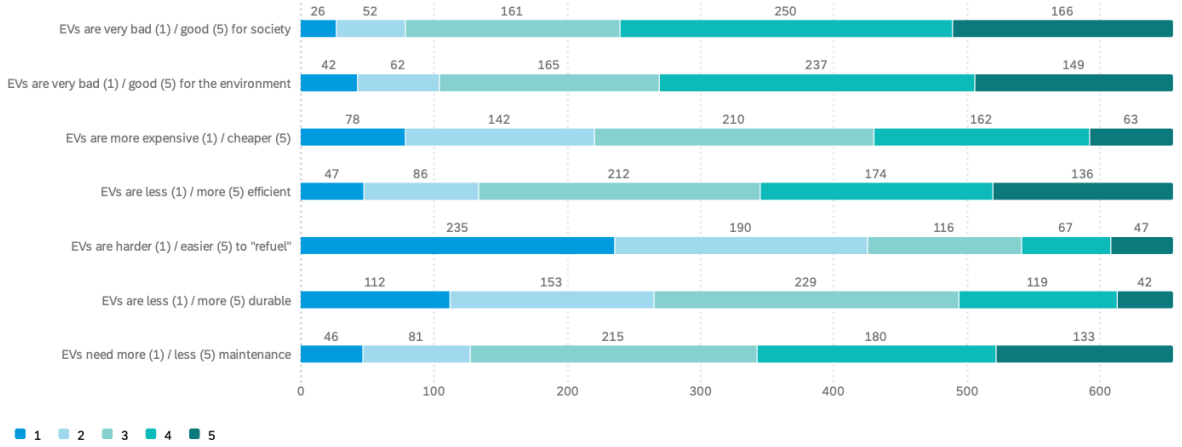

Figure 23: Number of answers for non-EV/PHEV/HEV owner participants' opinions about EVs, compared to ICEVs

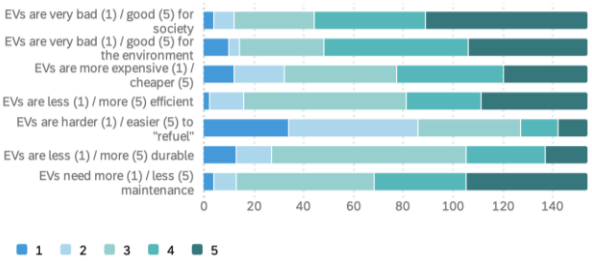

Figure 24: Number of answers for Denmark participants' opinions about EVs, compared to ICEVs

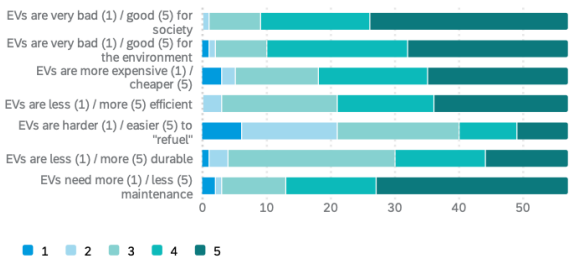

Figure 25: Number of answers for Denmark EV/PHEV/HEV owner participants' opinions about EVs, compared to ICEVs

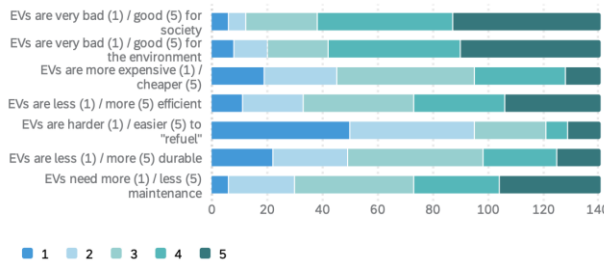

Figure 26: Number of answers for Greece participants' opinions about EVs, compared to ICEVs

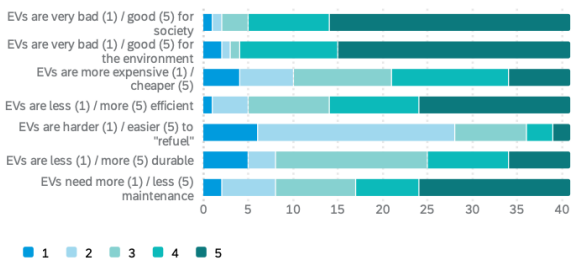

Figure 27: Number of answers for Greece EV/PHEV/HEV owner participants' opinions about EVs, compared to ICEVs

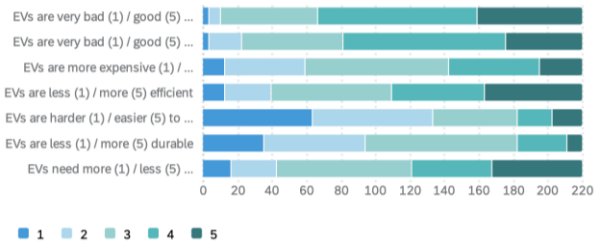

Figure 28: Number of answers for Portugal participants' opinions about EVs, compared to ICEVs

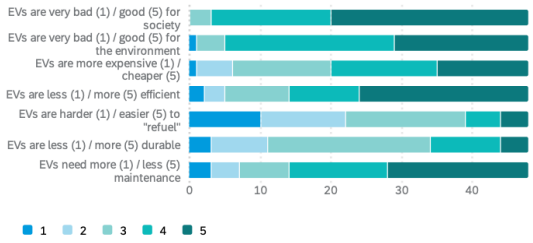

Figure 29: Number of answers for Portugal EV/PHEV/HEV owner participants' opinions about EVs, compared to ICEVs

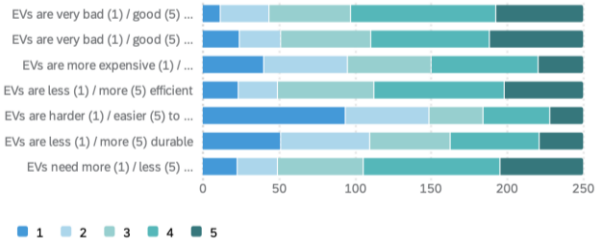

Figure 30: Number of answers for Slovenia participants' opinions about EVs, compared to ICEVs

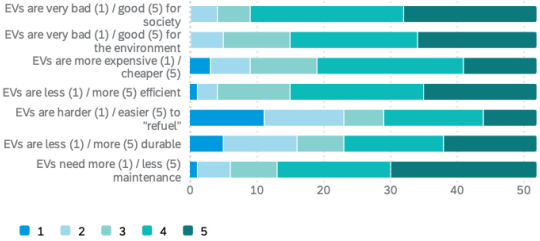

Figure 31: Number of answers for Slovenia EV/PHEV/HEV owner participants' opinions about EVs, compared to ICEVs

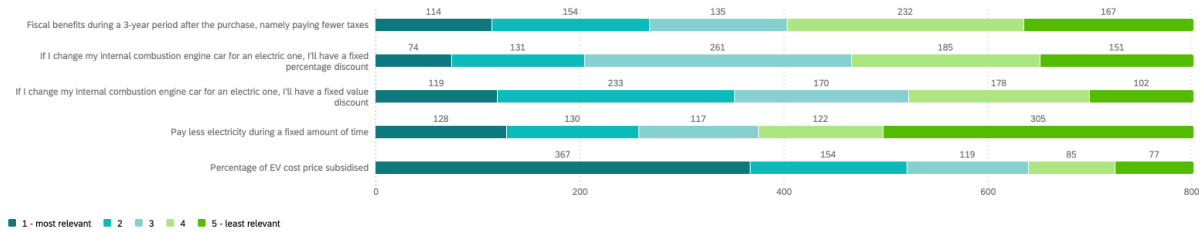

Figure 32: Number of answers for participants' preferences in incentives for buying EVs

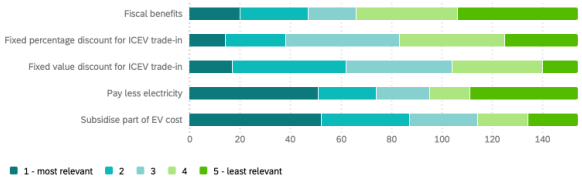

Figure 33: Number of answers for Denmark participants' preferences in incentives for buying EVs

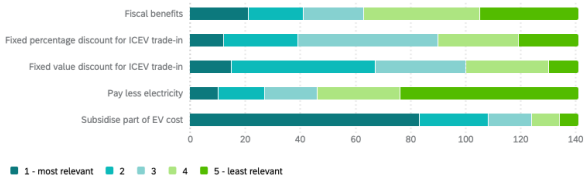

Figure 34: Number of answers for Greece participants' preferences in incentives for buying EVs

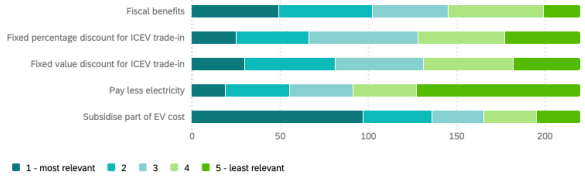

Figure 35: Number of answers for Portugal participants' preferences in incentives for buying EVs

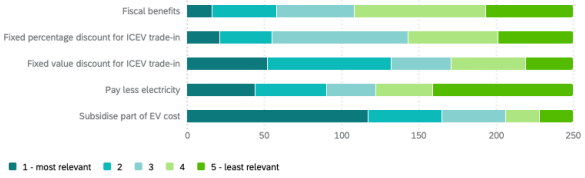

Figure 36: Number of answers for Slovenia participants' preferences in incentives for buying EVs

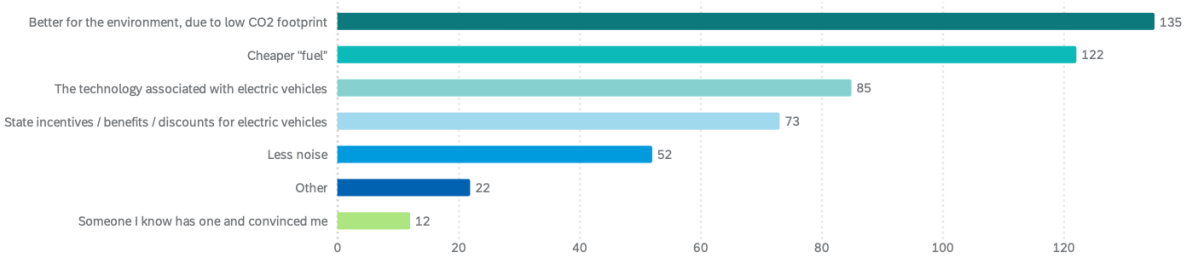

Figure 37: Number of answers for participants' reasons to have an EV (for EV/PHEV/HEV owners)

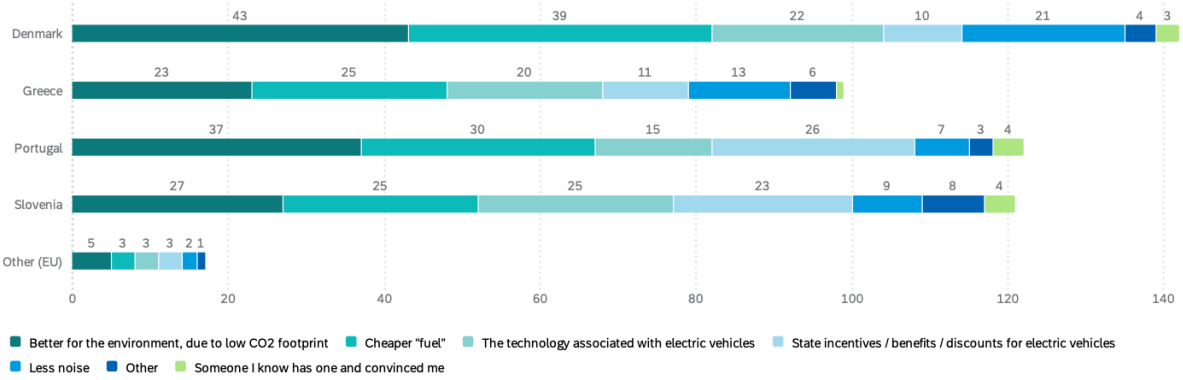

Figure 38: Number of answers for participants' reasons to have an EV (for EV/PHEV/HEV owners), by country

Charging Habits and Preferences (for EV & PHEV owners)

Information collected:

- Charging habits (location and frequence)
- Usage of public charging infrastructure

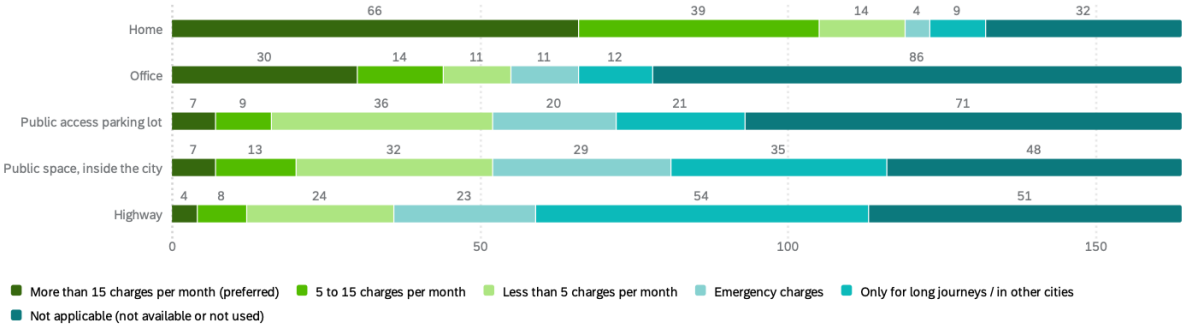

Figure 39: Number of answers for participants' preferences to charge their EV/PHEV (only shown to EV/PHEV owners, 164 in total), by type of charger

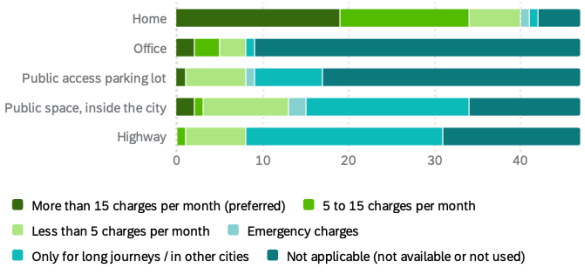

Figure 40: Number of answers for Denmark participants' preferences to charge their EV/PHEV (only shown to EV/PHEV owners, 47 in total), by type of charger

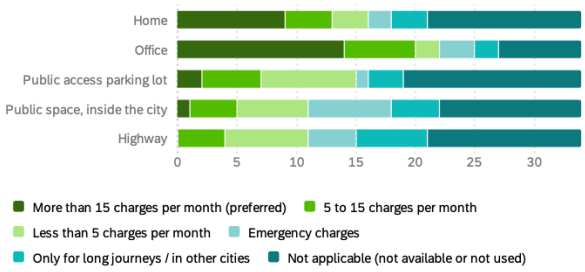

Figure 41: Number of answers for Greece participants' preferences to charge their EV/PHEV (only shown to EV/PHEV owners, 34 in total), by type of charger

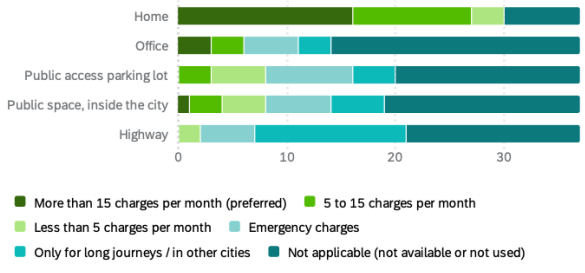

Figure 42: Number of answers for Portugal participants' preferences to charge their EV/PHEV (only shown to EV/PHEV owners, 37 in total), by type of charger

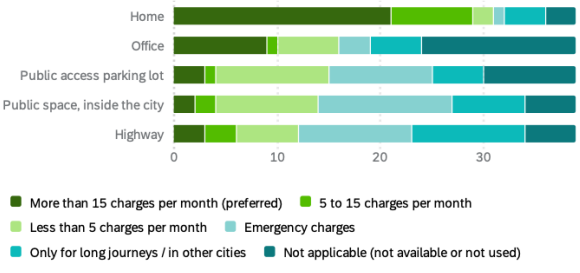

Figure 43: Number of answers for Slovenia participants' preferences to charge their EV/PHEV (only shown to EV/PHEV owners, 39 in total), by type of charger

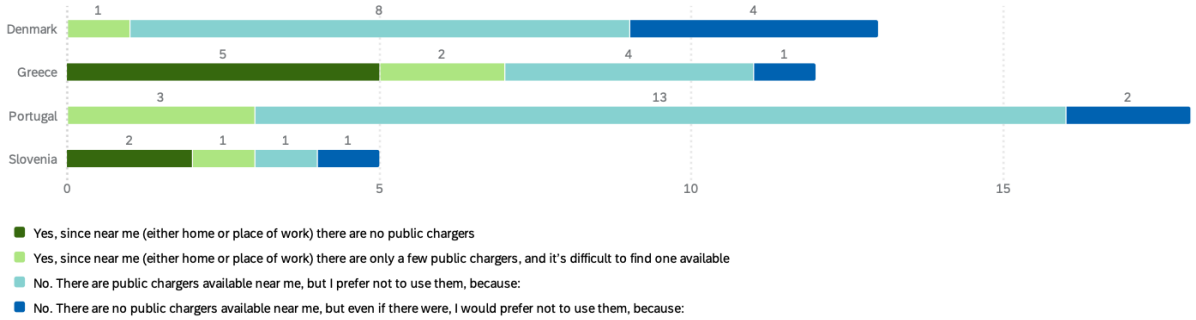

Figure 44: Number of answers for participants' reasons to want / not want to use public chargers (only shown to EV/PHEV owners that answered "Not applicable" for charging in public chargers inside the city, 48 in total), by country

Reasons given when answering (by country):

- *"No. There are public chargers available near me, but I prefer not to use them, because:"*
  - Danish participants: they charge at home, and see public charging as expensive
  - Greek participants: they charge at home, or have free chargers at work
  - Portuguese participants: price per kWh is the most mentioned reason, being cheaper to charge at home when possible, also mentioning low power and reliabilty of public chargers
  - Slovenian participants: they mention it's cheaper to charge at home
- *"No. There are no public chargers available near me, but even if there were, I would prefer not to use them, because:"*
  - Danish participants: they charge at home, mentioning charging "when energy prices are low"
  - Greek participants: they see it as a less convenient and more expensive method
  - Portuguese participants: they charge at home
  - Slovenian participants:they charge at home or at work

Scenarios for Public Charging

Information collected:

- Opinios regarding public charging infrastructure
- Location preferences of public charging infrastructure

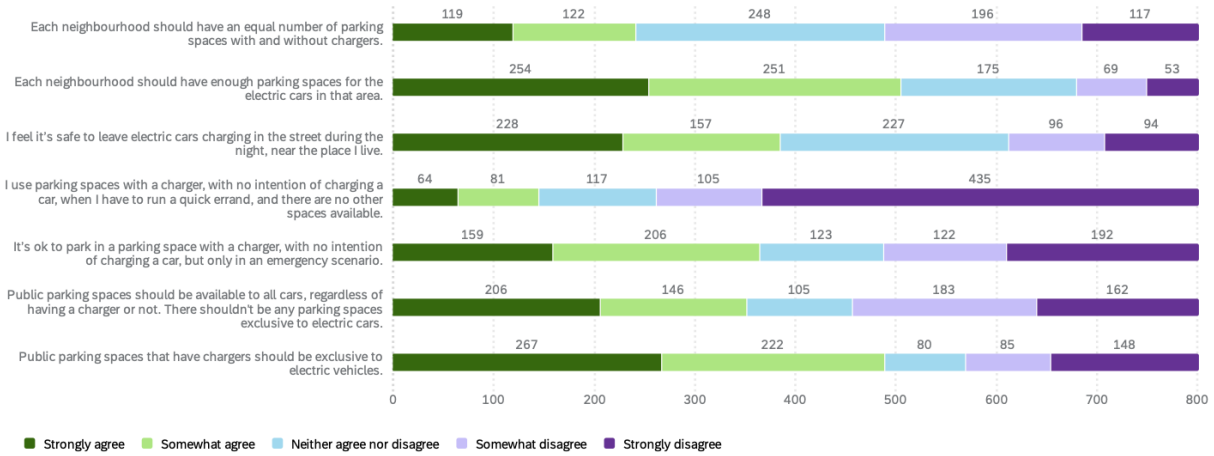

Figure 45: Number of answers for participants' agreement levels regarding different aspects of public charging infrastructure

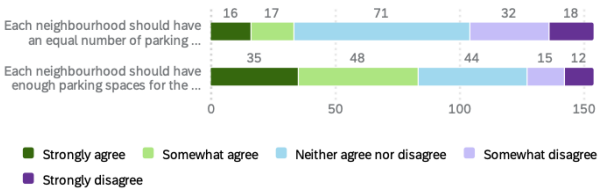

Figure 46: Number of answers for Denmark participants' agreement levels regarding distribution of parking spaces with EV chargers, at the neighbourhood level

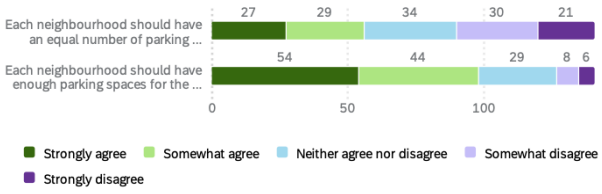

Figure 47: Number of answers for Greece participants' agreement levels regarding distribution of parking spaces with EV chargers, at the neighbourhood level

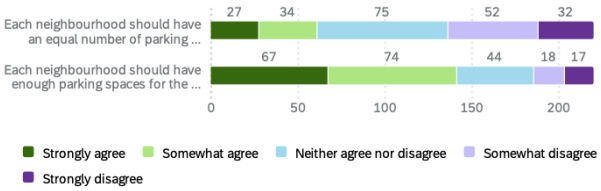

Figure 48: Number of answers for Portugal participants' agreement levels regarding distribution of parking spaces with EV chargers, at the neighbourhood level

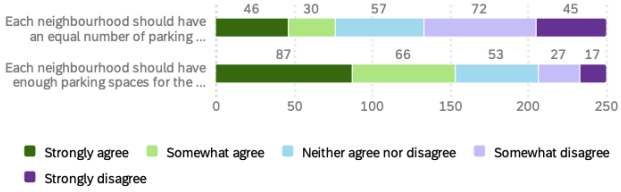

Figure 49: Number of answers for Slovenia participants' agreement levels regarding distribution of parking spaces with EV chargers, at the neighbourhood level

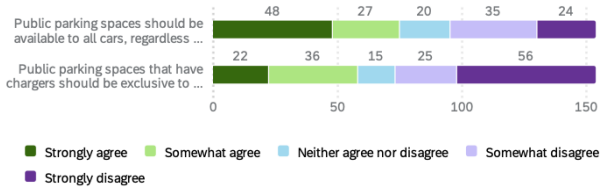

Figure 50: Number of answers for Denmark participants' agreement levels regarding overall usage of parking spaces with EV chargers

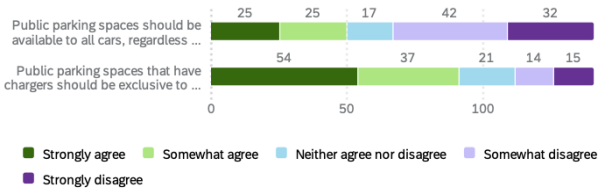

Figure 51: Number of answers for Greece participants' agreement levels regarding overall usage of parking spaces with EV chargers

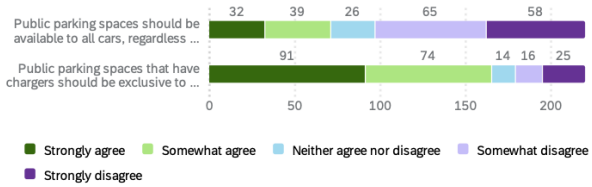

Figure 52: Number of answers for Portugal participants' agreement levels regarding overall usage of parking spaces with EV chargers

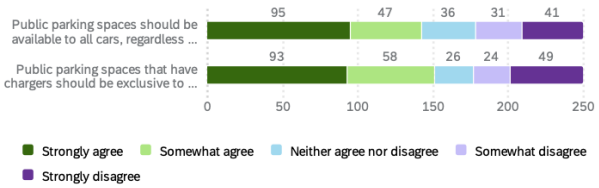

Figure 53: Number of answers for Slovenia participants' agreement levels regarding overall usage of parking spaces with EV chargers

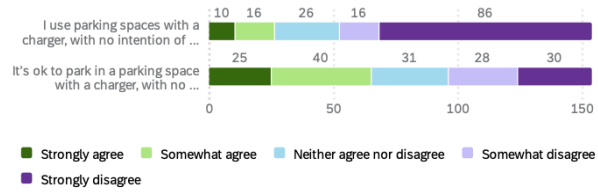

Figure 54: Number of answers for Denmark participants' agreement levels regarding their personal usage of parking spaces with EV chargers

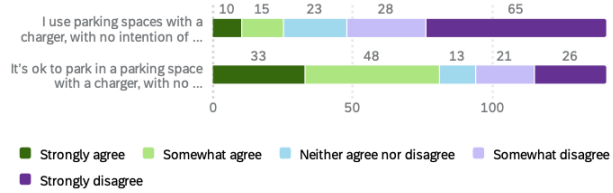

Figure 55: Number of answers for Greece participants' agreement levels regarding their personal usage of parking spaces with EV chargers

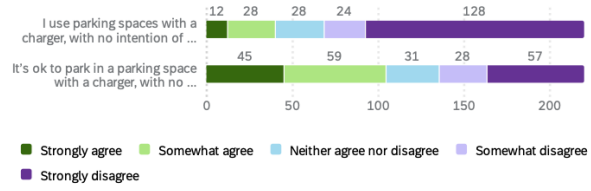

Figure 56: Number of answers for Portugal participants' agreement levels regarding their personal usage of parking spaces with EV chargers

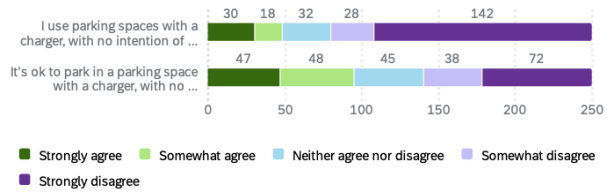

Figure 57: Number of answers for Slovenia participants' agreement levels regarding their personal usage of parking spaces with EV chargers

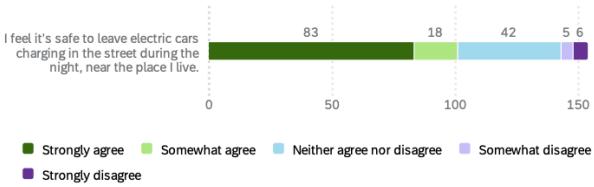

Figure 58: Number of answers for Denmark participants' agreement levels regarding safety of nighttime charging in public parking spaces

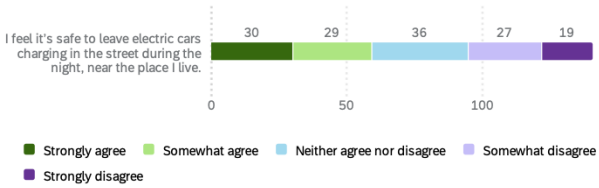

Figure 59: Number of answers for Greece participants' agreement levels regarding safety of nighttime charging in public parking spaces

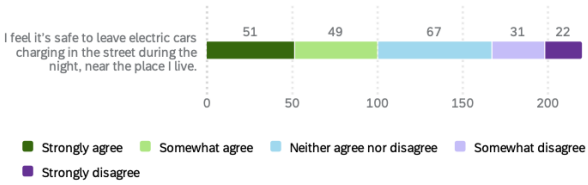

Figure 60: Number of answers for Portugal participants' agreement levels regarding safety of nighttime charging in public parking spaces

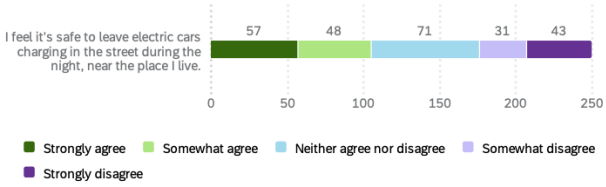

Figure 61: Number of answers for Slovenia participants' agreement levels regarding safety of nighttime charging in public parking spaces

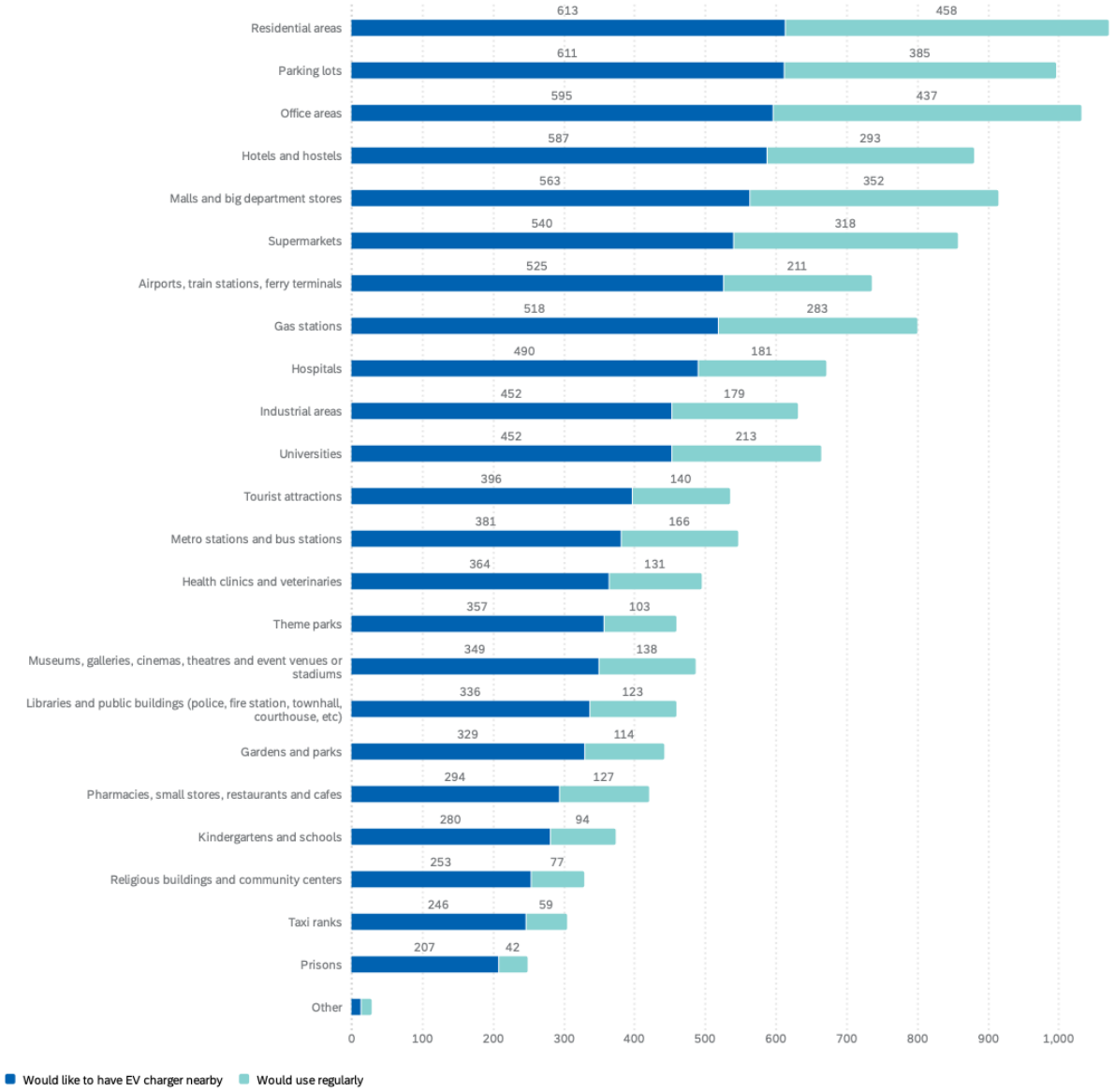

Figure 62: Number of answers for participants' preferences and possible personal usage of public charging infrastructure placement

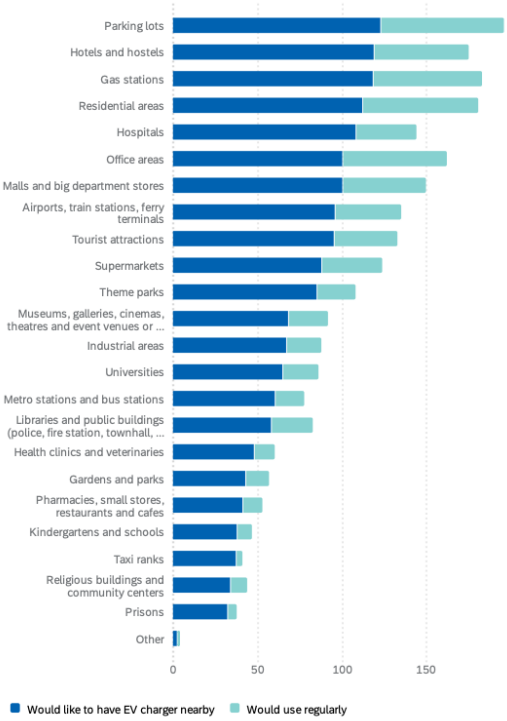

Figure 63: Ranking of answers for Denmark participants' preferences and possible personal usage of public charging infrastructure placement

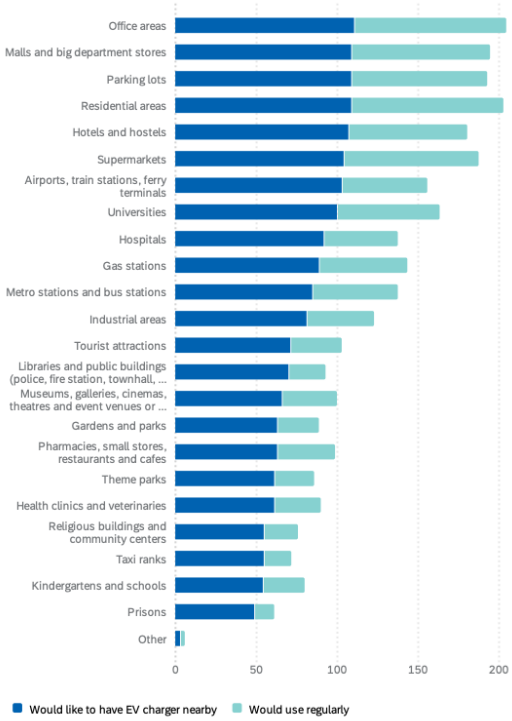

Figure 64: Ranking of answers for Greece participants' preferences and possible personal usage of public charging infrastructure placement

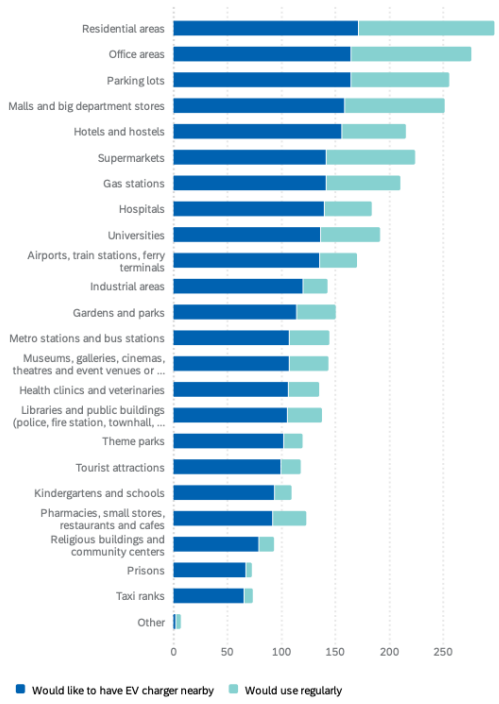

Figure 65: Ranking of answers for Portugal participants' preferences and possible personal usage of public charging infrastructure placement

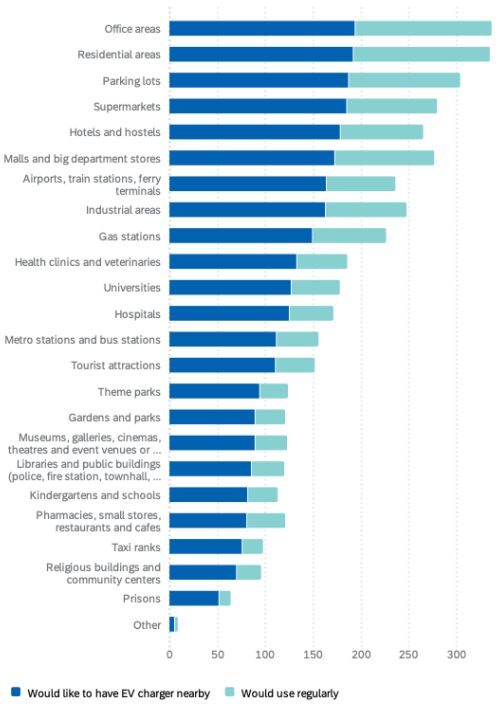

Figure 66: Ranking of answers for Slovenia participants' preferences and possible personal usage of public charging infrastructure placement

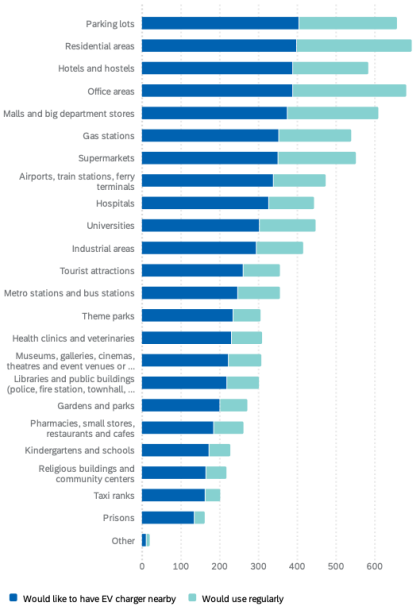

Figure 67: Ranking of answers for male participants' preferences and possible personal usage of public charging infrastructure placement

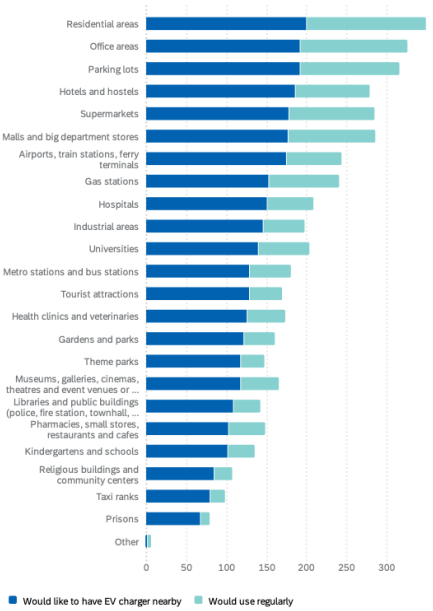

Figure 68: Ranking of answers for female participants' preferences and possible personal usage of public charging infrastructure placement

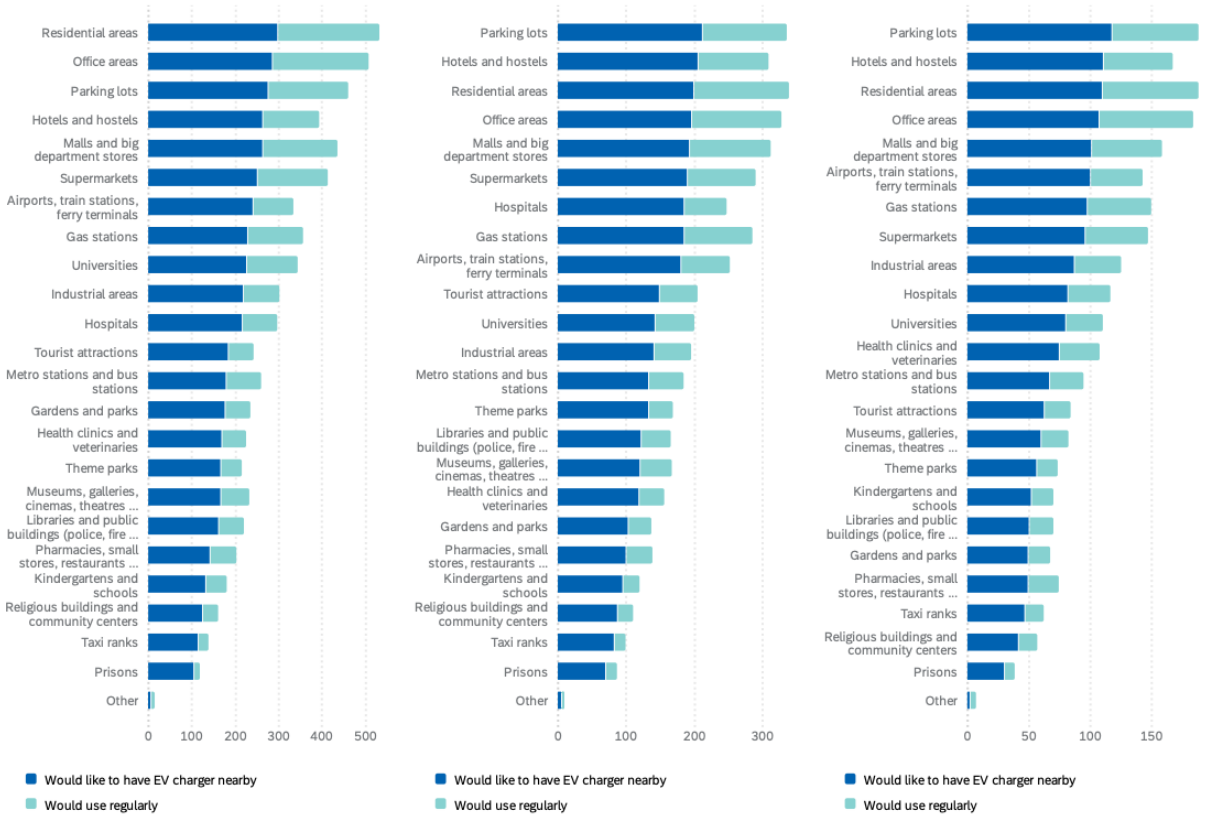

Figure 69: Ranking of answers for participants' preferences and possible personal usage of public charging infrastructure placement, living in different settings. From left to right, people living in urban settings (left), people living in city outskirts (middle), and people living in rural settings (right).

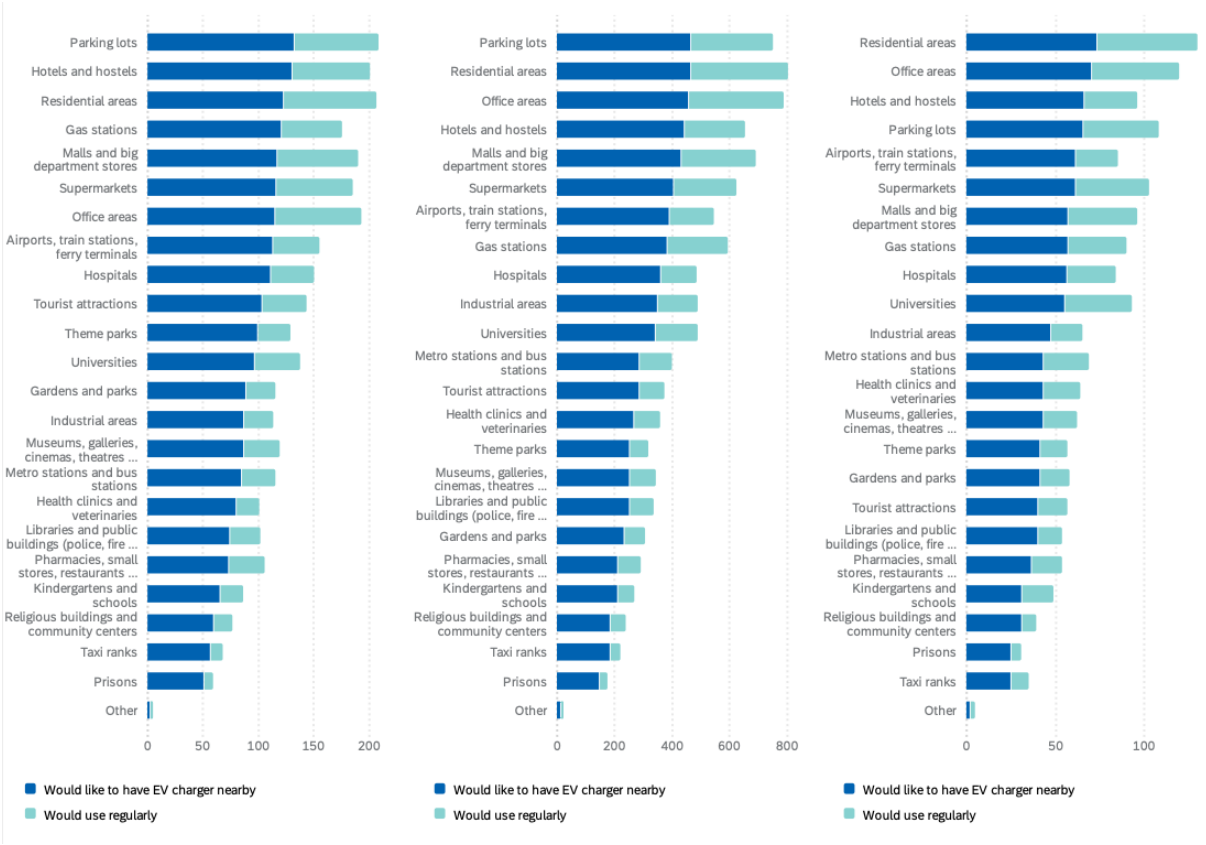

Figure 70: Ranking of answers for participants' preferences and possible personal usage of public charging infrastructure placement, owning different vehicle types. From left to right, people with EV/PHEV (left), people with HEV/ICEV (middle), and people with no vehicle (right).

V2X Knowledge and Expectations

Information collected:

- V2G and/or V2X prior knowledge
- Concerns with widespread V2X usage scenario
- V2X compensation expectations

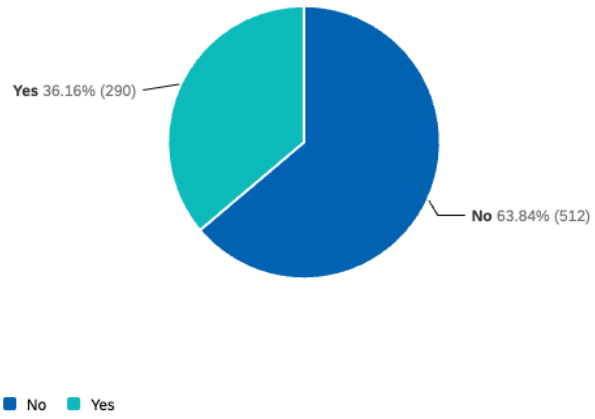

Figure 71: Number of answers of participants' prior knowledge of V2G and V2X concepts

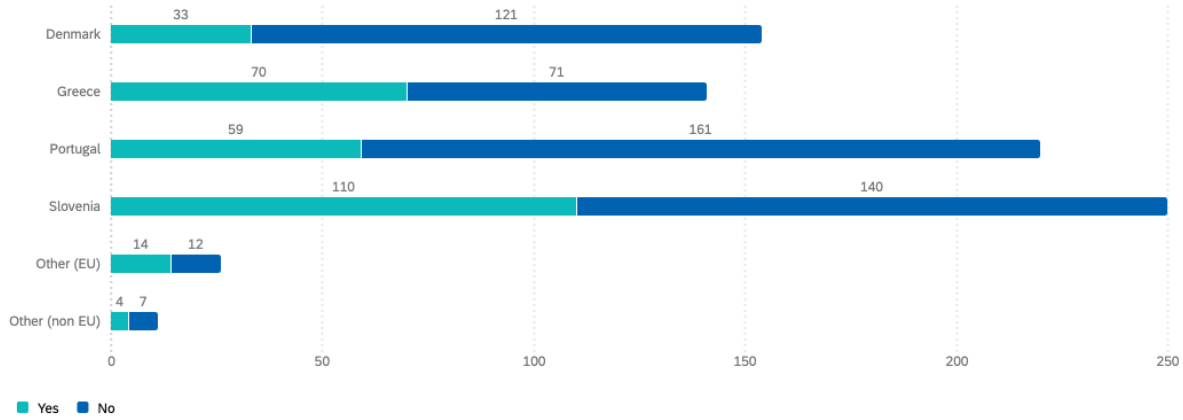

Figure 72: Number of answers of participants' prior knowledge of V2G and V2X concepts, by country

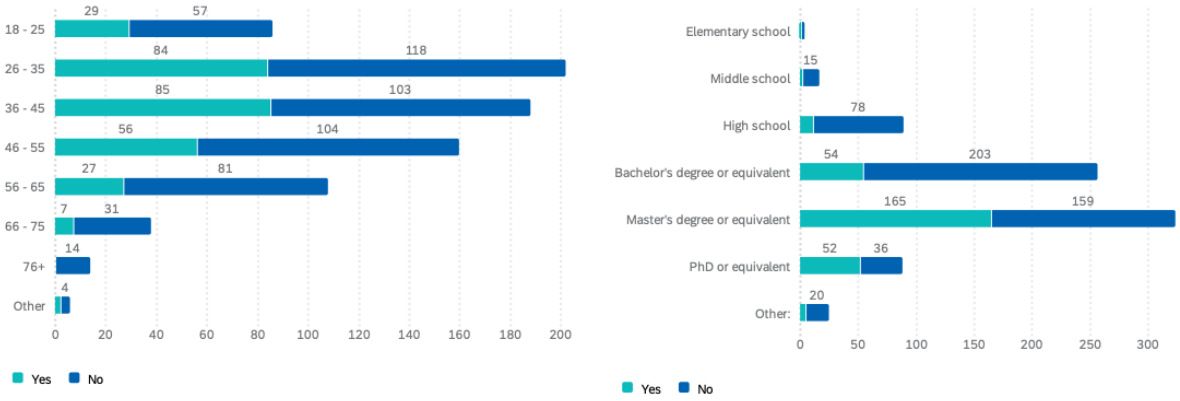

Figure 73: Number of answers of participants' prior knowledge of V2G and V2X concepts, by age group (left) and by education level (right)

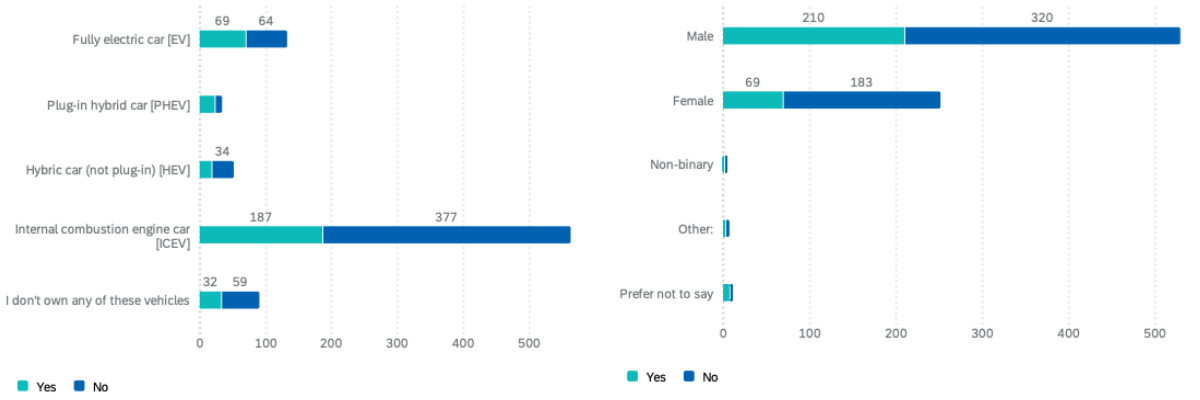

Figure 74: Number of answers of participants' prior knowledge of V2G and V2X concepts, by vehicle owned (left) and by gender (right)

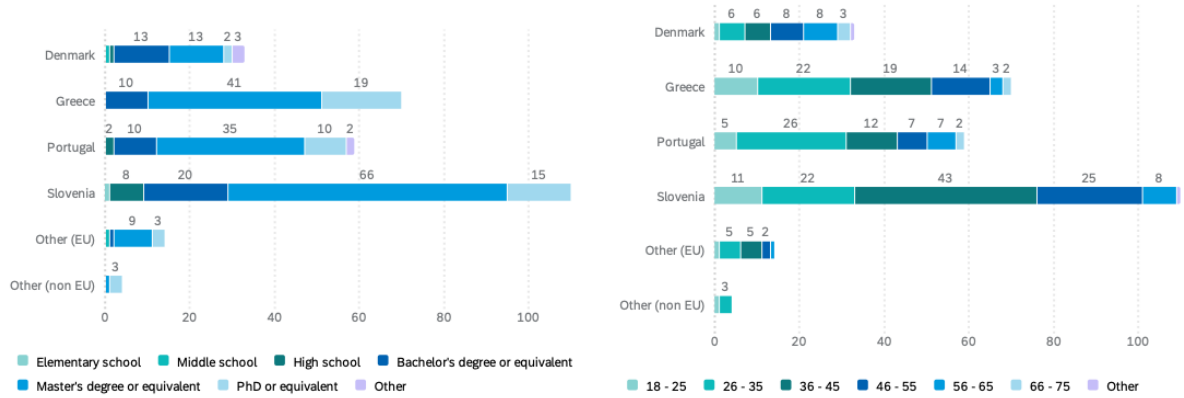

Figure 75: Number of answers of participants' that had prior knowledge of V2G and V2X concepts (answered "Yes"), by country, cross-referencing by education level (left) and by age group (right)

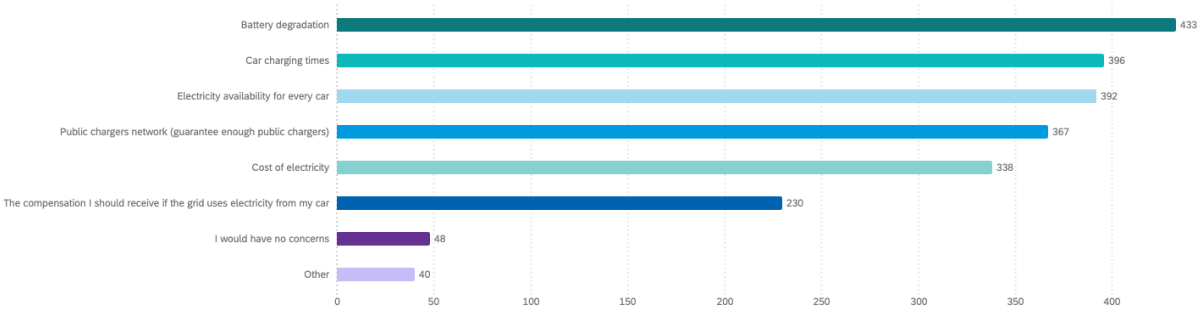

Figure 76: Number of answers of participants' top 3 concerns with an EV and V2X massification scenario

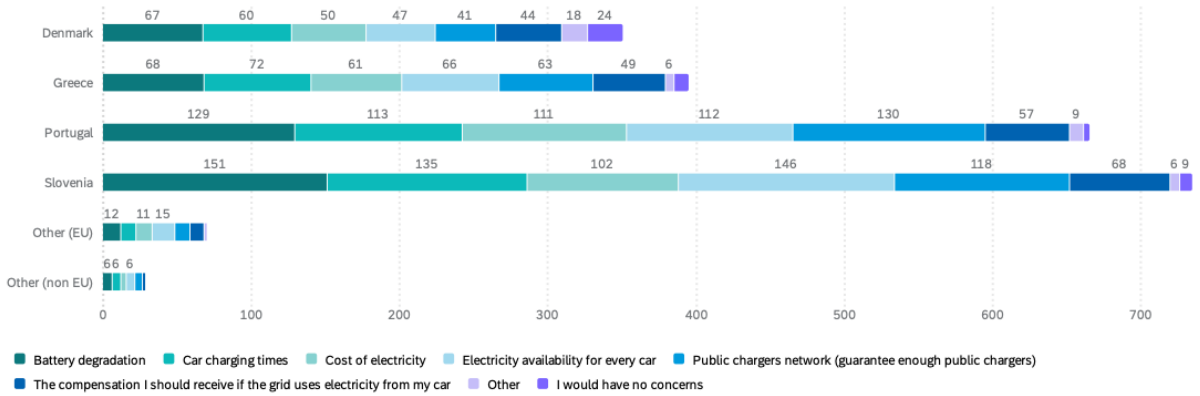

Figure 77: Number of answers of participants' top 3 concerns with an EV and V2X massification scenario, by country

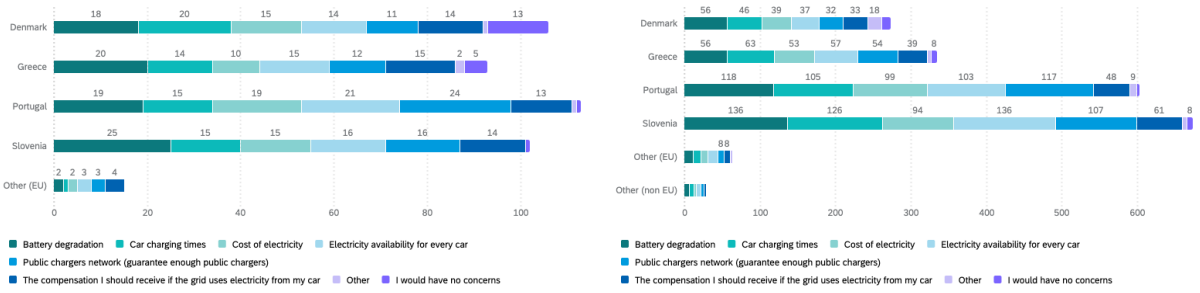

Figure 78: Number of answers of EV/PHEV owners' (left) and non-EV/PHEV owners' (right) top 3 concerns with an EV and V2X massification scenario, by country

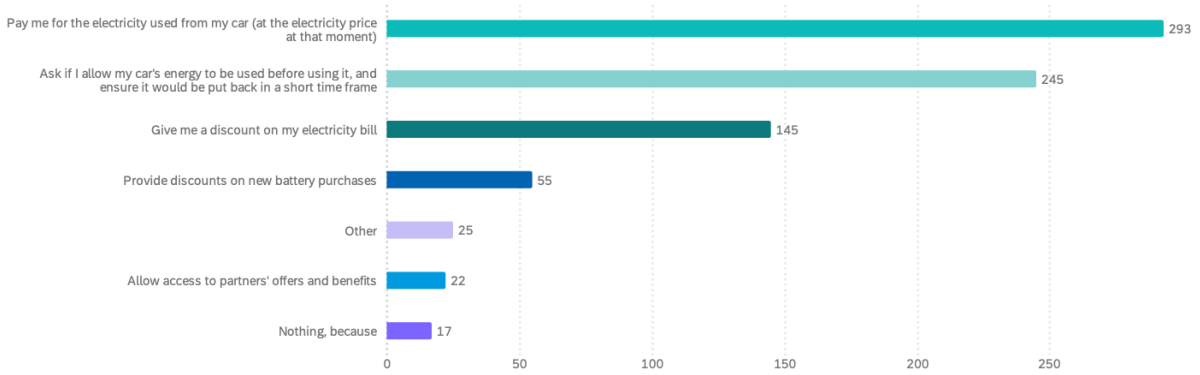

Figure 79: Number of answers for participants' preference on compensation expected for participating in V2X scenarios

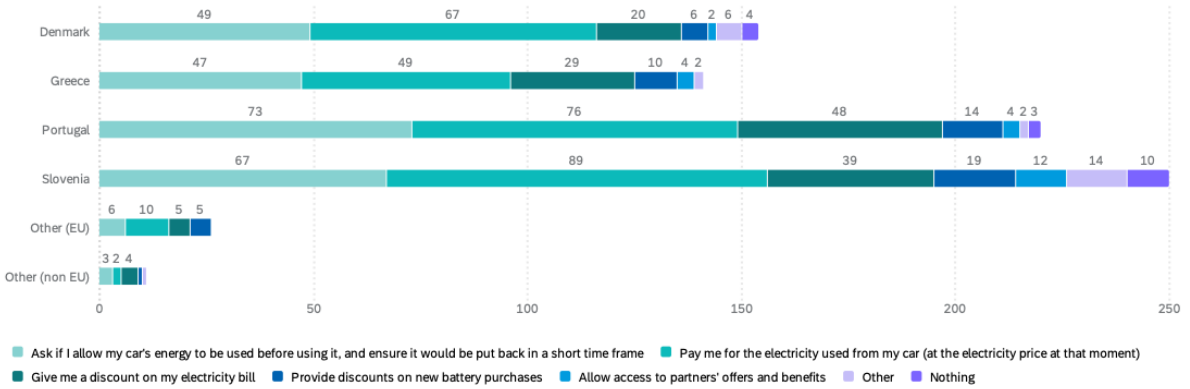

Figure 80: Number of answers for participants' preference on compensation expected for participating in V2X scenarios, by country

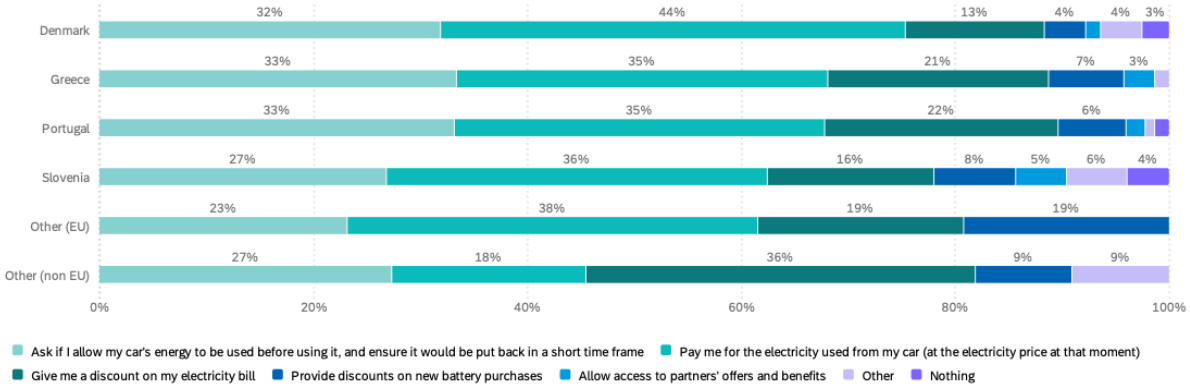

Figure 81: Percentage of answers for participants' preference on compensation expected for participating in V2X scenarios, by country

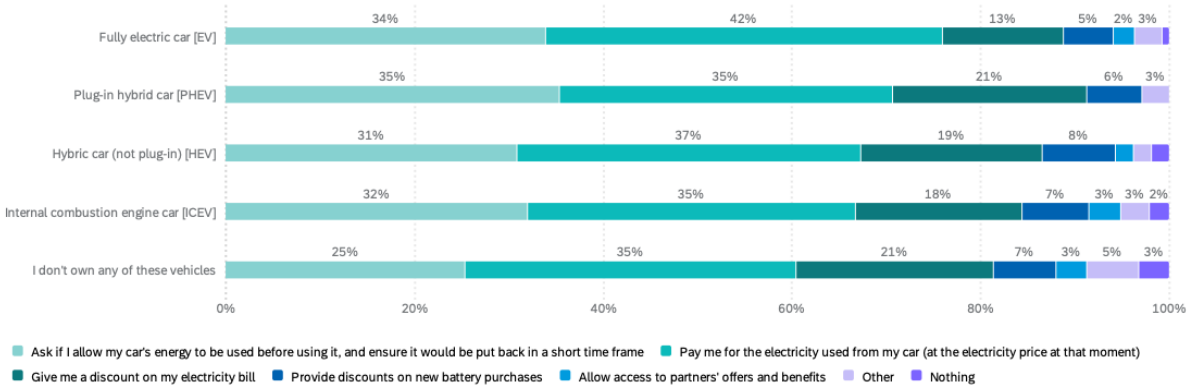

Figure 82: Percentage of answers for participants' preference on compensation expected for participating in V2X scenarios, by type of vehicle owned

APPENDIX B: Interview Script

Introduction:

This section is a suggestion of what to say when starting an interview. Please have in mind that interviews should feel like conversations, so use this text as an inspiration to get started.

Hello, thank you for giving us some of your time to talk with us today. We are exploring perceptions and the impact of technologies related to electric mobility, to better understand its potential awareness and adoption. Feel free to share your opinions and ideas honestly. There are no right or wrong answers.

This session will take about 1 hour. For now, do you have any questions?

Let's get started!

Context & Initial EV perceptions:

This section pretends to kick-start the conversation about the topic of electric mobility. Demo usage will be covered afterwards, after a perception about EVs is mapped.

1- Talk a bit about your profession. What do you do? *This question serves essentially to put the person at ease. People like explaining what they do. Furthermore, it helps understand their level of familiarity in using technology in their daily lives.*

2- And since our goal today is related to electric mobility, what do you think about electric vehicles? *Here honesty should be encouraged, even if we're working in a project about EVs, and talking with people that have or use EVs.*

3- What would you say are the main advantages of having / driving an EV? And what about disadvantages?

4- Do you own an EV, or is it from your company? Why did you buy an EV, or why did you choose not to buy one? *This helps clear up if this person would actually invest EVs and related technology, or if they are in a more "like it, but would not spend my money on it" position.*

About the demo usage and experience:

This section is focused on the experience the person had using the demo, so here you want to know all details possible about how it went, and how they felt about it. This is the most important part of the interview.

1- Have you used the chargers available in the project's demonstrator a lot? How many times would you say you charged an EV in the project's chargers, since they were installed? *The number of times used does not need to be exact, just an approximation.*

2- Tell me about the last time you used it. Was it easy? Did everything go according to your expectations? *Focusing on the last experience helps the details be concrete, about something that happened in a specific moment. This prevents mixing experiences from different days, that tamper with perceptions. Focus on one event at a time. Allow the person to tell you about more than one event, if they want to, but try to focus on the more recent usages.*

3- And what about the first time you used it? Has something changed since your first usage, compared to the last one you've had so far? *Same as above, but here on the first experience in the demo. This will allow you to understand if there was a steep learning curve or not.*

4- While using this demonstrator, did anything change regarding your opinions on EVs? And your perceptions about the process to charge an EV? Did you change any routines? *This is to*

understand impacts of opinions and perceptions the project had. Be prepared for negative comments, it's natural. But try and uncover the "why" behind it, justifying that we need to understand what went wrong and why were they frustrated, so that we can improve in the future.

5- Do you have any previous experience with charging an EV (prior to this demonstrator) that you would like to share? Please tell me about it, and how would you compare that experience with the one you had with this project's demonstrator. *Step out of the demo and explore other experiences. How are they comparing? If they're better, what made people like those? If they're worse, what did we do that was better than others?*

6- How likely are you to recommend using these chargers to a coworker, a friend or a family member (if they could use it)? Please give your answer in a scale of 1 to 7 (1 means "would not recommend at all", and 7 means "definitely would recommend"), and elaborate your answer. *Be strict about requesting a number, it really is important! And try to understand the "whys". An answer of "just because" is not enough.*

7- Do you have any comments or suggestions regarding these chargers? *If they hesitate, tell them to imagine they were 100% in charge of all decisions. What would they decide differently, and why?*

About V2X technology:

V2X was the goal of the project, even if the technology was not included in the demo. So it's important to map perceptions about this.

1- Even though this technology was not available at the demonstrator until now, we would like to discuss a bit about something called V2X technology. Have you ever heard about it? *Here focus on getting only 1 of 3 possible answers: "yes", "yes, but hard to explain", "no". The rest comes afterwards, here don't ask for explanations yet. After knowing this first part, then you can adapt according to the following:*

   a. "Yes" – Perfect! Can you please explain me how you see that technology working? *If the person feels tested, rest them assured, it's just to see if you're in the same page, you're not testing them.*

   b. "Yes, but hard to explain" – No problem! Tell me what you know, and I'll try to help in completing your explanation. *Help them formulate their interpretation, but don't give them the answer yet. It's ok to have incomplete knowledge.*

   c. "No" – Great! Then let me tell you all about it! *In this scenario, just skip directly to explaining V2X.*

*Depending on the answer given above, hear the definition, and afterwards **provide a V2X definition**, as well as some **examples** you can discuss a bit.*

2- Ok, so now that you're even more familiar with this concept, I would like to ask you what you think about it. How do you see this working? Please give me details, let's paint a futuristic scenario where this technology was available for all, and describe it. *This is an imagination exercise. It might feel strange, but insist on letting people be the "masters of what happens in the future" and ask them to describe it. Drawings can help, if you feel the person is up for it.*

3- Are you excited about this? Would you like to use it? *Let them go on about this scenario they painted, you want to steer them into imagining their own experience in it.*

4- What benefits do you see this technology bringing you, for yourself personally? *This intends to highlight the main things they like about this future.*
5- And what about benefits for others, like the energy grid, or other people? *Here you want to know if they see this as being beneficial for more people.*
6- And risks or problems, do you foresee any barriers or concerns you would have with this technology? *This intends to highlight the main concerns they would have in this future. As a bonus, do they imagine a way to overcome those concerns?*

Final questions & wrap-up:

This section is just a formality to finish up and assuring the person you're available to hear more inputs, even if you didn't address the topic directly. Some interesting inputs come from these simple questions at the end!

1- Is there anything we haven't discussed? Anything you'd like to add?
2- Do you have any other feedback about EVs or V2X technology that we haven't covered?

Thank you for sharing your knowledge and experience with us today. We appreciate your time!