



Report on consumer behaviour (3rd edition)

Project deliverable D1.1



This project has received funding from the European Union's Horizon Europe research and innovation programme under grant agreement No 101056874.

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Deliverable administrative information

Deliverable number	D1.1
Deliverable title	Report on consumer behaviour
Dissemination level	Public
Submission deadline	31/01/2025
Version number	3
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Project Executive Summary

SCALE (Smart Charging Alignment for Europe) is a three-year Horizon Europe project that explores and tests smart charging solutions for electric vehicles. It aims to advance smart charging and Vehicle-2-Grid (V2G) ecosystems to shape a new energy system wherein the flexibility of EV batteries' is harnessed. The project will test and validate a variety of smart charging and V2X solutions and services in 13 use cases in real-life demonstrations in 7 European contexts: Oslo (NO), Rotterdam/Utrecht (NL), Eindhoven (NL), Toulouse (FR), Greater Munich Area (GER), Budapest/Debrecen (HU) and Gothenburg (SE). Going further, project results, best practices, and lessons learned will be shared across EU cities, regions, and relevant e-mobility stakeholders. SCALE aims to create a system blueprint for user-centric smart charging and V2X for European cities and regions.

SCALE partners

List of participating cities:

- Oslo (NO)
- Rotterdam & Utrecht (NL)
- Eindhoven (NL)
- Toulouse (FR)
- Greater Munich Area (GER)
- Budapest & Debrecen (HU)
- Gothenburg (SE)

List of partners:

- (Coordinator) STICHTING ELAAD NL
- POLIS - PROMOTION OF OPERATIONAL LINKS WITH INTEGRATED SERVICES, ASSOCIATION INTERNATIONALE POLIS BE
- GoodMoovs NL
- Rupprecht Consult – Forschung & Beratung GmbH RC DE
- Trialog FR
- WE DRIVE SOLAR NL BV NL
- UNIVERSITEIT UTRECHT NL
- LEW Verteilnetz GmbH DE
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Deliverable executive summary

Key words

Electric vehicles, EV drivers, smart charging, Vehicle-to-Anything, Vehicle-to-grid.

Summary

The third edition of the consumer behaviour report builds on the findings from previous editions, providing a cohesive analysis of smart charging and Vehicle-to-anything (V2X) solutions. Drawing on the SCALE survey introduced in the second edition, the latest Global EV Driver Survey by GEVA, and interviews with representatives from European EV driver associations, this report offers a practical perspective on these emerging technologies.

The report highlights that EV drivers are generally receptive to adopting smart charging and V2X technologies, particularly when they see clear financial benefits and user-friendly implementations. However, significant challenges remain, such as the growing demand for energy and the mismatch between energy supply and demand, which are further complicated by the transition to less flexible renewable energy sources like solar and wind. To address these issues, the report emphasizes the importance of promoting smart grid solutions through incentives rather than strict regulatory measures.

The findings indicate that most EV drivers are open to smart charging and V2X, particularly when financial incentives are clearly communicated. Since the majority of charging occurs at home, this presents an ideal environment for V2X implementation. Nevertheless, there are lingering concerns among drivers regarding the potential loss of control over their vehicle batteries. To ensure the successful adoption of smart charging and V2X technologies, the report recommends establishing clear guidelines and introducing positive incentives, such as rewards for off-peak charging. Additionally, innovative strategies to encourage off-peak charging and reduce peak-hour energy demand are critical to achieving widespread adoption.





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List of abbreviations and acronyms

Acronym	Meaning
EV	Electric vehicle
V2G	Vehicle-to-grid
V2H	Vehicle-to-home
V2X	Vehicle-to-anything

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Purpose of the deliverable

Attainment of the objectives and explanation of deviations

The objectives related to the third edition of this deliverable (consumer behaviour report) have been achieved in full and as scheduled.

The purpose of this deliverable is to illustrate and analyse consumer needs and interests regarding smart charging of electric vehicles. The first edition of the consumer behaviour report focused on EV drivers' charging behaviour, smart charging habits and what considerations they have when deciding on charging technology. The second edition of the report provided a more thorough analysis of EV drivers' needs and motivations regarding smart charging and vehicle-to-anything technology.

This third edition of the consumer behaviour report ties everything together, with a focus both on charging habits and smart charging, and on electricity production and power grids in European countries. The report uses results from surveys conducted by partners within the SCALE project, and interviews with representatives of EV driver organizations from different European countries to analyse challenges and possibilities related to smart charging.

Intended audience

- EV drivers/owners
- EV Fleet Managers
- Mobility Service provider (MSPs)
- Site owner (building, parking, workplace, public)
- Organisations representing the above
- Charge Point Operator (CPO)
- Distribution System Operators (DSO)
- Transmission System operators (TSO)
- Vehicle Manufacturers (OEMs)
- Consultants in EV deployment and energy market,
- Balancing Service Providers (BSP)
- Aggregators
- Policymakers
- Standardisation bodies
- European Institutions (DG MOVE, DG ENER, DG CONNECT, DG GROW, EP, JRC)



Structure of the deliverable

This document is divided into five chapters, each with relevant subchapters. The first chapter introduces the third edition of the consumer behaviour report, providing definitions and background information on the topics discussed in later chapters. The second chapter examines EV charging patterns across European countries. The third chapter delves into the power grid and energy market in Europe. The fourth chapter explores smart charging and Vehicle-to-everything (V2X) technology. Finally, the conclusion summarizes the findings and offers recommendations for the implementation of smart charging and V2X technologies.

Consumer behaviour report

1 Introduction

The first consumer behaviour report (November 2022) brought together results from research articles, surveys and reports conducted by both external parties and SCALE project partners. It focused on EV drivers' charging behaviour, their smart charging habits, and the factors they consider when deciding to adopt new charging technologies. The second edition (September 2023) went a step further, providing a deeper analysis of drivers' needs and motivations around smart charging and V2X technology.

This third and final report ties everything together. It looks at EV drivers' charging habits and attitudes towards smart charging and V2X, and explores bigger issues like power grid capacity and electricity price models. For example, most EV drivers today charge at home, but in densely populated areas, this might change in the coming years. In some countries, grid congestion is already a problem, raising questions about how this affects EV drivers' thoughts and actions.

This report takes a hands-on, practical approach. It is based on surveys and in-depth interviews with representatives of EV driver organizations from different countries. Their insights help us paint a clear and realistic picture of EV drivers' opinions, concerns and expectations as smart charging continues to develop.

The report includes results from two large European surveys. The SCALE survey from 2023 maps EV drivers' attitudes and perceptions towards EV charging and V2X technology. The survey was open from March 20th to July 23rd and received responses from 3246 EV drivers from more than 20 countries. Seven countries got more than or close to 100 respondents and are thus the countries highlighted in the survey results. These countries were Austria, Hungary, the Netherlands, Norway, Poland, Portugal, and Slovenia.

The Global EV Driver survey was an online survey, conducted between August 27th to November 20th, 2024, and received over 23,000 respondents from 18 different countries (see table I in appendix). Only countries with over 100 respondents are included in the results. The survey reached EV drivers worldwide, primarily through the Global EV Alliance's (GEVA) 64 member organizations, or their collaborating partners. Since this report is a part of the SCALE project, only the results from 13 European countries are included: Austria, France, Germany, Hungary, Ireland, the Netherlands, Norway, Poland, Portugal, Slovenia, Sweden, Switzerland and the United Kingdom.

Updated versions of task 1.1

This is the third and final edition of report on consumer behaviour within the SCALE project. It builds on the first edition (November 2022) and second edition (September 2023) of the consumer behaviour report.



BEV market in Europe

The 13 countries mentioned in this report are at different stages of BEV adoption. Poland, for example, has a 3.0% BEV market share in new car sales and is in the early adopter's phase. Norway, on the other hand, has an impressive 88.9% market share, making it a leader in EV adoption.

	BEV market share new car sales (2024)	BEV share total fleet (end of 2023)
Austria	17.6%	3.2%
France	16.9%	2.3%
Germany	13.5%	3.2%
Hungary	7.0%	1.1%*
Ireland	14.4%	2.4%*
Netherlands	34.7%	5.2%
Norway	88.9%	22.2%
Poland	3.0%	0.3%
Portugal	19.9%	2.0%
Slovenia	5.9%	0.9%*
Sweden	35.0%	5.7%
Switzerland	19.3%	3.8%
United Kingdom	19.6%	3.1%

Table 1: EV share in new passenger car market per December 31st 2024, and EV share of total passenger car fleet per December 31st 2023. Source: ACEA (2025), IEA (2024a), *European Alternative Fuels Observatory (2024).



2 EV Charging patterns

Understanding the charging habits of EV drivers is crucial in identifying opportunities for smart charging and V2X technologies. This chapter explores the charging behaviours in various European countries and highlights where V2X can be most effectively implemented.

According to the SCALE survey, on average 79% of EV drivers across various European countries do most of their charging at home. This percentage ranges from nearly 60% in the Netherlands to 90% in Norway. Among those who charge at home, 77% use a home charging box. The use of home charging boxes is lowest in Portugal, Hungary and Poland, and highest in Norway.

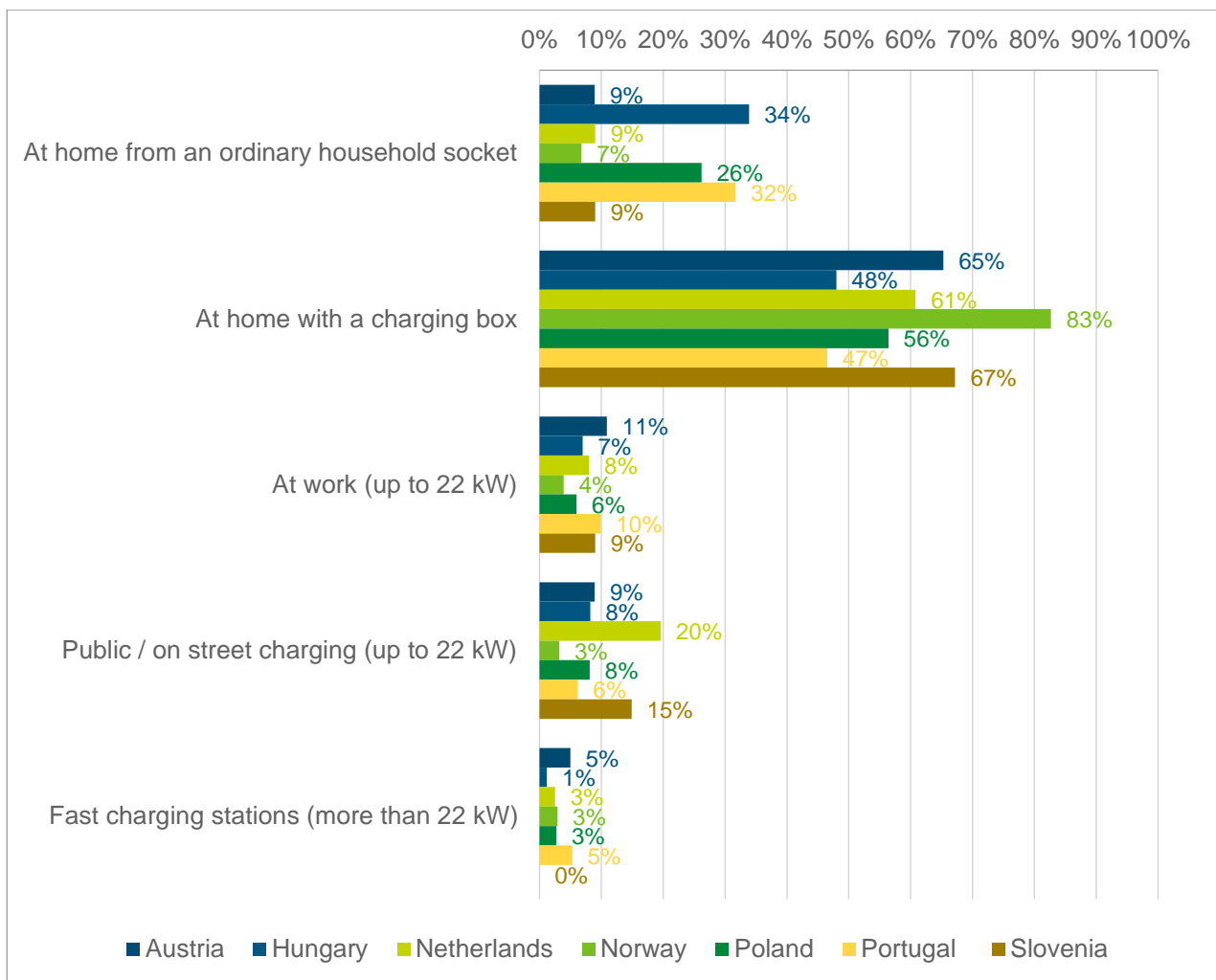


Figure 1: “Where do you do the majority of your charging?” Global EV Driver Survey (2024).

Additionally, 10% mostly use street charging stations (22 kW or lower), with the highest share of frequent users in the Netherlands at 20%.

The Global EV Driver Survey provides even more detailed data from 13 European countries. Respondents were asked about the share of their total charging across different locations: at home, fast charging, public parking with charging, work, and other. The survey revealed that between 56% (Poland) and 82% (Ireland) of all charging is done at home.





	At home	At fast charging stations (>50 kW)	At public parking with charging (<50 kW)	At work	Other private charging
Austria	65%	13%	11%	10%	2%
France	64%	18%	7%	9%	2%
Germany	58%	19%	11%	12%	1%
Hungary	70%	13%	6%	9%	2%
Ireland	82%	9%	3%	5%	1%
Netherlands	61%	13%	18%	8%	0%
Norway	79%	11%	5%	3%	2%
Poland	56%	21%	12%	10%	1%
Portugal	71%	11%	7%	9%	1%
Slovenia	76%	8%	7%	8%	1%
Sweden	74%	15%	4%	5%	1%
Switzerland	70%	16%	5%	8%	2%
United Kingdom	76%	12%	6%	6%	1%

Table 2: “How much of your charging would you estimate is done [at these different locations]:” Global EV Driver Survey (2024).

With a high percentage of home charging, there is significant potential for smart charging and V2X applications, particularly V2G and V2H systems. In countries like Norway, where the use of home charging boxes is high, smart charging technologies can be particularly effective. The Netherlands, despite having a lower percentage of home charging, still presents opportunities for smart charging due to its high use of street charging stations and the potential for integrating these into a broader smart charging network.

Moreover, the Global EV Driver Survey indicates that between 76% of EV drivers in the Netherlands and 99% in Ireland and Switzerland have their own parking space. This high availability of private parking spaces further supports the implementation of V2X technologies, as it provides the necessary infrastructure for home-based V2X systems.



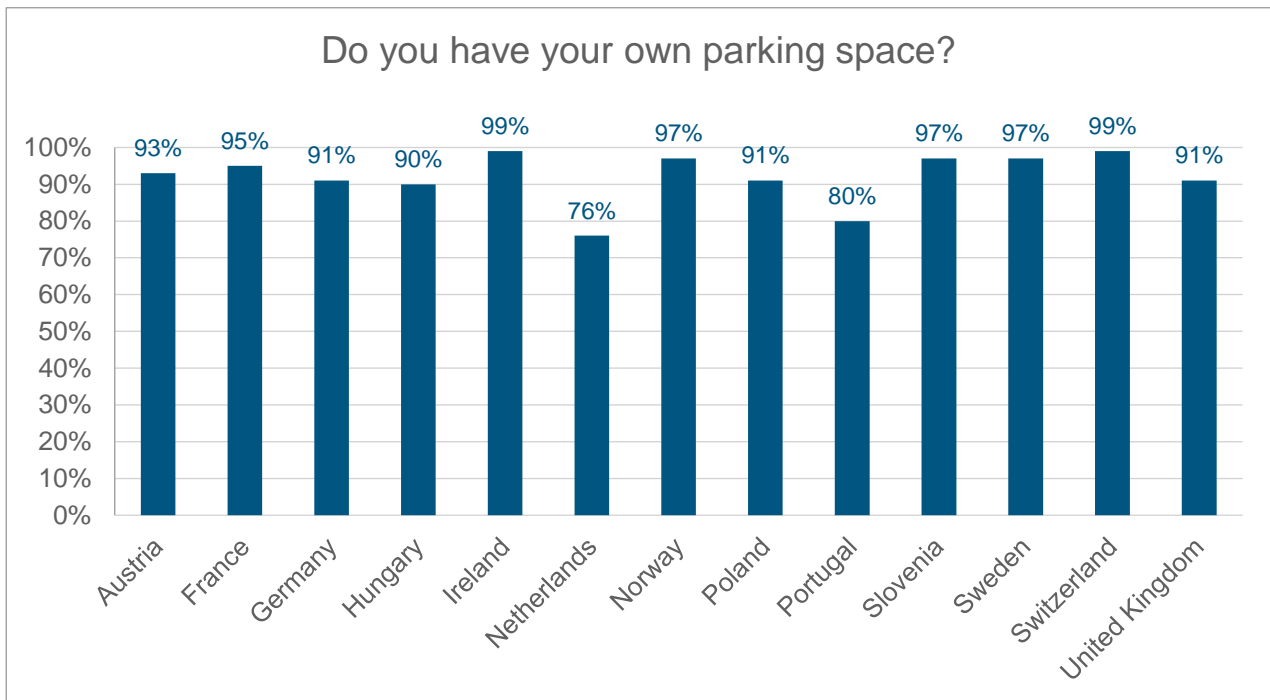


Figure 2: “Do you have your own parking space?” Global EV Driver Survey (2024).

By leveraging the high rates of home charging and the widespread use of home charging boxes, countries can enhance their grid stability and energy resilience through smart charging and V2X applications.

It should be noted that in many of these European markets, EV drivers are considered early adopters. In some countries, like the Netherlands, this often means that the percentage of EV drivers that have access to their own private charging opportunities might not be representative for the total population of vehicle owners in the country.



3 Electricity and power grid

The flexibility of a country's electricity production sources significantly impacts its ability to adjust production according to demand, especially during peak hours. A more flexible electricity source, such as hydro, allows for easier adjustment of electricity production to match peak demand periods. In contrast, wind and solar power, while renewable, do not offer the same level of flexibility due to their dependence on weather conditions. Energy storage can help with this issue, but most countries have limited capacity to store electricity in large quantities.

	Nuclear	Coal	Natural gas	Hydro	Wind	Solar	Other
Austria	0%	3%	10%	62%	11%	5%	8%
France	63%	1%	6%	12%	10%	4%	4%
Germany	1%	25%	16%	5%	28%	12%	11%
Hungary	45%	7%	20%	1%	2%	20%	5%
Ireland	0 %	4 %	50 %	4 %	38 %	0 %	4 %
Netherlands	3%	9%	37%	0%	24%	17%	10%
Norway	0 %	0 %	0 %	89 %	9 %	0 %	2 %
Poland	0%	60%	10%	2%	15%	8%	5%
Portugal	0%	0%	21%	30%	27%	12%	10%
Slovenia	35%	19%	3%	34%	0%	7%	2%
Sweden	29%	0%	0%	40%	21%	1%	8%
Switzerland	32 %	0 %	0 %	55 %	0 %	8 %	4 %
United Kingdom	14 %	1 %	34 %	3 %	30 %	5 %	13 %

Table 3: Electricity source in European countries. Source: IEA (2024b)

The Netherlands has the highest share of non-flexible electricity production, with wind and solar accounting for 41% of its electricity mix. Germany follows closely with 40%, and Portugal with 39%. On the other hand, Norway demonstrates high flexibility, with hydroelectric power constituting 89% of its electricity production. Austria and Poland also exhibit significant flexibility, with hydro, coal and natural gas making up 75% and 72% of their electricity production, respectively.



Electricity price models and grid tariffs vary significantly across countries, influencing how EV drivers manage their charging. In the majority of countries fixed price models for electricity are dominant, while in other countries, like Norway, dynamic hour-based electricity prices are common. Fixed price models for electricity and grid tariffs offer stability but may also lead to weaker incentives for off-peak charging, which could exacerbate grid challenges. Dynamic pricing, on the other hand, promotes smart charging and V2G solutions. This approach is already common in Norway, and Austria will transition to dynamic tariffs from January 2025, encouraging EV drivers to charge during off-peak hours and potentially reducing grid strain. Tailored policies and infrastructure investments can help optimize EV charging and ensure grid stability.

Analysing the electricity consumption of the EV fleet across different countries, we find that EVs currently account for approximately 0.1-1.1% of total electricity consumption in each of the countries. If the total electricity consumption remains constant and the EV fleet grows to 25% of all passenger cars, the share of electricity consumption by EVs will increase significantly. In Poland, with 25% of the passenger car fleet being electric, EVs would consume 7.0% of today's electricity consumption. In Norway, where the EV fleet already is high, a 25% EV fleet share will consume only 1.3% of the total electricity.

	Number of EVs (end of 2023)	Consumption EVs (end of 2023) (TWh)	Consumption total (2023) (TWh)	EV consumption shares (end of 2023)	EV consumption shares at 25% EV fleet share
Austria	160 000	0.352	70.1	0.5%	3.9%
France	980 000	2.156	454.3	0.5%	4.6%
Germany	1 500 000	3.300	498.5	0.7%	5.1%
Hungary*	45 000	0.0990	44.6	0.2%	5.0%
Ireland*	57 000	0.125	33.4	0.4%	3.9%
Netherlands	440 000	0.968	113.6	0.9%	4.1%
Norway	690 000	1.518	136.3	1.1%	1.3%
Poland	52 000	0.1144	157.7	0.1%	7.0%
Portugal	91 000	0.200	59.1	0.3%	4.2%
Slovenia*	12 000	0.026	13.7	0.2%	5.4%
Sweden	290 000	0.638	133.5	0.5%	2.1%
Switzerland	180 000	0.3960	67.2	0.6%	3.9%
United Kingdom	980 000	2.156	293.5	0.7%	5.9%

Table 4: EV electricity consumption. (See more in table III in the appendix.)



As the share of EVs grows, the proportion of electricity consumed by EVs is expected to rise substantially. There will also be an increase in renewable sources with variable production rates like wind and solar. This underscores the potential need for smart charging and V2X technologies to maintain grid stability as the share of electricity used by EVs increases.

According to the in-depth interviews with representatives of EV driver organizations, several countries face significant challenges with their electricity grids. The Netherlands experiences significant congestion, with over 105 gigawatts in applications for reinforcements or new connections, indicating a highly constrained grid. Hungary also faces structural challenges due to underinvestment, resulting in an unreliable grid and long lead times for grid connections. Austria encounters difficulties due to ambitious renewable energy targets, local opposition to renewable power production and long-winded permit processes.

Portugal struggles with electricity distribution, especially in urban areas and low voltage networks, while Poland has issues integrating photovoltaic installations and lacks connection power for high-power charging stations on motorways. France faces challenges in upgrading its distribution network, driven by the development of renewable energy sources. These examples highlight the diverse challenges and constraints different countries face in managing and upgrading their electricity grids to meet current and future demands.



4 Smart charging and V2X

The previous chapter highlights the different needs in the different countries. As the future BEV fleet will take up more of the total electricity production in some countries, these countries will especially need to look at different solutions that can offset the increased energy demand as well as the changes in power distribution. Both smart charging and V2X technology can contribute to load balancing. As seen in the first chapter, most of the EV drivers do most of their charging at home. This means that there is potential for high adoption rates of smart charging and V2X technology, if consumers are incentivized correctly.

Perceptions and attitudes among EV drivers toward smart charging and V2X technology

In the second edition of the SCALE Consumer Behaviour report, the results of a brand-new European survey about smart charging and V2X was presented. The survey mapped EV drivers' perceptions and motivations towards smart charging and V2X in Austria, Hungary, the Netherlands, Norway, Poland, Portugal, and Slovenia.

The findings in the survey revealed a strong inclination among EV drivers towards green charging practices, with the use of solar panels being a common motivation. In five of the seven countries, respondents most often cited environmental benefits, such as using solar energy, as a key reason for smart charging. Poland led this trend, with 47% of its respondents prioritizing solar panel usage, closely followed by Austria at 45%, and Hungary and the Netherlands at 38%.

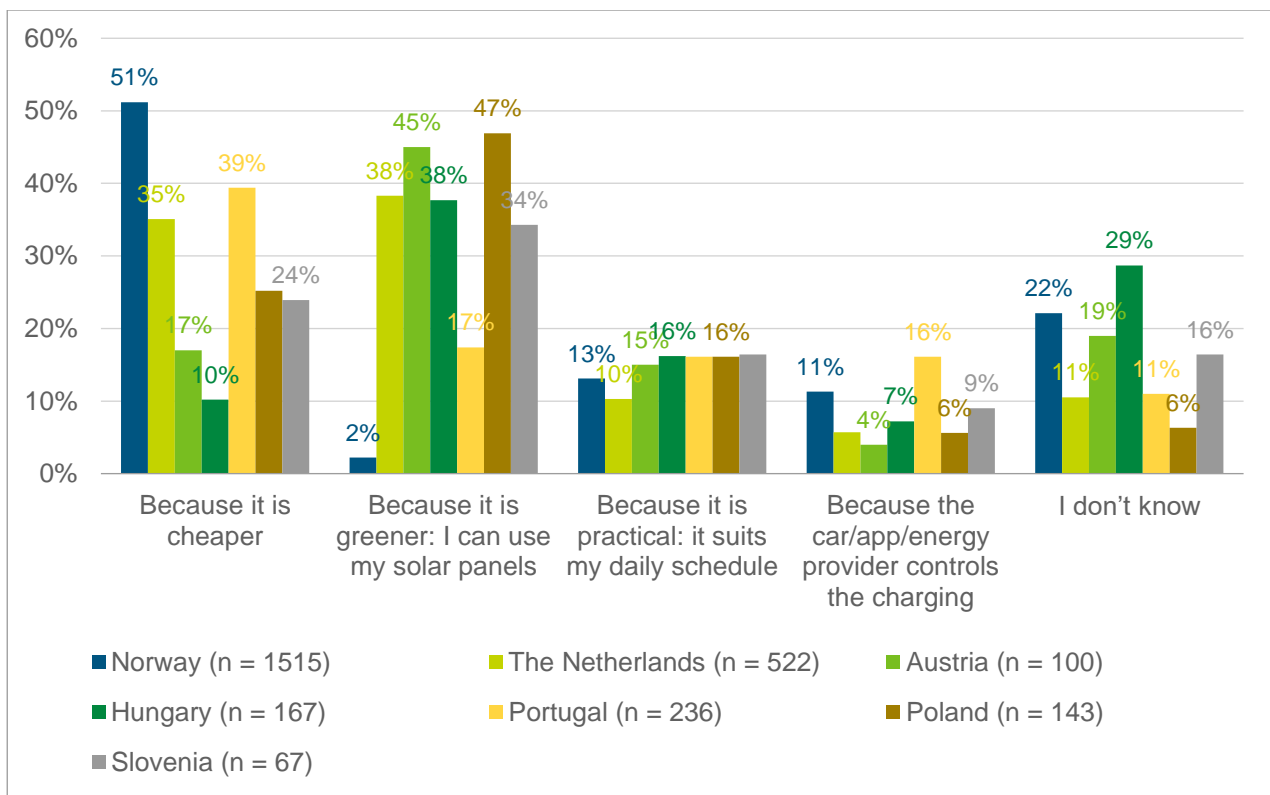


Figure 3: "If you charge smart/control the charging of your car, why do you do that?" SCALE survey (2023).



However, discussions with experts from EV driver associations indicated that financial considerations, rather than pure environmental concerns, often drive the purchase of solar panels. In many cases, choosing the green option is also the cheaper option, reinforcing a practical, cost-saving mindset.

The survey also explored the willingness of drivers to adopt smart charging. While a majority expressed a positive attitude towards smart charging, the actual satisfaction levels varied across countries. Portugal and Poland had the highest smart charging adoption rates, with 84% and 85% of drivers reporting that they are satisfied. Conversely, in the Netherlands, despite high smart charging usage, fewer drivers reported being content with the experience.

	I am willing to charge smart.	I am already smart charging and happy with it.
Austria	90%	38%
Hungary	89%	43%
Netherlands	89%	39%
Norway	85%	54%
Poland	89%	66%
Portugal	93%	70%
Slovenia	80%	58%

Table 5: “To what extent do you agree with the following statements?” Percentage that agree or strongly agree with the statements. SCALE survey (2023)

Regarding V2X technology, respondents across all countries expressed a preference for using their EV batteries to power their homes, particularly during periods of high grid electricity costs (see table II in the appendix). Interestingly, Polish and Slovenian drivers were more open to using their EVs to charge other vehicles, a less popular option elsewhere. The willingness to participate in V2G (Vehicle-to-Grid) technology grew significantly when financial compensation was offered, particularly in Slovenia and Portugal, which saw increases of 21% and 20%, respectively. In contrast, Dutch drivers were less motivated by financial incentives, with only a 5 percentage point increase. However, the Dutch respondents stood out in their willingness to contribute to a stable power grid by returning electricity to the grid, with 45% showing strong support, significantly higher than in other countries.

One common objection with regards to V2X technology is insecurity related to possible degradation of the high voltage battery. In the SCALE survey the respondents were asked what their concerns were if they would use the battery of their car for other things than powering their own EV. The option “battery degradation (reduced capacity of the battery)” received the highest number of responses in all countries except Norway.

In the Global EV Driver Survey, the respondents were asked whether they agreed with the statement “I am concerned about the lifespan of my battery”. In this survey, there were substantial differences between the



thirteen European countries mapped. In Germany only 10% agree to this statement, while 49% agree in Poland. On average for all countries 25% are concerned about the lifespan of their battery.

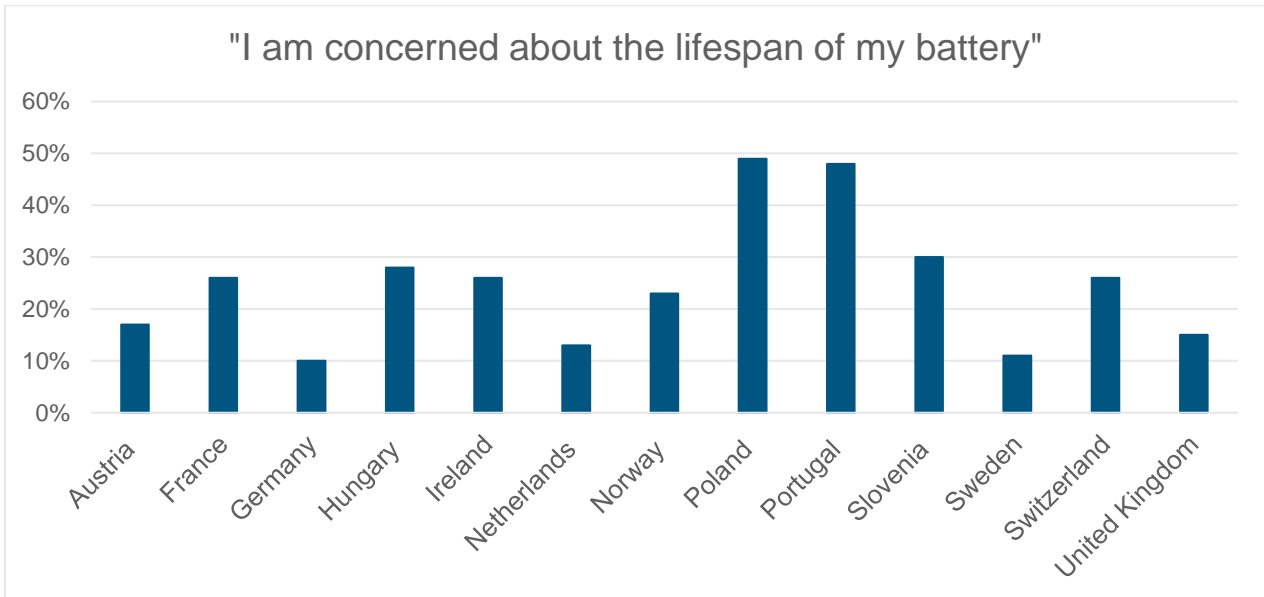


Figure 4: "I am concerned about the lifespan of my battery" – percentage that agree or strongly agree. Global EV Driver Survey 2024.

This result might have an impact on the willingness to adopt V2X technology, as the likelihood of wear and tear on the EV battery may increase with the use of this technology.

The points above are important because the widespread usage of smart charging and V2X technology rely on the consumers' willingness to adopt it. EV drivers' perceptions and motivations towards this technology can inform those developing this technology, grid owners in a country and policy makers in general. If we are to see widespread adoption of this technology, consumers must be incentivized to use it.

The potential of smart charging and V2G in load balancing our grids

The potential reduction in grid peak loads through smart charging varies depending on the specific implementation, EV adoption rates, and local grid conditions, but studies have shown promising reductions in several cases.

Smart charging can already lower the peak demand for charging in the evening by 35 to 49 percent when a simple charging profile based on non-flexible loads is used. This was shown in a recent smart charging test (September 2024) conducted by Vattenfall InCharge, ElaadNL, grid operator Enexis, and six cities in the Dutch provinces of North Brabant and Limburg.

The potential for smart charging increases even further, to 74% reduction of the charging peak, when the possibility to add real-time free capacity to the charging profiles, as shown in the Flexpower3 project conducted in 2022 by Vattenfall Incharge, ElaadNL, grid operator Liander and the University of Applied Sciences of Amsterdam. This, however, requires fully measured mid voltage stations which may not be available yet in all neighbourhoods that need smart charging solutions.

TotalEnergies and Jedlix have collaborated on smart charging solutions in the Netherlands to help reduce the load on the electricity grid. By using local solar energy from nearby panels and implementing smart charging systems, they managed to cut electricity consumption during peak hours (4:00 PM to 9:00 PM) by



40%. The program involved both public and private charging points, with TotalEnergies adjusting the charging schedule at 360 public charging points and Jedlix offering discounts for private users who charged during off-peak hours. This initiative shows how charging infrastructure can help reduce grid congestion without impacting driver convenience.

Furthermore, CE Delft, an independent research (March 2023) and consultancy organization based in the Netherlands, specializing in sustainability and environmental issues, has investigated how neighbourhoods and home or car batteries could help address grid congestion issues. Technically, if deployed optimally, these batteries could reduce peak loads by 5 to 30 percent under current conditions.

These peak production reductions, as well as demand reductions, through smart and bidirectional charging can help prevent grid overloads, lower electricity costs, and improve overall grid stability, all while the number of EVs continue to grow.



5 Conclusions and advice

This report provides insights into the experiences and preferences of EV drivers, emphasizing practical perspectives. It highlights the growing interest in smart charging and V2X solutions among EV drivers, while addressing key factors influencing their adoption. While EVs currently account for only a small portion of total electricity consumption, the anticipated rise in EV adoption could pose challenges. Challenges exist in the growing electricity demand, but also - and more importantly- with respect to the mismatch in time between power demand and supply. This mismatch will increase with the transition to inflexible sustainable electricity production (through solar and wind) that is taking place in most countries studied. To manage this, it's important to encourage smart grid solutions through incentives instead of strict rules.

EV drivers are generally open to smart charging and V2X, especially when there are financial benefits. Since most people charge at home, this is a great place to focus on V2X. However, EV drivers are also concerned about losing control over their batteries. To make smart charging and V2X work, we need clear rules and positive incentives, like rewards for charging during off-peak hours. Moreover, innovative strategies to encourage off-peak charging and reduce demand during peak hours will be essential. Emergency measures, such as blocking charging during peak hours, should be considered only as a last resort.

Advice from experts

For this report, we carried out in-depth interviews with representatives from various EV drivers' organizations across Europe. They provided valuable insights and advice that will help further develop smart charging and V2X technologies. Their input has been helpful in better understanding the challenges and opportunities for improving these systems.

As EV adoption grows, local electricity grids will face increasing pressure, especially in areas already experiencing grid congestion. Drivers in these areas are likely to adopt smart charging solutions as a way to mitigate the strain on the grid. While dynamic tariffs are a good starting point, we need more advanced solutions that allow private EV owners to actively contribute to grid stability.

For V2X systems to be effective, these capabilities should be standard features in modern EVs. Additionally, both AC and DC bidirectional charging should be supported. Scaling up V2X technologies will also require affordable charging boxes and incentives to make it worthwhile for drivers to regularly plug in their vehicles.

It's essential that V2G provides clear benefits for consumers. Drivers should be compensated for potential battery wear and the inconvenience of lost charging time. To encourage participation, dynamic charging systems should offer lower costs per kWh, and V2G should compensate drivers more than what they paid to charge their vehicles.

Lastly, drivers can reduce their carbon footprint and reliance on the grid by pairing their EV charging with renewable energy sources such as solar panels. It's also wise to plan for future infrastructure upgrades, including higher charging speeds, and to utilize apps for better energy management and efficiency.

In short, making the switch to EVs smoother and more sustainable will come from smart policies, good incentives, renewable energy, and future-proof infrastructure.

6 References

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Smart charging test (September 2024) conducted by Vattenfall InCharge, ElaadNL, grid operator Enexis, and six cities in the Dutch provinces of North Brabant and Limburg. Link (in dutch) <https://elaad.nl/slim-laden-kan-pieken-in-stroomverbruik-halveren/>

Interviews/online deep dive surveys with:

- Christian Peter, Director Electro Mobility Club Austria
- Tibor Antaloczy. Journalist and member of ELMOB The Hungarian Electromobility Association
- Lukasz Lewandowski, CEO EV Club Polska
- Ignac Završnik, President Slovenian Emobility Society (DEMS)
- Manuel Reis, Vice President Electric Vehicle Users Association Portugal
- Matthias Laffont, Deputy Director General at Union of the French Electricity Industry



7 Appendix

I – Respondents per country in the Global EV Driver Survey

Number of respondents in the Global EV Driver Survey	
Austria	872
France	718
Germany	108
Hungary	1294
Ireland	243
Netherlands	528
Norway	15 341
Poland	875
Portugal	258
Slovenia	156
Sweden	348
Switzerland	157
United Kingdom	363

II – Perceptions towards V2X

	Power my home when I want to	Power my home when electricity from the grid is expensive	Power my home when the grid is unstable	Power the EV of another person	Give electricity back to the grid to contribute to a stable energy network	Give electricity back to the grid if I received financial compensation	Power my caravan, electric BBQ, portable refrigerator, or similar additions I have for my road trip activities	None of these options seem very relevant to me
Austria	67 %	40 %	46 %	16 %	36 %	49 %	25 %	7 %
Hungary	47 %	42 %	51 %	20 %	26 %	40 %	25 %	11 %
Netherlands	53 %	57 %	35 %	14 %	45 %	50 %	21 %	8 %
Norway	15 %	33 %	19 %	13 %	11 %	29 %	27 %	35 %
Poland	59 %	47 %	54 %	21 %	22 %	32 %	29 %	6 %
Portugal	37 %	36 %	21 %	20 %	16 %	36 %	19 %	19 %
Slovenia	58 %	53 %	65 %	24 %	34 %	55 %	29 %	3 %

“If you were able to use the power from your EVs battery for other things than powering your EV (often referred to as Vehicle-to-anything), would you use it to...”. Source: SCALE survey (2023).

III – EV electricity consumption

	Number of EVs 2023*	Consumption EVs 2023 (TWh)**	Consumption total (TWh)***	EV consumption shares 2023	EV fleet share 2023*	Number of EVS at 25% fleet share	EV consumption at 25% fleet share (TWh)**	EV consumption shares at 25% fleet share
Austria	160 000	0,3520	70,1	0,5 %	3,2 %	1 255 682	2,7625	3,9 %
France	980 000	2,1560	454,3	0,5 %	2,6 %	9 573 171	21,0610	4,6 %
Germany	1 500 000	3,3000	498,5	0,7 %	3,2 %	11 574 074	25,4630	5,1 %
Hungary	45 000	0,0990	44,6	0,2 %	1,1 %	1 022 727	2,2500	5,0 %
Ireland	57 000	0,1254	33,4	0,4 %	2,4 %	593 750	1,3063	3,9 %
Netherlands	440 000	0,9680	113,6	0,9 %	5,2 %	2 108 434	4,6386	4,1 %
Norway	690 000	1,5180	136,3	1,1 %	22,2 %	775 862	1,7069	1,3 %
Poland	52 000	0,1144	157,7	0,1 %	0,3 %	5 051 020	11,1122	7,0 %
Portugal	91 000	0,2002	59,1	0,3 %	2,0 %	1 121 795	2,4679	4,2 %
Slovenia	17 000	0,0264	13,7	0,2 %	0,9 %	333 333	0,7333	5,4 %
Sweden	290 000	0,6380	133,5	0,5 %	5,70 %	1 272 727	2,8000	2,1 %
Switzerland	180 000	0,3960	67,2	0,6 %	3,78 %	1 189 655	2,6172	3,9 %
United Kingdom	980 000	2,1560	293,5	0,7 %	3,10 %	7 900 000	17,3800	5,9 %

*Source: IEA (2024a), EAFO (2024)

**Electricity consumption is calculated based on the average European yearly driving distance at 11 000 km (Odysse-Muree, 2023) and an average of 2 kWh/km.

***Source: IEA (2024b)





This project has received funding from the European Union's Horizon Europe research and innovation programme under grant agreement No 101056874.

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