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Attitude of European car drivers towards electric vehicles: a survey

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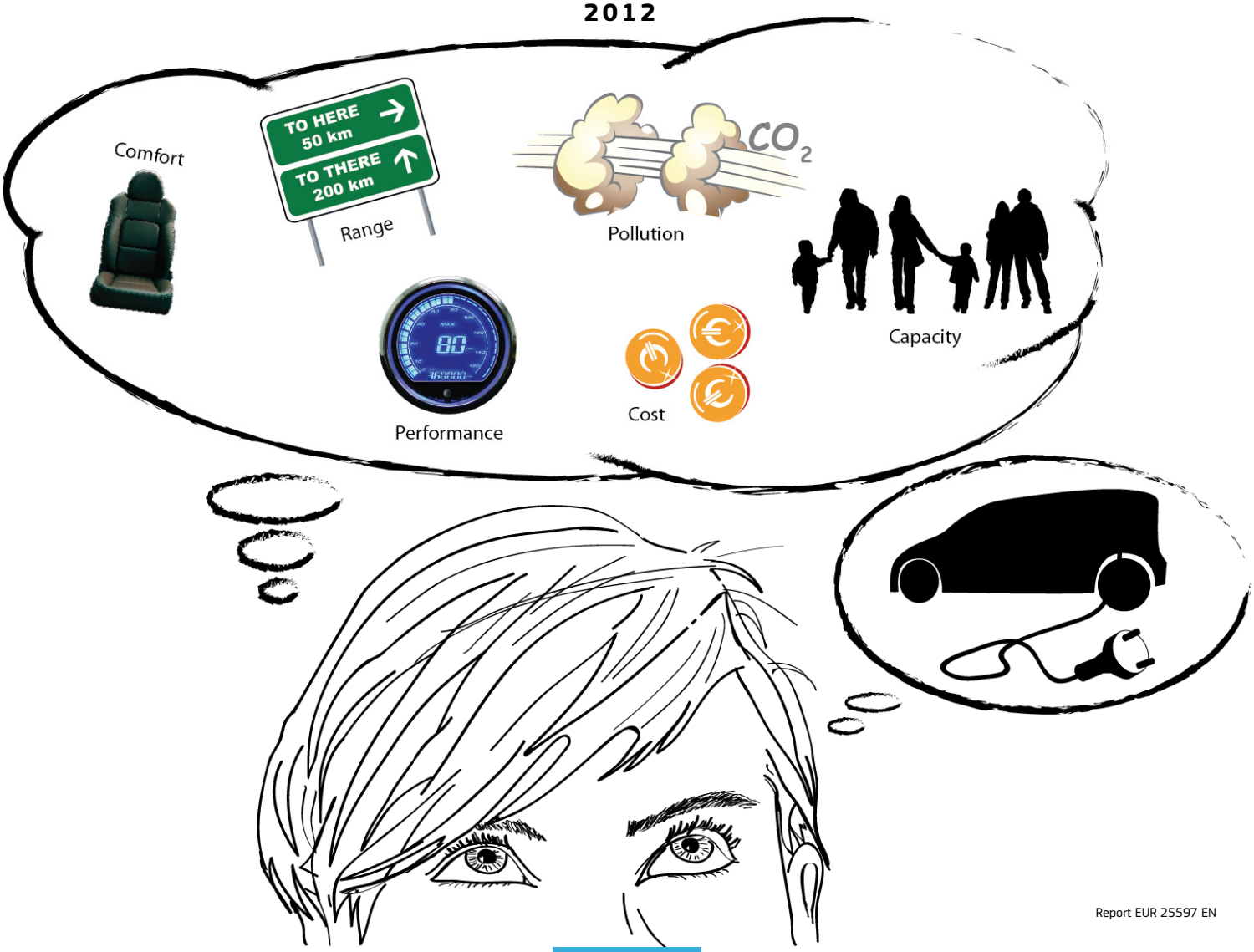

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Executive Summary

CO2 emissions from road transport have risen significantly in the past and projections show that they will continue to rise in the future if no adequate policy measures are implemented. Several European initiatives aim at reducing CO2 emissions from passenger vehicles. A potential option to reduce passenger vehicle CO2 emissions is the deployment of electric vehicles (EV). Consumer perception and willingness to purchase these new vehicle technologies lies at the heart of its successful large scale diffusion. This report aims at describing and analyzing how car drivers in the six countries France, Germany, Italy, Poland, Spain, and United Kingdom consider electric cars, how familiar they are with the electric car concept and its main features. It investigates, which features of EVs people consider essential in terms of propensity to consider electric cars a realistic alternative in case they wanted to purchase a new car. 600 drivers on average per each of the six Member States responded to the questionnaire. As a result we derive an "ideal" composition of an electric car in terms of car purchase price, range, re-charge time and maximum speed. The perspective of the European car drivers, as derived from this study, highlights the importance of further R&D investments to improve some of the performance characteristics of electric vehicles. It provides some guidance which performance aspects matter most for car drivers, notably costs and range. The study finds that the familiarity of car drivers with the electric vehicle aspects is lower when direct exposure or driving experience would be needed to properly assess these aspects. This stresses the need of demonstration activities in order to increase public awareness of electro-mobility and also to receive first hand feedback from car drivers on their experience operating an electric vehicle. A majority of the respondents considers that public incentives are needed to foster a wider market deployment of electric vehicles. Furthermore the study shows that an adequate re-charge network is perceived as crucial by car drivers.
It can be concluded that European car drivers see the opportunities that electric vehicles could offer but that a number of pre-requisites need to be fulfilled in order to ensure that the car drivers can consider electric vehicles as a credible vehicle choice.

1. Introduction

Electric vehicles are seen by many as a potential way to improve the environmental aspects of road transport. Most notably, they could play an important role in reducing road transport related carbon emissions. Several automotive original equipment manufacturers (OEM) have recently launched or are about to deploy electric vehicles to the European market. Some aspects of currently available electric vehicles still pose challenges for a larger market uptake. A number of European policy initiatives underline the opportunities of electro-mobility and introduce measures to overcome the challenges. In the Communication "CARS 2020: Action Plan for a competitive and sustainable automotive industry in Europe", the European Commission proposes actions to promote investments in re-charging infrastructure and an EU standard for the recharging interface for electric vehicles (European Commission, 2012a). The Transport Whitepaper "Roadmap to a Single European Transport Area – Towards a competitive and resource efficient transport system" states as one of the goals to halve the use of 'conventionally-fuelled' cars in urban transport by 2030; phase them out in cities by 2050; achieve essentially CO2-free city logistics in major urban centres by 2030 (European Commission, 2011). Here, electric vehicles could play an important role. Under the umbrella of the "European Clean Transport Systems Initiative", the "Expert Group on Future Transport Fuels" outlines recommendations for measures addressing challenges for the deployment of electric vehicles in the broader context of an alternative fuels strategy for Europe (European Expert Group on Future Transport Fuels, 2011a and 2011b). Electric vehicle sales in Europe are still comparatively low and direct exposure of car drivers to electric vehicles is also low. Selected consumer feedback can be derived from field tests, but these have typically a narrow regional scope and the methodologies applied to gather the consumer feedback vary between the different demonstration projects. Several surveys have been performed recently to collect selective feedback from consumers on electric vehicles (Ernst & Young, 2010), (Bunzeck et al., 2011),

(EurotaxGlass, 2011). This present study adds to recent research on the topic by testing the familiarity of car drivers with electric vehicles, investigating their interest to purchase an electric vehicle as well as inquiring about their priorities for improving the features of current electric vehicles. In the study we have tried to make an effort in order to ensure representativeness of the results for the selected countries. The study results can provide input for the implementation of the above listed policy initiatives.

This report is part of a broader study, aimed at building a database of load profiles for Electric-Drive vehicles (EDVs)[1] based on car use profiles in six European countries (France, Germany, Italy, Poland, Spain and United Kingdom). The study was performed by the JRC together with TRT and Ipsos. During the study, car drivers in the six member states were asked to provide travel diaries and respond to an online questionnaire. More details on the travel diaries as well as the methodological details of the questionnaire can be found in the report on "Driving and parking patterns of European car drivers – first European scale mobility survey" (European Commission, 2012b).

This report focuses on the results of the part of the questionnaire that investigated the attitudes of European car drivers towards electric vehicles. The six member states that were covered in this questionnaire represented a market share of more than 75% of the total new sales of passenger cars in the European Union in 2011 (see Figure 1.1) (European Environment Agency, 2012).

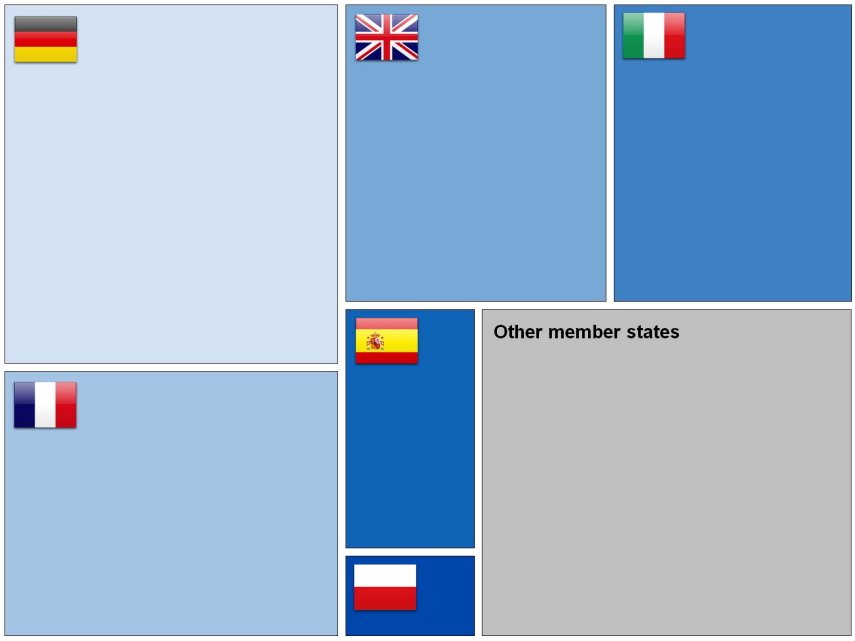


Figure 1.1 2011 passenger car market share of the six member states in comparison with other member states

The structure of this report is as follows. Section 2 describes the methodological approach used to investigate the attitude of European car drivers towards electric cars. Then section 3 presents the results obtained and section 4 draws conclusions from the survey results. The annex reproduces the full section of the questionnaire that deals with the attitude survey.

[1] For this study EDVs are defined as Plug-in Hybrid Vehicles (PHEV) and Battery Electric Vehicles (BEV). A PHEV is an externally chargeable hybrid electric vehicle with limited electric performance and electric range although the possibility to drive in electric mode is expanded by the possibility to plug the battery on the grid. A BEV is a pure battery electric vehicle since there is no internal combustion engine, but only an electric motor to propel the vehicle, with full performance in electric mode and enlarged - but still limited - electric range. (JEC 2011)

2. Description of the methodology

The attitudes of car drivers towards electric cars were investigated within the sample survey carried out to collect car trip diaries in the six European countries. The general methodological features of the sample survey – sample, full questionnaire, fieldwork – are described in the report (European Commission, 2012b) together with the key results concerning driving behaviour.

The introductory section of the attitude survey was designed to understand how car drivers in the six countries consider electric cars. After an initial question where respondents were asked how familiar they were with the concept of electric cars, a second question was aimed at going into more details about the knowledge of the electric cars. In this second question a list of statements about the features of electric cars (e.g. about their cost, their environmental impact, etc.) was presented and the individuals were asked to indicate their level of agreement with each statement. A question on the relevance of public incentives to boost the diffusion of electric cars was also asked in this introductory part.

A second part of the attitude survey was more specifically devoted to elicit how relevant some features of electric cars were for the respondents and to measure their propensity to consider electric cars a realistic alternative in case they wanted to purchase a new car. The procedure was as follows.

First, a comparison between a generic conventional and a generic electric car was proposed to respondents in terms of some key variables: car purchase price, operating costs (i.e. the cost needed to run the car for 100 km), the range of the car, the time needed to re-fuel/re-charge the car, the maximum speed and the level of well-to-wheel emissions (see Table 2.1). Based on this comparison, respondents were asked to provide a probability for them to purchase the electric car rather than the conventional car.

Table 2.1 Key characteristics of generic electric and conventional car

Feature	Electric cars currently available on the market	Conventional cars
Car Purchase price[2]	More in the range of 30,000 Euros or above	More in the range of 20,000 Euros
Distance with one recharge	150 km	At least 300 km
Re-charge time	Not less than 30 minutes	5 minutes
Euros per 100 km	2 Euros	10 Euros
Total emissions (well-to-wheel)	low	high

Subsequently, respondents were asked to assume that they were endowed with a monetary sum and can use it to improve one of the features of the electric car as described in the initial comparison. They were asked to indicate which feature they would improve. This exercise was repeated two more times. Each time the respondent was allowed to choose the same feature to improve or a different one.

Finally, the individuals were presented with a comparison between the conventional car and the electric car with the improvements according to their previous choices. Ultimately, they were asked to indicate the probability of purchasing the improved electric car.

The attitude survey ended with two questions related to the expected future background concerning the fuel price and the share of electric cars that could be in the car fleet in the future.

The survey was administered to all the surveyed individuals that participated in the broader questionnaire and fieldwork (population aged 18-74 years) in the 6 European countries during the period March – June 2012. Completed interviews per member state are:

- France: 623 interviews

[2] For the non-eurozone member states the prices were given in Euro and local currency (Zloty and Pound Sterling)

- Germany: 606 interviews
- Italy: 613 interviews
- Poland: 548 interviews
- Spain: 617 interviews
- UK: 716 interviews

As explained in detail in the companion report (European Commission, 2012a), a specific weight has been applied to the raw data, in order to rebalance the (deliberate) dis-proportional design of the sample and reproduce the (known) characteristics of the reference universe in terms of gender and age, geographical area, size of city or town, education level, and occupational status. In the following section all the shown percentages refer to the weighted data, whereas the basis refers to the actual number of achieved interviews.

3. The survey results

The main results related to the attitude towards the electric cars elaborated from the questionnaire are presented below. Initially, the background knowledge and the familiarity of respondents with the electric car are analysed. Then, the preferences for the electric vehicles and the most required features, as provided in the answers of the respondents, are shown.

3.1. The background

Respondents have a common expectation regarding the evolution of the price of fuel in the near future: in all countries the majority of the sample thinks that the price of fuel would increase a lot in the next 5 years (Figure 3.1). Basically nobody expects that fuel price would decrease.

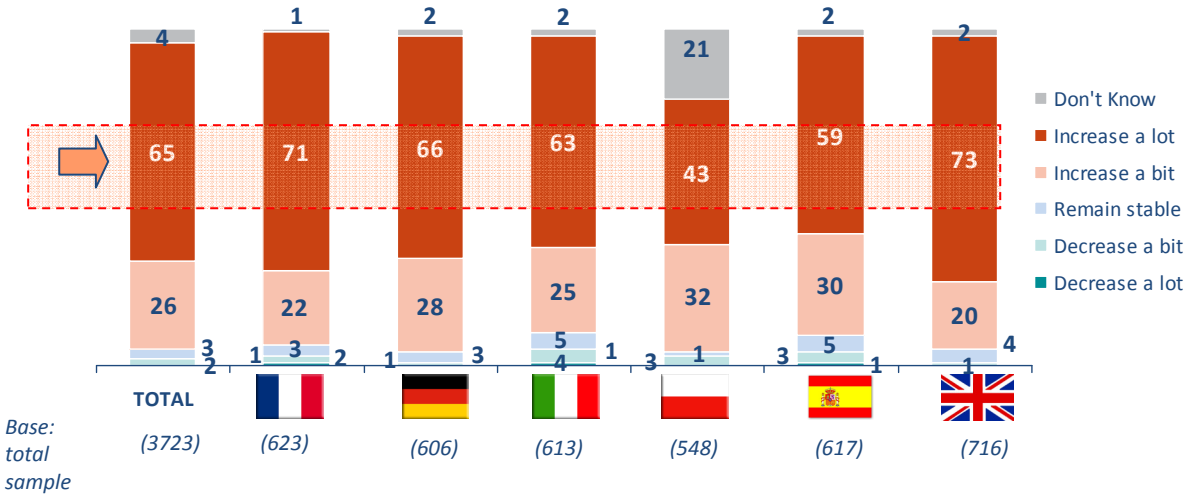


Figure 3.1 Expectation about the price of fuel in the near future

Regarding the awareness of the electric car, data shows a low level of familiarity with this technology. The mean score is 5.5 where 1 means “no knowledge at all” and 10 means “full knowledge” (Figure 3.2). National average scores are similar in the different countries, with Italy, Spain and UK lying above the overall mean and France and Poland positioned below (Germany matches the overall mean score). As far as the different age range is concerned, we noticed a slightly higher level of familiarity for youngest people, in comparison to the other age ranges.

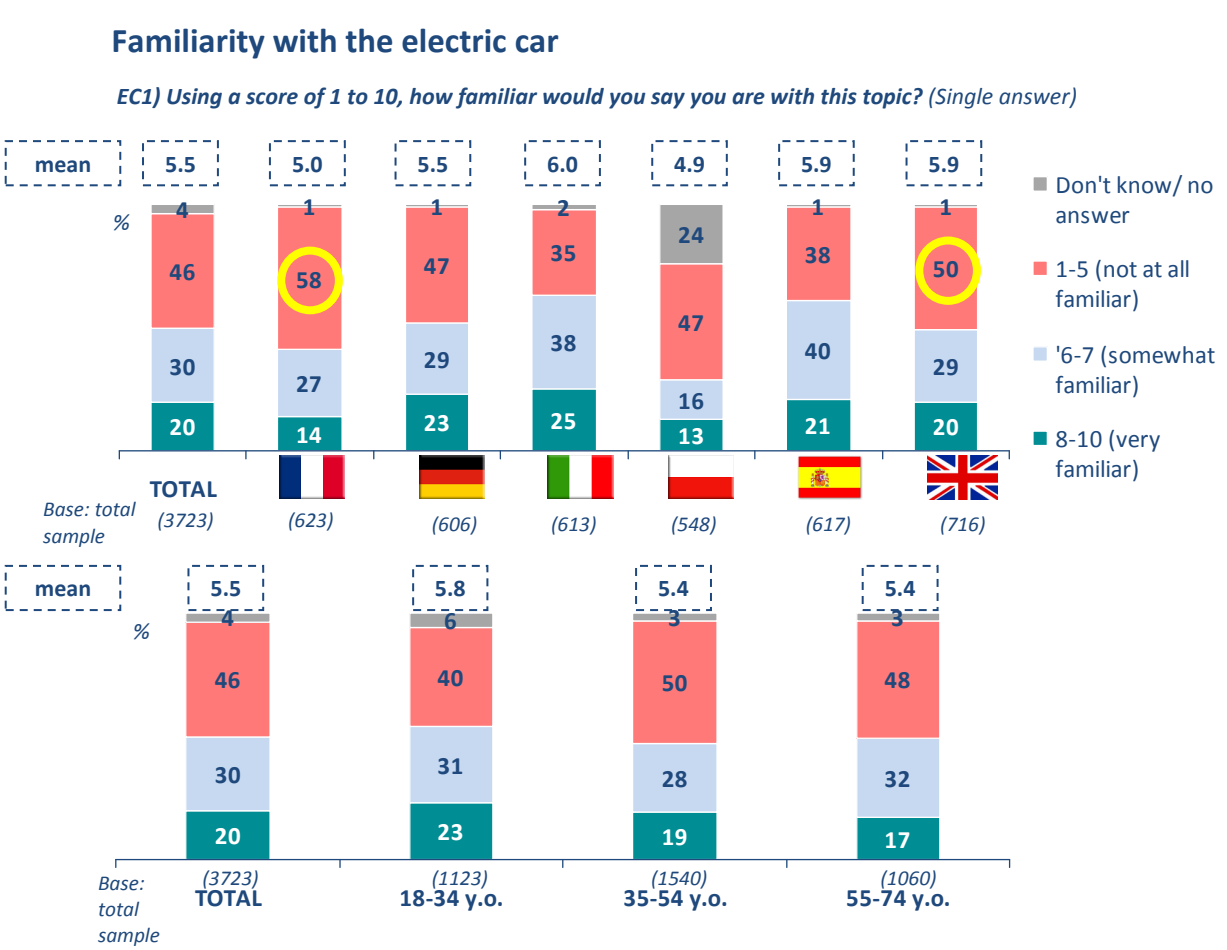


Figure 3.2 Familiarity with the electric car

Although the level of familiarity with electric cars among the respondents was somewhat limited, there were quite optimistic expectations about the number of electric cars sold in the future (i.e. the market share of electric cars in 10 years from now). 40% of the total sample expects that the share of electric cars will increase fast, reaching a percentage higher than 20% of the total market (Figure 3.3). Furthermore, almost one out of five interviewed expects a market share for electric cars over 40%. Drivers in Italy and Spain (the countries where more respondents declared to be familiar with electric cars) are more optimistic in terms of future electric car shares than the average.

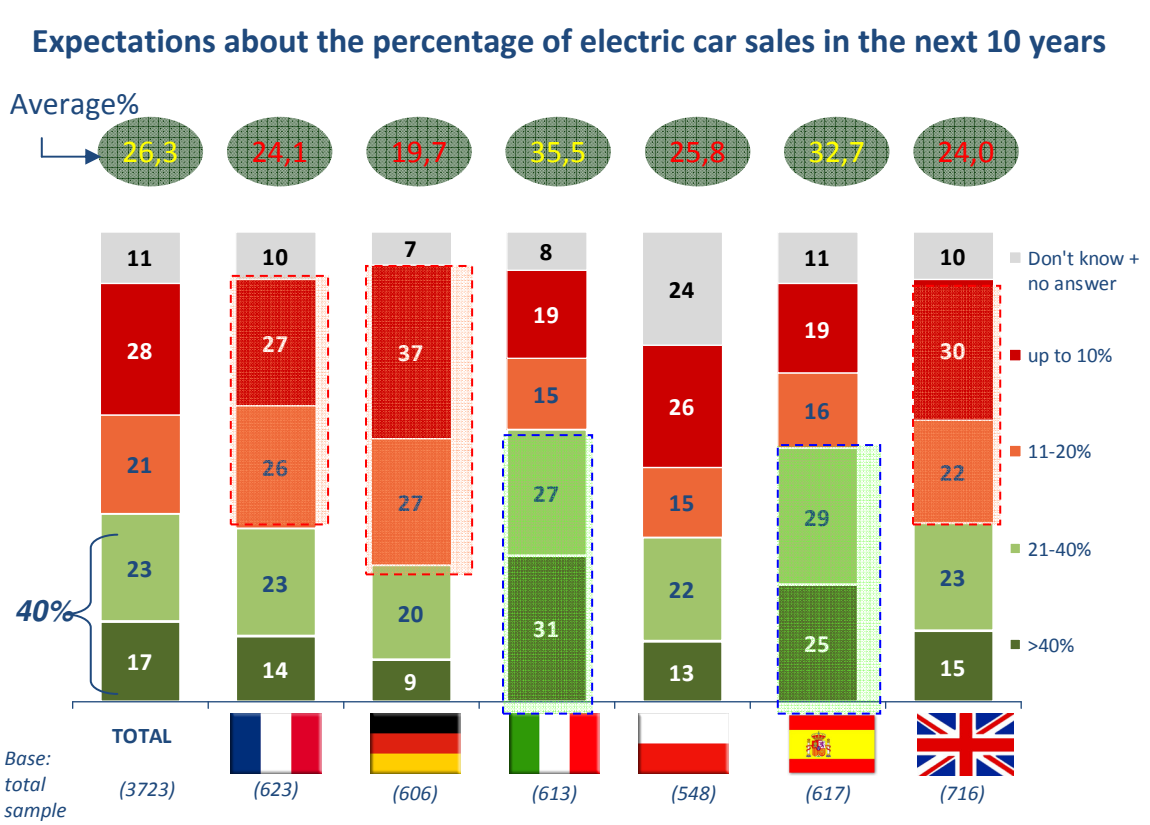


Figure 3.3 Expectations about the percentage of electric car sales in the next 10 years

Declared familiarity with electric cars was tested by asking respondents to give their opinion about several statements concerning electric car features. Answers could range from 1 (= strongly disagree) to 10 (= strongly agree). Results are shown in Figure 3.4 below where the numbers within the bars represents the share of respondents providing a certain response and the flags on the right side identify the countries in which the average score is above the overall mean value (shown between the bars and the flags).

Despite the declared low level of information and familiarity with this technology, the overall perception is generally in line with the actual features of electric cars. Overall, people think that electric cars are quite expensive (75% of the total sample). Moreover, it is generally correctly perceived that electric cars are not noisy and have no tailpipe emissions (69% of the total sample agrees with these statements). Some lack of information, however, emerges on how this technology works in practice. Actually, respondents were not able to express an opinion regarding the charging time of the battery (one respondent out of 3 was not able to provide the answer), the cost of the electricity to cover 100 km (in this case the relative majority was unable to provide an answer), as well as the distance that can be covered between two charges (28% did not answer). There is also a lack of information regarding the maintenance costs that are considered to be high by 42% of the sample, while the 33 % gave no answer.

Some statements were in some way more arbitrary. As far as safety is concerned, electric cars were considered safe for 41% of the sample; only 17% considered the electric car unsafe. However, the notion of a “safe car” can differ significantly among individuals (e.g. someone thinking of braking performance, crash safety, or battery safety and risk of thermal runaways). Also the impact of electric cars on driving pleasure is disputable, so the strong disagreement about this statement is not directly a matter of knowledge.

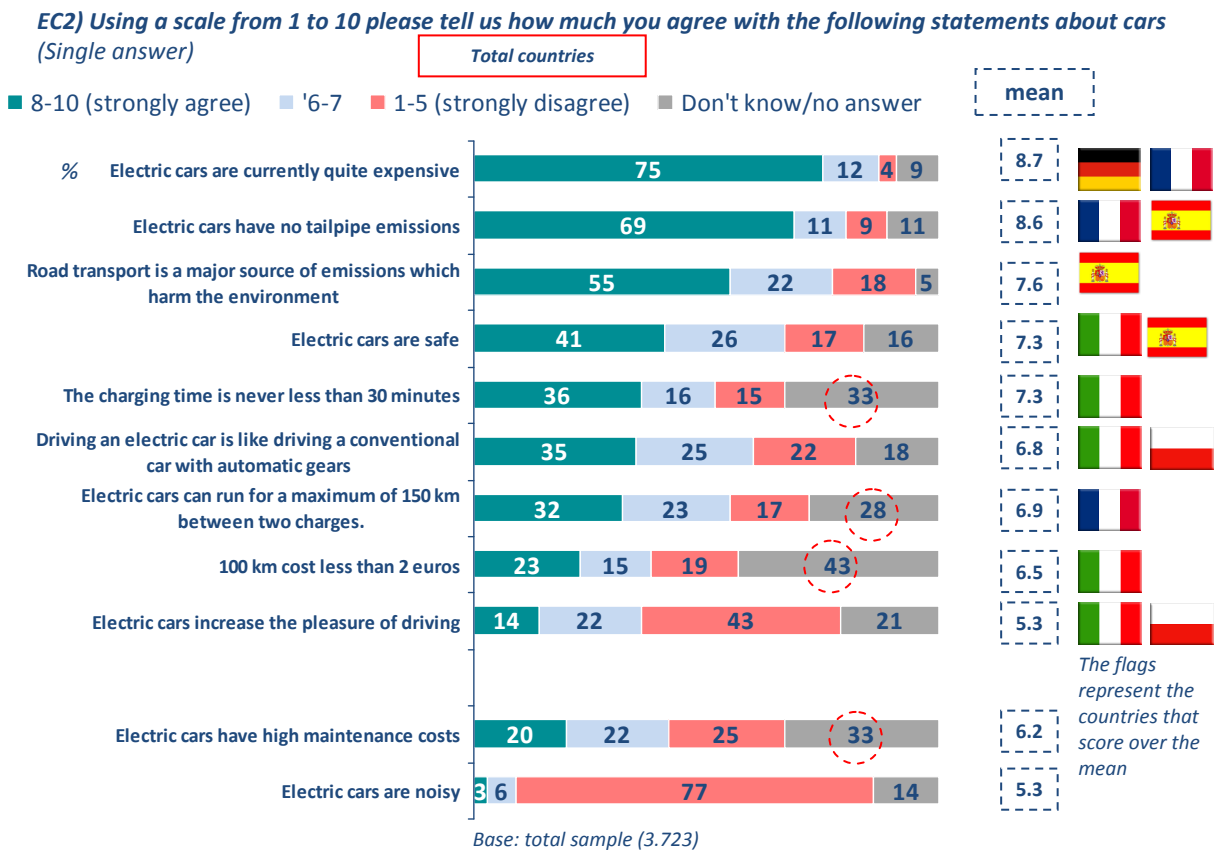


Figure 3.4 Agreement with statements on electric cars

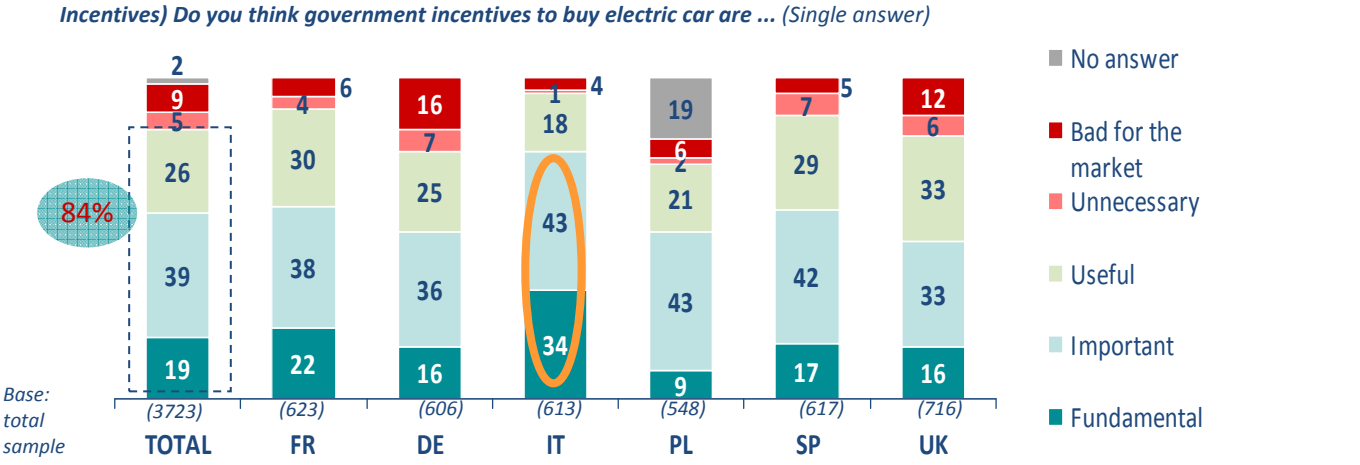


Figure 3.5 Importance of public incentives for electric cars

The large majority of the sample (84%) considered government incentives to support the diffusion of electric cars useful or, for the 19% of the total sample, even fundamental (Figure 3.5). This opinion was particularly widespread in Italy, while in Germany and UK a larger share of respondents (although still a clear minority) believe that electric car market would be negatively affected by governmental incentives. The perceived important role of government incentives is not surprising since, as shown previously, the most recognised feature of current electric cars is their high price.

3.2. The propensity towards electric cars

After collecting their opinions, respondents were asked to express their "intention to buy" an electric car considering the electric vehicles actually available on the market. A short description of

the main features of an actual generic electric car were shown in comparison to a generic state of the art conventional car (Table 2.1); then they were asked to express their opinion about the chances to buy an electric car, in case they would have to change their current one in the next few months.

On average a considerable share of car drivers declared that they would prefer to purchase the electric car rather than the conventional car: nearly 40% of the total sample would go for this choice (Figure 3.6). While this result is interesting, the percentage value should be interpreted with great care. It is a characteristic of this kind of surveys that the feedback on purchase considerations can differ significantly from later purchase behaviour. It is therefore more instructive to look at the relative differences between the countries and demographic characteristics.

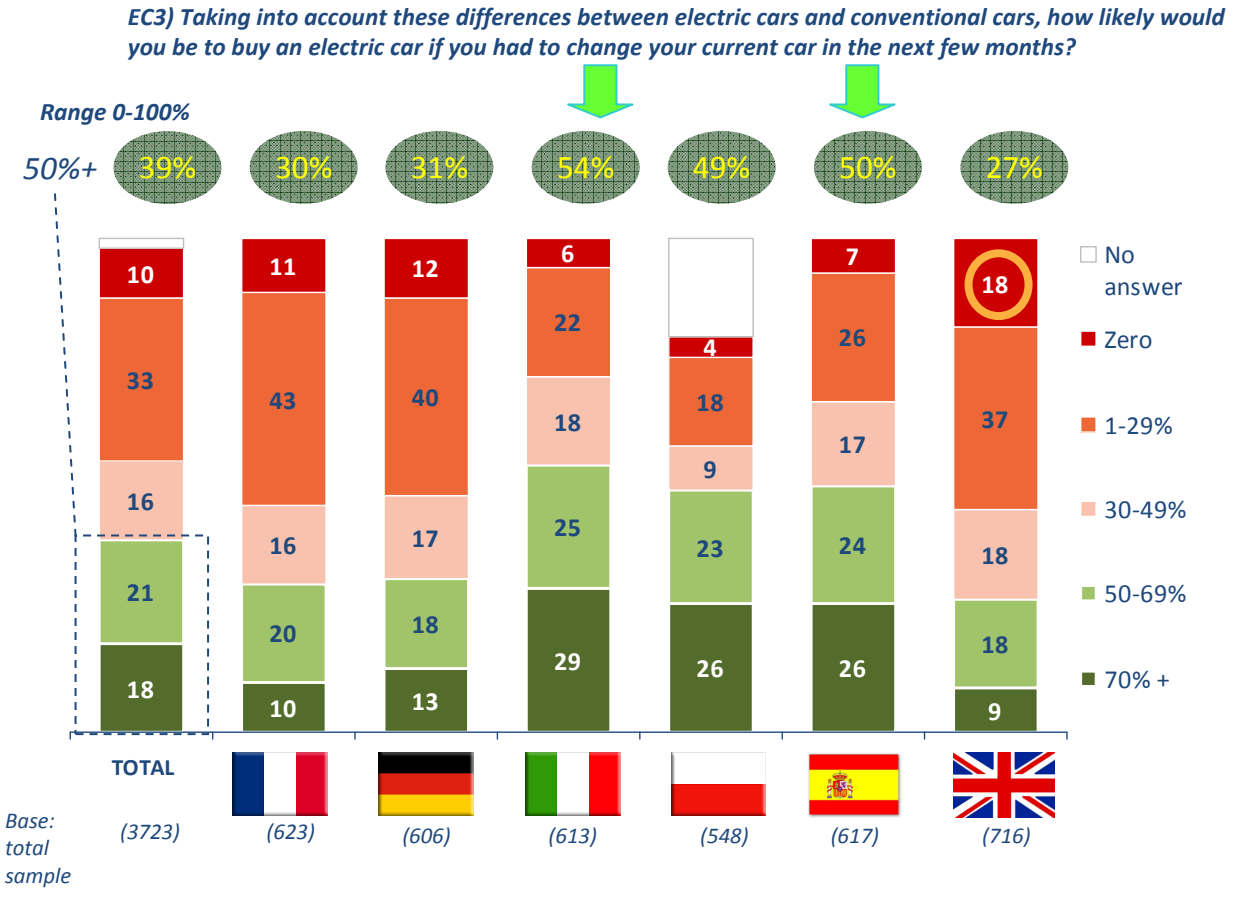


Figure 3.6 Probability of purchasing an electric car with its current average characteristics

However the result shows a geographical differentiation. Basically two groups of countries can be identified. On the one hand Poland, Spain and especially Italy, where the average declared probability that the electric car is purchased is close to or even higher than 50% and for more than one fourth of the sample the probability is 70% or more. On the other hand, France, Germany and mainly UK, where the average declared probability is around 30% or less.

Differences exist also between different socioeconomic groups as shown in Figure 3.7. Probably the most remarkable differences are those between groups defined by the intention of buying a car in the future. Individuals planning to purchase a new car in the next six months declare their preference for the electric car more than any other group (nearly 43% of probability in comparison to the average 38%,). Also those planning to purchase a car in a couple of years are above the average.

It is also interesting that individuals using their car everyday are more prone to purchase an electric car. Not surprisingly, also respondents declaring a good familiarity with electric cars are more ready to purchase one.

Above the average are also younger people (40.6%) and those living in metropolitan areas or large towns. This result seems consistent with the different trip behaviour in these groups emerging from the trip diaries. From the analysis of the driving profile, in fact, it emerges that young

individuals make shorter trip chains and that shorter trip chains are also made in metropolitan areas and large cities. In both cases, driving behaviour better fits with the use of an electric car.

Likelihood of buying an electric car

EC3) Taking into account these differences between electric cars and conventional cars, how likely would you be to buy an electric car if you had to change your current car in the next few months?

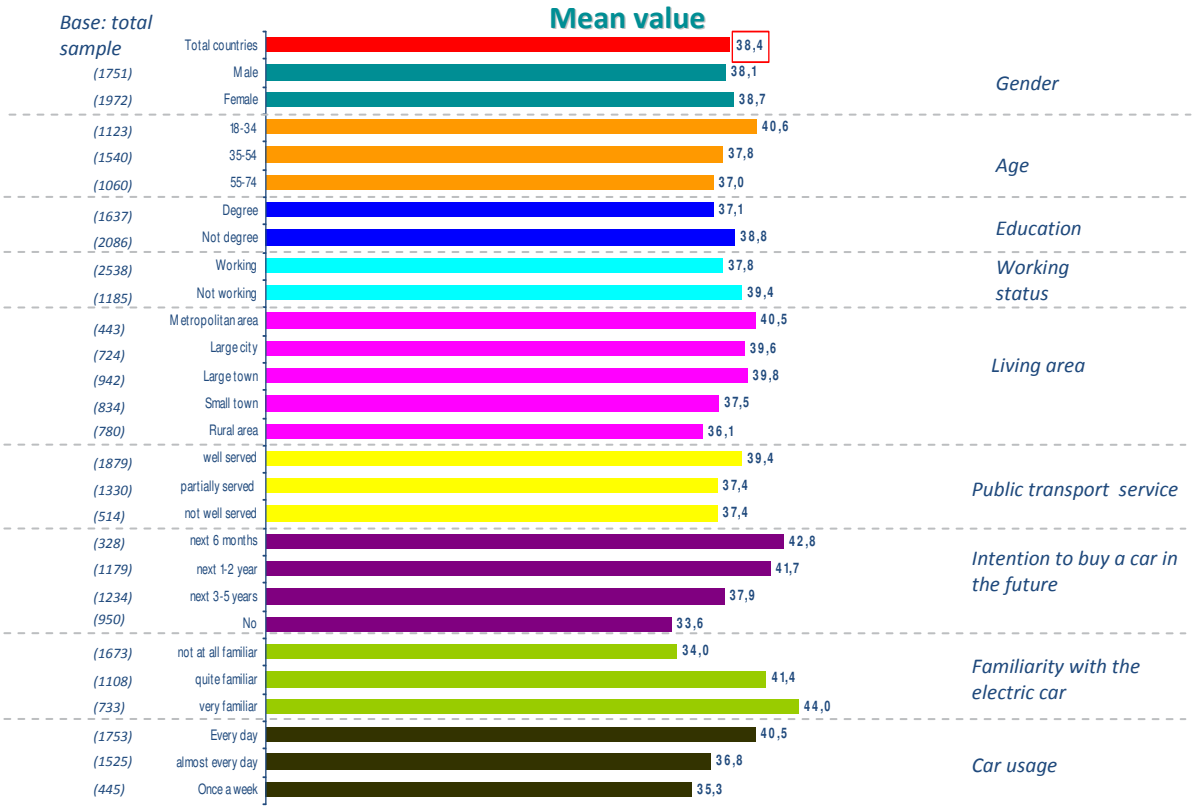


Figure 3.7 Probability of purchasing an electric car with its current average characteristics by socioeconomic segment

The further step in the analysis of the attitude towards electric car was to explore which of its current features the individuals would like to improve. As mentioned above, respondents were asked to choose one feature of the current electric car to improve assuming they had an amount of money (3,000 Euros[3]) to spend to achieve the improvement. This choice was repeated three times. Each time they were allowed to choose one feature only, including the one already chosen. The starting point, i.e. the current representative features of the electric car and the available improvements are shown in Table 3.1.

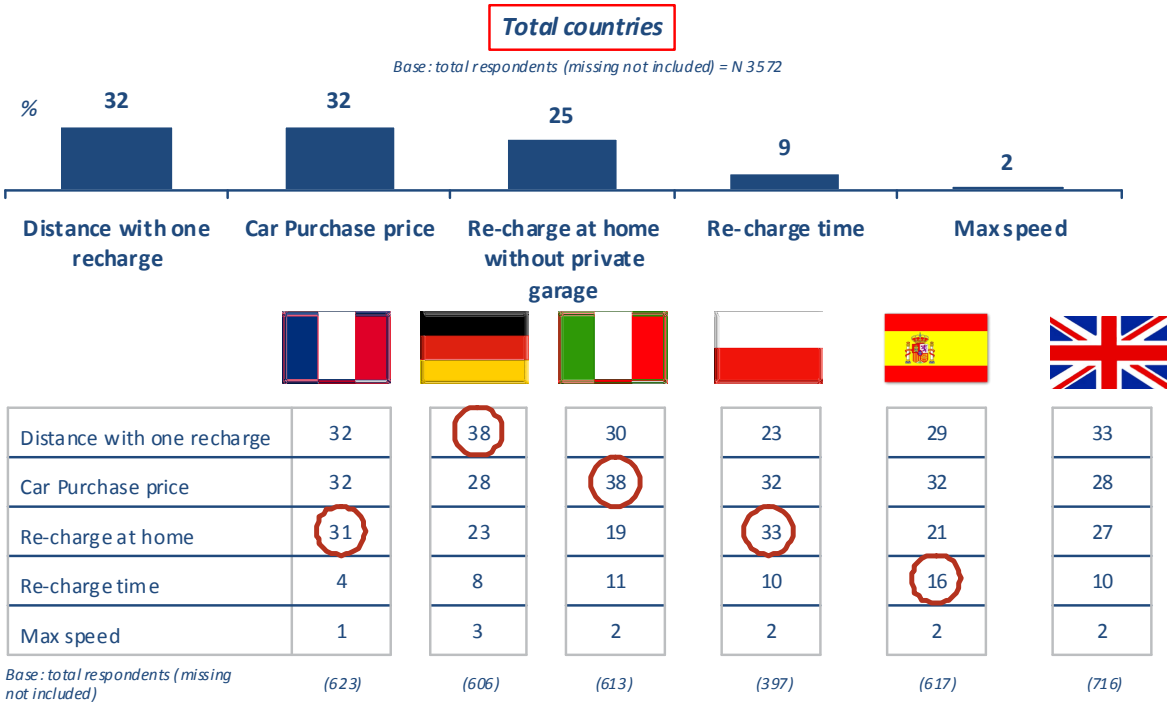
Table 3.1 Current and improved features of electric car

Feature	Starting point	Step 1	Step 2	Step 3
Car Purchase price	30,000 €	27,000 €	24,000 €	21,000 €
Distance with one recharge	150 km	200 km	250 km	300 km
Re-charge time	2 hours	1.5 hours	1 hours	30 minutes
Re-charge at home without private garage	NO	Yes	Yes	Yes
Max speed	120 km/h	140 km/h	160 km/h	180 km/h

In this exercise, the first choice is indicative of which feature respondents are more sensitive to. The preferences of respondents were equally distributed between the possibility of increasing the distance with one recharge and the possibility to decrease the price; both these alternatives got

[3] For the non-eurozone member states the prices were given in Euro and local currency (Zloty and Pound Sterling)

32% of preferences (Figure 3.8). The possibility to re-charge the car at home even without the availability of a private garage was chosen as first improvement by one quarter of the sample. Recharge time is the first choice only for 9% of the respondents while increasing the maximum speed is a priority for just a few individuals.
The hierarchy in feature selection is similar in all countries, but with some differences. Car price wins in Italy and Spain, car range is at top in Germany and UK. In Poland re-charge at home is the most important feature and also in France is almost as important as car price and range.



Distance with one recharge	32	38	30	23	29	33
Car Purchase price	32	28	38	32	32	28
Re-charge at home	31	23	19	33	21	27
Re-charge time	4	8	11	10	16	10
Max speed	1	3	2	2	2	2
Base: total respondents (missing not included)	(623)	(606)	(613)	(397)	(617)	(716)

Figure 3.8 Most chosen improved feature as first choice[4]

[4] In Poland, only 397 respondents participated in this section of the attitude survey. That is why from here onwards, the received answers from respondents from Poland only add up to 397.

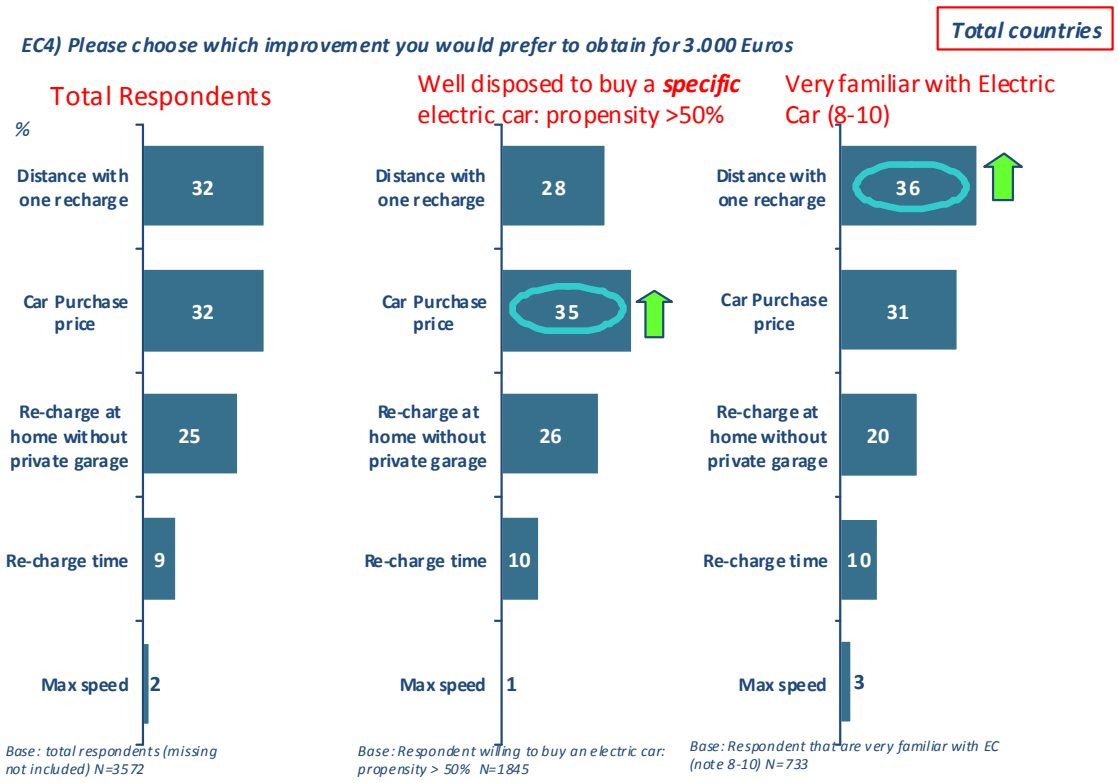


Figure 3.9 Most chosen improved feature as first choice in some groups

As shown in Figure 3.9 respondents who declared a higher level of familiarity with the electric car find it more important to increase the distance with one recharge than the average respondent does. Instead, those who are more prone to purchase an electric car would prefer to reduce the car price first.

The responses after all the three steps provided a different perspective on the relevance of the attributes. If some attributes are largely dominant they should be chosen in the first step and then also in the second and third step. Instead, if the respondent changes the attribute step after step this means that despite the implicit hierarchy, more features are considered of comparable relevance. Figure 3.10 shows that the preferences after the three steps are quite similar to those after the first step. This means that either most of the respondents confirmed their choice in all steps or most of the respondents changed their responses and the characteristics emerged after the first choice were the most important but were not dominant. In order to understand which of the two inferences is more correct, the analysis of the "ideal" electric car emerging as result of the choices is helpful.

As "ideal" electric car we define, for each respondent, the combination of the characteristics after the three choices have been completed. Certainly, the electric car described by the combination is "ideal" only under the constraint of the allowed improvements. If these constraints were relaxed it might well be that e.g. a lower price and a longer range were asked. However, an unconstrained ideal definition would not be very informative as it would probably converge towards an unrealistic combination of very low price and features that meet high performance expectations such as short re-charge time (at home) , a very long range and high top speed.

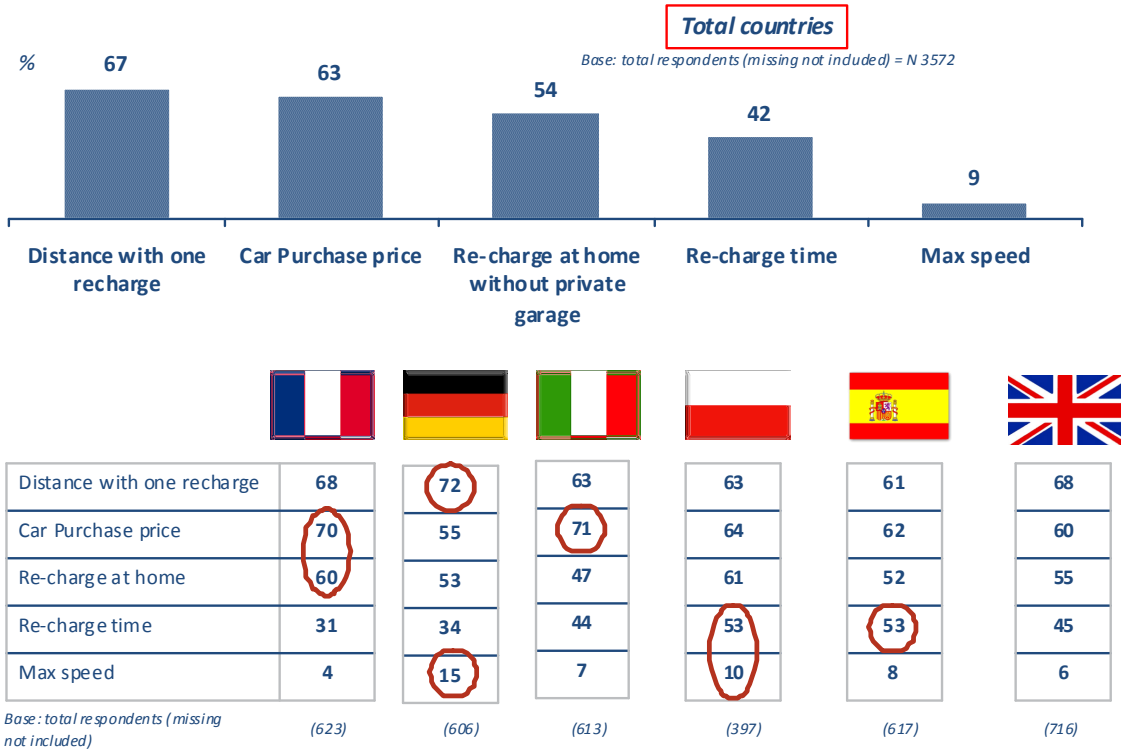


Figure 3.10 Most chosen improved features after three choices

From the choices of the respondents as much as 125 different combinations of an "ideal" electric car emerged. Already this number explains that the sample did not choose some elements repeatedly. Instead, different attributes were mentioned with a certain hierarchy. Among this large number of combinations, five of them explain more than half of the preferences; they are summarised in Table 3.2.

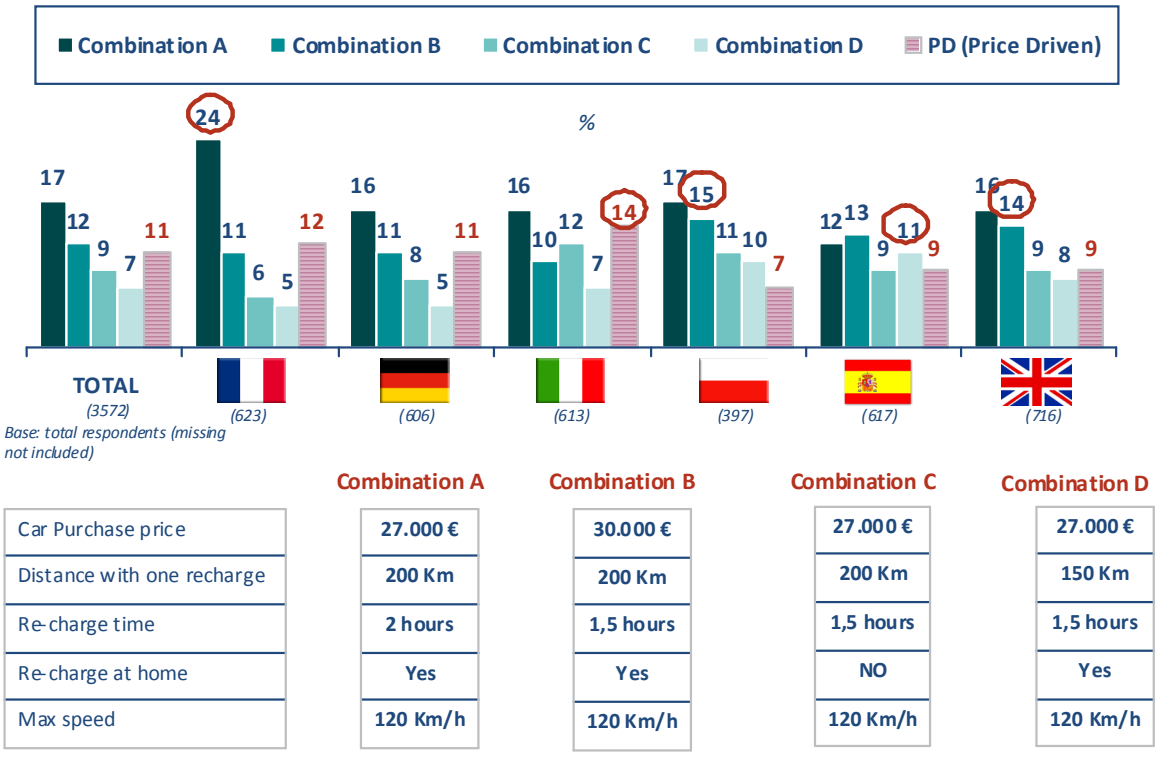
Table 3.2 Main "ideal" combinations of electric car after three choices

Feature	Starting point	A	B	C	D	PD
Car Purchase Price	30.000 €	27,000 €	30,000 €	27,000 €	27,000 €	21,000 €
Distance with one recharge	150 KM	200 KM	200 KM	200 KM	150 KM	150 km
Re-charge time	2 hours	2 hours	1.5 hours	1.5 hours	1.5 hours	2 hours
Re-charge at home	No	Yes	Yes	No	Yes	No
Max Speed	120 Km/h	120 Km/h	120 Km/h	120 Km/h	120 Km/h	120 km/h
% of preferences		***17%***	***12%***	***9%***	***7%***	***11%***

Moving from the starting point, the most preferred ideal combination – selected by 17% of respondents was the one improving purchase price (from 27 to 30 kEuro) as well as driving range (from 150 km to 200 km) and including the possibility to re-charge at home. 12% of the individuals would leave price unchanged and rather reduce re-charge time to 1.5 hours. 9% of individuals, would also reduce re-charge time but would give up re-charging at home. 7% would prefer to reduce price and re-charge time and would like to re-charge at home even if the range of the car remain 150 km. Finally, 11% of respondents were actually focused on just one specific feature, selected for three times: price. So the so called Price Driven (PD) combination represents the third most chosen.

There are some differences in the preference hierarchy of these combinations across countries (Figure 3.11). In France the combination A results largely the preferred one (24%) and the combination "PD" (Price Driven) is the second one. Also in Italy the PD combination is the second one and is also very close to combination A with a percentage that almost mirrors the most chosen one. However, despite the fact that also in Spain "purchase price" was the most mentioned relevant

feature of electric cars, the PD combination ranked below combination D and at the same level of combination C while combination B (where purchase price is not reduced) is the most chosen one. Similarly in Poland the PD combination is less important than the other four. Preferences in UK and especially in Germany are close to the average of the six countries.



	Combination A	Combination B	Combination C	Combination D
Car Purchase price	27.000 €	30.000 €	27.000 €	27.000 €
Distance with one recharge	200 Km	200 Km	200 Km	150 Km
Re-charge time	2 hours	1,5 hours	1,5 hours	1,5 hours
Re-charge at home	Yes	Yes	NO	Yes
Max speed	120 Km/h	120 Km/h	120 Km/h	120 Km/h

Figure 3.11 Main "ideal" combinations of electric car after three choices – country differences

After completion of the exercise which led to the description of the respondents' (constrained) "ideal" electric car, they were asked again about the probability that they would purchase such an electric car instead of a conventional vehicle. A higher probability than the one estimated at the beginning of the exercise was expected (see Figure 3.12). However, this question was aimed also at assessing the potential of the different combinations describing the "ideal" electric car. Even if the relative majority of respondents ended their exercise with combination A as description of their "ideal" electric car, this does not mean that they are keen to purchase this electric car.
Indeed, for all the five main combinations the expressed probability to purchase the electric car is higher than the expressed probability to purchase an electric car with the current features (38.4%). However, despite that the combination A was the most chosen, it ranks just third considering the purchase propensity (47.5%, see numbers at bottom of Figure 3.12). On the other hand, combination D, that was the less selected among the four main combinations, shows a very good level of propensity. In other words those who selected combination D seem more "convinced" about their choice (i.e. expressed a higher level of propensity to buy that particular combination) in comparison to those selecting "Combination A". Also the potential of the PD (Price Driven) combination is above 50%.

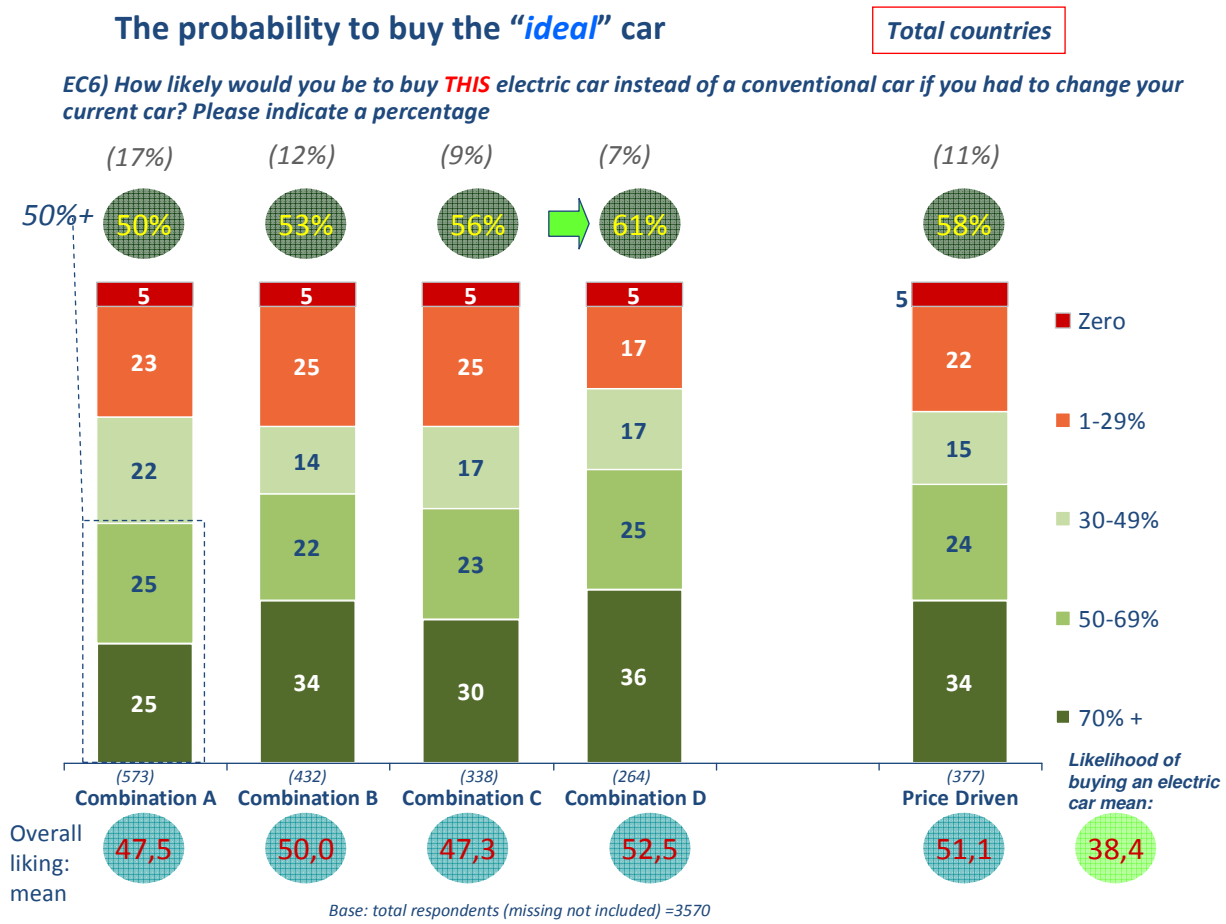


Figure 3.12 Probability of purchasing the "ideal" electric car

This hierarchy of the combinations based on the referred probability of purchasing is not the same in the surveyed countries (Figure 3.13). Combination D is at the top only for Italy and the UK. In Spain, France and Germany the "Price Driven" combination is associated with the highest probability to purchase the electric car. In Poland it is combination B. It is interesting that for the respondents in France the overall propensity to buy an electric car for combination C is lower than for the current electric car. This could be an indication that the respondents implicitly assumed that also the conventional cars on the market will improve over time or other alternative cars will emerge, which will have an influence on the future value proposition of electric cars.

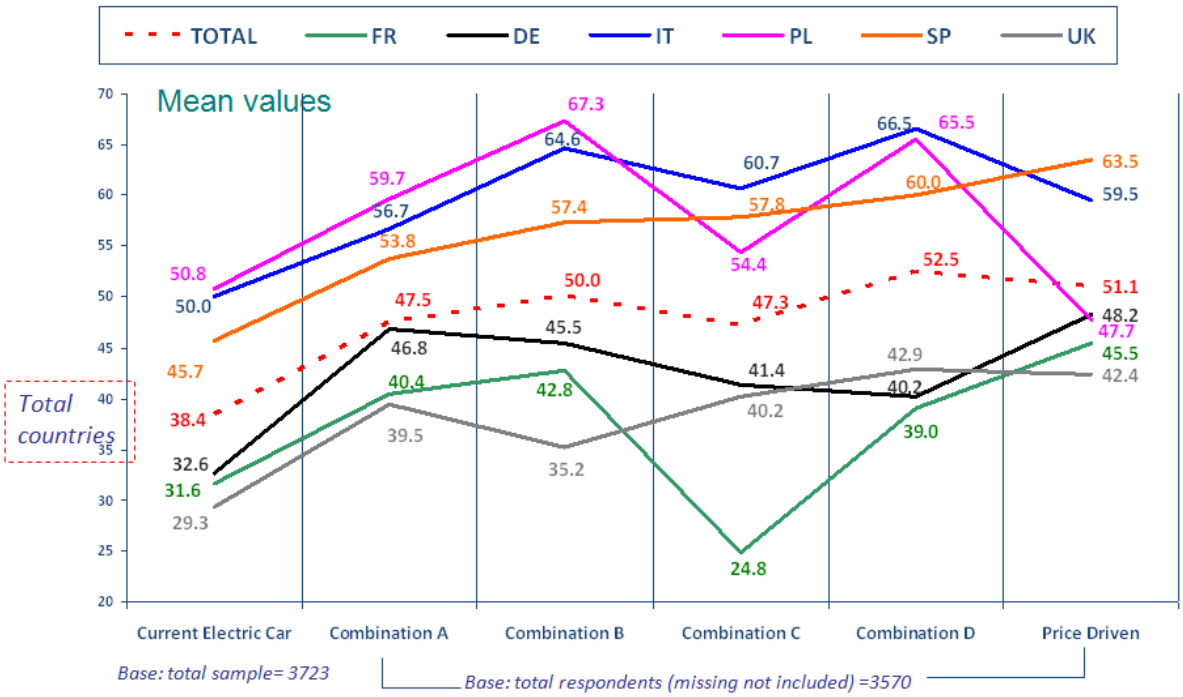


Figure 3.13 Probability of purchasing the "ideal" electric car – country differences

The questionnaire included an open question to investigate the reasons of individuals who are weakly or not at all interested in buying an electric car (even in its "ideal" version). A number of responses were obtained, the most relevant are summarised in Figure 3.14.

Two reasons dominate. The first one is related to the price. Among those expressing a low interest in the purchase of their "ideal" electric car this element is in fact in pole position (56%). The price is a key element in particular for Italian and Polish respondents. The second one is related to perceived challenges with batteries (42%), namely problems of recharge time and life expectation (calendar life/ cycle life) of the battery. Especially in Spain and Germany (48% and, respectively, 47%) respondents are concerned about these aspects.

Other elements referred are far less important. It is worth to mention that in Germany someone is discouraged by the limited car performance (mainly speed) and both in Germany and UK also potential detrimental environmental effects are considered as reasons for not purchasing an electric car.

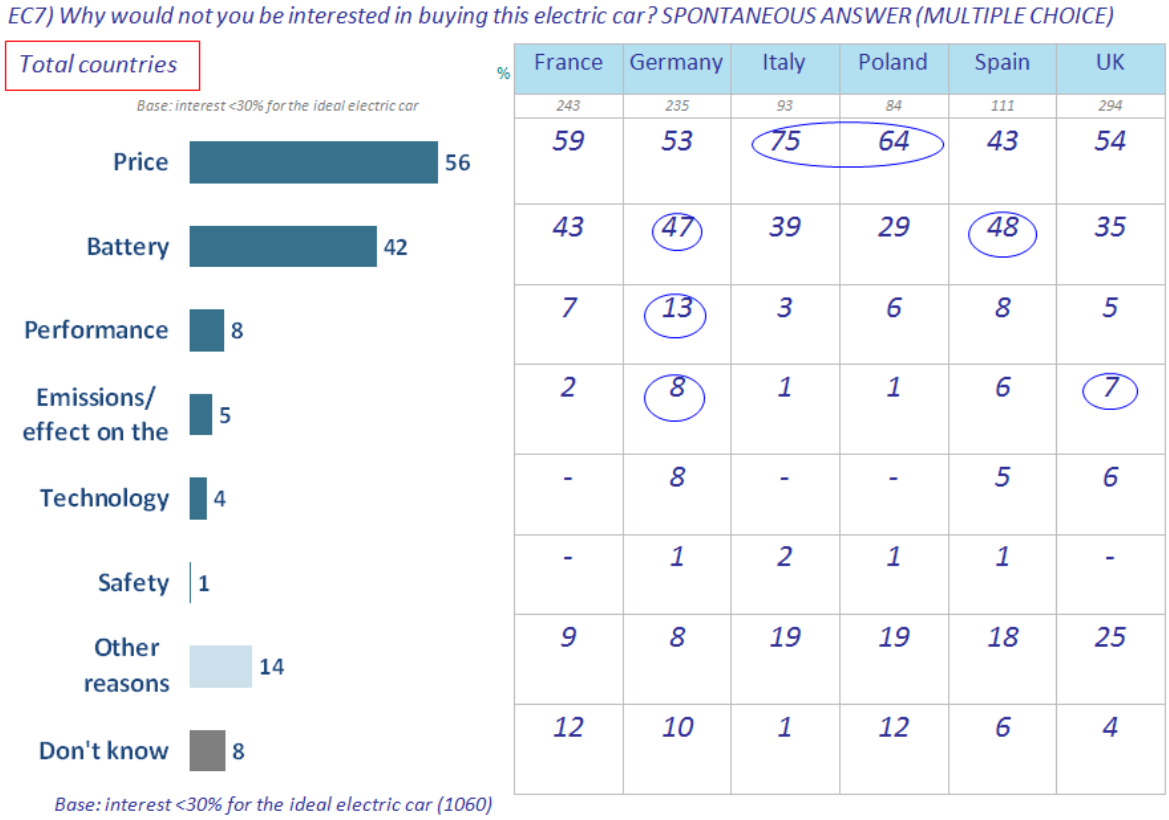


Figure 3.14 Reasons for not being interested in purchasing an electric car

4. Conclusions

The survey on the attitude of European car drivers towards electric cars provided some interesting outcomes, which can be summarised as follows.

First, several individuals admit not to be very familiar with this topic. However, considering that very few electric cars are currently available in the market or seen on roads the level of knowledge is not that bad. Most of the people agree that electric cars are still quite expensive, have zero tailpipe emissions and are emitting relatively little noise.

Second, many people seem to be keen on purchasing an electric car. The referred probability of purchasing an electric car in the next future is probably overestimated but there is an undisputable interest for this alternative.

Third, the clear priority to improve the value proposition of electric cars is to reduce their price and improve their range – i.e. to give the possibility to maintain the same level of mobility cost and autonomy that is currently offered by traditional cars. The possibility to re-charge the car at home for those who do not have a private garage is also a key factor.

The perspective of the European car drivers, as derived from this study, highlights the importance of further R&D investments to improve some of the performance characteristics of electric vehicles. It provides some guidance which performance aspects matter most for car drivers, notably costs and range. The study finds that the familiarity of car drivers with the electric vehicle aspects is lower when direct exposure or driving experience would be needed to properly assess these aspects. This stresses the need of demonstration activities in order to increase public awareness of electro-mobility and also to receive first hand feedback from car drivers on their experience operating an electric vehicle. A majority of the respondents considers that public incentives are needed to foster a wider market deployment of electric vehicles. Furthermore the study shows that an adequate re-charge network is perceived as crucial by car drivers.

It can be concluded that European car drivers see the opportunities that electric vehicles could offer but that a number of pre-requisites need to be fulfilled in order to ensure that the car drivers can consider electric vehicles as a credible vehicle choice.

5. References

Bunzeck, I.; Feenstra, C.F.J.; Paukovic, M., 2011. Evaluation of potential users of electric cars related to charging – A survey in eight EU countries.

Ernst & Young, 2010. Gauging interest for plug-in hybrid and electric vehicles in selected markets.

European Commission, 2011. Communication – Whitepaper: Roadmap to a Single European Transport Area – Towards a competitive and resource efficient transport system. COM(2011) 144.

European Commission, 2012a. Communication - CARS 2020: Action Plan for a competitive and sustainable automotive industry in Europe. COM(2012) 636.

European Commission, 2012b. Driving and parking patterns of European car drivers –mobility survey.

European Environment Agency, 2012. Monitoring CO2 emissions from new passenger cars in the EU: summary of data for 2011.

European Expert Group on Future Transport Fuels, 2011a. Report – Future Transport Fuels.

European Expert Group on Future Transport Fuels, 2011b. Report – Infrastructure for Alternative Fuels.

EurotaxGlass, 2011. Electrification of the Automotive Industry – The European Consumer's View.

JEC, 2011. Joint Research Centre, EUCAR, Concawe - WTW GHG-Emissions of Externally Chargeable Electric Vehicles – Appendix 2 of Well-to-wheels Analysis of Future Automotive Fuels and Powertrains in the European Context.

Annex: The section of the questionnaire related to the electric cars

(ASK ALL)

Section 3: Attitude towards electric cars

SCRIPT: This section is filled in at the end of the week, after the travel diary has been completed.

DISPLAY:
Welcome to the last section of the questionnaire! Remember that you have to fill this section in only once.

In this section we shall be dealing with another topic, namely: the electric car. The electric car is a vehicle that is comparable to your car but that uses exclusively an electric motor for propulsion and batteries for storing electricity. A driving licence is needed to drive this type of car. Neither hybrid vehicles nor minicars are considered here.

EC1) Using a score of 1 to 10, how familiar would you say you are with this topic? (Please enter your score in the space below)

|__|__|

SCRIPT: SHOW SCALE
1= Not at all
10= Completely
Don't know

EC2) Using a scale of from 1 to 10 please tell us how much you agree with the following statements about cars (Please give one answer only for each statement)

SCRIPT: SHOW SCALE

1= I totally disagree
10= I totally agree
Don't know

SCRIPT RANDOM ITEMS

1. Road transport is a major source of emissions, which harm the environment.
2. Driving an electric car is like driving a conventional car with automatic gears. So, in many respects electric cars are just like conventional cars
3. Electric cars are currently quite expensive
4. Electric cars can run for a maximum of 150 km between two charges.
5. The charging time is never less than 30 minutes
6. 100 km cost less than 2 Euros
7. Electric cars have no tailpipe emissions
8. Electric cars are safe
9. Electric cars have high maintenance costs
10. Electric cars increase the pleasure of driving
11. Electric cars are noisy

Incentives) Do you think government incentives to buy electric cars are … (please select one answer only)

SCRIPT ROTATE 1-5 / 5-1

1) Fundamental: only through government incentives will it be possible to buy an electric car
2) Important: they can speed up the introduction of electric cars into the market
3) Useful, they could be a great help when buying an electric car
4) Unnecessary: when buying an electric car technical features are more important than price
5) Bad for the market: in that way the market will become totally dependent on government incentives without being able to develop its own policies.

NEXT SCREEN

SCRIPT SHOW THE TABLE AND THE DISPLAY TOGETHER IN THE SAME SCREEN

DISPLAY A) We are now going to talk about electric cars that are currently available on the market and conventional cars.

NEXT SCREEN

DISPLAY B): This table shows some features of electric cars currently available on the market and conventional cars.

Feature	Electric cars currently available on the market	Conventional cars
Car Purchase price	*More in the range of 30,000 Euros or above*	*More in the range of 20,000 Euros*
Distance with one recharge	*150 km*	*At least 300 km*
Re-charge time	*Not less than 30 minutes*	*5 minutes*
Euros per 100 km	*2 Euros*	*10 Euros*
Total emissions (well-to-wheel)	*low*	*high*

EC3) Taking into account these differences between electric cars and conventional cars, how likely would you be to buy an electric car if you had to change your current car in the next few months? Please indicate a percentage

0% _____▽_____100%

I would definitely not buy an electric car

I would definitely buy an electric car

NEXT SCREEN

SCRIPT SHOW :

- **DISPLAY B**

- **TABLE**
- **EC3**

ON THE SAME SCREEN

NEXT SCREEN

DISPLAY: Please now choose from different features of electric cars. Differences between electric cars and conventional cars are likely to change in the future, as a result of technological progress or policy measures. Assume you have 3,000 Euros. You can use this sum to improve <u>one and only one</u> feature of the electric car in the table.

EC4) Please choose which improvement you would prefer to obtain for 3,000 Euros:

	Feature	Starting point
➲	Car Purchase price	30,000 Euros
➲	Distance with one recharge	150 km
➲	Re-charge time	2 hours
➲	Re-charge at home without private garage	No
➲	Max speed	120 km/h

SCRIPT:
THE RESPONDENT IS ALLOWED TO SELECT <u>ONE FEATURE ONLY PER QUESTION</u>. AFTER THE RESPONDENT HAS MADE HIS/HER CHOICE, SHOW THE IMPROVEMENT MADE IN THE TABLE BELOW. FOR EXAMPLE, if the respondent selects "price":

Feature	IMPROVED	Starting point
Car Purchase price	**27.000 Euros**	30,000 Euros
Distance with one recharge	150 km	150 km
Re-charge time	2 hours	2 hours
Re-charge at home without private garage	No	No
Max speed	120 km/h	120 km/h

NEXT SCREEN
DISPLAY: Assume you have 3,000 more Euros.
Again you can use the money to improve one and only one feature of the electric car (including the feature you have already chosen to improve)

EC5) Please choose which further improvement you would make with these extra 3,000 Euros:

SCRIPT:
THE STARTING POINT OF THE TABLE FOR EC5 CORRESPONDS TO THE RESPONDENT'S LAST CHOICE AT EC4), ACCORDING TO THE IMPROVEMENT MADE. I.E.
IF, AT EC4), THE RESPONDENT SELECTS THE PRICE, THE TABLE WILL BE AS FOLLOWS:

Feature	Starting point
Car Purchase price	**27,000 Euros**
Distance with one recharge	150 km
Re-charge time	2 hours
Re-charge at home without private garage	No
Max speed	120 km/h

Repeated 2 more times (3 in total).
Range of improvements (assuming 3 repetitions of the game)

SCRIPT: BELOW YOU'LL FIND THE COMPLETE MATRIX WHICH INDICATES THE IMPROVEMENTS THAT CAN BE MADE.

Feature	Starting point	Step 2	Step 3	Step 4
Car Purchase price	30,000 Euros	27,000 Euros	24,000 Euros	21,000 Euros
Distance with one recharge	150 km	200 km	250 km	300 km
Re-charge time	2 hours	1.5 hours	1 hours	30 minutes
Re-charge at home without private garage	NO	Yes	Yes	Yes
Max speed	120 km/h	140 km/h	160 km/h	180 km/h

NEXT SCREEN

DISPLAY: These are the features of the electric car you have selected.

Feature	Improved
Car Purchase price Range Re-charge time Re-charge at home without private garage Max speed	The content of the table depends on the answers to the previous questions

EC6) How likely would you be to buy <u>this</u> electric car instead of a conventional car if you had to change your current car? Please indicate a percentage

0% _____▽_____ 100%
I would definitely not buy this electric car
I would definitely buy this electric car

SCRIPT: SHOW DISPLAY TABLE AND EC6 IN THE SAME SCREEN

NEXT SCREEN

(If percentage lower than 30% at Q.EC6)
EC7) Why would you not be interested in buying this electric car? (Please enter your reply below)

Script: open-ended question

99. Don't Know

EC8) In the next 10 years what do you think will be the percentage of electric cars sold in your country? (Please enter a percentage of from 0 to 100% in the box below)

SCRIPT: SHOW SCALE
0% means you think no electric cars will be sold
100% means you think all cars will be electric

|__|__|% Range = 0 – 100
Don't Know

FUEL) In the next 5 years do you think the price of petrol will … (Please select one answer only)

1. Increase a lot
2. Increase a bit
3. Remain stable
4. Decrease a bit
5. Decrease a lot
6. Don't Know

NEXT SCREEN

European Commission
EUR 25597 – Joint Research Centre – Institute for Energy and Transport

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C. Thiel, A. Alemanno, G. Scarcella, A. Zubaryeva, G. Pasaoglu

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Abstract

CO2 emissions from road transport have risen significantly in the past and projections show that they will continue to rise in the future if no adequate policy measures are implemented. Several European initiatives aim at reducing CO2 emissions from passenger vehicles. A potential option to reduce passenger vehicle CO2 emissions is the deployment of electric vehicles (EV). Consumer perception and willingness to purchase these new vehicle technologies lies at the heart of its successful large scale diffusion. This report aims at describing and analyzing how car drivers in the six countries France, Germany, Italy, Poland, Spain, and United Kingdom consider electric cars, how familiar they are with the electric car concept and its main features. It investigates, which features of EVs people consider essential in terms of propensity to consider electric cars a realistic alternative in case they wanted to purchase a new car. 600 drivers on average per each of the six Member States responded to the questionnaire. As a result we derive an "ideal" composition of an electric car in terms of car purchase price, range, re-charge time and maximum speed. The perspective of the European car drivers, as derived from this study, highlights the importance of further R&D investments to improve some of the performance characteristics of electric vehicles. It provides some guidance which performance aspects matter most for car drivers, notably costs and range. The study finds that the familiarity of car drivers with the electric vehicle aspects is lower when direct exposure or driving experience would be needed to properly assess these aspects. This stresses the need of demonstration activities in order to increase public awareness of electro-mobility and also to receive first hand feedback from car drivers on their experience operating an electric vehicle. A majority of the respondents considers that public incentives are needed to foster a wider market deployment of electric vehicles. Furthermore the study shows that an adequate re-charge network is perceived as crucial by car drivers.
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