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Quantifying the factors influencing people's car type choices in Europe

Results of a stated preference survey

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Quantifying the factors influencing people's car type choices in Europe

This study aims at tracking the evolution of the attitude of car drivers towards electro-mobility. The results of a new survey conducted in six European countries are shown. The purchase price continues to represent the major hurdle to widespread adoption of zero tailpipe emission cars.

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Executive summary

In this study, the results of a new survey on attitudes and preferences towards electric vehicles (in this case synonymous with battery electric vehicles) are reported. In addition, these results are compared with those of a similar survey conducted in 2012, so that the evolution of preferences towards electric cars by European drivers can be mapped.

Policy context

The transition to a low-carbon economy is a key political priority for the European Commission. Low- and zero-emission vehicles will need to become a widespread reality in Europe (EU, 2017a).

The CO₂ standards for cars and vans (EU, 2014a) (EU, 2014b) (EU, 2017b) have an impact on low- and zero-emission vehicle models offered in the market. Incentives for these technologies, available in several Member States, can improve the value proposition these vehicles have for consumers (EU, 2017c).

The Directive (2014/94/EC) and its related Action Plan (EU, 2017d) aim to address refuelling infrastructure needs for the deployment of alternative fuels (EU, 2014c). To promote the mass adoption of electric and fuel cell cars, a better understanding of consumers' attitudes and preferences is needed.

Key conclusions

The fact that almost half of the survey sample never chose an electric or fuel cell car as option for their next car purchase in the stated choice experiments leads to the key conclusion that zero tailpipe emission cars still face certain acceptance challenges in Europe.

The purchase price continues to represent the major hurdle to widespread adoption of these powertrains. Other reasons, the respondents mentioned for not buying electric cars, were: lack of recharging infrastructure, short range, little model choice. Policies may help to overcome these challenges.

Furthermore, in general, attitudes towards electric cars in Europe have remained relatively stable in the last five years. Because of the size of the sample, knowledge gaps and uncertainties about the attitudes and preferences of European drivers towards low- and zero-emission vehicles remain.

Main findings

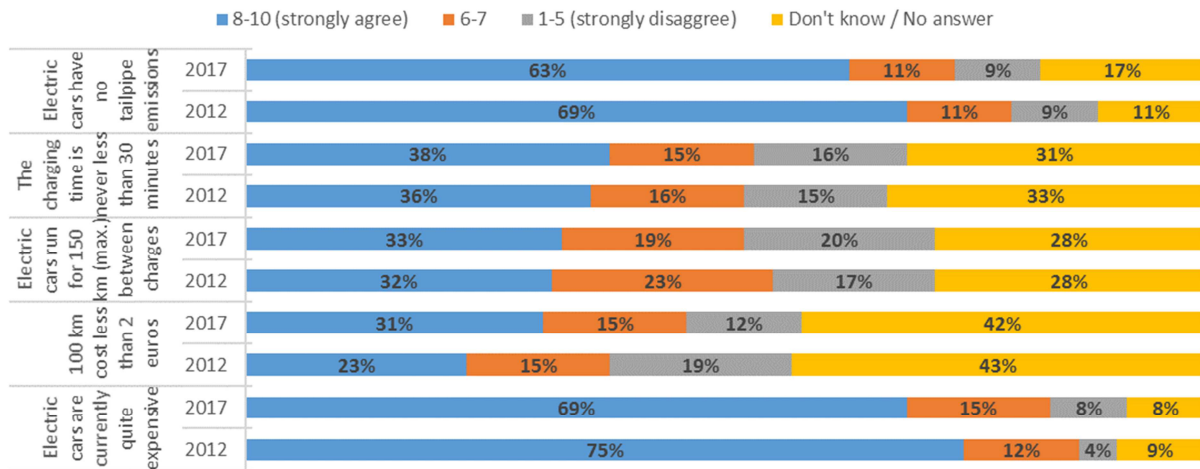
In comparison with the results of the 2012 survey, the proportion of consumers strongly agreeing with the statement that electric cars are currently quite expensive has declined during the past five years. This could be attributed to an improvement of the cost competitiveness of this technology in the last five years together with the introduction of purchase subsidies (e.g. in Germany and Spain, in addition to the then already existing in France and the UK) that lowers their price tag.

A second finding shows that the proportion of the surveyed drivers that strongly agree with the statement on the operating cost of electric cars ("100km costs less than 2 Euros") has increased over time. Thus European drivers seem to better appreciate now the economic advantage of using electricity over conventional fuels in electric cars.

A third finding relates to the fact that the consumer awareness on the environmental benefits of electric cars ("Electric cars have no tailpipe emissions") compared to conventional cars seems to have worsened, due to an increase in 'do not know' answers. This may be a sign of growing consumer awareness on life cycle emission aspects, although the question was limited to tailpipe emissions. In this context it may become important to explain the role of the European policy mix to ensure decarbonisation across sectors and ensuring that emissions are not shifted from one sector to another (EU,

2016). Indeed, zero-emission vehicles could help accelerating the decarbonisation of the power sector (Thiel et al., 2016).

Percentage of agreement with statements on electric cars



Related and future JRC work

Future work involves the econometric estimation of discrete choice models that quantify the factors influencing people’s car type choices and the embedment of this information into the JRC in-house Powertrain Technology Transition Market Agent Model (PTTMAM) (Harrison et al., 2016).

Quick guide

This study is based on a stated preference survey consisting of two stated choice experiments, in which respondents were asked to choose between different types of cars, with a focus on electric vehicles. In this report, electric vehicles refer to battery electric vehicles and plug-in hybrid electric vehicles. The survey was conducted in France, Germany, Italy, Poland, Spain and the UK. In total, 1,248 European car owners answered a questionnaire that contained 23 questions, including those of an attitudinal nature and questions related to the demographic and lifestyle characteristics of the respondent.

1 Introduction

Transport decarbonisation requires the deployment and widespread adoption of cleaner vehicle powertrain technologies. There is a need to better understand the factors that influence people's vehicle type choices. Alternative fuel vehicles (AFVs) such as liquefied petroleum gas (LPG), compressed natural gas (CNG) and flexible-fuel vehicles (FFVs) powered by biofuels are beyond the scope of this report. This report focuses on private passenger cars, so excluding attitudes of those who manage business fleets.

Increasing our knowledge of people's attitudes and preferences, specifically towards electric vehicles (EVs), helps us in our task to scientifically support transport-related policy making of the European Commission (EC). In particular, understanding the influence of car attributes such as range and recharging time on the attractiveness of electric cars, as perceived by consumers, makes a contribution towards determining recharging infrastructure needs in the market. The link between refuelling/recharging infrastructure and car demand is characterised as a 'chicken-and-egg' problem (Achtnicht et al., 2012). At the European Union (EU) level, the Directive (2014/94/EC) on the Deployment of Alternative Fuels Infrastructure (AFI) aims to address infrastructure needs for the deployment of alternative fuels, including electricity (EU, 2014c). Recently, the EC has adopted the 'Clean Mobility Package' that includes an action plan and investment solutions for the trans-European deployment of AFI (EC, 2017).

In 2012, the JRC published a study (Thiel et al., 2012), based on a survey conducted that year, that aimed at:

1. Testing the familiarity of car drivers with EVs;
2. Investigating consumers' interests to purchase an EV; and
3. Inquiring about car owners' priorities for improving the features of current EVs.

The present report, to some extent a follow-up of that study, has the objective of tracking the evolution of the attitudes of European car drivers towards electro-mobility by incorporating the results of a survey conducted in 2017. This new survey deviates from previous work in two significant ways:

1. It does not seek to elicit priorities for improving the features of EVs; and
2. It serves as a basis for further work, to be reported as econometric output separately.

In the 2012 survey, six European countries were chosen as a proxy for the 28 Member States (MS) of the European Union (EU28): France (FR), Germany (DE), Italy (IT), Poland (PL), Spain (ES) and the United Kingdom (UK). In the new survey, the same countries were again selected. Whereas these countries accounted for more than 75% of new car sales in the EU in 2011 (Thiel et al., 2012); they held a market share of ca. 78% in 2016 (ACEA, 2017a).

This report is structured as follows. After the introduction, section 2 describes the survey design. In section 3, a comparison of the results of the 2012 survey is made with the results of the 2017 survey. Conclusions are drawn in section 4. An annex showing the actual questionnaire completes this report.

2 Survey design

Three aspects of survey design are described in this section: the approach adopted to carry out the survey, the degree of representativeness of the survey and the level of respondents' engagement in the stated choice (SC) experiments.

2.1 Description of the approach

This study is based on a new stated preference (SP) survey that incorporated two SC experiments. In an SC experiment, respondents are asked to choose between two or more alternatives described by their key attributes. In this study, respondents participated in two experiments. First, they were asked to make choices between two generic (unlabelled) car type alternatives, described by key car type attributes (SP1). The aim of this experiment was to provide information on the relative importance of different car type factors. Second, they were asked to choose between a range of different car types, described by their specific attributes, e.g. purchase price, range (SP2). The aim of this experiment was to collect information on their preferences for different car types and to quantify substitution rates between the different alternatives. In the survey, each respondent was presented with eight different SP choice tasks (four choices for SP1 and four choices for SP2).

Based on the outcomes of a literature review (Jensen et al., 2013) (Hackbarth and Madlener, 2013) (Franke and Krems, 2013) (Kim et al., 2014) (Hoen and Koetse, 2014), the following six car attributes were identified as being important in consumers' car type choices and were therefore included in SC experiments: purchase price, operating cost, depreciation, range, refuelling/recharging times and emissions. Three car sizes were considered: small, medium and large. In order to reduce the cognitive burden on respondents, the second experiment considered five car alternatives only: internal combustion engine (ICE)-petrol, ICE-diesel, hybrids (conventional or plug-in hybrid (PHEV)), battery electric (BEV) and hydrogen fuel cell (FC).

The questionnaire contained 23 questions, including those of an attitudinal nature and questions related to the demographic and lifestyle characteristics of the respondent, including gender, age group, household income and residential location by area type as well as car ownership profile. Education attainment was used as a surrogate for propensity to adopt EVs.

The questionnaire of the 2012 survey was answered by 3,723 respondents, ranging from 548 in Poland to 716 in the UK. In the 2017 survey, 1,248 respondents answered the questionnaire (see Table 1). Therefore, the size of the sample of this study is smaller, almost a third, than the one on which the 2012 study was based. Whereas IPSOS was chosen in 2012, the 2017 survey was conducted by *Gesellschaft für Konsumforschung* (GfK).

Table 1. Number of respondents in 2012 and 2017, by country

	FR	DE	IT	PL	ES	UK
2012	623	606	613	548(*)	617	716
2017	200	200	248	200	200	200

(*) A section of this Polish survey was answered by only 397 respondents.

Source: (Thiel et al., 2012) and survey results (N=1,248).

The new survey was conducted in June 2017. The questionnaire was made available to respondents in the national languages of all countries surveyed in order to maximise respondent engagement and understanding. Budget constraints limited the design of the questionnaire so that it could be completed within 10 minutes. A pilot survey of 30

respondents was undertaken in the UK to test the questionnaire and survey methodology.

2.2 Sample representativeness

How representative can the survey presented in this report be considered? The aim of the sampling approach specified by the research design was to secure a broadly representative sample. The respondents were recruited from online panels, with the survey being conducted using computer assisted web interviewing (CAWI). However, members of such panels are usually not recruited in a random fashion. An evident feature of web-based surveys is a bias towards certain groups in the population. Often in their raw form the datasets are not designed to be wholly representative of relevant 'populations' but typically require application of weights or other tools to ensure they are robust for an intended purpose.

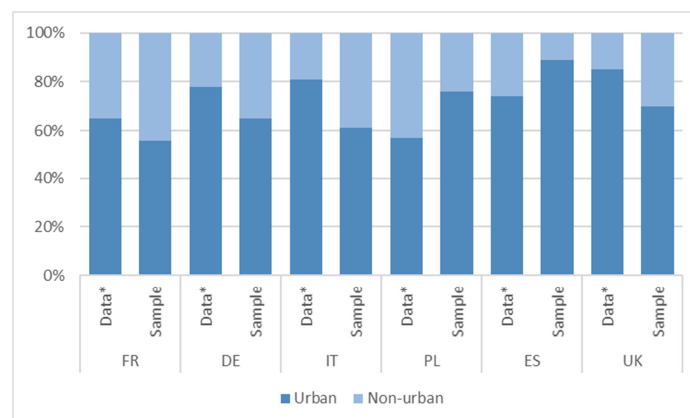
The sampling approach adopted for this study involved using a random sampling approach applied to national online panels using the GfK network. To participate in the survey respondents had to own a car. The sample design is therefore not intended to be representative of the wider population, but rather of households owning cars. The samples were drawn by setting target quotas by age, gender and educational level. Respondents entered the sample when they passed the demographic and car ownership screening questions and completed the questionnaire.

Statistical tests (encompassing a combination of parametric and non-parametric indicators including binomial, chi square and t-tests) have been undertaken for differences between sub-samples, the panel and, where comparable official data was readily available, for wider national statistics.

2.2.1 Socio-economic characteristics

The type of location where people live is expected potentially to have a significant impact on the EV car market. Overall, nearly 40% of respondents lived in urban areas with population greater than 200,000, with 11.6% living in large urban areas with population more than 1 million. The distribution of responses from the online sample is shown in Figure 1.

Figure 1. Distribution of population by area where the household lives, by country



(*) 2015.

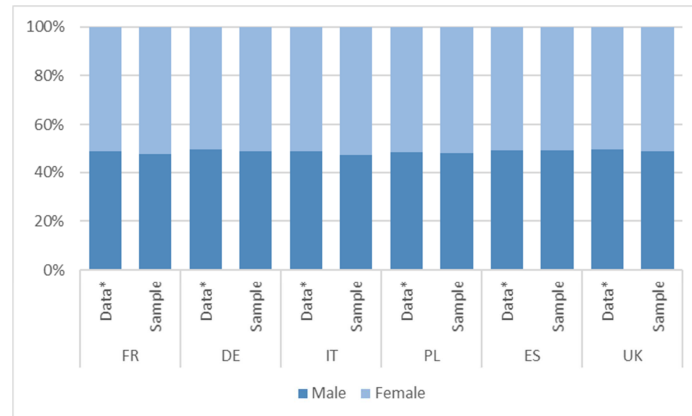
Source: (Eurostat, 2017) and survey results.

The sample from Spain shows a higher proportion of respondents living in urban areas, compared to the other countries. Almost one third of respondents lived in non-urban areas, with higher proportions of respondents in France and Italy. Though the differences are not dramatic, urban households tend to be unrepresented compared to the

population as whole for the UK, France Germany and Italy, while the opposite is the case for Poland and Spain. This may suggest differences in the distribution of car ownership and non-car owning sections of the population and yet further differences between these patterns in more affluent MS and other countries.

Figure 2 shows the distribution of the sample and population by gender. As can be seen, the sample is representative of the total population by gender.

Figure 2. Distribution of population by gender, by country



(*) 2016.

Source: (Eurostat, 2017) and survey results.

Table 2 shows the age profile. It seems that the sample is broadly consistent with what can be expected for the household car owning population groups in the respective countries.

Table 2. Age distribution of population, by country

	Age	FR	DE	IT	PL	ES	UK
Survey sample	18-34 years	26.0%	24.0%	20.2%	30.0%	24.0%	28.5%
	35-54 years	34.0%	34.5%	42.7%	33.5%	38.0%	34.5%
	55+ years	40.0%	41.5%	37.1%	36.5%	38.0%	37.0%
Observed proportions(*)	18-34 years	25.9%	24.5%	21.7%	29.5%	23.1%	28.6%
	35-54 years	33.9%	34.0%	36.6%	33.3%	39.3%	34.1%
	55+ years	40.2%	41.5%	41.7%	37.2%	37.6%	37.3%

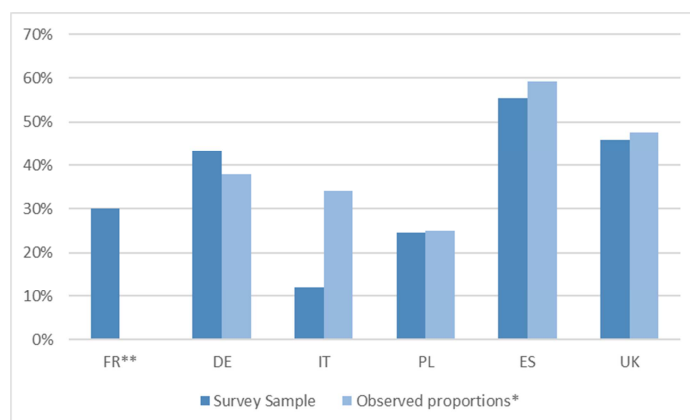
(*) 2016.

Source: (Eurostat, 2017) (% shown based on population aged 18+ years) and survey results.

Education attainment was included explicitly in the survey instrument design as surrogate for both income and likely attitude towards mass adoption of EVs. The sample from France, Poland and Spain contained higher proportions of respondents who had

'elementary (primary) school education or less'. The sample from Italy also had much lower proportions who completed secondary school or achieved university graduation. Figure 3 shows the proportion of the population achieving graduation at tertiary level. Inspection of the data on educational attainment among respondents compared to national data for graduation rates at tertiary level suggests the samples for the UK, Germany, Poland and Spain are broadly representative of the wider populations in those countries. It also seems reasonable to assume that the samples are broadly representative of the educational attainment levels of the car owning sections of their respective populations.

Figure 3. Distribution of population achieving graduation at tertiary level, by country



(*) 2014. (**) Observed proportion for France not available (N/A).

Source: (OECD, 2017) and survey results.

Given the importance of income in understanding developments in the car market, respondents were requested to provide an estimate of their households combined yearly income (before tax), in the currency of their country. Respondents were then classified into eight separate income categories (including a 'Prefer not to say' category). Their responses are summarised for Eurozone MS in Table 3.

Table 3. Household income distribution in the survey sample for Eurozone MS

Income level	FR	DE	IT	ES
Up to EUR 11,999	10.0%	3.5%	13.7%	4.5%
EUR 12,000 – EUR 17,999	12.0%	7.5%	12.5%	13.5%
EUR 18,000 – EUR 29,999	27.5%	15.5%	27.8%	20.5%
EUR 30,000 – EUR 39,999	19.5%	17.0%	17.8%	18.5%
EUR 40,000 – EUR 59,999	16.0%	20.0%	9.3%	15.0%
EUR 60,000 – EUR 89,999	4.5%	12.5%	4.0%	12.0%
EUR 90,000+	1.0%	5.5%	2.0%	2.0%
Prefer not to say	9.5%	18.5%	12.9%	14.0%

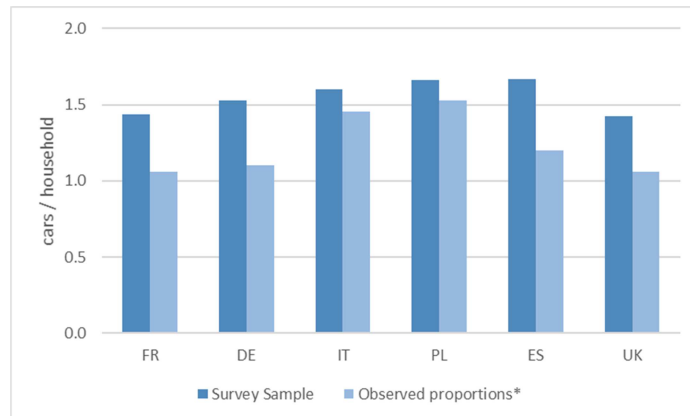
Source: Survey results.

2.2.2 Car ownership and travel patterns

Below Figure 4 displays national statistics for car ownership and household characteristics. Inspection of the sample data and available national statistics, statistical tests and a sense check across the selection of countries suggests, on the basis of the indicator 'cars per household', that the samples drawn from the national panels are typical of conditions applying to each of the MS surveyed.

Furthermore, around 6% of respondents have access to a personal company car, 5% have access to a car pool for employees and a very small number of respondents are self-employed with a company car.

Figure 4. Cars per household, by country

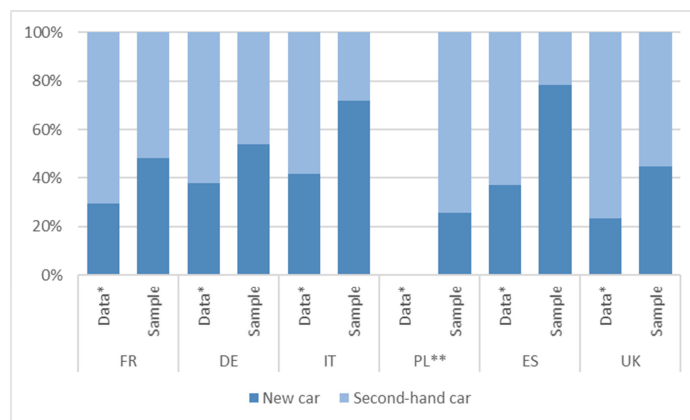


(*) 2015 and 2016.

Source: (Eurostat, 2017) and survey results.

With regards to car size, respondents in Italy owned the highest proportion of small cars, respondents in Germany and Poland owned the highest proportion of medium-sized cars and respondents in Spain owned the highest proportion of large cars. The survey sample appears to underrepresent small cars, although generally the representation is in the right order of magnitude across the countries. The distribution of respondents (N=1,248) by the size of the car they owned at the time the survey was conducted can be seen in Figure 16 (see section 3.2).

Figure 5. Distribution of new versus second-hand car purchase, across all surveyed countries



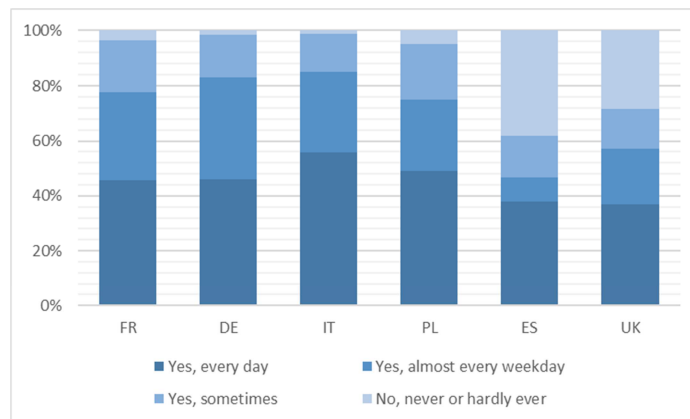
(*) 2010. (**) Data for Poland was N/A.

Source: ACEA/National Trade Bodies in (BCA, 2012) and survey results.

Respondents were invited to indicate whether their last car purchase was a new or second-hand car. The distribution of responses can be seen in Figure 5. A larger proportion of the survey sample report that they last purchased a new car compared to general market data (although it is noted that these data are from 2010). Whereas respondents in Italy and Spain were much more likely to purchase new cars, respondents in Poland were much more likely to purchase second-hand cars.

The next two figures do not intend to measure the degree of representativeness of the sample, but provide information on the travel patterns of the respondents. Given the importance of car ownership for commuting, respondents were asked whether they usually commute by car. Nearly half of the respondents commute by car every weekday. As illustrated in Figure 6, very small proportions never or hardly ever commute by car, except in the UK and Spain.

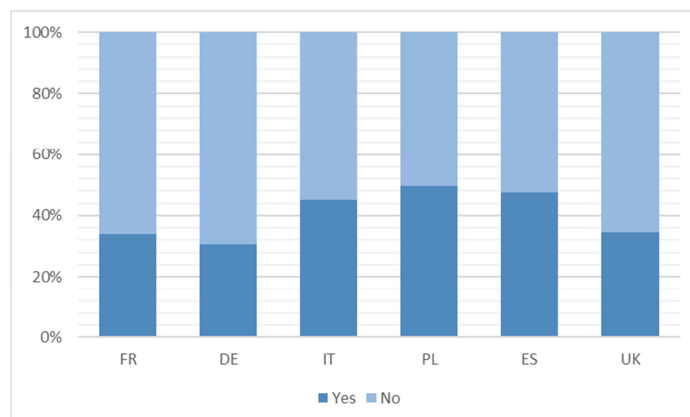
Figure 6. Commuting by car, by country



Source: Survey results.

Respondents were also asked about their regularity of travel to large urban areas, which could influence perceptions of charges introduced in such areas for car travel (particularly in the SP2 experiment). Around 40% of respondents regularly (i.e. 2-3 times per week) travel to a large urban area (population greater than half a million). Figure 7 shows the results by country.

Figure 7. Regularity of travel to large urban areas, by country



Source: Survey results.

2.3 Respondents' engagement in the stated choice experiments

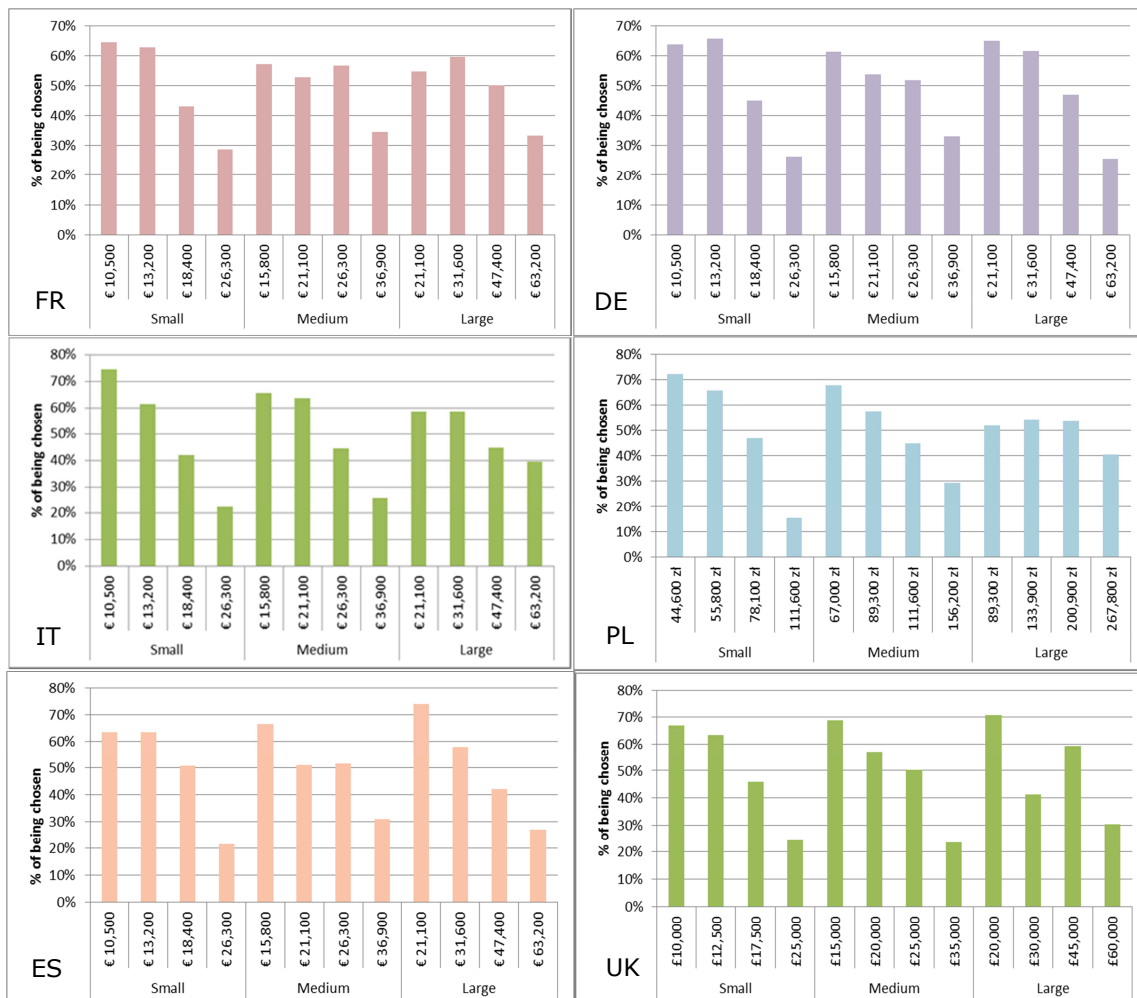
Two measures to examine respondents' engagement in the SC experiments were explored. The first one looked at the influence of attribute levels on the choices that the respondents made. Secondly, trading behaviour across alternatives was investigated.

2.3.1 Influence of attribute levels on choices

One way to examine respondents' engagement in the SC experiment is to look at respondents' sensitivities to changing attribute levels in the choices they made. As an example, the variable 'purchase price' is considered.

Figure 8 presents the proportion of respondents that chose an alternative at a specific purchase price level in the first SC experiment, in each of the countries sampled. It is emphasised that in the choices the other attributes are also varying, and this is not taken into account in the figure (but was taken into account in the modelling analysis). The vertical axes of the charts show the proportion of respondents choosing an alternative; the horizontal axes are the purchase price levels included in the SP1 experiment for each car size. As can be seen, the impact of purchase price is as expected, i.e. as the purchase price increases, the percentage of the respondents that selected the option decreases, especially for the small and medium-sized car. This pattern occurs across all six countries.

Figure 8. Influence of purchase price levels on stated choices, by country

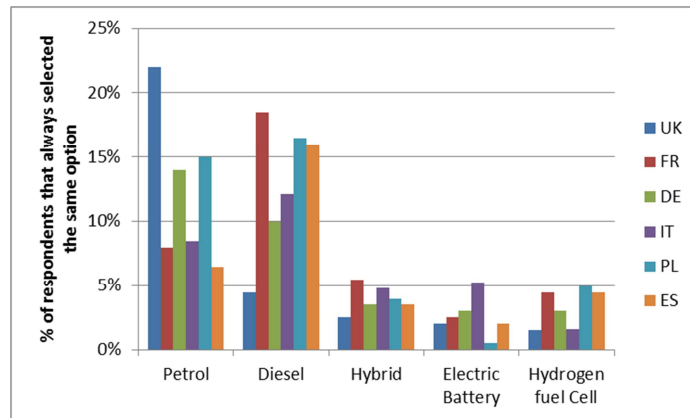


Source: Survey results.

2.3.2 Trading behaviour across alternatives

With a focus on the SP2 experiment, the extent to which respondent's choices varied across the five alternatives in the choice scenarios is explored. Figure 9 presents the percentage of respondents who always selected the same alternative across the choices presented in the experiment. Over 20% of respondents did this for petrol cars in the UK. The proportions of respondents who always chose hybrid, BEV and FC cars are relatively low. However, none of these proportions is very high, suggesting substantial trading within the experiment.

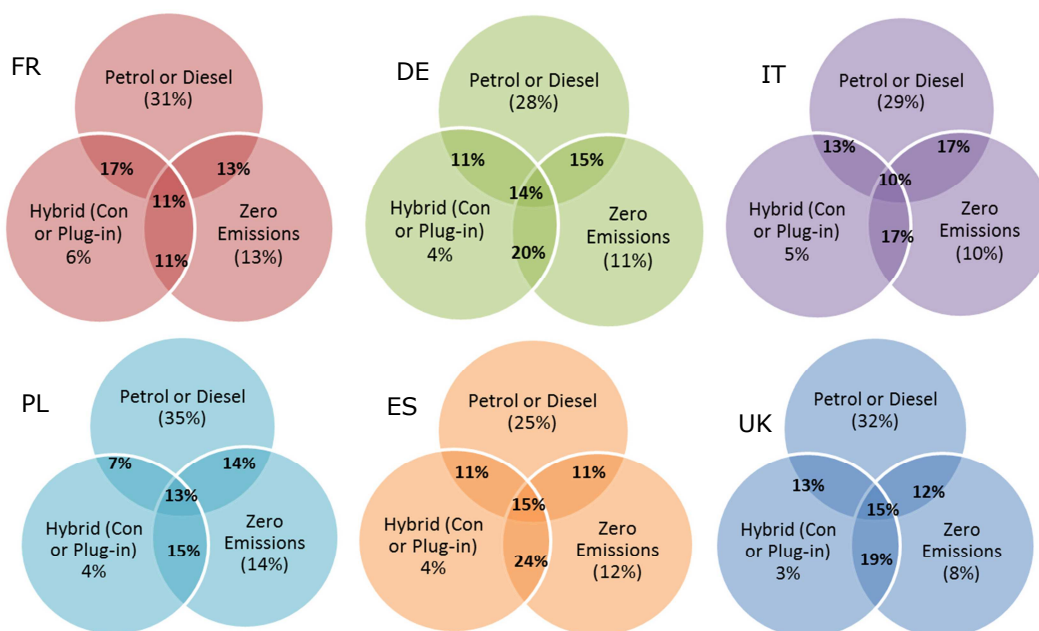
Figure 9. Proportion of respondents who always choose one alternative, by country



Source: Survey results.

Furthermore, Figure 10 summarises in country-specific Venn diagrams the trading behaviour across the five different car alternatives (aggregated into three classes). The overlap area in the diagrams show the proportion of respondents who switch between the car types within the experiment. In all the six countries nearly a third of people always selected ICE cars. Smaller proportions are found for hybrid than for zero emission cars. Overall, a relatively good balance of trading different car types can be observed.

Figure 10. Trading behaviour across alternatives, by country



Source: Survey results.

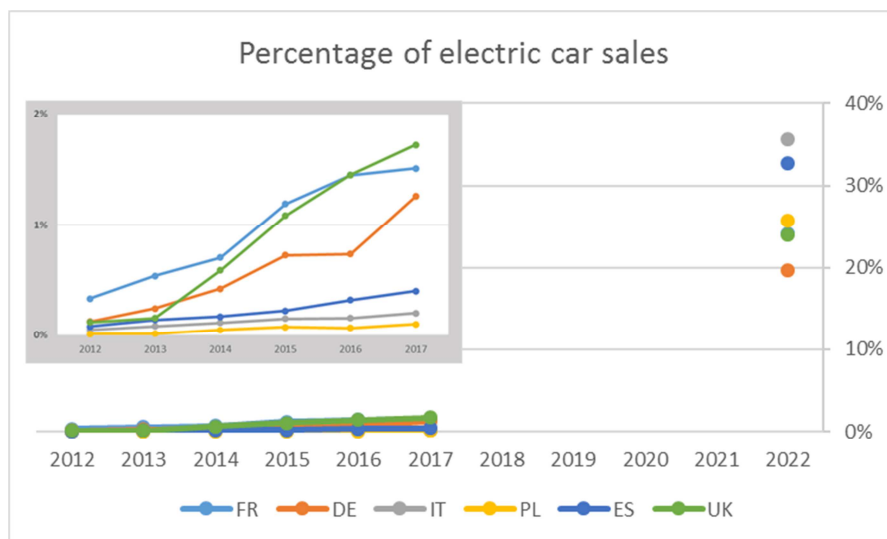
3 Key survey results

The results of the survey reported here cover two facets. Firstly, a comparison with the results of the 2012 survey is made. Secondly, novel insights are given.

3.1 Comparing the results of the 2012 and 2017 surveys

Before comparing the results of both surveys, it is salutary to take stock and examine the role of expectations. In the 2012 survey, respondents were asked to communicate their expectations about the percentage of electric car sales in the next 10 years. From that question, mean values were calculated for each country. Figure 11 shows these, together with 2012-2017 data from (EAFO, 2017). It is unknown whether 2012 survey respondents had in mind a linear or a non-linear market uptake between 2012 and 2022. What is clear is that, after five years, growth in the percentage of electric car sales has taken place (albeit marginal in Italy and Poland). However, if the expectations the respondents from the 2012 survey had are to be met, faster sales growth is needed in the next five years to meet the 2022 expected levels.

Figure 11. Expectations in 2012 on EV market uptake by 2022 versus data



Source: (Thiel et al., 2012) (N=3,723) and (EAFO, 2017) [as of October 2017].

The questionnaire used in the 2017 survey (see Annex 1) is an amended version of the one employed in the 2012 survey (cf. Annex in (Thiel et al., 2012)). Therefore, both surveys are, strictly speaking, not comparable. Despite this, a comparison of the results of both surveys, which took place in a time span of ca. five years, is deemed to be a useful exercise.

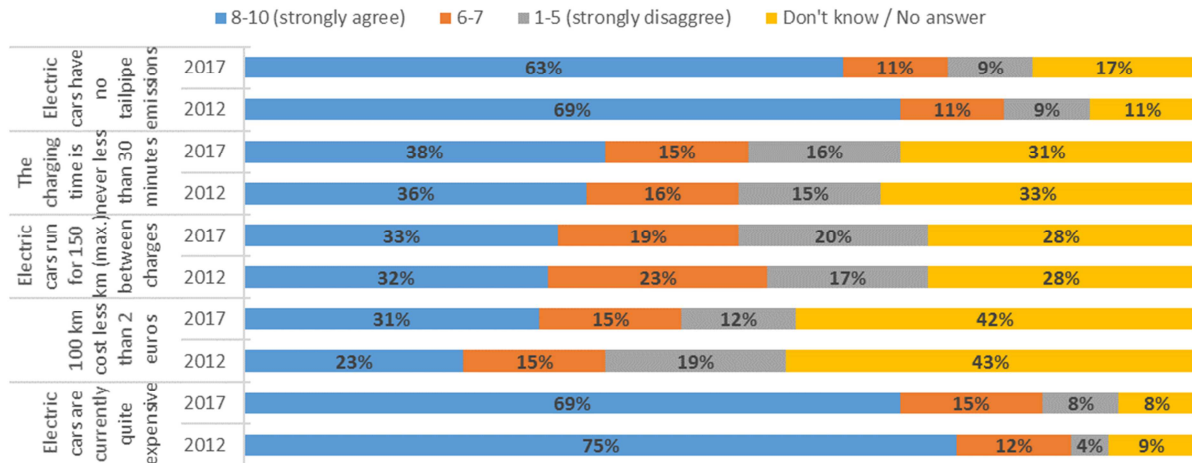
In 2012, 46% of the respondents declared that they were “not at all familiar” with electric cars. Particularly high percentages were found among French and British respondents. In 2017, this question was not asked because of the aforementioned time limit. However, in theory European car drivers should have become more familiar with this technology since then, for more recharging stations are visible in public areas, more models are now available in the market and registrations of electric cars have gathered pace in the last two years (see (EAFO, 2017)).

In the 2012 survey, respondents were asked to indicate the level of agreement with a set of statements, with answers ranging from 1 (the highest level of disagreement) to 10 (the highest level of agreement). In the new survey, five of these statements were retained and the results across all countries are shown in Figure 12:

— “Electric cars have no tailpipe emissions”: 63% of the sample strongly agreed;

- “The charging time is never less than 30 minutes”: 38% of the sample strongly agreed;
- “Electric cars run for a maximum of 150 km between charges”: 33% of the sample strongly agreed;
- “Driving 100 km on an electric car costs less than 2 euros”: 31% of the sample strongly agreed; and
- “Electric cars are currently quite expensive”: 69% of the sample strongly agreed.

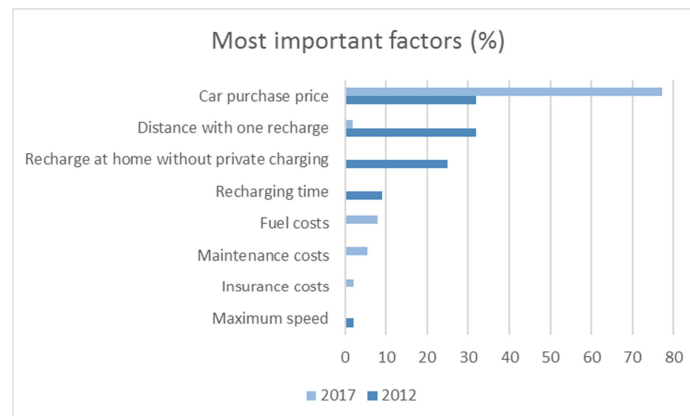
Figure 12. Percentage of agreement with key statements in 2012 versus 2017



Source: (Thiel et al., 2012) (N=3,572) and survey results (N=1,248).

In both 2012 and 2017, a substantial proportion of respondents agree with the statement that electric cars are expensive and that they have no tailpipe emissions. Across the five statements there is a substantial proportion of respondents who indicated ‘don’t know’, both in 2017 and 2012. Interestingly, the proportions who answer ‘don’t know’ are very similar between the two time periods. The lowest level of ‘don’t know’ responses are observed for the statements on whether electric cars are expensive or whether they have no tailpipe emissions. The highest levels are around operating costs levels. The highest levels of ‘don’t know’ responses were observed in the UK (not shown) for all of the statements.

Figure 13. Top factors in car choices across all surveyed countries

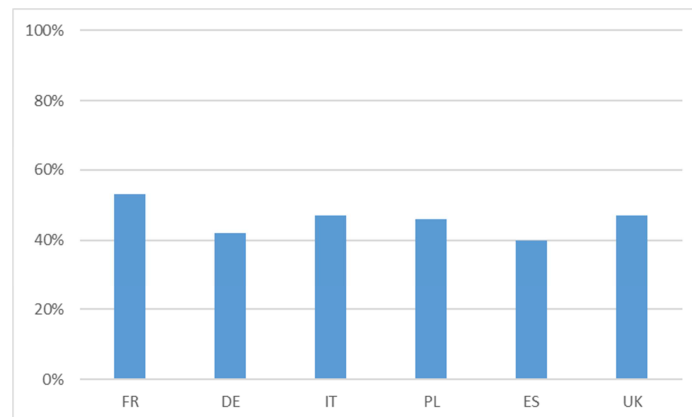


Source: (Thiel et al., 2012) (N=3,572) and survey results (N=1,248).

Respondents were then asked to indicate the top three factors that would be important to them when choosing a car. Their responses, aggregated across countries, are shown in Figure 13. In this figure, the 2017 values refer to 'first choices' (the 2012 values reflect the 'most chosen improved feature', which was the wording used in the 2012 survey). The top factor was purchase price, which was chosen by 77% of respondents across all countries as their first choice (interestingly but not shown in that figure, it was never chosen as a second or third choice). The priority of this factor was consistent across countries. Further, fuel costs and maintenance costs become important in the second choices (not shown), followed by brand/manufacturer. Again, these patterns were quite consistent across countries (although more Polish respondents report maintenance costs to be important compared to fuel costs).

A range of other factors become important in the third choices, including maintenance costs, insurance costs, brand/manufacturer, perceived reliability, safety rating and comfort. It is noteworthy that some of the choice considerations widely associated with EVs did not emerge as particularly significant when consideration is not focused explicitly on such vehicles. In particular driving range, recharging time and access to recharging infrastructure did not generate high ratings. Maximum speed and, especially, recharging availability were identified as influencing factors in 2012 but not in the 2017 survey. In fact, all top factors were cost-related in the new survey. In contrast, charging-related factors featured more prominently in the 2012 survey results. In both surveys, range appeared to be more important for respondents than recharging time.

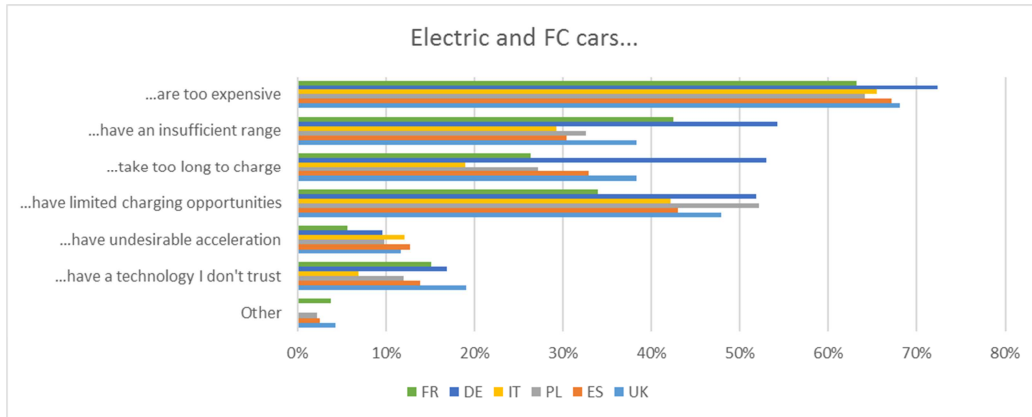
Figure 14. Share of respondents who never chose an electric or fuel cell car, by country



Source: Survey results.

In the second SC experiment, it is noteworthy that 46% of the sample did not select electric or FC cars. This information can be seen by country in Figure 14. If respondents never chose an electric or FC car, they were asked to provide a reason from a pre-defined list. The reported reasons for not choosing these alternatives are shown in Figure 15 (see Annex 1 for an accurate description of the stated reasons). In all the surveyed countries, the most important reason for not choosing electric or FC cars was the purchase price. This was followed by the risk of limited recharging opportunities when travelling for Polish, German and British respondents and insufficient driving range for German and French respondents. The concern over excessively long recharging times was also pointed out, particularly by German respondents. When asked for reasons why people didn't purchase EVs in 2012, the purchase price was also the main reason, followed by issues with the battery (mainly related to recharging time and longevity). Since purchase subsidies for electric cars lower the purchase price of these powertrains, the respondent's views on purchase subsidies for electric cars is of interest. A question on this was asked in 2012 and retained in the 2017 survey. The results will be reported in a separate publication.

Figure 15. Reported reasons for not choosing electric or fuel cell cars, by country



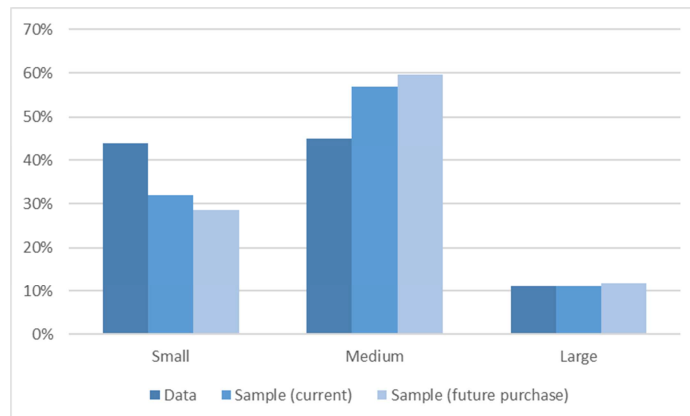
Source: Survey results.

3.2 Novel insights

This section centres on new information that was not gathered in the 2012 survey. Although the next figures provide insights into the surveyed European markets in general (that is, they do not address electric cars directly), they do have implications for new sales of low-emission and zero tailpipe emission cars.

Figure 16 shows the distribution of respondents by the size of the car they owned at the time the survey was conducted as well as the size the respondent would probably purchase, if they were to purchase a new car. Across all countries, a reduction in reported purchases of small cars compared to the size of currently owned cars can be seen, and an increase in medium-sized cars (except Poland), with a small increase in large cars (mixed across countries).

Figure 16. Distribution of car sales by size, data versus sample (current and future)

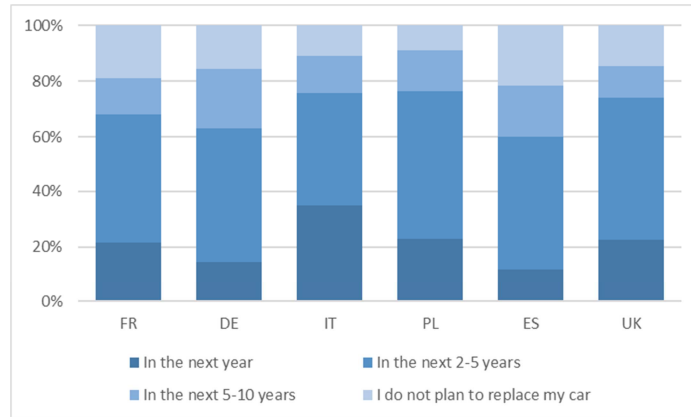


(*) Data refers to 2016 (average excluding Poland, which was N/A).

Source: (ACEA, 2017b) and survey results (N=1,248).

Respondents were also asked when they would be likely to purchase their next car. Nearly half of the respondents indicated that they were planning to purchase a new car in the next two to five years (see Figure 17). Circa 22% were planning to purchase their car in the next year, with more respondents in Italy planning to purchase a new car in the next year and fewer in Germany and Spain. Nearly 15% indicated that they do not plan to replace their car.

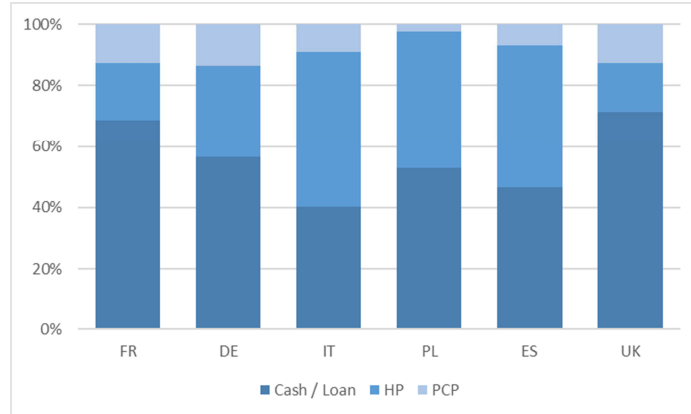
Figure 17. When respondent is planning to purchase their next car, by country



Source: Survey results.

Moreover, respondents were asked how they would likely purchase their car. They were offered three purchasing options: (i) that they would pay cash or take out a personal loan, (ii) that they would purchase the car through a 'hire purchase' (HP) option (i.e. they would make a down payment and pay monthly instalments for the car); or (iii) that they would make a purchase under a 'personal contract purchase' (PCP) plan (i.e. they would pay a deposit and make monthly payments for the car and after 3 years they would not own the car but would have the option of paying off the balance owed or starting a new plan on another vehicle). Figure 18 summarises the answers to this question.

Figure 18. Reported purchase option for new car, by country



Source: Survey results.

The highest proportion of respondents indicating that they would pay cash (or take out a loan) were in the UK and France. Italy and Spain had the lowest proportion of respondents who indicated that they would pay this way. However, they had much higher proportions of respondents who said that they would pay by HP, along with respondents in Poland. This was the least favourite way of purchasing a vehicle for respondents from the UK and France. Overall, arguably surprising given actual purchasing behaviour in the UK, the proportion of respondents proposing to purchase a PCP plan was small, with the highest proportions in the UK, France and Germany. However, it must be emphasised that for practical reasons this question was positioned in the survey instrument prior to the prospective respondent being presented with details of payment requirements. Subsequent questioning of some pilot survey interviewees and the car retail sector highlights the significance of the salesperson's role in making the potential car buyer aware of the initial outlay savings to the purchaser under the PCP model.

4 Conclusions

4.1 Summary and concluding remarks

This study shows the results of a new survey on car type choices, conducted five years after a 2012 survey reported in (Thiel et al., 2012). In the new survey, 1,248 car owners in total were surveyed in France, Germany, Italy, Poland, Spain and the UK. The 2017 questionnaire consisted of 23 questions and two stated choice experiments, including a variety of awareness and attitudinal questions in relation to electric cars, whereas the original survey focused on the attitudinal questions.

In the second experiment, nearly half of the respondents never chose the electric or fuel cell car option. The main reason given for this was the purchase price. Therefore, the higher upfront cost consumers face for electric and fuel cell cars continue to be a key barrier, as the 2012 survey revealed that reducing purchase price was a priority to improve the value proposition of electric cars. Interestingly, fuel costs and maintenance costs (which were not considered in 2012) also play a role in the car purchasing decision (Figure 13), but they are not as important as purchase price. For a recent comprehensive analysis of total cost of ownership, see (Lévy et al., 2017).

Due to a robust survey design and execution of the stated choice experiments and a thorough analysis of their results, we can expect to gain an improved understanding on the factors that influence people's car type choices, specifically in relation to electric vehicles. This will add to the existing literature on this subject, such as the one mentioned in section 2.1.

Although the stated choice experiment focused on the purchase of a new car, nearly half of the 2017 sample survey purchased a second-hand car for their last car purchase. Purchasing second-hand cars can have a negative impact on the adoption of novel powertrain technologies, which are yet to enter the second-hand car market. However, over the next years this impact is thought to be lower for electric than for fuel cell cars.

For manufacturers, the finding that driving range appears to be more important for respondents than recharging time can have direct implications on their strategies for electric vehicle battery capacity.

Altogether, the main reasons that respondents mentioned for not buying electric cars were: their relatively high purchase price, lack of recharging infrastructure, range concerns, and too little model choice. Policies can help to remove or overcome these adoption hurdles.

Comparing our 2017 findings to the 2012 survey, attitudes towards electric cars in Europe can be described as relatively stable, with three main findings:

1. While the purchase price continues to be identified as the most important factor for respondents when it comes to choosing a car, the proportion of the sample that strongly agrees with the statement that electric cars are currently quite expensive has decreased over time;
2. The proportion of the surveyed drivers that strongly agree with the statement that driving an electric car has a cost of less than 2 euros per 100 km has increased over time; and
3. Consumer awareness on the environmental benefits of electric cars compared to conventional cars seems to have worsened, due to an increase in 'do not know' answers.

4.2 Limitations and further research

A main limitation relates to the duration of the survey, which was constrained to a time limit of 10 minutes. Additional resources and time could have led to a full replication of the 2012 survey questions, thereby ensuring a more consistent comparison between the results of both surveys.

It is pertinent to note that the size of the sample in the survey on which this study is based is smaller, by almost two thirds, than the one on which the 2012 study was based. Again, this was limited by resources available for the study. Overall, the sample obtained had a satisfactory degree of representativeness for the purpose it was designed for, although some characteristics of the sample with regards to the reference universe can be challenged. It is worthwhile to remember that the benchmark for the sample is not the wider population, but the households owning cars. An advantage over the 2012 survey is an explicit consideration of three car sizes (small, medium and large) as well as several purchasing options.

Much of the information gathered in this new survey has been used to quantify econometrically the factors that influence people's car type choices in the selected European countries. As a result, discrete choice models have been estimated. These will be reported in a separate publication.

References

- ACEA, 2017a. Historical series 1990-2016: new passenger car registrations by country. ACEA - European Automobile Manufacturers' Association [WWW Document]. URL <http://www.acea.be/statistics/tag/category/by-country-registrations> (accessed 5.15.17).
- ACEA, 2017b. Historical series 1990-2016: new passenger car registrations by segments & body. ACEA - European Automobile Manufacturers' Association [WWW Document]. URL <http://www.acea.be/statistics/tag/category/segments-body-country> (accessed 5.15.17).
- Achtnicht, M., Bühler, G., Hermeling, C., 2012. The impact of fuel availability on demand for alternative-fuel vehicles. *Transp. Res. Part Transp. Environ.* 17, 262–269. <https://doi.org/10.1016/j.trd.2011.12.005>
- BCA, 2012. The European Used Car Market Report 2012. Centre for Automotive Management. The University of Buckingham.
- EAFO, 2017. European Alternative Fuels Observatory [WWW Document]. URL <http://www.eafo.eu/> (accessed 5.15.17).
- EC, 2017. Energy Union: Commission takes action to reinforce EU's global leadership in clean vehicles. European Commission [WWW Document]. URL http://europa.eu/rapid/press-release_IP-17-4242_en.htm
- EU, 2017a. COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS Delivering on low-emission mobility. A European Union that protects the planet, empowers its consumers and defends its industry and workers. European Union Law [WWW Document]. URL <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52017DC0675> (accessed 12.4.17).
- EU, 2017b. Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL setting emission performance standards for new passenger cars and for new light commercial vehicles as part of the Union's integrated approach to reduce CO2 emissions from light-duty vehicles and amending Regulation (EC) No 715/2007. European Union Law [WWW Document]. URL <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM:2017:676:FIN> (accessed 12.4.17).
- EU, 2017c. COMMISSION STAFF WORKING DOCUMENT Detailed Assessment of the National Policy Frameworks Accompanying the document COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS Towards the broadest use of alternative fuels - an Action Plan for Alternative Fuels Infrastructure under Article 10(6) of Directive 2014/94/EU, including the assessment of national policy frameworks under Article 10(2) of Directive 2014/94/EU [WWW Document]. URL <http://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1512384850915&uri=CELEX:52017SC0365>
- EU, 2017d. COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS Towards the broadest use of alternative fuels - an Action Plan on Alternative Fuels Infrastructure under Article 10(6) of Directive 2014/94/EU, including the assessment of national policy frameworks under Article 10(2) of Directive 2014/94/EU. European Union Law [WWW Document]. URL <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52017DC0652> (accessed 12.4.17).
- EU, 2016. COMMUNICATION FROM THE COMMISSION TO THE EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE, THE

- COMMITTEE OF THE REGIONS AND THE EUROPEAN INVESTMENT BANK Clean Energy For All Europeans. European Union Law [WWW Document]. URL <http://eur-lex.europa.eu/legal-content/en/TXT/?uri=CELEX:52016DC0860> (accessed 12.4.17).
- EU, 2014a. Regulation (EU) No 333/2014 of the European Parliament and of the Council of 11 March 2014 amending Regulation (EC) No 443/2009 to define the modalities for reaching the 2020 target to reduce CO₂ emissions from new passenger cars. European Union Law [WWW Document]. URL http://eur-lex.europa.eu/legal-content/EN/TXT/?toc=OJ%3AL%3A2014%3A103%3AFULL&uri=uriserv%3AOJ.L_.2014.103.01.0015.01.ENG (accessed 5.15.17).
- EU, 2014b. Regulation (EU) No 253/2014 of the European Parliament and of the Council of 26 February 2014 amending Regulation (EU) No 510/2011 to define the modalities for reaching the 2020 target to reduce CO₂ emissions from new light commercial vehicles. European Union Law [WWW Document]. URL <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32014R0253> (accessed 12.4.17).
- EU, 2014c. Directive 2014/94/EU of the European Parliament and of the Council of 22 October 2014 on the deployment of alternative fuels infrastructure. European Union Law [WWW Document]. URL <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32014L0094> (accessed 5.22.17).
- Eurostat, 2017. Your key to European statistics. European Commission (EC) [WWW Document]. URL <http://ec.europa.eu/eurostat/web/main/home>
- Franke, T., Krems, J.F., 2013. What drives range preferences in electric vehicle users? *Transp. Policy* 30, 56–62. <https://doi.org/10.1016/j.tranpol.2013.07.005>
- Hackbarth, A., Madlener, R., 2013. Consumer preferences for alternative fuel vehicles: A discrete choice analysis. *Transp. Res. Part Transp. Environ.* 25, 5–17. <https://doi.org/10.1016/j.trd.2013.07.002>
- Harrison, G., Thiel, C., Jones, L., 2016. Powertrain Technology Transition Market Agent Model (PTTMAM): An Introduction (EUR - Scientific and Technical Research Reports). Publications Office of the European Union.
- Hoen, A., Koetse, M.J., 2014. A choice experiment on alternative fuel vehicle preferences of private car owners in the Netherlands. *Transp. Res. Part Policy Pract.* 61, 199–215. <https://doi.org/10.1016/j.tra.2014.01.008>
- Jensen, A.F., Cherchi, E., Mabit, S.L., 2013. On the stability of preferences and attitudes before and after experiencing an electric vehicle. *Transp. Res. Part Transp. Environ.* 25, 24–32. <https://doi.org/10.1016/j.trd.2013.07.006>
- Kim, J., Rasouli, S., Timmermans, H., 2014. Expanding scope of hybrid choice models allowing for mixture of social influences and latent attitudes: Application to intended purchase of electric cars. *Transp. Res. Part Policy Pract.* 69, 71–85. <https://doi.org/10.1016/j.tra.2014.08.016>
- Lévay, P.Z., Drossinos, Y., Thiel, C., 2017. The effect of fiscal incentives on market penetration of electric vehicles: A pairwise comparison of total cost of ownership. *Energy Policy* 105, 524–533. <https://doi.org/10.1016/j.enpol.2017.02.054>
- OECD, 2017. Graduation rate - Tertiary education (indicator). doi: 10.1787/b858e05b-en [WWW Document]. URL (accessed 5.15.17).
- Thiel, C., Alemanno, A., Scarcella, G., Zubaryeva, A., Pasaoglu, G., 2012. Attitude of European car drivers towards electric vehicles: a survey (EUR - Scientific and Technical Research Reports). Publications Office of the European Union. <https://doi.org/10.2790/67556> (online)

Thiel, C., Nijs, W., Simoes, S., Schmidt, J., van Zyl, A., Schmid, E., 2016. The impact of the EU car CO2 regulation on the energy system and the role of electro-mobility to achieve transport decarbonisation. *Energy Policy* 96, 153–166. <https://doi.org/10.1016/j.enpol.2016.05.043>

List of abbreviations and definitions

AFI	Alternative fuels infrastructure
AFV	Alternative fuel vehicle
BEV	Battery electric vehicle
CAWI	Computer assisted web interviewing
CNG	Compressed natural gas
DE	Germany
EAFO	European Alternative Fuels Observatory
EC	European Commission
ES	Spain
EU	European Union
EV	Electric vehicle
FC	Fuel cell vehicle
FFV	Flexible-fuel vehicle
FR	France
GfK	<i>Gesellschaft für Konsumforschung</i>
HP	Hire purchase
ICE	Internal combustion engine
IT	Italy
LPG	Liquefied petroleum gas
MS	Member State
N	Sample size
N/A	Not available
PCP	Personal contract purchase
PHEV	Plug-in hybrid electric vehicle
PL	Poland
SC	Stated choice
SP	Stated preference
UK	United Kingdom

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Annexes

Annex 1. Survey questionnaire

Questionnaire Template

Example for Italy

INTRODUCTION: This survey explores what things are important to you when considering your next car purchase. Click next to start with the questions.

Base: all respondents

S1 [Q]

How old are you?

Scripter: min=10, max=99; screenout when younger than 18 years old

Base: all respondents

S2 [S]

Are you a man or a woman?

Scripter: ONE ANSWER ONLY

1. Man
2. Women

Base: all respondents

S3 [S]

What is the highest level of education you have successfully completed?

Scripter: ONE ANSWER ONLY

1. Elementary (primary) school or less
2. Some high (secondary) school
3. Graduation from high (secondary) school
4. Graduation from college, university or higher

Base: all respondents

S4 [S]

Do you own a car? (It can also be a company car, family car, etc.)

Scripter: ONE ANSWER ONLY

1. Yes
2. No (Screenout)

Base: all respondents

Q1 [M]

What size of car do you own?

Scripter: MULTIPLE ANSWERS POSSIBLE

1. **Small**, e.g., Fiat 500, Ford Fiesta, SEAT Ibiza, Nissan Juke, Open/ Vauxhall Corsa, Volkswagen up!, Volkswagen Polo, Renault Zoe, Renault Clio, Peugeot 208, Honda Jazz, Toyota Yaris
2. **Medium / family car**, e.g., Volkswagen Golf, Ford Focus, Ford Kuga, Opel/Vauxhall Astra, Nissan Leaf, Toyota Prius, KIA Sportage, Hyundai Tucson, Nissan Qashqai, Skoda Octavia, Audia A3, BMW 3 Series, Mercedes C-class
3. **Large / executive style**, e.g., Volkswagen Sharan, SEAT Alhambra, Citroen Picasso, Ford Galaxy, Land Rover Discovery, Tesla Model S, Audi A6, BMW 5 series, Mercedes E-class

Base: all respondents

Q2 [S]

Was your last car purchase a new car or second hand car?

Scripter: ONE ANSWER ONLY

1. New car
2. Second hand car

Base: all respondents

Q6 [SGRID]

We would now like you to tell us how much you agree with the following statements about electric cars.

Please give one answer for each statement.

Scripter: ONE ANSWER PER LINE

Columns:

1. Totally disagree / 2. / 3. / 4. / 5. / 6. / 7. / 8. / 9. / 10. Totally agree / 11. Don't know

Rows :

1. Electric cars are currently quite expensive
2. Electric cars can run for a maximum of 150 km between two charges
3. The charging time is never less than 30 minutes
4. 100 km cost less than 2 Euros
5. Electric cars have no tailpipe emissions

Base: all respondents

Q3[S]

If you were to purchase a new car, what size of vehicle would you probably purchase?

Scripter: ONE ANSWER ONLY

1. **Small**, e.g., Fiat 500, Ford Fiesta, SEAT Ibiza, Nissan Juke, Open/ Vauxhall Corsa, Volkswagen up!, Volkswagen Polo, Renault Zoe, Renault Clio, Peugeot 208, Honda Jazz, Toyota Yaris
2. **Medium / family car**, e.g., Volkswagen Golf, Ford Focus, Ford Kuga, Opel/Vauxhall Astra, Nissan Leaf, Toyota Prius, KIA Sportage, Hyundai Tucson, Nissan Qashqai, Skoda Octavia, Audia A3, BMW 3 Series, Mercedes C-class
3. **Large / executive style**, e.g., Volkswagen Sharan, SEAT Alhambra, Citroen Picasso, Ford Galaxy, Land Rover Discovery, Tesla Model S, Audi A6, BMW 5 series, Mercedes E-class

Base: all respondents

Q4 [S]

How would you most likely purchase your car?

Scripter: ONE ANSWER ONLY

1. I would **pay cash** for the car, or take out a personal loan to finance it.
2. **Hire purchase (HP)**, which means I would pay a down payment, say 10% and pay monthly instalments for between 12 and 60 months. At the end of the period I would own the vehicle.
3. **Personal contract purchase (PCP)**, which means I would pay a deposit and then a monthly payment for the car, which reflects the difference between its sale price and the price for resale. After 3 years, I would not own the car, but would have the option of paying off the balance owed or starting a new plan on another vehicle.

Base: all respondents

Q5 [M]

Please indicate the top three factors that would be important to you when choosing a car, assuming that you are purchasing a **small (IF Q3=1) / medium (IF Q3=2) / large (IF Q3=3)** car?

Scripter: ACCEPT THREE ANSWERS

1. Purchase price
2. Fuel costs
3. Maintenance costs
4. Insurance costs
5. Retained value - Vehicle depreciation
6. Financing options available, eg hire purchase, leasing, personal contract purchase
7. How far you can drive on a full tank or charge (effective range)
8. How long it takes to refuel or recharge
9. Distance to the nearest refuelling / recharging station
10. Energy efficiency of vehicle
11. Brand / Manufacturer, eg Volkswagen, SEAT, Renault, Volvo, BMW, Audi, Fiat, Skoda etc.
12. Speed and acceleration performance
13. Perceived reliability
14. Safety rating
15. Warranty
16. Tailpipe emissions
17. Comfort
18. Other, please specify [O]

Base: all respondents

TxtSP1a[S]

1. *small*
2. *medium*
3. *large*

TxtSP1a=1 IF Q3=1 / TxtSP1a=2 IF Q3=2 / TxtSP1a=3 IF Q3=3

Base: all respondents

TxtSP1b[S]

1. purchase
2. hire purchase
3. personal contract purchase

TxtSP1b=1 IF Q4=1 / TxtSP1b=2 IF Q4=2 / TxtSP1b=3 IF Q4=3

Base: all respondents

SP1 [S]

In the next four questions we will present you with a hypothetical choice for a <TxtSP1a> car. Please assume that you would be purchasing a new car. The car will be described by six features:

- **Purchase cost:** Reflecting the cost for <TxtSP1b>.
- **Operating cost:** Reflecting the costs of fuel, energy and maintenance
- **Depreciation:** Reflecting the retained value of the vehicle after 3 years
- **Range on a full tank / charge:** Reflecting how far the vehicle can travel on a full tank or charge
- **Refuel / recharge time:** The time to refuel or recharge at a service station
- **Tailpipe emissions:** Reflecting the tailpipe emissions of the vehicle

Please review each of the choices and indicate which vehicle you would prefer.

Please note that there is no correct answer, we are only interested in your own preferences.

<INSERT SCENARIOS>

Scripter:

- IF Q3=1 then RANDOMIZE "SMALL" SCENARIOS (SP1_1_SMALL OR SP1_2_SMALL OR SP1_3_SMALL OR SP1_4_SMALL OR SP1_5_SMALL OR SP1_6_SMALL OR SP1_7_SMALL OR SP1_8_SMALL OR SP1_9_SMALL)

-IF Q3=2 then RANDOMIZE "MEDIUM" SCENARIOS (SP1_1_MEDIUM OR SP1_2_MEDIUM OR SP1_3_MEDIUM OR SP1_4_MEDIUM OR SP1_5_MEDIUM OR SP1_6_MEDIUM OR SP1_7_MEDIUM OR SP1_8_MEDIUM OR SP1_9_MEDIUM)

-IF Q3=3 then RANDOMIZE "LARGE" SCENARIOS (SP1_1_LARGE OR SP1_2_LARGE OR SP1_3_LARGE OR SP1_4_LARGE OR SP1_5_LARGE OR SP1_6_LARGE OR SP1_7_LARGE OR SP1_8_LARGE OR SP1_9_LARGE)

Scripter: !!! RANDOMLY ALLOCATE ONE SCENARIO (WITH EACH 4 CHOICES) TO EACH RESPONDENT !!!

Scripter: !!! EACH SCENARIO CONSISTS OF 4 CHOICES. PLEASE PRESENT EACH CHOICE ON A SEPARATE PAGE !!!

Which vehicle would you choose?

1. Vehicle A / 2. Vehicle B

Base: all respondents

SP2 [S]

Next we will present you with four more possible choices, reflecting options across a wide range of vehicle types, described by different engine types and characteristics, specifically:

- **Internal Combustion Engine:** Powered either through petrol or diesel.

- **Conventional Hybrid vehicle:** Which can run on the internal combustion engine to cover longer distances or an electric battery or a combination of these over a journey, which means that you use less fuel and have fewer emissions over the journey. These cars do not require external charging of the electric battery.

- **Plug-In Hybrid vehicle:** Which can run on the internal combustion engine to cover longer distances, but they can also be plugged into an electrical outlet to be charged. This means you can travel further on the battery, but also have an internal combustion engine in case the battery runs out.

- **Fully Electric (Battery) Vehicle:** Which runs only on a battery and needs to be recharged at home, at the journey destination or at charging stations on route. Battery technology is improving so that in future these vehicles will be able to travel longer distances without recharging.

- **Fuel Cell Vehicle:** These vehicles, which are not yet widely available, will use a fuel cell to power the on-board electric motor, generally using oxygen from the air and compressed hydrogen. The driving range and refuelling times for these vehicles are likely to be similar to petrol and diesel engines, but with much lower emissions.

Please consider each of the choices, and the characteristics of the different vehicles, and indicate which vehicle you would choose if you were going to purchase a new car.

Again, please note that there are no correct answers, we are only interested in your own preferences.

<INSERT SCENARIOS>

Scripter:

- IF Q3=1 then RANDOMIZE "SMALL" SCENARIOS (SP2_1_SMALLOR SP2_2_SMALLOR SP2_3_SMALLOR SP2_4_SMALLOR SP2_5_SMALLOR SP2_6_SMALLOR SP2_7_SMALLOR SP2_8_SMALLOR SP2_9_SMALLOR SP2_10_SMALLOR SP2_11_SMALLOR SP2_12_SMALLOR SP2_13_SMALLOR SP2_14_SMALLOR SP2_15_SMALLOR SP2_16_SMALLOR SP2_17_SMALLOR SP2_18_SMALL)

-IF Q3=2 then RANDOMIZE "MEDIUM" SCENARIOS (SP2_1_MEDIUMOR SP2_2_MEDIUMOR SP2_3_MEDIUMOR SP2_4_MEDIUMOR SP2_5_MEDIUMOR SP2_6_MEDIUMOR SP2_7_MEDIUMOR SP2_8_MEDIUMOR SP2_9_MEDIUMOR SP2_10_MEDIUMOR SP2_11_MEDIUMOR SP2_12_MEDIUMOR SP2_13_MEDIUMOR SP2_14_MEDIUMOR SP2_15_MEDIUMOR SP2_16_MEDIUMOR SP2_17_MEDIUMOR SP2_18_MEDIUM)

-IF Q3=3 then RANDOMIZE "LARGE" SCENARIOS (SP2_1_LARGEOR SP2_2_LARGEOR SP2_3_LARGEOR SP2_4_LARGEOR SP2_5_LARGEOR SP2_6_LARGEOR SP2_7_LARGEOR SP2_8_LARGEOR SP2_9_LARGEOR SP2_10_LARGEOR SP2_11_LARGEOR SP2_12_LARGEOR SP2_13_LARGEOR SP2_14_LARGEOR SP2_15_LARGEOR SP2_16_LARGEOR SP2_17_LARGEOR SP2_18_LARGE)

Scripter: !!! RANDOMLY ALLOCATE ONE SCENARIO (WITH EACH 4 CHOICES) TO EACH RESPONDENT !!!

Scripter: !!! EACH SCENARIO CONSISTS OF 4 CHOICES. PLEASE PRESENT EACH CHOICE ON A SEPARATE PAGE !!!

Which vehicle would you choose?

1. Vehicle A / 2. Vehicle B / 3. Vehicle C / 4. Vehicle D / 5. Vehicle E

Base: Respondents who never chose the electric or hydrogen fuel celled vehicle (SP2/=1 OR 2 OR 3)

Scripter: Show this question only to respondents who never indicated 4 or 5 in any of the 4 choices they had to make in SP2.

Q7 [M]

You never chose the electric or hydrogen fuel cell car option in these experiments, can you say why? (You can select multiple reasons)

Scripter: MULTIPLE ANSWERS POSSIBLE

1. These vehicles are too expensive
2. I need a car with a longer driving range
3. They take too long to charge

4. I don't trust that there will be enough charging opportunities available when I am making a journey
5. I don't think that they will have the acceleration that I like in a car
6. I don't trust the technology
7. Other, please specify [O]

Base: all respondents

Q8 [S]

Do you think government incentives to buy electric car are ...?

Please select one answer only.

Scripter: ONE ANSWER ONLY

1. Fundamental: only through government incentives will be possible to buy an electric car
2. Important: they can speed the introduction of electric cars in the market
3. Useful, they could be a good 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 market will become totally dependent on government incentives without being able to develop its own policies

Base: all respondents

We would now like to finish up by asking a few questions about you.

Base: all respondents

Q9 [S]

How would you describe the area where you live?

Scripter: ONE ANSWER ONLY

1. Large urban area, population more than 1 million, e.g., London, Berlin, Madrid, Rome, Paris, Warsaw, Barcelona, Munich, Milan, Birmingham, Cologne
2. Medium-sized urban area, population between half a million and a million, e.g., Naples, Marseille, Valencia, Leeds, Krakow, Frankfurt, Seville, Palermo, Wroclaw, Stuttgart, Dusseldorf, Glasgow, Genoa, Dortmund, Essen, Sheffield, Malaga, Leipzig, Bremen, Dresden, Poznan, Hanover, Bradford, Manchester, Nuremberg, Edinburgh
3. Urban area with population between 200,000 and 500,000
4. Urban area or town with population less than 200,000
5. Rural area, near town or city
6. Rural area, with no significant towns or cities nearby

Base: all respondents

Q10 [S]

Do you usually commute by car?

Scripter: ONE ANSWER ONLY

1. Yes, every week day
2. Yes, almost every week day

3. Yes, sometimes
4. No, never or hardly ever

Base: all respondents

Q11 [S]

Do you regularly travel, i.e. 2-3 times per week, to a large urban area (population greater than half a million)?

Scripter: ONE ANSWER ONLY

1. Yes
2. No

Base: all respondents

Q12 [M]

How many people live in your household?

Scripter: ONE ANSWER PER LINE

1. ____ adults (Number, range from 0 – 10)
2. ____ children (Number, range from 0 – 10)

Base: all respondents

Q13 [S]

How many vehicles does your household own or have for continuous use at present? Please count any vehicles currently being repaired which may be in use from next week or cars from a company carpool scheme

Scripter: ONE ANSWER ONLY

1. ____ Number: (range from 0 to 10)

Base: all respondents

Q14 [S]

Do you have access to a company car?

Scripter: ONE ANSWER ONLY

1. Yes, I am provided with a personal company car
2. Yes, I have access to a car pool from which employees take a car when they need one
3. Yes, I am self-employed with a company car
4. No

Base: Z1=2,3,4 or 6 respondents from euro countries

Q15 [S]

What is your households combined yearly income (before tax)?

Scripter: ONE ANSWER ONLY

- 1 Up to €11.999
- 2 €12.000 - €17.999
- 3 €18.000 - €29.999

4 €30.000 - €39.999

5 €40.000 - €59.999

6 €60.000 - €89.999

7 €90,000+

8. Prefer not to say

Base: all respondents

Q16 [S]

When are you planning to purchase your next car?

Please select one answer only

Scripter: ONE ANSWER ONLY

1. In the next year
2. In the next 2-5 years
3. In the next 5 -10 years
4. I do not plan to replace my vehicle

Base: Respondents who indicate that they will replace their vehicle (Q16 = 1, 2, OR 3)

Q17 [S]

Would this be a new or a second hand car?

Please select one answer only

Scripter: ONE ANSWER ONLY

1. New car
2. Second hand car
3. I am not sure

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