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**Working Paper**

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SAFE Working Paper, No. 453

**Provided in Cooperation with:**
Leibniz Institute for Financial Research SAFE

*Suggested Citation:* Fitzpatrick, Aoife Claire (2025) : Understanding electric vehicle adoption: The role of information frictions and heterogeneous beliefs, SAFE Working Paper, No. 453, Leibniz Institute for Financial Research SAFE, Frankfurt a. M., https://doi.org/10.2139/ssrn.5391851

This Version is available at:
https://hdl.handle.net/10419/324654

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SAFE Working Paper No. 453 | August 2025

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# Understanding Electric Vehicle Adoption: The Role of Information Frictions and Heterogeneous Beliefs.

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August 12, 2025

**Abstract**

In 2023, the transportation sector in Europe contributed 25% of CO2 emissions, with almost no reduction since 2010. Despite government policies promoting decarbonization, public adoption of electric vehicles (EVs) remains limited. This study, involving 5,500 German participants from a pre-registered survey and experiment, identifies information frictions and mixed beliefs about EV sustainability as key barriers. Two treatments—highlighting EVs' environmental benefits and public policies—both increased participants' likelihood of choosing an EV, but only the environmental treatment raised willingness to pay more. The findings underscore the need for clear, accurate information to complement policy efforts, reducing disinformation and amplifying the impact of initiatives to meet climate goals.

**Keywords**: Electric Vehicles; Consumer Behaviour; Behavioural Economics; Green Transition

**JEL classification**: D12, D91, G11, G18, G53

*I would like to Acknowledge funding provided by the Leibniz association under the project Stranded Assets, Financial Constraints, and the Distributional Impacts of Climate Policy (FAIRCLIP), as well as funding provided by the SAFE Experiment fund. I would like to say thank you to Loriana Pelizzon, Peter Andre, Michael Kosfeld, Konrad Lucke and Lukas Fischer. As well as participants of the Gruneberg seminar, the Frankfurt Summer School, the Second Annual PhD Research Workshop held at IWH, the C.r.e.d.i.t. 2024 conference, the tri-city Day-Ahead Workshop on the Future of Financial Intermediation, and the Aggregate confusion team.
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# 1 Introduction

The transition to a low-carbon economy is a central priority for the EU, with ambitious goals targeting a 55% reduction in greenhouse gas emissions by 2030 compared to 1990 levels. To achieve this, EU governments have implemented a wide array of policies and initiatives targeting not only the financial and industrial sectors but also aiming to promote greener behavior among households. One sector where household behavior and broader economic activity strongly intersect—the transportation sector—has remained notably resistant to decarbonization, with $CO_2$ emissions showing little change in recent years despite sustained policy efforts. This paper investigates the frictions that hinder the effective transmission of green public policies within the household sector.
To explore these frictions, I focus on the transportation sector in Germany, which represents one of the largest financial decisions for households, both in terms of vehicle purchase and ongoing use and is a major contributor to national emissions. In 2023, transportation accounted for 22% of the country's total $CO_2$ emissions and has been notably slow to decarbonize, with emissions declining by only 3% since 2010[1]. A central pillar of Germany's 2030 climate strategy is the electrification of the transport sector, primarily through large-scale adoption of electric vehicles (EVs). The government has set a target of 15 million EVs on the road by 2030[2], supported by a combination of financial incentives, investments in charging infrastructure, and $CO_2$-based taxes on fossil fuels to shift relative prices in favor of EVs.

Administrative data from the German Federal Motor Transport Authority (KBA) provide important context for the current state of adoption. As shown in Figure 1.1, the share of newly registered internal combustion engine vehicles (ICEVs) has declined steadily since 2016, while registrations of battery electric vehicles (BEVs) and plug-in hybrids increased sharply after the introduction of substantial subsidies and regulatory pressure in 2020. These trends suggest that policy instruments can, in principle, generate behavioral change in the vehicle market. However, EVs still represent a minority of total vehicle registrations, and the current trajectory remains insufficient to meet the 2030 target.

[1] https://enveurope.springeropen.com/articles/10.1186/s12302-022-00663-7

[2] https://www.reuters.com/article/world/new-german-government-aims-for-at-least-15-million-evs-by-2030-idUSKBN2I91Q4/

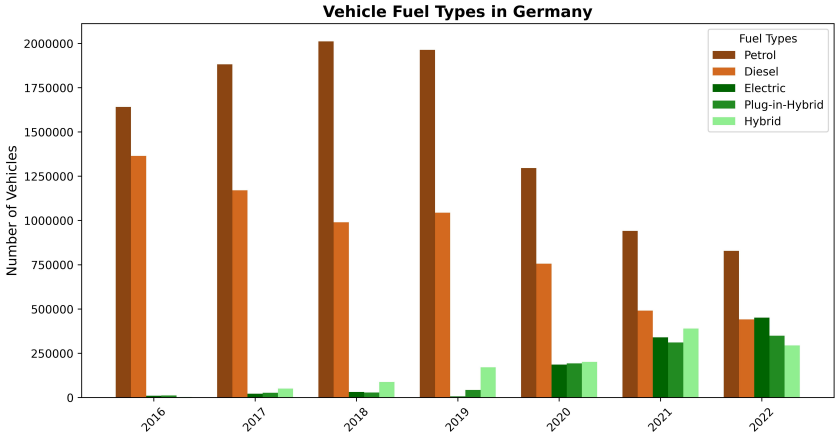



**Figure 1:** Trends in Vehicle Registrations in Germany, 2016–2022

Note: Share of newly registered internal combustion engine vehicles (ICEVs), battery electric vehicles (BEVs), and plug-in hybrid electric vehicles (PHEVs) based on administrative data from the German Federal Motor Transport Authority (KBA).

Moreover, adoption is highly uneven across regions as seen in Figure 1.2, with significantly lower uptake in eastern federal states such as Saxony-Anhalt, Thuringia, and Brandenburg. These regional disparities raise concerns about informational and infrastructural frictions that may disproportionately affect less urbanized or economically disadvantaged areas. Despite the scale of policy intervention, adoption rates remain below expectations—raising questions about the effectiveness of existing instruments and pointing to the importance of behavioral and informational frictions in shaping household-level responses to climate policy.

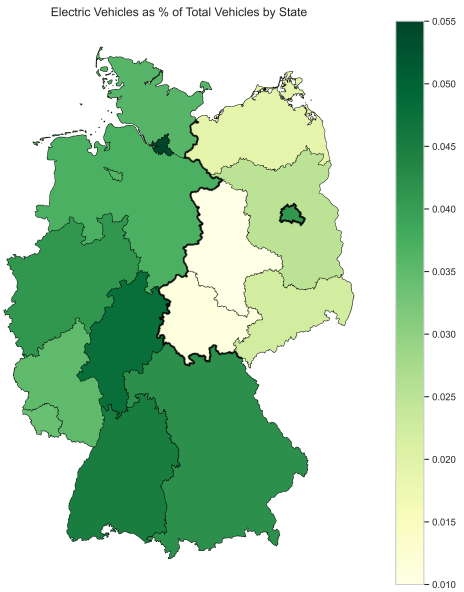



**Figure 2:** Regional Variation in EV Uptake Across German Federal States, 2022

Note: Share of EVs in total new vehicle registrations by federal state.

Utilizing a preregistered survey and experiment of 5,500 German participants this paper shows that the limited adoption of EVs in Germany is shaped by three central frictions: (i) heterogeneity in beliefs about the environmental benefits of EVs, (ii) low

awareness of public policies designed to support EV adoption, and (iii) differences in financial literacy. First, beliefs about the environmental benefits of EVs vary widely across the population, with many individuals—particularly ICEV owners—doubting that EVs offer meaningful reductions in $CO_2$ emissions. This misalignment between public perception and scientific evidence reduces the effectiveness of policy efforts that rely on environmental motivation to shift behavior. Second, many individuals are unaware of core public policies intended to influence vehicle choice, including $CO_2$-based fuel taxes, EV purchase subsidies, and the planned 2035 ban on new ICEV sales. These information frictions limit the transmission of price signals and reduce the behavioral salience of forward-looking regulation. Third, this paper highlights the role of financial literacy in shaping household responses to EV-related policies. As the regulatory environment becomes more complex—incorporating intertemporal cost considerations, transition risks, and changing tax structures—adopting an EV increasingly requires households to evaluate dynamic financial trade-offs. Individuals with higher financial literacy are more likely to correctly interpret policy incentives, update beliefs in response to new information, and exhibit a higher willingness to pay for EVs. Together, these three frictions constrain the effectiveness of climate policy at the household level and represent a key barrier to accelerating the energy transition through private vehicle de-carbonization.

The first wave gathered data from a representative sample of German adults, including ICEV owners, EV owners, and individuals with a drivers license who currently didn't own a vehicle, to establish baseline attitudes and awareness regarding EVs. Key areas measured included participants' demographic data, financial literacy, and political affiliation. Attitude measures assessed personal and social norms surrounding climate change, economic preferences such as altruism, patience, and risk tolerance, as well as perceived behavioral controls like concerns about EV driving range, charging availability, and maintenance costs. Additionally, participants were surveyed on their awareness of specific policy incentives, including $CO_2$ taxes and the 2035 ban on ICEV, alongside perceptions of the environmental and economic benefits of EVs.

The results from the first wave revealed significant information frictions and heterogeneous beliefs regarding EVs within the German population. Many participants, especially ICEV owners, exhibited limited awareness of policies and incentives aimed at making EV ownership more affordable. Additionally, beliefs about the environmental benefits of EVs varied considerably, with ICEV owners showing skepticism about the environmental benefit of EVs compared to current EV owners. This disparity highlighted a key information gap likely hindering EV adoption among key target groups. Financial literacy also emerged as a meaningful predictor of EV preference: individuals with higher financial literacy were significantly more likely to report an intention to purchase an EV as their next vehicle and showed stronger stated preferences for EV ownership.

The second wave was an experiment, where participants were randomly assigned to either a control group or one of two treatment groups—an environmental information treatment group or a public policy information treatment group. The environmental treatment aimed to correct misconceptions by providing scientific evidence on EVs' lower life-cycle emissions compared to ICEVs. Participants were informed of a study done by the German Environmental Agency which found that EVs manufactured in 2020 had, on average, 40% lower environmental impact compared to an ICE vehicle, with this advantage expected to increase to 55% by 2030 as renewable energy use grows. Additionally, participants received context on EVs' role in reducing the transportation sector's 22% contribution to Germany's $CO_2$ emissions.

The policy treatment aimed to increase awareness of the economic incentives and regulatory landscape promoting EV adoption in Germany. Participants received detailed information on Germany's national Emissions Trading Scheme, which includes progressively increasing carbon taxes on fossil fuels, making conventional ICEV less economically attractive over time. Additionally, the treatment outlined the planned 2035 ban on new ICE vehicle sales, providing context on future regulatory shifts. To highlight direct financial benefits for EV owners, participants were informed about available tax savings, and carbon credit benefits that lower the cost of ownership for EVs compared to traditional vehicles. By addressing both current and future economic measures, the policy treatment sought to clarify the financial advantages of EV adoption and enhance participants' understanding of the long-term economic impact of transitioning to low-emission vehicles.

The results of the second wave show that the environmental treatment notably increased participants' willingness to pay for and consider purchasing an EV, underscoring the role of accurate information in reshaping perceptions. While the policy treatment effectively raised awareness of cost-related incentives, it had a more limited impact on willingness to pay. Financial literacy again played a key moderating role: participants with higher financial literacy exhibited significantly stronger responses to both treatments, particularly the policy treatment, suggesting they were more capable of processing intertemporal trade-offs and future policy risk. These findings suggest that financial incentives are most effective when paired with clear communication about the environmental and economic benefits of EVs. These findings also highlight that individuals with lower financial literacy may be less able to act on complex incentive structures, limiting the effectiveness of policy measures in this group.

This paper adds to the existing research on information frictions, which has been widely studied in relation to fiscal and monetary policies transmission to households. These frictions often arise from households' limited awareness of policy changes or a lack of understanding about how these measures impact economic incentives (Agarwal and Mazumder (2013), Agarwal et al. (2017), Agarwal et al. (2020), Roth and Wohlfart (2020), Andre et al. (2021b), D'Acunto et al. (2021)). However, the impact of information frictions on the transmission of climate-related policies remains under-explored, despite their likely influence on the adoption of low-carbon technologies and behaviors. Effectively addressing these frictions in climate-related policies requires a tailored approach, given the unique challenges of climate impacts and the complexities of encouraging sustainable practices.

Transmission of climate-related public policies is distinct for three primary reasons: the less tangible nature of climate outcomes, skepticism around the origins of climate change (whether man-made or not), and the widespread disagreement on the best approach to achieving climate neutrality. First, climate outcomes are generally long-term and less immediately measurable. Unlike policies with outcomes such as inflation or employment, which can be observed within months, climate effects—such as reduced emissions or temperature stabilization—unfold over years or even decades. This delayed visibility can diminish the perceived urgency of actions like adopting EVs, as individuals may find it challenging to connect present behaviors with distant climate benefits. Consequently, public attention to climate-related policies may wane as more immediate issues capture their focus, exacerbating the information frictions that commonly accompany policy implementation.

Second, significant skepticism around the cause of climate change remains prevalent,

especially among the German population. A 2023 survey by TUV found 24% of Germans do not believe that climate change is caused by human activity[3] and a 2018 survey by the EIB found that Germany had on average greater skepticism around the origins of climate change than other EU countries[4]. Such widespread doubt within the population could lead to considerable criticism and resistance toward climate protection measures. This skepticism not only weakens public support for necessary policy changes but also deepens information friction by fostering mistrust in environmental policies and scientific messaging. As a result, climate-related initiatives may face greater challenges in gaining traction, with portions of the population potentially viewing these policies as unnecessary or misaligned with their beliefs, ultimately hindering effective policy implementation.

Third, there is a wide range of heterogeneous beliefs about the best ways to achieve the EU 2030 carbon goals, particularly in regard to decarbonizing the transportation sector in Germany and the EU. Political divisions about the promotion of widespread EV adoption exist with staunch opposition existing within the popular political party AfD as they view the transition away from ICE vehicles as harmful for thousands of German automotive employees[5], whilst SPD is calling for the reintroduction of EV subsidies in Germany[6]. Furthermore policy debate among EU countries around the 2035 ban on ICEV highlights the challenges of implementing cohesive policies for the transition to a cleaner transportation sector, with Germany pushing to have vehicles run on e-fuels exempt from such a ban[7]. Beyond the policy debate concerns around the environmental benefits of EVs vs ICEV are prevalent, particularly regarding the environmental damaged caused by the production of lithium batteries[8] and pollution from their tires[9]. This diversity of opinions creates significant information frictions by producing conflicting messages about the most effective personal and collective actions to address climate change. These mixed signals not only complicate public understanding of climate goals but also risk diluting the impact of policies aimed at transitioning to a sustainable transportation sector, making it challenging to build consensus and drive effective action toward the EU's 2030 carbon targets.

This paper documents the existence of significant information frictions surrounding EV policies, alongside heterogeneous beliefs about the environmental and economic benefits of EVs, both of which appear to dampen demand. These findings highlight the importance of not only reducing these frictions but also addressing the diverse beliefs and perspectives that shape public perceptions of climate action. While many individuals express a willingness to act against climate change, the ongoing debate about the "correct" approaches to decarbonization creates uncertainty. By clarifying both the policy rationale and the evidence supporting EV benefits, this study demonstrates that effectively addressing information gaps and diverse beliefs can enhance public alignment with Germany's and the EU's climate goals.

The rest of the paper is organized as follows. Section 2 provides a literature review, Section 3 describes the survey and experimental set-up. Section 4 describes data and provides descriptive statistics. Section 5 details the empirical methodology and reports the empirical results, and Section 6 discusses the results and potential avenues for future

[3]https://www.tuev-verband.de/pressemitteilungen/beim-klimaschutz-spalten-extrempositionen-die-gesellschaft

[4]https://www.eib.org/en/surveys/citizens-climate-change-survey.htm

[5]https://afd-thueringen.de/aktuelles/2021/07/hoecke-ueberfoerderung-der-e-mobilitaet-schadet-unserer-thueringer-au

[6]https://www.auto-motor-und-sport.de/verkehr/neue-e-auto-praemie-staatliche-foerderung/

[7]https://www.cleanenergywire.org/news/germanys-conservatives-double-down-criticism-eus-planned-2035-combustio

[8]https://earth.org/lithium-and-cobalt-mining/

[9]https://nypost.com/2024/03/05/business/evs-release-more-toxic-emissions-are-worse-for-the-environment-study/

research and concludes.

## 2 Related Literature

My research complements existing studies on drivers of EV adoption, which have largely focused on the upfront costs of EVs, the impact of government subsidies, and intrinsic consumer preferences. Archsmith et al. (2022), Muehlegger and Rapson (2022), Muehlegger and Rapson (2023) study the causal impact of EV subsidies on EV adoption in California and find positive impact on EV uptake. Gallagher and Muehlegger (2011) evaluate how hybrid vehicle sales respond to various tax incentives in the US. Other works have examined demographic determinants of EV adoption and found a strong correlation between income and education with EV adoption (Borenstein and Davis (2016), Archsmith et al. (2022)). Whilst Krupa et al. (2014), Gehlmann et al. (2024), Zhang et al. (2022) examine the impact of social and personal norms i.e. if they themselves or people around them are concerned about climate change. They find personal and social norms regarding climate change to be a strong determinant of EV adoption. Furthermore, perceived behavioral controls related to an individual's belief in their capability to purchase and use an electric vehicle related to EV adoption were seen as important factors for EV adoption (Bobeth and Matthies (2018), Li et al. (2020)). Several authors have documented the importance of car attributes for consumer EV adoption. In particular, the development of charging infrastructures to promote EVs, the importance of long driving ranges for higher acceptance of EVs, and a high purchase price as a deterrent for consumers' adoption of EVs. (Buhmann and Criado (2023), Cecere et al. (2018), Egbue and Long (2012), Knez et al. (2014), Lane and Potter (2007), Barkenbus (2020), Hardman et al. (2018), Sierzchula et al. (2014), Ozaki and Suyama (2011)). However, Li et al. (2017) argues that investing in charging infrastructure generates a greater increase in EV demand per dollar spent than equivalent spending on consumer purchase subsidies.

Beyond vehicle attributes, I contribute to the broader climate finance literature, which has shown that individuals express a strong desire to act against climate change. Studies, including (Andre et al. (2021a), Andre et al. (2024)), show that people are often willing to donate to climate initiatives and support environmentally focused organizations, indicating a latent motivation to contribute to sustainability efforts. This inclination suggests that when provided with clear, accessible information, individuals are likely to support climate-positive behaviors, underlining the potential for climate policies to harness this pro-environmental intent more effectively. Additionally, this paper contributes to the economic literature on the role of narratives in shaping beliefs and economic outcomes (Shiller (2017), Hirshleifer (2020)), as well the literature showing information treatments can shape an individuals attitude towards climate policies (Dechezleprêtre et al. (2022)) or the prevalence of transition risk(Ceccarelli and Ramelli (2024)). Furthermore, this paper relates to the burgeoning literature that examines the financing conditions of EVs compared to ICEV. Bena et al. (2023) finds EVs in Europe are subject to higher interest rates, lower loan-to-value ratios, and shorter durations, attributing this to volatile resale values of early-stage EVs and rapid technological advancements in EV-specific technologies. Whilst Klee et al. (2024) finds that in the US EV borrowers pay 2.2 percentage point lower interest rate highlighting the impact of differential consumer markets and regulatory spaces have on EV financing and adoption.

# 3 Survey Set-up

To study what drives electric vehicle adoption in the German population, a large, broadly representative sample is required. This section explains how I designed the sampling approach and survey.

## 3.1 Sample and survey procedures

I collected survey data from a large sample of 5,500 German adults, representative of the general population across key sociodemographic variables, including gender, German state, and age. All waves - the survey, experiment and obfuscated followup- as well as the sampling approach, and the main analyses of all waves was pre-registered and recieved ethics approval[10]. To participate in the study, respondents were required to reside in Germany and be at least 18 years old. The data was collected in two waves. The first wave (N = 2,500) was conducted in May 2024 and included 1,500 ICEV owners, 500 EV owners, and 500 licensed drivers who did not own a vehicle. This initial wave forms the basis for the descriptive analysis in this paper and informs the treatments applied in the second wave. The second wave (N = 3,000) was carried out in September 2024, consisting solely of ICEV owners. It featured an information experiment designed to explore the causal relationships between environmental beliefs, climate policy awareness, the likelihood of owning an EV, and willingness to pay for one.

To gather the data, I partnered with Dynata, a professional survey company widely used in social science research. All participants were members of the company's large online panel, which invites individuals to take part in surveys. The surveys were programmed using LimeSurvey software. In the first wave, the median completion time was 12 minutes, while in the second wave, it was 8 minutes. Participants could only partake in one wave, and those who failed an attention check or completed the survey in under three minutes for the first wave and two minutes for the second wave were excluded. These exclusion criteria were pre-registered. A stratified sampling method was employed to ensure that the samples reflected the adult German population in terms of gender, age, and region (Bundesland), addressing any potential selection bias. When comparing my sample with national data, the distribution of demographic characteristics closely mirrors those of a representative national sample as seen in Table 1.

[10]Wave 1 pre-registered at - AsPredicted#172,673, Wave 2 pre-registered at - AsPredicted#188,815 and wave 3 pre-registered at - AsPredicted#190,384. Ethics approval received from the joint ethics committee of the Faculty of Economics and Business Administration of Goethe University Frankfurt (GU) and the Gutenberg School of Management Economics of the Faculty of Law, Management and Economics of Johannes Gutenberg University Mainz (JGU) prior to wave 1.

**Table 1:** Demographic Statistics

| | (1) Wave 1 | (2) Wave 2 | (2) German Population |
|---|---|---|---|
| Female | 50% | 50% | 50% |
| | | | |
| Age: 18-34 | 25% | 26% | 26% |
| Age: 35-44 | 16% | 16% | 16% |
| Age: 45-54 | 18% | 18% | 18% |
| Age: 55-64 | 20% | 20% | 20% |
| Age: 65+ | 21% | 21% | 21% |
| | | | |
| East Germany | 15% | 15% | 15% |
| West Germany | 85% | 85% | 85% |
| | | | |
| CDU* | 23% | 27% | 30% |
| SPD* | 17% | 10% | 14% |
| FDP* | 6% | 15% | 5% |
| Die Linke* | 6% | 5% | 3% |
| Die Grunen* | 12% | 4% | 12% |
| AfD* | 15% | 7% | 16% |
| Not Specify* | 20% | 32% | |

Note: Columns 1 and 2 display the summary statistics for the survey samples of waves 1 and 2, respectively. Column 3 displays summary statistics based on the 2022 German census results and the results for the EU election in May 2024. Percentages are rounded to the nearest whole number.

## 3.2 Measuring Willingness to Pay and Likelihood to own an electric vehicle.

The likelihood of owning an EV was measured in both waves of the survey. In the first wave, all respondents were asked if they intended to purchase a new vehicle within the next five years. If a participant responded affirmatively, they were presented with a follow-up question about their choice of vehicle, offering three options: Electric or Hybrid Vehicle, ICEV (e.g., petrol or diesel), or undecided. Participants who selected electric or hybrid vehicles were classified as likely to purchase an EV within the next five years, whereas those who selected ICEV or were unsure were classified as unlikely to purchase an EV. In the second wave, all participants were asked to imagine that they would be purchasing a new vehicle within the next five years. They were then asked to indicate, on a scale of 0 to 10, how likely they were to choose an EV.

To assess preferences for EVs at different price points, participants were asked two willingness-to-pay (WTP) questions. This approach aimed to capture participants' interest in EVs while accounting for the possibility that some may favor EVs but consider them financially out of reach. In the first wave, ICEV owners were asked in a theoretical scenario, what condition they would be willing to switch from their current petrol or diesel vehicle to an identical EV as seen in Figure 5. The options were: they would not switch, they would only switch if the EV were cheaper, or they would switch if there were no additional costs. For those willing to pay more, price ranges between €1 and more than €7,500 were provided. In the second wave, all participants were asked the same question.

Additionally, all participants in both waves were asked to consider a scenario in which

they were purchasing a new petrol-fueled vehicle priced at €20,000 as seen in Figure 4. They were asked under what conditions they would be willing to switch to an EV that was identical in all respects (driving range, size, etc). The answer options were similar to the first WTP question: they would not switch, they would switch only if the EV were cheaper, or they would switch if there were no additional cost. Again, those willing to pay more than €0 were presented with ranges from €1 to more than €10,000 to capture more detailed preferences.

Two measures of willingness-to-pay were derived from these questions. First, an individual's preference for owning an EV was determined by whether they chose any value other than "I wouldn't buy an EV." This measure, was coded as 1 if the participant selected any value indicating willingness to switch to an EV, and 0 if they selected "I wouldn't buy an EV." The second measure reflected their marginal willingness to pay for an EV. If a participant indicated that they would not pay extra for an EV, they were assigned a value of 0. For those who selected a price range under which they would switch to an EV, the midpoint of that price range was used as their willingness to pay for an EV. The square root of the monetary value of their WTP was taken to account for the distribution of 0 values.

## 3.3 Measuring determinants of Electric Vehicle ownership.

Since EVs are a consumer good, various factors beyond policy awareness and environmental beliefs influence ownership and purchase intentions. Decisions about EV ownership are shaped not only by attitudes toward climate policies but also by a complex set of demographic, social, economic, and personal factors. Therefore, in the first wave of this project, I conducted an extensive survey to capture a broad set of predictors for EV ownership and purchase intent, including policy awareness, environmental beliefs, and a range of personal characteristics. To start, demographic information was collected from all participants, including key factors such as income, education, employment type, and financial literacy. Financial literacy, assessed through the Lusardi "Big 3" measure (Lusardi and Mitchell (2011)), is particularly relevant, as Beny et al. (2023) found individuals with higher financial knowledge are often more likely to invest in energy-efficient products.

Perceived behavioral controls were captured, focusing on factors that have been shown to be closely related to EV ownership. Four perceived behavioral controls were measured, with participants rating their concerns on a 5-point scale regarding 1) EV driving range, 2) the availability of charging stations in their area, 3) the time it takes to charge an EV, and 4) the battery replacement cost.

Personal norms related to climate change, which are considered important factors in EV ownership, were also assessed. Four measures were used: participants rated on a 5-point scale 1) how much they believe climate change poses a serious threat to humanity, 2) how personally responsible they feel for acting against climate change, 3) how responsible they feel for purchasing sustainable goods, and 4) whether they believe EVs are better for the environment than ICEV.

Social norms were also evaluated as key factors in EV adoption. Participants rated on a 5-point scale 1) how much their social circle perceives climate change as a threat, 2) whether their social circle expects them to buy sustainable products, and 3) how many people in their social circle currently drive EVs. Additionally, participants were asked to rate how exciting they found the idea of driving an EV compared to an ICEV.

Economic preferences were measured since they predict an individual's willingness to take action against climate change. Using established measures, participants' altruism, patience, risk preference, and reciprocity (both positive and negative) were assessed (Falk et al. (2016), Falk et al. (2018)).
Further, participants' awareness of four key economic incentives was measured to gauge their familiarity with policies designed to make ICEVs less appealing and EVs more price-competitive. Participants rated their awareness using three categories: 1) No Knowledge, 2) Basic Knowledge (having heard of it but knowing few details), and 3) Good Knowledge (familiar with the details). Participants were asked about their awareness of the 2030/2050 EU carbon targets, subsidies for EVs available in recent years, the motor tax act (which increases tax for petrol and diesel vehicle owners while granting EV owners a 10-year tax exemption), and the planned 2035 ban on new ICE vehicles. Additionally, participants rated their support for these climate policies and their perception of the credibility of Germany achieving its 2030 target.
Lastly, participants were asked about their perceptions of various pricing aspects of EV ownership compared to ICE vehicles. Specifically, they rated their views on the maintenance costs, fuel costs, resale value, loan interest rates, and total cost of ownership over a 10-year period for EVs compared to ICEV.

## 3.4 Shifting EV Adoption behaviour

After the first wave survey, where the primary determinants of EV ownership are established, I move to a second experiment phase to determine what, if any, interventions can be utilized to shift consumer preferences towards EVs. Given that widespread EV adoption is a key policy priority for the German government, with a target of having 15 million electric vehicles on the road by 2030, it is crucial to identify which interventions can increase the likelihood of individuals purchasing an EV and managing the typically higher upfront costs associated with ownership. As discussed in Section 4.1, climate-related public policy awareness and beliefs about the environmental benefits of EVs are significant predictors of both EV ownership and the likelihood of purchasing an EV within the next five years. These factors also influenced individuals' willingness to pay for an EV in the first wave survey. However, the first wave simultaneously revealed substantial information frictions and heterogeneous beliefs amongst the German driving population. Specifically, ICEV owners tend to have a lower awareness of the economic incentives related to EVs and often believe that EVs do not offer significant environmental advantages over ICE vehicles. Based on these findings, two information treatments were embedded in the second wave of this study. 3000 Participants were randomly assigned to either a control group, a treatment group that received information about the environmental benefits of EVs, or a group that received information on the relevant economic incentives available for EV ownership.

1. The **Environmental Treatment** seen in Figure 5 aimed to inform participants about the environmental benefits of owning an EV compared to an ICEV. Participants were provided with information from a life cycle assessment study conducted by the German Environmental Agency (Kirsten Biemann (2024)), which found that an EV manufactured in 2020 is, on average, 40% better for the environment than an ICEV manufactured in the same year. Furthermore, they were informed that this number is expected to improve to 55% by 2030

due to the anticipated rise in renewable energy in the grid. Additionally, the treatment highlighted that the transportation sector contributed approximately 22% of Germany's total CO2 emissions in 2023. According to the US Environmental Protection Agency (EPA), a petrol vehicle emits an average of 4.6 tonnes of CO2 annually, while EVs produce no tailpipe emissions[11]. This information underscored the environmental advantages of transitioning from ICEVs to EVs.

2. The **Economic Incentive Treatment** seen in Figure 6 aimed to provide participants with an overview of the current and near future regulatory landscape in the Transportation sector. Participants of this treatment group were informed of five policies and initiatives, with approximate associated savings or costs with these incentives to ensure participants could better internalize the financial impact of these policies. First they were informed of two key petrol and diesel tax policies: the current national Emissions Trading Scheme (nETS) in Germany, which prices CO2 emissions at 45€ per metric tonne, and the forthcoming EU-wide ETS II policy, which aims to increase the cost of petrol, diesel, and heating gas for households. Estimates where ased on conservative projections from recent modeling studies (Rickels et al., 2023; Agora Energiewende and Agora Verkehrswende, 2023). Participants were also informed about several EV ownership incentives, including the carbon credits scheme EV owners can partake, earning around 100€ per year. Additionally, EV owners are exempt from paying vehicle ownership tax until 2030, which results in an average savings of 100€ per year. Finally, they were informed about the EU's 2035 ban on the sale of new combustion engine vehicles. Participants were informed the costs and savings were based on a comparison between a Volkswagen Golf and a comparable electric model, the Volkswagen ID.3 two popular and well known vehicle models in Germany.

3. **Control**: No information was provided to participants in the control condition.

This study design examines whether providing participants with accurate information about the environmental benefits of EVs and the public policies or incentives supporting EV adoption affects their likelihood of purchasing an EV within the next five years and their willingness to pay higher upfront costs. The interventions are expected to function through two key channels: the environmental information treatment aims to shift beliefs about the environmental benefits of EVs, while the economic incentive treatment seeks to update beliefs about the total cost of owning an EV. By addressing these information gaps, the treatments are anticipated to influence individual perceptions of EV ownership. Given that individuals hold varying beliefs about the environmental advantages of EVs and generally have low knowledge of climate policies, I propose that these information interventions will likely increase the likelihood of participants purchasing an EV within the next five years and their willingness to pay for one. To assess whether participants updated their beliefs, I measured their prior and posterior beliefs regarding the environmental and cost benefits of EVs. These posterior beliefs were framed differently from the initial prior belief questions, helping to reduce experimenter demand effects and consistency bias in the survey responses (Haaland et al. (2023)).
The controlled environment of this information experiment provides several key advantages. By carefully controlling the information that participants receive, I can ensure that they are exposed to consistent and accurate content about both the

[11]https://www.epa.gov/greenvehicles/greenhouse-gas-emissions-typical-passenger-vehicle

environmental benefits and economic incentives of electric vehicles. This design allows me to observe how participants' beliefs shift in response to targeted information interventions, helping to understand how these changes influence their likelihood of purchasing an EV and their willingness to pay for one. However, while the experiment is effective in isolating the impact of these informational treatments, it is important to consider certain limitations. Moreover, the study's reliance on self-reported measures, such as likelihood of purchasing an EV within the next five years or willingness to pay, may introduce some level of bias, including potential experimenter demand effects, where participants may respond based on perceived expectations. These concerns are addressed in the discussion section.

## 3.5 Mitigating experimenter demand

A key challenge in information experiments is distinguishing genuine belief changes from effects driven by priming or participants' desire to please the experimenter. While existing empirical evidence suggests that experimenter demand effects have limited quantitative significance in anonymous online surveys (de Quidt et al. (2018)), I took several steps to mitigate these concerns. As Haaland et al. (2023) note, demand effects can vary across settings, so it is best practice to implement measures to reduce them. First, I informed all participants that their responses were anonymous and that no conclusions could be drawn about their identity. Second, I elicited prior beliefs from all respondents, regardless of their treatment status, ensuring that all participants were primed to think about the issue at hand. By comparing prior and posterior beliefs, I was able to demonstrate that participants in the treatment groups were more likely to revise their beliefs, while also documenting heterogeneity in treatment effects based on initial beliefs. These results are often interpreted as evidence that the observed treatment effects are driven by genuine belief changes (Haaland et al. (2023)).

### 3.5.1 Obfuscated follow-up study to deal with demand effects

To further mitigate potential experimenter demand effects, I conducted a pre-registered obfuscated follow-up study. Participants where recontacted two weeks after the initial experiment. This follow-up study was designed to appear as an independent survey, minimizing the likelihood that participants would recognize its connection to the main experiment. Invitations were sent using the same survey panel but contained only generic information about compensation and expected duration, ensuring no reference to the initial study. Additionally, the follow-up utilized a different survey layout and presented itself as a short survey about top sustainability behaviours of German Households. The survey began with general questions about broader unrelated sustainability behaviours e.g. if they recycled, how often they ate meat, if they avoided flying for sustainability reasons. Then it asked about sustainability purchases e.g. if they owned solar panels, geothermal pump, EVs. Questions related to the initial experiment were included later in the survey, reworded to reduce recognition and placed on separate pages to avoid drawing attention to their relevance. By taking these steps, the follow-up study minimized any potential experimenter demand effects while allowing for an assessment of the persistence of belief changes observed in the main experiment.

# 4 Descriptive Statistics

The descriptive statistics from Phase 1 of the survey reveal substantial information frictions and significant heterogeneous beliefs among participants. Table 2, demonstrates the varying level of awareness across different types of vehicle owners. Participants rate their self reported policy awareness in relation to one of three response options: 0 ("No awareness - never heard of it."), 0.5 ("Basic awareness – for example, you've seen it mentioned in some headlines, but you don't know the details."), and 1 ("Good awareness - For example, you have read one or two newspaper articles on the topic and understand the main points and the desired results."). A score below 0.5 indicates less than basic knowledge of these policies. In the main regression in Table 4 through Table 7 an average awareness score was calculated for each participant based on their responses to four policy questions. As seen in Table 2, EV owners exhibit the highest awareness, showing above basic understanding of the 2030 targets, subsidies, and the 2035 ban. However, ICE owners and participants without vehicles exhibit substantially lower levels of awareness, often below basic knowledge across the various policies. Notably, ICEV owners—who are directly impacted by the motor tax policy—only display basic knowledge. This highlights the presence of significant information frictions among the target audience of these public policies.

**Table 2:** Descriptive Statistics - Information Frictions

| | (1) 2030/2050 Targets | (2) Subsidies | (3) Motor Tax | (4) 2035 ICE Ban |
|---|---|---|---|---|
| EV Owners | 0.58 | 0.66 | 0.49 | 0.62 |
| ICE Owners | 0.45 | 0.49 | 0.34 | 0.51 |
| No Vehicle | 0.41 | 0.42 | 0.29 | 0.42 |

Note: Table 2 presents descriptive statistics for public policy awareness in Wave 1.

However, the descriptive statistics not only point to information frictions but also substantial heterogeneity in beliefs about the environmental benefits of EVs. Table 3 illustrates these environmental beliefs across vehicle owner type, revealing the extent of this disagreement. Participants were asked to indicate on a 5-point likert scale to the extent they agreed with the following statement: "I believe that electric vehicles are better for the environment compared to gasoline or diesel vehicles." In spite of the policy targets for widespread EV adoption there still appears to be a substantial amount of the driving population who do not view EV as better for the environment than ICEV, 42% of ICEV owners disagreed wuth the statement that EVs were better for the environment than ICEVs, compared with 30% of non-owners and 18% of EV owners. Given that widespread EV adoption is a central policy goal for the German government, this variation in beliefs regarding EV environmental benefits likely acts as a barrier for higher EV adoption and reflects the prevalence of misinformation surrounding EV and the green transition.

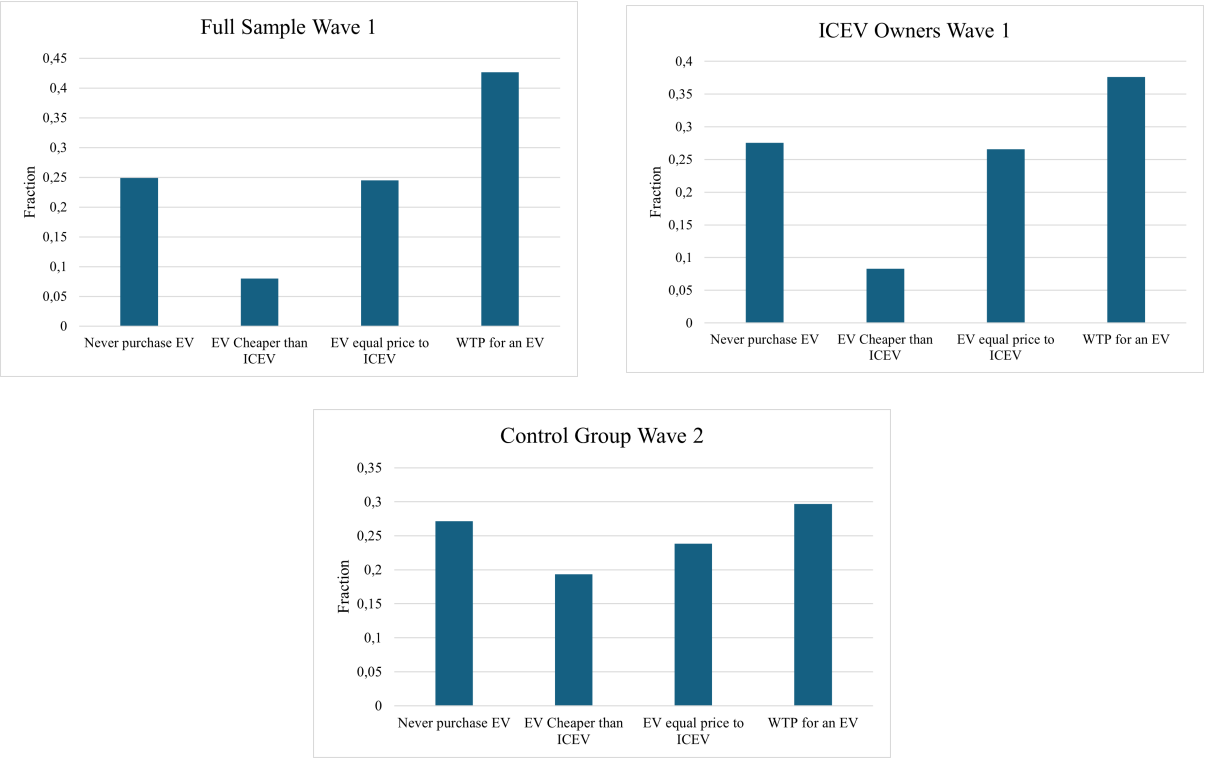
**Table 3:** Descriptive Statistics - Environmental Beliefs

| | (1) **Strongly Disagree** | (2) **Disagree** | (3) **Neutral** | (4) **Agree** | (5) **Strongly Agree** |
|---|---|---|---|---|---|
| EV Owner | 8% | 10% | 23% | 32% | 28% |
| ICEV Owner | 23% | 19% | 29% | 19% | 10% |
| No Vehicle | 17% | 13% | 29% | 24% | 17% |

Note: This table presents descriptive statistics for beliefs about environmental benefits of EVs.

Furthermore to assess the general preference for EV at varying price points I look to participants response to how much they would be willing to pay for an EV in a hypothetical purchasing scenario. The first bar chart in Figure 3 presents the distribution of EV preferences at various price points for the full sample of participants in phase 1. Only 24% of respondents stated they would never choose an EV over an ICE vehicle. Since the sample is representative of the German population, this suggests there is a considerable preference for EVs, with just 8% indicating they would only choose an EV if it were cheaper than an ICEV. Another 24% would opt for an EV if the prices were equal, and more than 40% of the sample indicated they would be willing to bear an additional cost to own an EV.

**Figure 3:** Three images with the same width, two side by side and one below




Note: The figure shows the distribution of respondents preferences for owning an EV at various pricing options. Respondents were asked "Imagine you want to buy a car for €20,000. The bank has offered you a loan to make this purchase possible. They have opted for a 4-seater gasoline engine at this price. How much more would you be willing to pay to switch to the electric version of this vehicle, assuming it's identical in every way (size, engine power, range, etc.)?" The responses ranged from never, only if it was cheaper, only if it was equal in price, and various ranges from €1 to >€10,000.

The second bar chart in Figure 1 shows the same distribution but focuses specifically on ICEV owners in Phase 1 of the survey as this is the most critical demographic to shift. The results are largely similar, though there is a slight increase in the percentage of respondents who would not choose an EV under any circumstances or would only opt for an EV if it were cheaper. This suggests that the preference for EVs is not driven solely by current EV owners, but is also prevalent among ICEV owners.

To understand if preferences for EV shifts over time, I compare the results for ICEV owners in wave 1 with the responses of the control in wave 2 for the same question. The last bar chart in Figure 1 displays the distribution for these responses and reveals a shift in EV preference among the German population from May 2024 to September 2024. Although the rate at which participants revealed they would not choose an EV under any condition remains stagnant at 27% across both waves, the prices at which participants would be willing to pay for an EV changed significantly. Wave 2, reveals only 29% of ICE owners are willing to pay a premium for an EV, down from 37% in wave 1. Additionally, the percentage of participants stating they would only choose an EV if it were cheaper increased significantly from 8% to 19%. These findings suggest that the likelihood of the German government achieving its EV adoption targets diminished between May and September 2024, further emphasizing the need for effective policy interventions.

# 5 Results

## 5.1 Determinants of EV ownership and Willingness to Pay

For the purpose of this phase of the analysis, we focus on survey data collected in wave 1 with N = 2,500 participants. If participants which finished the survey in under 3 minutes where removed from the sample leaving N = 2,446 participants, furthermore this phase of the study did not contain any information treatments. This wave of data was used to explore predictive factors for current EV owners, soon-to-be EV owners, those with a preference to be an EV owner, and individuals willingness-to-pay (WTP) for an EV. Table 4 through Table 8 present the main results of five regression analyses showing these predivtive factors. To extract relevant determinants of current EV ownership, participants where asked about their current vehicle type as well as if they planned to purchase a new vehicle within the next 5 years and if so which vehicle type they intended to purchase. A Logit regression was then used to predict the probability of current EV owner as well as for the likelihood of purchasing an EV as your next vehicle. Furthermore two willingness to pay question was used to determine first if there was any price at which the participant would prefer the EV to an ICEV and if so how much monetarily they would be willing to pay. To explore the determinants of having a preference for an EV at a given price point the sum of money (in €) was regression on the collected determinants.

When analyzing the key predictors of current EV ownership shown in column (1), several factors emerged as significant. Variables positively associated with EV ownership included a high level of awareness regarding climate policies designed to promote EV adoption, being between the ages of 35 and 44, owning multiple vehicles, and the belief that EVs are more environmentally friendly than ICEVs. Additionally, individuals whose social circles included many EV drivers and those who expressed enthusiasm about the prospect of driving an EV were also more likely to be EV owners.

**Table 4:** Phase 1 Survey Regressions

| | (1) EV Owner | (2) Next Vehicle EV | (3) EV Pref | (4) WTP for EV | (5) WTS for EV |
|---|---|---|---|---|---|
| Financial Literacy | -0.00452 | 0.640*** | 0.481** | -45.75 | -120.4 |
| | (0.206) | (0.199) | (0.205) | (129.0) | (167.4) |
| Male (Base) | 0 | 0 | 0 | 0 | 0 |
| | (.) | (.) | (.) | (.) | (.) |
| Female | 0.0868 | -0.195 | -0.265* | 13.83 | -157.6 |
| | (0.136) | (0.130) | (0.136) | (85.44) | (110.4) |
| Age: 18 - 34 (Base) | 0 | 0 | 0 | 0 | 0 |
| | (.) | (.) | (.) | (.) | (.) |
| Age: 35 - 44 | 0.801*** | 0.749*** | 0.0225 | -294.5** | -197.0 |
| | (0.182) | (0.179) | (0.229) | (127.8) | (172.3) |
| Age: 45 - 54 | 0.254 | 0.557*** | -0.336 | -259.5** | -218.0 |
| | (0.189) | (0.185) | (0.209) | (127.0) | (157.6) |
| Age: 55 - 64 | -0.0922 | 0.469** | -0.441** | -438.5*** | -398.1** |
| | (0.228) | (0.210) | (0.216) | (137.3) | (169.5) |
| Age: 65+ | 0.247 | 0.402 | -0.674** | -498.0*** | -287.5 |
| | (0.299) | (0.287) | (0.273) | (179.0) | (223.7) |
| Log Income | -0.295*** | -0.279*** | -0.149** | -24.77 | -43.91 |
| | (0.0589) | (0.0567) | (0.0633) | (35.79) | (47.07) |
| West Germany (Base) | 0 | 0 | 0 | 0 | 0 |
| | (.) | (.) | (.) | (.) | (.) |
| East Germany | 0.0359 | 0.103 | -0.0759 | 62.81 | -8.098 |
| | (0.180) | (0.169) | (0.158) | (106.0) | (135.5) |
| $N$ | 2416 | 1731 | 2446 | 2446 | 1475 |
| pseudo $R^2$ | 0.248 | 0.244 | 0.352 | | |
| adj. $R^2$ | | | | 0.531 | 0.447 |

Note: Columns 1-3 Logistic regressions and Column 4 OLS regression of WTP in Euro for the first Phase of the survey May 2024. Controls variables include Bundesland, Employment type, Education, as well as all variables found in Tables 5 - 8. Standard errors in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Conversely, several factors were negatively associated with EV ownership. Social norms played a role, particularly in cases where individuals perceived that people in their social circle did not view climate change as a serious threat to humanity. Perceived financial barriers were also significant, as individuals who considered EVs substantially more expensive than ICEVs were less likely to own one. Furthermore, concerns about practical limitations—such as the time required for charging—acted as deterrents to EV adoption. Interestingly, income, measured as the logarithm of participants' earnings, was negatively associated with EV ownership, suggesting that wealthier individuals continue to prefer luxury petrol- or diesel-powered vehicles over EV alternatives.

Notably, political affiliation did not emerge as a significant predictor of EV ownership, indicating that, at least within the German context during this period, EV adoption was not highly polarized along political lines. Similarly, economic preferences such as patience

and positive or negative reciprocity did not show significant predictive power. These findings suggest that while individual and social perceptions of climate policies, financial considerations, and perceived behavioral controls play a crucial role in EV adoption, whilst economic preferences do not appear to be major determinants.

**Table 5:** Phase 1 Survey Regressions

| | (1) EV Owner | (2) Next Vehicle EV | (3) EV Pref | (4) WTP for EV | (5) WTS for EV |
|---|---|---|---|---|---|
| CDU (Base) | 0 | 0 | 0 | 0 | 0 |
| | (.) | (.) | (.) | (.) | (.) |
| SPD | -0.101 | 0.0495 | 0.244 | -252.1** | -10.11 |
| | (0.190) | (0.178) | (0.202) | (122.3) | (154.0) |
| FDP | 0.195 | 0.208 | 0.516* | 256.4 | 94.65 |
| | (0.252) | (0.243) | (0.310) | (173.7) | (221.9) |
| Die Linke | -0.131 | 0.0648 | -0.0147 | -133.4 | -180.0 |
| | (0.278) | (0.252) | (0.284) | (174.1) | (229.2) |
| Die Grunen | -0.00862 | 0.335 | 0.224 | 246.1* | 380.1* |
| | (0.211) | (0.215) | (0.283) | (144.8) | (196.3) |
| AfD | 0.0700 | 0.0853 | -0.286 | -12.99 | -23.15 |
| | (0.212) | (0.199) | (0.194) | (132.7) | (159.7) |
| Not Specified | -0.113 | -0.405** | -0.199 | -269.1** | -2.573 |
| | (0.193) | (0.186) | (0.173) | (116.9) | (142.0) |
| $N$ | 2416 | 1731 | 2446 | 2446 | 1475 |
| pseudo $R^2$ | 0.248 | 0.244 | 0.352 | | |
| adj. $R^2$ | | | | 0.531 | 0.447 |

Note: Columns 1-3 Logistic regressions and Column 4 OLS regression of WTP in Euro for the first Phase of the survey May 2024. Controls variables include Bundesland, Employment type, Education, as well as all variables found in Tables 4, 6, 7 and 8. Standard errors in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

The predictors of intending to purchase an EV as the next vehicle seen in column (2) were largely similar to those of current EV ownership, with a few differences. Age emerged as a significant factor, with younger individuals being more likely to intend to buy an EV. Political alignment with the Green Party and perceived behavioral controls (such as the perceived difficulty of charging infrastructure) also had a more pronounced effect on future EV intentions. Additionally, high financial literacy was a key predictor of planning to own an EV in the near future.

**Table 6:** Phase 1 Survey Regressions

| | (1) EV Owner | (2) Next Vehicle EV | (3) EV Preference | (4) WTP for EV | (5) WTS for EV |
|---|---|---|---|---|---|
| Number of Vehicles | 0.160* | -0.106 | -0.0400 | 36.01 | -71.70 |
| | (0.0848) | (0.0768) | (0.0798) | (50.07) | (70.93) |
| Drive time per week (Hours) | 0.0394 | 0.141* | 0.323*** | 196.0*** | 195.0*** |
| | (0.0782) | (0.0725) | (0.0682) | (42.79) | (62.33) |
| Risk Preference | -0.0317 | -0.0146 | 0.0528* | 15.79 | 7.103 |
| | (0.0340) | (0.0315) | (0.0300) | (20.01) | (25.17) |
| Patience | -0.0265 | -0.0108 | -0.0419 | 13.52 | -7.471 |
| | (0.0276) | (0.0262) | (0.0259) | (16.76) | (21.12) |
| PBC: Driving Range | -0.0759 | -0.0721 | -0.122 | -22.02 | -73.01 |
| | (0.0704) | (0.0662) | (0.0771) | (45.29) | (58.51) |
| PBC: Charging Time EV | -0.185*** | -0.141** | -0.0556 | -87.84** | -85.12 |
| | (0.0683) | (0.0643) | (0.0777) | (44.66) | (58.62) |
| PBC: No. Charging Stations | -0.0914 | -0.217*** | 0.0255 | -157.5*** | -95.55 |
| | (0.0673) | (0.0649) | (0.0800) | (45.19) | (58.89) |
| PBC: Battery Replacement Cost | -0.104 | 0.00247 | 0.00788 | 5.300 | -51.99 |
| | (0.0722) | (0.0720) | (0.0900) | (49.13) | (67.84) |
| Altruism | 0.0432 | -0.0117 | -0.0435* | 9.296 | -8.024 |
| | (0.0278) | (0.0261) | (0.0237) | (16.03) | (19.89) |
| Pos. Reciprocity | -0.0538 | -0.0331 | -0.0104 | -50.26** | -25.40 |
| | (0.0336) | (0.0320) | (0.0290) | (19.58) | (24.56) |
| Neg. Reciprocity | -0.00515 | 0.00444 | -0.00845 | -1.590 | 25.34 |
| | (0.0243) | (0.0229) | (0.0226) | (14.57) | (18.06) |
| $N$ | 2416 | 1731 | 2446 | 2446 | 1475 |
| pseudo $R^2$ | 0.248 | 0.244 | 0.352 | | |
| adj. $R^2$ | | | | 0.531 | 0.447 |

Note: Columns 1-3 Logistic regressions and Column 4 OLS regression of WTP in Euro for the first Phase of the survey May 2024. Controls variables include Bundesland, Employment type, Education, as well as all variables found in Tables 4, 5, 7 and 8.
Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Individuals who intend to purchase an EV as their next vehicle seen in column (2) primarily share the characteristics of current EV owners seen in column (1), particularly in terms of environmental awareness, climate policy awareness, positive perceptions of EV technology, and social influences. However, several distinct factors differentiate this group. Higher financial literacy is positively associated with the intention to buy an EV, indicating that individuals with a stronger understanding of financial concepts are more likely to consider EV ownership. Additionally, individuals between the ages of 35 and 65 show a higher likelihood of intending to purchase an EV compared to younger age groups. Driving frequency is also a significant predictor, with those who spend more hours on the road being more likely to prefer an EV for their next vehicle. These findings suggest that while prospective EV buyers closely resemble current owners, financial literacy, age, and driving habits contribute to differences in purchasing intentions. Understanding these

factors can help inform policy and industry strategies to further promote EV adoption.

**Table 7:** Phase 1 Survey Regressions

| | (1) EV Owner | (2) Next Vehicle EV | (3) EV Preference | (4) WTP for EV | (5) WTS for EV |
|---|---|---|---|---|---|
| PN1: Climate Change is a threat | -0.0373 | -0.0974 | 0.0386 | -120.2** | 2.048 |
| | (0.0803) | (0.0767) | (0.0791) | (50.62) | (61.75) |
| PN2: Res for Reducing my CO2 | 0.0161 | 0.0486 | 0.0602 | 21.48 | -104.7* |
| | (0.0790) | (0.0760) | (0.0780) | (49.66) | (62.89) |
| PN3: Buy Env Friendly Products | 0.0940 | 0.0443 | -0.104 | -53.96 | 69.67 |
| | (0.0766) | (0.0727) | (0.0774) | (47.96) | (61.06) |
| PN4: EV are Better for Env | 0.228*** | 0.128** | 0.189*** | 121.6*** | 164.5*** |
| | (0.0700) | (0.0648) | (0.0652) | (42.59) | (53.38) |
| SN1: Climate Change is a threat | -0.209*** | -0.0686 | -0.136* | -23.52 | -82.04 |
| | (0.0794) | (0.0744) | (0.0783) | (49.08) | (62.92) |
| SN2: Buy Env Friendly Products | -0.0518 | 0.0364 | -0.0483 | 70.38 | 76.70 |
| | (0.0756) | (0.0728) | (0.0752) | (47.14) | (59.63) |
| SN3: Social Circle Drive EV | 0.244*** | 0.123** | 0.106 | 213.0*** | 127.7** |
| | (0.0623) | (0.0607) | (0.0790) | (42.89) | (56.45) |
| Driving an EV is exciting | 0.383*** | 0.457*** | 0.822*** | 254.6*** | 256.9*** |
| | (0.0638) | (0.0595) | (0.0687) | (39.22) | (50.86) |
| $N$ | 2416 | 1731 | 2446 | 2446 | 1475 |
| pseudo $R^2$ | 0.248 | 0.244 | 0.352 | | |
| adj. $R^2$ | | | | 0.531 | 0.447 |

Note: Columns 1-3 Logistic regressions and Column 4 OLS regression of WTP in Euro for the first Phase of the survey May 2024. Controls variables include Bundesland, Employment type, Education, as well as all variables found in Tables 4, 5, 6 and 8.
Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Column (3) across Table 4 through Table 8 focuses on those who express a preference for owning an EV. Once again those with higher financial literacy appeared to have a stronger preference for owning an EV. However, this group differed slightly from the previous models, particularly men were more likely to prefer owning an EV than women, younger people showed a stronger preference for EVs, and individuals with a higher risk tolerance were also more inclined to favor EV ownership.

Examining individuals' willingness to pay (WTP) for an EV or willingness to switch (WTS) from their current ICEV to an EV, as presented in Columns (4) and (5) across Table 4 through Table 8, several key patterns emerge. Notably, younger individuals, Green Party voters, and those who spent more hours driving per week exhibited a higher WTP for an EV. Additionally, individuals who perceived EVs as environmentally superior and those with a greater number of EV owners in their social network demonstrated a stronger willingness to pay. However, the most significant predictor of both WTP and WTS was an individual's awareness of climate policies introduced at the EU and German levels to promote EV adoption. Those with good awareness were WTS €1,052.80 more for an EV compared to those with no awareness, highlighting the potential role of policy

knowledge in shaping consumer behavior. This suggests that increasing public awareness and understanding of climate policies could be an effective strategy to accelerate EV adoption, as individuals who are better informed about governmental incentives and environmental regulations appear to be more inclined to make the transition from ICEVs to EVs.

**Table 8:** Phase 1 Survey Regressions

| | (1) EV Owner | (2) Next Vehicle EV | (3) EV Pref | (4) WTP for EV | (5) WTS for EV |
|---|---|---|---|---|---|
| Lifetime Cost of EV << ICEV | -0.178 | 0.201 | 0.0265 | 278.8** | 243.0 |
| | (0.187) | (0.183) | (0.203) | (122.9) | (161.3) |
| Lifetime Cost of EV < ICEV | -0.0917 | -0.0112 | 0.270 | -115.8 | 49.31 |
| | (0.163) | (0.156) | (0.168) | (106.4) | (134.1) |
| Lifetime Cost of EV == ICEV | 0 | 0 | 0 | 0 | 0 |
| | (.) | (.) | (.) | (.) | (.) |
| Lifetime Cost of EV > ICEV | -0.243 | -0.170 | 0.0640 | -60.84 | -130.8 |
| | (0.228) | (0.205) | (0.185) | (132.0) | (160.2) |
| Lifetime Cost of EV >> ICEV | -0.571* | -0.665** | -0.683*** | -10.33 | -224.4 |
| | (0.292) | (0.271) | (0.198) | (145.9) | (174.9) |
| Aggregate CP Awareness | 0.849*** | 0.390*** | 0.446*** | 485.4*** | 526.4*** |
| | (0.140) | (0.133) | (0.143) | (88.42) | (113.5) |
| Credibility of 2030 Targets | -0.0133 | -0.0151 | -0.0322 | 69.65*** | 48.47* |
| | (0.0303) | (0.0295) | (0.0334) | (19.67) | (24.86) |
| Support for Climate Policies | -0.0423 | 0.0785** | 0.0560 | 68.50*** | 54.38** |
| | (0.0353) | (0.0334) | (0.0345) | (21.76) | (27.00) |
| $N$ | 2416 | 1731 | 2446 | 2446 | 1475 |
| pseudo $R^2$ | 0.248 | 0.244 | 0.352 | | |
| adj. $R^2$ | | | | 0.531 | 0.447 |

Note: Columns 1-3 Logistic regressions and Column 4 OLS regression of WTP in Euro for the first Phase of the survey May 2024. Controls variables include Bundesland, Employment type, Education, as well as all variables found in Tables 4 to 7. Standard errors in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

## 5.2 Correcting Information Frictions and Heterogeneous Beliefs

Given the strong correlation between policy awareness and belief in the environmental benefits of EVs—both of which were highly predictive across all models and are critical for policy design and implementation—I developed two information treatments, which are detailed in Section 3.4. The main results for the two information treatments are shown in Table 9. The dependent variables in column (1) is the self reported likelihood of choosing an EV as your next vehicle, it ranges on an 11-point scale (0-10). The dependent variables in column (2) is the additional amount (in €) a respondent is willing to pay to switch their current ICEV for an identical EV. The dependent variables in column (3) is the additional amount (in €) a respondent is willing to pay for an EV over an ICEV in a hypothetical purchasing scenario. Participants were exposed to two distinct treatments: the environmental treatment, which offered information on the environmental advantages

of EVs, and the policy treatment, which emphasized financial incentives and regulatory measures aimed at promoting EV adoption. These treatments were designed to assess how targeted information can influence both perceptions and financial commitment to EV ownership.

**Table 9:** Treatment effects on future EV ownership and WTP.

| | (1) Next Vehicle EV | (2) WTP-Switch | (3) WTP- Replace |
|---|---|---|---|
| Env Treatment | 0.574*** | 3.424*** | 2.045* |
| | (0.137) | (1.285) | (1.209) |
| Policy Treatment | 0.399*** | -0.0791 | -1.174 |
| | (0.137) | (1.289) | (1.213) |
| Control Group Ave. | 4.2 | 1166 | 1110 |
| Controls | Yes | Yes | Yes |
| $N$ | 2989 | 2989 | 2989 |
| adj. $R^2$ | 0.122 | 0.103 | 0.113 |

Note: This table shows OLS regression estimates using respondents from wave 2. It is regressed on binary indicators that take the value of 1 for respondents in the environmental treatment and Policy treatment, respectively. The OLS regression has controls: Bundesland, Gender, log Income, Education, Politics, Age and employment type. Standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

The environmental treatment had a significant positive effect on participants' willingness to pay for an EV. Those who received this treatment were much more likely to consider an EV as their next vehicle and exhibited a higher willingness to switch their current vehicle to an EV. Additionally, participants in this group were more willing to pay a premium for an EV in a hypothetical purchase scenario. These findings highlight the impact of correcting environmental beliefs in influencing consumer behavior.

On the other hand, the policy treatment did not significantly affect willingness to pay. While participants exposed to the policy treatment showed a slightly increased likelihood of choosing an EV as their next vehicle, there was no statistically significant effect on their willingness to switch vehicles or pay for hypothetical EV purchases.

Table 10 highlights the impact of the environmental and policy treatments on participants' posterior beliefs regarding the environmental benefits and perceived cost competitiveness of EVs. The environmental treatment had a strong positive effect on updating participants' beliefs about the environmental advantages of EVs. Those who received this treatment reported significantly higher beliefs in the environmental benefits of EVs compared to ICEVs. In contrast, participants in the control group had lower environmental posterior beliefs, demonstrating the effectiveness of targeted environmental information in shifting perceptions about the environmental impact of EVs.

**Table 10:** Treatment effects on posterior beliefs

| | (1) Env_Post | (2) Env_Post | (3) Price_Post | (4) Price_Post |
|---|---|---|---|---|
| Env Treatment | 0.673*** | | 0.552*** | |
| | (0.132) | | (0.120) | |
| Policy Treatment | | 0.212 | | 0.311** |
| | | (0.133) | | (0.123) |
| Control Group Ave. | 5.1 | 5.1 | 4.3 | 4.3 |
| Controls | Yes | Yes | Yes | Yes |
| $N$ | 1989 | 1993 | 1989 | 1993 |
| adj. $R^2$ | 0.151 | 0.163 | 0.162 | 0.161 |

Note: This table shows OLS regression estimates using respondents from wave 2. It is regressed on binary indicators that take the value of 1 for respondents in the environmental treatment and Policy treatment, respectively. The OLS regressions has controls: Bundesland, Gender, log Income, Education, Politics, Age and employment type.
Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

In terms of cost perceptions, the environmental treatment also had a significant positive effect on participants' beliefs about the long-term affordability of EVs. This indicates that participants not only updated their environmental beliefs but also became more optimistic about the financial advantages of owning an EV.

The policy treatment also influenced price-related beliefs, though to a lesser extent. Participants exposed to the policy treatment reported an improvement in their perceptions of EV cost competitiveness, suggesting that information on taxes and subsidies can shift cost-related beliefs. However, its impact was smaller compared to the environmental treatment.

In the control group, price-related posterior beliefs were lower, further illustrating the effectiveness of both treatments in enhancing participants' views of EV affordability. While both treatments were successful in updating participants' beliefs, the environmental treatment had the strongest impact on both environmental and cost beliefs. The policy treatment significantly improved cost perceptions but had a smaller effect on environmental beliefs. These findings emphasize the importance of addressing specific belief areas, particularly in correcting misconceptions about the environmental and financial benefits of EVs, to drive broader adoption.

## 5.3 Financial Literacy and Treatment Effect

Understanding how treatment effects vary across different subgroups is critical for assessing the effectiveness of policy interventions. A key dimension of heterogeneity in this context is financial literacy, as it shapes individuals' ability to process complex economic trade-offs and policy incentives. Given that vehicle purchases represent one of the largest financial decisions households make, financial literacy likely influences how individuals assess the long-term economic implications of transitioning to an EV. This is particularly relevant for the policy treatment, which provides information on increasing financial penalties for ICEVs—including carbon taxes, fuel price increases,

and the planned 2035 phase-out. The ability to internalize such financial incentives and risks may differ systematically between individuals with high and low financial literacy, affecting the extent to which policy interventions drive behavioral change.

Table 11 presents the results of this heterogeneity analysis. The findings indicate that financial literacy plays a significant role in moderating treatment effects. Among respondents with high financial literacy, the environmental treatment leads to a statistically significant increase in both their likelihood of choosing an EV and their WTP. The policy treatment also has a positive effect on this group, significantly increasing their likelihood of selecting an EV. By contrast, for individuals with lower financial literacy, the environmental treatment still generates a positive shift in EV preferences, albeit with a smaller magnitude. The policy treatment, however, does not significantly influence WTP for this subgroup, suggesting that those with lower financial literacy may struggle to fully internalize the financial implications of climate public policies.

**Table 11:** Heterogeneity Analysis based on Respondent Financial Literacy.

| | Low Financial Literacy | | | High Financial Literacy | | |
|---|---|---|---|---|---|---|
| | Next Veh EV | WTP-S | WTP | Next Veh EV | WTP-S | WTP |
| Env Treat | 0.451* | -0.000838 | 0.436 | 0.667*** | 5.718*** | 3.342* |
| | (0.219) | (2.205) | (2.120) | (0.176) | (1.581) | (1.470) |
| Policy Treat | 0.234 | -0.425 | -1.748 | 0.537** | 0.345 | -0.606 |
| | (0.225) | (2.264) | (2.177) | (0.175) | (1.570) | (1.460) |
| Controls | Yes | Yes | Yes | Yes | Yes | Yes |
| $N$ | 1131 | 1131 | 1131 | 1858 | 1858 | 1858 |
| adj. $R^2$ | 0.105 | 0.101 | 0.123 | 0.133 | 0.113 | 0.107 |

Note: This table shows OLS regression estimates using respondents from wave 2. Respondents where split according to their mean financial literacy score. The dependent variables in column (1) is the self reported likelihood of choosing an EV as your next vehicle, it ranges on an 11-point scale (0-10). The dependent variables in column (2) is the additional amount (in €) a respondent is willing to pay to switch their current ICEV for an identical EV. The dependent variables in column (3) is the additional amount (in €) a respondent is willing to pay for an EV over an ICEV in a hypothetical purchasing scenario. It is regressed on binary indicators that take the value of 1 for respondents in the environmental treatment and Policy treatment, respectively. The OLS regressions has controls: Bundesland, Gender, log Income, Education, Politics, Age and employment type.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

These results highlight the importance of financial literacy in shaping consumer responses to both environmental and economic information. Individuals with higher financial literacy may be better equipped to integrate policy-driven financial incentives and transition risks into their decision-making, making them more responsive to information about future regulatory changes. In contrast, those with lower financial literacy may require additional support—such as simplified financial framing or tailored policy communication—to achieve similar shifts in behavior. These findings underscore the need for policymakers to consider not only the content of EV-related interventions but also the financial decision-making capabilities of target populations.

## 5.4 Treatment Effect Heterogeneity

To investigate how treatment effects vary across different subgroups, I examine whether the treatments are more effective for respondents with differing prior beliefs about the environmental benefits of EVs and their awareness of public policies. Table 12 analyzes heterogeneity in treatment effects based on participants' prior perceptions of EVs' environmental advantages. Respondents are divided into two groups: those with low environmental benefit priors (who are skeptical about EVs' environmental benefits) and those with high environmental benefit priors (who already view EVs as environmentally superior). The results indicate that the environmental treatment significantly increases the likelihood of choosing an EV for both groups, but the effect is larger for those with lower priors. Specifically, participants who initially underestimated the environmental benefits of EVs exhibit a strong and statistically significant increase in both their stated likelihood of choosing an EV and their willingness to pay (WTP), suggesting that correcting misperception can meaningfully shift preferences.

**Table 12:** Heterogeneity Analysis on Perception of EV Environmental Benefits.

| | Low Env Benefit | | | High Env Benefit | | |
|---|---|---|---|---|---|---|
| | Next Veh EV | WTP-S | WTP | Next Veh EV | WTP-S | WTP |
| Env Treat | 0.614*** | 2.527* | 2.853** | 0.465** | 4.402* | 0.455 |
| | (0.168) | (1.417) | (1.324) | (0.187) | (2.250) | (2.114) |
| Policy Treat | 0.360** | -1.378 | -2.241* | 0.448** | 1.133 | -0.506 |
| | (0.169) | (1.419) | (1.326) | (0.188) | (2.257) | (2.122) |
| Controls | Yes | Yes | Yes | Yes | Yes | Yes |
| $N$ | 1722 | 1722 | 1722 | 1267 | 1267 | 1267 |
| adj. $R^2$ | 0.091 | 0.079 | 0.103 | 0.055 | 0.076 | 0.082 |

Note: This table shows OLS regression estimates using respondents from wave 2. Respondents where split according to if they view EVs as better for the environment than ICEVs based on their response to an 11-point scale (0-10). The dependent variables in column (1) is the self reported likelihood of choosing an EV as your next vehicle, it ranges on an 11-point scale (0-10). The dependent variables in column (2) is the additional amount (in €) a respondent is willing to pay to switch their current ICEV for an identical EV. The dependent variables in column (3) is the additional amount (in €) a respondent is willing to pay for an EV over an ICEV in a hypothetical purchasing scenario. It is regressed on binary indicators that take the value of 1 for respondents in the environmental treatment and Policy treatment, respectively. The OLS regressions has controls: Bundesland, Gender, log Income, Education, Politics, Age and employment type. Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

The policy treatment, however, shows a different pattern. While it increases the likelihood of choosing an EV among those with low environmental priors, it reduces WTP, suggesting that financial incentives alone may not be sufficient to drive investment. One possible explanation is that individuals who remain unconvinced of EVs' environmental benefits may not fully internalize the rationale behind policy measures. Without a clear justification linking these policies to broader environmental objectives, they may perceive them as primarily financial mechanisms rather than as part of a green transition. This could lead to an unintended rebound effect, where exposure to policy incentives without accompanying environmental framing discourages financial commitment rather than

reinforcing it.

For respondents with high environmental priors, the environmental treatment also significantly increases WTP, reinforcing the role of pro-EV messaging in strengthening preferences. By contrast, the policy treatment has no effect on WTP, suggesting that while financial incentives can increase interest, they are most effective when paired with a clear narrative about why EV adoption is being encouraged. This highlights the importance of policy communication, ensuring that incentives not only shape economic considerations but also effectively convey their environmental rationale to maximize their impact on consumer behavior.

Table 13 examines how prior beliefs about EV price competitiveness shape responses to the treatments. Respondents who already viewed EVs as cheaper were significantly more likely to choose an EV and had a higher WTP following the environmental treatment, suggesting that reinforcing environmental benefits strengthens existing preferences. The policy treatment, however, had no effect on WTP in this group, implying that financial incentives are less influential when EVs are already seen as cost-competitive.

For those who perceived EVs as more expensive, the policy treatment increased the likelihood of choosing an EV but did not raise WTP, indicating that while financial incentives can shift stated preferences, they do not necessarily lead to greater financial commitment. The environmental treatment had no significant effect, suggesting that cost concerns may overshadow environmental messaging. These findings underscore the importance of addressing cost perceptions alongside policy incentives. While financial incentives can encourage EV consideration, they may be more effective when paired with efforts to shift perceptions of long-term affordability. If consumers continue to view EVs as expensive, policy measures alone may not be sufficient to drive widespread adoption.

**Table 13:** Heterogeneity Analysis on Perception of EV price compared to ICEV.

| | EV Cheaper | | | EV Expensive | | |
|---|---|---|---|---|---|---|
| | Next Veh EV | WTP-S | WTP | Next Veh EV | WTP-S | WTP |
| Env Treat | 0.615*** | 3.853** | 2.733* | 0.469** | 2.026 | 0.0703 |
| | (0.161) | (1.709) | (1.621) | (0.224) | (1.805) | (1.629) |
| Policy Treat | 0.375** | -0.480 | -1.129 | 0.462** | 0.536 | -1.556 |
| | (0.162) | (1.718) | (1.629) | (0.223) | (1.802) | (1.626) |
| Controls | Yes | Yes | Yes | Yes | Yes | Yes |
| $N$ | 1942 | 1942 | 1942 | 1047 | 1047 | 1047 |
| adj. $R^2$ | 0.088 | 0.092 | 0.101 | 0.105 | 0.059 | 0.058 |

Note: This table shows OLS regression estimates using respondents from wave 2. Respondents where split according to if they view the total cost of ownership over a ten-year period for an EV as better or worse than an ICEV – considering purchase price, fuel or charging costs, maintenance, and resale value. The dependent variables in column (1) is the self reported likelihood of choosing an EV as your next vehicle, it ranges on an 11-point scale (0-10). The dependent variables in column (2) is the additional amount (in €) a respondent is willing to pay to switch their current ICEV for an identical EV. The dependent variables in column (3) is the additional amount (in €) a respondent is willing to pay for an EV over an ICEV in a hypothetical purchasing scenario. It is regressed on binary indicators that take the value of 1 for respondents in the environmental treatment and Policy treatment, respectively. The OLS regressions has controls: Bundesland, Gender, log Income, Education, Politics, Age and employment type.
Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table 14 examines how climate policy awareness influences responses to the treatments. Participants with low awareness exhibit a strong increase in both their likelihood of choosing an EV and their WTP following the environmental treatment, suggesting that exposure to new information drives behavior change. The policy treatment also increases EV selection in this group, though its effect on WTP is weaker, implying that financial incentives alone may not be enough to drive investment.

**Table 14:** Heterogeneity Analysis based on Prior Public Policy Awareness.

| | Low Public Policy Awareness | | | High Public Policy Awareness | | |
|---|---|---|---|---|---|---|
| | Next Veh EV | WTP-S | WTP | Next Veh EV | WTP-S | WTP |
| Env Treat | 0.736*** | 4.628*** | 3.638*** | 0.320 | 1.177 | -1.001 |
| | (0.166) | (1.503) | (1.407) | (0.245) | (2.431) | (2.320) |
| Policy Treat | 0.475*** | 1.182 | -0.417 | 0.247 | -3.113 | -2.996 |
| | (0.169) | (1.526) | (1.429) | (0.239) | (2.375) | (2.266) |
| Controls | Yes | Yes | Yes | Yes | Yes | Yes |
| $N$ | 1982 | 1982 | 1982 | 1007 | 1007 | 1007 |
| adj. $R^2$ | 0.103 | 0.082 | 0.099 | 0.152 | 0.144 | 0.136 |

Note: This table shows OLS regression estimates using respondents from wave 2. Respondents where split according to their self rated awareness of public policies prior to this experiment, respondents where given an aggregate policy awareness score those assigned >0.5 where regarded as high awareness. The dependent variables in column (1) is the self reported likelihood of choosing an EV as your next vehicle, it ranges on an 11-point scale (0-10). The dependent variables in column (2) is the additional amount (in €) a respondent is willing to pay to switch their current ICEV for an identical EV. The dependent variables in column (3) is the additional amount (in €) a respondent is willing to pay for an EV over an ICEV in a hypothetical purchasing scenario. It is regressed on binary indicators that take the value of 1 for respondents in the environmental treatment and Policy treatment, respectively. The OLS regressions has controls: Bundesland, Gender, log Income, Education, Politics, Age and employment type.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

For participants with high policy awareness, neither treatment produces a statistically significant effect on EV selection or WTP. This suggests that knowledge updating, rather than simple exposure to incentives, is the key channel driving behavior change. When individuals are already informed, additional policy or environmental messaging has little impact on their stated preferences or willingness to pay. These findings highlight the importance of closing informational gaps to maximize EV adoption. The treatments are most effective among those with limited prior knowledge, reinforcing the need for targeted outreach to consumers who may be less familiar with climate policies and incentives.

## 5.5 Do changes in attitudes persist in the obfuscated follow-up?

There are several concerns about the evidence from the main experiment. First, treatment effects may be short-lived. Second, treatment effects may be biased due to differences in experimenter demand effects across treatment arms. Specifically, respondents in the treatment group may infer from the research evidence that the experimenter has pro-EV or environmental attitudes and therefore adjust their reported views on EV's. Since I consider the intentionally induced experimenter demand as the upper limit of the demand that my research findings may generate, this implies that follow-up surveys are an effective method for addressing demand effects. Given this evidence, obfuscated follow-up surveys should effectively reduce concerns about differential experimenter demand.

Table 15 provides evidence that the effects of the treatments persist two weeks after the initial experiment. Respondents in the policy treatment group remained more likely to indicate that their next vehicle purchase would be an EV. However, for the

environmental treatment group, I find smaller, statistically non-significant effects on actual EV ownership.

**Table 15:** Follow-up.

| | (1) Next Vehicle EV | (2) WTP-Switch | (3) WTP- Replace |
|---|---|---|---|
| Env Treatment | 0.320 | 3.473 | 2.596 |
| | (0.256) | (2.227) | (2.103) |
| Policy Treatment | 0.517** | 5.426** | 3.937* |
| | (0.258) | (2.251) | (2.125) |
| $N$ | 1086 | 1086 | 1086 |
| adj. $R^2$ | 0.002 | 0.004 | 0.001 |

Note: This table shows OLS regression estimates using respondents from wave 2. The dependent variables in column (1) is the self reported likelihood of choosing an EV as your next vehicle, it ranges on an 11-point scale (0-10). The dependent variables in column (2) is the additional amount (in €) a respondent is willing to pay to switch their current ICEV for an identical EV. The dependent variables in column (3) is the additional amount (in €) a respondent is willing to pay for an EV over an ICEV in a hypothetical purchasing scenario. It is regressed on binary indicators that take the value of 1 for respondents in the environmental treatment and Policy treatment, respectively.
Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

The follow-up survey was initially designed to include a minimum of 1,800 respondents, but due to low response rates, I was only able to recontact 1,086 of the original 3,000 experiment participants. To address this limitation, I created two preference dummy variables based on respondents' stated willingness to switch to an EV. Participants who indicated in either willingness-to-pay question that they would never consider switching to an EV were categorized as having no preference for EVs (coded as "0"). Conversely, those who reported a willingness to switch at a certain price point—including scenarios where an EV was the same price or cheaper—were categorized as having a preference for EVs (coded as "1").
The results of the two logit regressions presented in Table 16 indicate that respondents in both treatment groups exhibited a stronger preference for EV ownership compared to the control group. This suggests that both the policy and environmental treatments were effective in shifting respondents' preferences toward EVs, even two weeks after the experiment, mitigating concerns about experimenter demand effects.

**Table 16:** Follow-up Preference for EV'S

| | (1) Preference - Replace | (2) Preference - Switch |
|---|---|---|
| Env Treatment | 0.348** | 0.360** |
| | (0.168) | (0.165) |
| Policy Treatment | 0.344** | 0.369** |
| | (0.169) | (0.167) |
| Constant | 0.850*** | 0.776*** |
| | (0.111) | (0.110) |
| $N$ | 1086 | 1086 |
| pseudo $R^2$ | 0.005 | 0.005 |

Note: This table shows Logit regression estimates using respondents from wave 2. The dependent variable in column (1) and (2) is a constructed preference for owning an EV. Respondents are coded as 0 if they report that they will never choose to own an EV on the willingness to pay to replace/switch to an EV questions. At any other price point respondents are coded as 1. It is regressed on binary indicators that take the value of 1 for respondents in the environmental treatment and Policy treatment, respectively. Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

# 6 Discussion

The results from Waves 1 and 2 offer key insights into the factors influencing EV adoption in Germany, underscoring the importance of addressing information frictions and heterogeneous beliefs. A significant finding across both waves is the strong influence of environmental beliefs on participants' preferences for EVs. Individuals who believed in the environmental benefits of EVs were much more likely to choose an EV as their next vehicle and were also willing to pay more for one. This was further validated by the environmental treatment in Wave 2, which led to a significant increase in both the likelihood of EV adoption and willingness to pay. These results highlight the critical role that accurate environmental information plays in shaping consumer behavior. Correcting misconceptions and improving understanding of the environmental benefits of EVs can be a highly effective strategy in promoting their adoption.

Economic incentives, while impactful, revealed more nuanced effects. The policy treatment did increase the likelihood of participants to consider an EV, particularly for those who were previously skeptical about the environmental benefits of EVs. However, the same treatment had a weaker influence on participants' willingness to pay more for an EV. In some cases, particularly among individuals who viewed EVs as worse for the environment compared to ICEV, the policy treatment even reduced their willingness to pay for an EV. This suggests that while financial incentives may encourage initial interest, without clear communication about the rationale behind these policies—specifically the environmental reasoning—there is a risk of unintended consequences, such as dampening the willingness to invest. These findings imply that economic policies, while essential, cannot work in isolation. They need to be accompanied by clear, compelling information that emphasizes the long-term environmental and economic benefits of EVs.

The results underline the necessity of integrating clear communication strategies with

financial incentives. Economic incentives, such as tax benefits and subsidies, are important levers in encouraging EV adoption. However, without effectively addressing the underlying information gaps—particularly the reasons behind these incentives, such as reducing carbon emissions and combating climate change—there is a risk that consumers may perceive these incentives as insufficient or irrelevant to their personal decision-making. Policymakers should ensure that financial incentives are accompanied by strong messaging that explains the environmental benefits of EVs and corrects any existing misinformation. Without this dual approach, policies may fall short of their intended goals and negatively impact long-term EV adoption.

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# 7 Appendix

**Table 17:** Phase 1 Survey Regressions

| | (1) EV Owner | (2) Next Vehicle EV | (3) EV Preference | (4) WTP for EV | (5) WTS for EV |
|---|---|---|---|---|---|
| Lower Secondary Education | 0 | 0 | 0 | 0 | 0 |
| | (.) | (.) | (.) | (.) | (.) |
| Secondary school leaving certificate | -0.0480 | 0.398 | 0.483** | -228.0 | -8.911 |
| | (0.252) | (0.246) | (0.196) | (138.6) | (174.9) |
| University Entrance Examinations | -0.000125 | 0.216 | 0.541** | -83.18 | -231.4 |
| | (0.264) | (0.258) | (0.219) | (149.9) | (189.4) |
| Bachelor Degree | -0.0276 | 0.671** | 0.943*** | 118.9 | 494.8** |
| | (0.293) | (0.286) | (0.290) | (177.5) | (222.2) |
| Diploma | 0.375 | 0.532* | 0.612** | -139.7 | -141.6 |
| | (0.299) | (0.296) | (0.263) | (175.8) | (225.0) |
| Masters Degree | 0.609** | 0.555* | 0.831*** | 189.4 | -27.51 |
| | (0.304) | (0.302) | (0.311) | (188.6) | (250.3) |
| Ph.D. | 0.561 | 0.0606 | 1.327** | -257.4 | 511.7 |
| | (0.477) | (0.491) | (0.640) | (339.7) | (457.7) |
| No School Completion | 0 | 0 | -1.379 | -1679.9** | -1679.5* |
| | (.) | (.) | (0.901) | (781.3) | (942.1) |
| $N$ | 2416 | 1731 | 2446 | 2446 | |
| pseudo $R^2$ | 0.248 | 0.244 | 0.352 | | |
| adj. $R^2$ | | | | 0.343 | |

Note: Columns 1-3 Logistic regressions and Column 4 OLS regression of WTP in Euro for the first Phase of the survey May 2024. Controls variables include Bundesland, Employment type, Education, as well as all variables found in Tables 4, 5 and 6.
Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

**Table 18:** Phase 1 Survey Regressions

| | (1) EV Owner | (2) Next Vehicle EV | (3) EV Preference | (4) WTP for EV | (5) WTS for EV |
|---|---|---|---|---|---|
| Student | -1.147*** | -0.524* | 0.124 | -532.6** | -319.8 |
| | (0.390) | (0.305) | (0.417) | (210.7) | (263.1) |
| Full Employment (Base) | 0 | 0 | 0 | 0 | 0 |
| | (.) | (.) | (.) | (.) | (.) |
| Part-time Employment | -0.476** | -0.174 | 0.214 | -272.9** | -96.88 |
| | (0.205) | (0.191) | (0.198) | (125.2) | (153.8) |
| Self Employed | 0.0395 | -0.125 | -0.193 | -464.0** | -355.3 |
| | (0.286) | (0.304) | (0.318) | (195.1) | (262.6) |
| Job Seeking Unemployed | -1.408** | -0.737* | -0.170 | -494.1** | -393.8 |
| | (0.664) | (0.424) | (0.372) | (243.1) | (339.7) |
| Unemployed | 0 | 0 | -0.631 | -797.7** | -885.9* |
| | (.) | (.) | (0.542) | (385.5) | (521.6) |
| Retired | -0.526** | -0.309 | -0.542** | -225.9 | -154.0 |
| | (0.263) | (0.242) | (0.219) | (149.8) | (185.7) |
| Homemaker | -0.652* | -0.269 | 0.145 | -483.4** | -383.9 |
| | (0.367) | (0.315) | (0.282) | (196.1) | (235.3) |
| Disability Leave | -0.632 | -0.672 | -0.0734 | -329.4 | 131.1 |
| | (0.677) | (0.501) | (0.386) | (273.9) | (431.5) |
| $N$ | 2416 | 1731 | 2446 | 2446 | |
| pseudo $R^2$ | 0.248 | 0.244 | 0.352 | | |
| adj. $R^2$ | | | | 0.343 | |

Note: Columns 1-3 Logistic regressions and Column 4 OLS regression of WTP in Euro for the first Phase of the survey May 2024. Controls variables include Bundesland, Employment type, Education, as well as all variables found in Tables 4, 5 and 6.
Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

## 7.1 Definitions

**Table 19:** Phase 1 Variable Definitions

| Variable Name | Definition |
|---|---|
| Number of Vehicles | How many vehicles does your household own? |
| Drive time per week (Hours) | How much time do you spend driving per week? |
| Risk Preference | How willing or unwilling are you to take risks? |
| Patience | How much would you be willing to give up something that benefits you today in order to benefit more in the future? |
| PBC: Driving Range | Perceived Behavourial Control: How concerned are you about the range of an electric vehicle? |
| PBC: Charging Time EV | Perceived Behavourial Control: How concerned are you about the time it takes to charge an electric vehicle? |
| PBC: No. Charging Stations | Perceived Behavourial Control: How concerned are you about the number of EV charging stations in my neighborhood? |
| PBC: Battery Replacement Cost | Perceived Behavourial Control: How concerned are you about the cost of replacing the battery of an electric vehicle? |
| Altruism | How much would you be willing to give to a good cause without expecting anything in return? |
| Pos. Reciprocity | If someone does me a favor, I'm willing to reciprocate. |
| Neg. Reciprocity | How much would you be willing to punish someone who treats you unfairly, even if it would have negative consequences for you? |
| PN: Climate Change is a threat | Personal Norm: I believe that climate change poses a significant threat to humanity. |
| PN: Res for Reducing my CO2 | Personal Norm: I feel personally responsible for reducing my CO2 footprint in order to combat climate change. |
| PN: Buy Env Friendly Products | Personal Norm: I primarily buy products and services from companies that are committed to positive environmental practices. |
| PN: EV are Better for Env | Personal Norm: I believe that electric vehicles are better for the environment compared to gasoline or diesel vehicles. |

**Table 20:** Phase 1 Variable Definitions

| Variable Name | Definition |
|---|---|
| SN: Climate Change is a threat | Social Norm: Most people in my social environment believe that climate change poses a significant threat to humanity. |
| SN2: Buy Env Friendly Products | Social Norm: Environmentally conscious purchasing decisions are expected of me in my social environment. |
| SN3: Social Circle Drive EV | Social Norm: In my circle of acquaintances and friends, many people drive electric vehicles. |
| Driving an EV is exciting | I find the idea of driving an electric vehicle exciting. |
| Aggregate CP Awareness | The average self report awareness among four climate policies. |
| Credibility of 2030 Targets | How credible do you think it is that Germany can reduce its carbon emissions by 65% by 2030 and achieve a net-zero footprint by 2045? |
| Support for Climate Policies | In general, how much do you support the German and European environmental and climate policies discussed in this survey? |

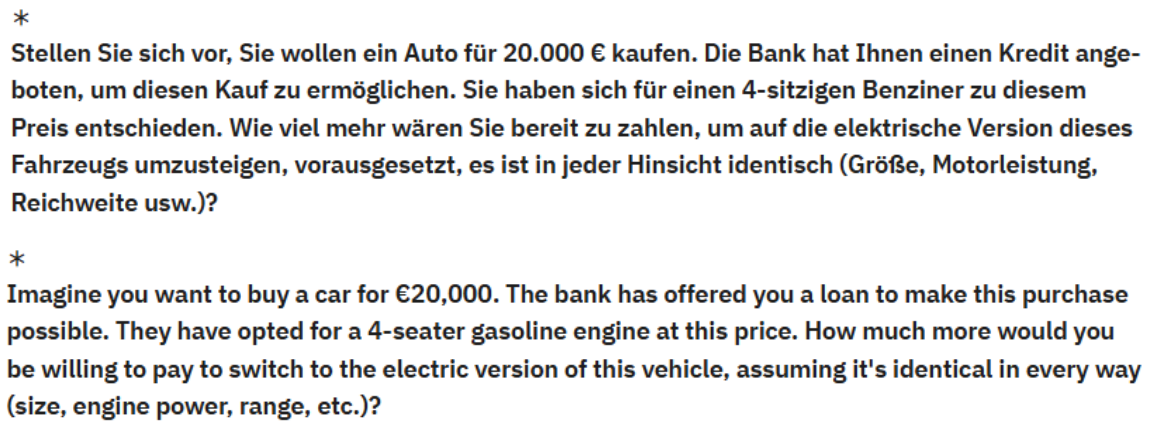


**Figure 4:** Willingness-to-Pay Dependent Variable as seen in the survey (with English translation).

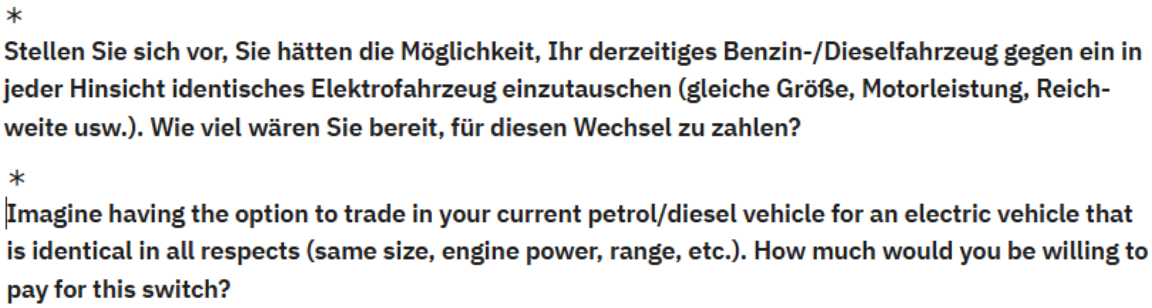


**Figure 5:** Willingness-to-Switch Dependent Variable as seen in the survey (with English translation).

*

Die Regierungen der EU und Deutschlands haben mehrere klimapolitische Maßnahmen und Initiativen eingeführt, die darauf abzielen, die Kosten für den Besitz eines Elektrofahrzeugs zu senken und die Kosten für den Besitz von Diesel- und Benzinfahrzeugen zu erhöhen. Zum Beispiel:

- Im Jahr 2027 wird ein EU-weiter CO2-Preis auf Benzin und Diesel erhoben werden. Mehrere Studien schätzen, dass dies die Kosten für das Tanken eines Benzinfahrzeugs um zusätzliche 14 € pro 50-Liter-Tank erhöhen könnte, wobei einige Prognosen sogar von zusätzlichen 42 € pro Tank ausgehen.
- Laut ADAC verteuert der seit 2021 geltende CO2-Preis auf Benzin und Diesel das Tanken eines 50-Liter-Benzins bereits um 6,35 €.
- Es gibt eine Steuerbefreiung für Elektrofahrzeuge, die den Besitzern bis Ende 2030 eine jährliche Ersparnis von ca. 100 € bringt*.
- Es gibt eine Treibhausgasquote, die es den Besitzern von Elektrofahrzeugen ermöglicht, ihre CO2-Einsparungen in Form von Zertifikaten zu verkaufen. Laut ADAC können Besitzer von Elektrofahrzeugen zwischen 80 € und 110 € pro Jahr verdienen.
- Und ab 2035 wird die EU den Verkauf von neuen Benzin- und Dieselfahrzeugen verbieten.

Als Folge dieser Maßnahmen könnte der Besitz eines Benzin- oder Dieselfahrzeugs immer teurer werden.

*Die geschätzten Einsparungen basieren auf einem Vergleich zwischen zwei ähnlichen Fahrzeugen: einem Volkswagen Golf und einem vergleichbaren Elektromodell, dem Volkswagen ID.3.

*

The governments of the EU and Germany have introduced several climate policy measures and initiatives aimed at reducing the cost of owning an electric vehicle and increasing the cost of owning diesel and gasoline vehicles. For example:

- In 2027, an EU-wide CO2 price will be levied on petrol and diesel. Several studies estimate that this could increase the cost of refueling a gasoline vehicle by an additional €14 per 50-litre tank, with some projections even putting an additional €42 per tank.
- According to the ADAC, the CO2 price on gasoline and diesel, which has been in force since 2021, already makes refueling a 50-liter gasoline more expensive by €6.35.
- There is a tax exemption for electric vehicles, which will provide owners with an annual saving of approximately €100 until the end of 2030*.
- There is a greenhouse gas quota that allows owners of electric vehicles to sell their CO2 savings in the form of certificates. According to the ADAC, owners of electric vehicles can earn between €80 and €110 per year.
- And from 2035, the EU will ban the sale of new petrol and diesel vehicles.

As a result of these measures, owning a petrol or diesel vehicle could become more and more expensive.

*The estimated savings are based on a comparison between two similar vehicles: a Volkswagen Golf and a comparable electric model, the Volkswagen ID.3.

**Figure 6:** Policy Treatment as seen by Respondents in the survey (with English translation).

*
Elektrofahrzeuge sind deutlich umweltfreundlicher im Vergleich zu Benzin- oder Dieselfahrzeuge laut einer aktuellen Studie des Umweltbundesamtes (UBA).

- Der UBA-Studie kommt zu dem Ergebnis, dass die im Jahr 2020 zugelassene Elektrofahrzeuge um 40% klimafreundlicher sind als herkömmliche Fahrzeuge.
- Der Verkehrssektor ist einer der Hauptverursacher der deutschen CO2-Emissionen, auf ihn entfallen 22 % sektoralen CO2-Emissionen im Jahr 2023 laut UBA.
- In der Studie wurde jede Phase des Lebenszyklus eines Fahrzeugs untersucht, von der Rohstoffgewinnung über die Herstellung, die Batterieproduktion, die Fahrzeugnutzung und -wartung bis hin zum Kraftstoffverbrauch und der Entsorgung des Fahrzeugs.
- Mit steigendem Anteil erneuerbarer Energien im deutschen Stromnetz werden E-Fahrzeuge bis 2030 voraussichtlich sogar 55% klimafreundlicher als herkömmliche Fahrzeuge sein.
- Zudem stößt ein durchschnittlicher Benziner 4,6 Tonnen CO2 pro Jahr aus, während E-Fahrzeuge keine Abgase produzieren (US EPA).

Daher ist die Wahl eines E-Fahrzeugs die nachhaltigste Entscheidung die Sie treffen können, wenn Sie ein neues Auto kaufen möchten laut der Studie des Umweltbundesamtes.

*
Electric vehicles are significantly more environmentally friendly compared to gasoline or diesel vehicles, according to a recent study by the Federal Environment Agency (UBA).

- The UBA study comes to the conclusion that electric vehicles registered in 2020 are 40% more climate-friendly than conventional vehicles.
- The transport sector is one of the main sources of German CO2 emissions, accounting for 22% of sectoral CO2 emissions in 2023, according to UBA.
- The study looked at every stage of a vehicle's life cycle, from raw material extraction, manufacturing, battery production, vehicle use and maintenance, to fuel consumption and disposal of the vehicle.
- With the increasing share of renewable energies in the German power grid, electric vehicles are expected to be as much as 55% more climate-friendly than conventional vehicles by 2030.
- In addition, an average gasoline engine emits 4.6 tons of CO2 per year, while electric vehicles produce no exhaust gases (US EPA).

Therefore, choosing an electric vehicle is the most sustainable decision you can make if you want to buy a new car, according to the study by the Federal Environment Agency.

**Figure 7:** Environmental Treatment as seen by Respondents in the survey (with English translation).

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