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PROMOTING THE UPTAKE OF ELECTRIC VEHICLES FOR EMISSION REDUCTION IN ESTONIA

Applied Behavioral Science (227502)

Master's Thesis

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1. Abstract in Estonian and English

Kokkuvõte

Sõiduautod emiteerivad Euroopas suurima osa transpordisektori heitest. Seetõttu keskendutakse käesolevas magistritöös sekkumisprogrammi väljatöötamisele, mis aitaks elektriautode kui heitevabade sõidukite kasutusele võtmist Eestis suurendada.

Töös arendatakse planeeritud käitumise teooria ja COM-B mudelite põhjal välja elektriautode valimist mõjutav käitumuslik mudel. Käitumuslike taipamiste põhjal töötatakse välja sekkumiskava ja selle mõjususe testimise analüüsiplaan.

Uurimistulemus näitab, et elektriauto valimiseks peavad inimesed oluliseks laadimistaristut, eriti kodulaadija paigaldamise võimalust. Kulude osas peetakse oluliseks soetuskulu, elektriauto väärtuse langust ja elektriauto teenindamisega seotud kulude suurust. Motivatsiooni elektriauto kasutajaks saamisel tõstab suhtumine elektriautodesse, mis on kõrgem, kui olemas on teadmised elektriautode kohta. Oluline on ka arvamus potentsiaalse keskkonnakasu kohta.

Sekkumiskava lähtub fiskaalselt säästliku ja lihtsa rakendamise ning suurima kasu põhimõttest. Töös soovitatakse teadlikkuse tõstmiseks tuntud inimeste poolt avalikku kogemuse jagamist, töötubasid automüügiettevõtetele ning sõidukite keskkonnamõju võrdlevat illustratiivset teavitusmaterjali. Elektriautode väärtuse langust soovitatakse adresseerida sõiduaku kindlustusvõimaluse loomisega. Tagamaks võimalus elektriauto kasutusele võtta, on oluline tuvastada ja adresseerida kodulaadija paigaldamist takistavad tegurid.

Abstract

Within the European transport sector, emission from cars is the biggest. Therefore, the current thesis concentrates on the development of a behavioral intervention plan to increase the uptake of electric vehicles as non-emitting vehicles in Estonia.

The thesis develops a behavioral model based on the Theory of Planned Behavior and COM-B models for mapping the influence factors for choosing an electric vehicle. Behavioral insights are the basis for the development of the behavioral intervention plan and the experiment plan for measuring its impact.

The results indicate that for people to choose an electric vehicle, charging infrastructure is crucial, especially the possibility to install a home charger. Besides the opinion of the potential environmental benefits, acquisition costs, the decrease in value of electric vehicles and servicing costs are considered important. Motivation to become an electric vehicle user increases with a positive attitude, which is stronger when people have knowledge about electric vehicles.

The suggested intervention plan envisaging a principle of fiscal prudence and easy implementation with maximum impact foresees an experience-sharing by publicly known people, workshops for car dealerships and illustrative material comparing the environmental impact of EV and combustion engine vehicles. To mitigate concerns regarding the value decrease of electric vehicles, the introduction of an insurance option for the battery is proposed. To enable the uptake of an electric vehicle, it is essential to identify and address the obstacles hindering the installation of home chargers.

2. Executive Summary

2.1. The Problem, its Importance and Scope and Effectiveness of Previous Solutions

In cities, people often experience bad air quality because of the vehicles' exhaustion systems. Public transport is not always convenient enough to give up private transport and lightweight vehicles, although gaining popularity, and not entirely a substitute for cars. Currently, majority of cars on Estonian roads are combustion engine vehicles, which produce greenhouse gases.

According to European data, cars emit over 60% of greenhouse gases in the road transportation sector (European Parliament, 2024). Across its life cycle, a typical electric vehicle (EV) in Europe produces fewer greenhouse gases, compared with its petrol or diesel equivalent. Although emissions are usually higher in the production phase, these are more than offset by lower emissions in the use phase over time. (European Environment Agency, 2024a) EV-s operate with only around 11% of energy loss and up to 91% of original energy goes to wheels, while gasoline powered vehicle loses around 80% of energy to various inefficiencies and only up to 25% reaches wheels (Kirk, 2024). EV-s of all types (vans and trucks, buses, passenger cars, 2- and 3-wheelers) are already displacing 1.7 million barrels of oil usage per day, which is equivalent to about 3% of total road fuel demand (Bloomberg NEF, 2024). By 2035, a zero-CO2 emission target is set in Europe for the fleet of new cars and vans. To reach these goals, a significant increase in the uptake of zero-emission vehicles will be needed. (European Environment Agency, 2024b)

In Estonia, the biggest sector emitting greenhouse gases is energetics with 6.9 million tons of CO2 equivalent of emissions, followed by agriculture and the transport sector with 2.5 million tons of CO2 equivalent emissions per 2022 (Kliimaministeerium, 2025a).

As of February 1st, 2025, there are a total of 755,636 vehicles registered in the Estonian Traffic Register, of which 8,581 are electric vehicles (Transpordiamet, 2025a), i.e 1.1% of the total vehicle fleet. In the European Union, a total of 2.4 million new electric vehicles were registered in 2023, accounting for an average of 22.7% of new car registrations. Estonia ranks sixth from the bottom in the line of 27 member states accounting for below than 10% of new EV registrations (European Environment Agency, 2024a). To reduce emissions by road transport in Estonia, electric vehicles are a good alternative to combustion engine vehicles, and therefore their uptake needs to be increased.

Therefore, the policy maker, the Ministry of Climate has set a policy objective for wider uptake of low-emission vehicles (Kliimaministeerium, 2025a). This thesis concentrates on developing a policy intervention plan to support wider electric vehicle uptake. The thesis is not promoting vehicle change nor the vehicle use uptake.

2.2. The Main Outcome of Behavior Change Intervention Development Process for the Problem

Research and intervention development for the problem revealed that a target behavior of choosing an EV over a combustion engine vehicle requires one to have a behavioral intention to choose an EV, for which one must be motivated to become an EV user. For a higher motivation to become an EV user one must have a higher attitude towards EV, which requires knowledge about EV use. Additionally, opportunities and capabilities to choose an EV are prerequisites. The policy measures that target total costs of ownership have the largest impact potential. Analysis revealed though that the current tax measure that supports the uptake and EV use is perceived as more important compared to a grant support measure. The second important policy field is perceived to be the support for convenience of use, which is connected also to the sufficient infrastructure of charger network and the possibility of home charger installation.

Policy intervention mapping suggested different measures, of which the largest potential effect, fiscal prudence and easiest implementation have three following intervention suggestions:

1. experience sharing by longtime publicly known EV users to act as role models and succeed in persuasion of EV use benefits and provide to knowledge level improvement,
2. workshops for salespeople to share knowledge of state priorities and discuss the EV use characteristics to provide to the potential of overcoming the knowledge gap in the decision process, and
3. informative illustrative material comparing the environmental impact of combustion engine vehicles and EV-s to emphasize the positive environmental impact of EV-s.

More difficult to implement, but a large effect is foreseen in the fourth policy intervention measure suggested, which is driving battery insurance to address financial risk of EV ownership.

2.3.Strengths and Limitations to the Study

The strengths of this research stand in comprehensive behavioral overview of the influence factors of choosing an EV. Valuable insights derive from a large sample of EV users engaged in the research, whose practical experience and knowledge revealed important aspects that helped to understand the state of play and design a policy intervention plan.

Any practical decisions that are to be made based on this study must consider that the gathering of data was voluntary and is therefore skewed by interest in the topic. The sample consisted of over 67% of highly educated people, which does not correspond to the population distribution and therefore incorporates a widely common WEIRD (White, Educated, Industrialized, Rich, Democratic) sample that threatens the external validity of the findings (Darling, 2017). Therefore, the sample is in correspondence to early adopter profile but is not suitable for generalization to population. To gather a contrasting sample that does not incorporate interest skewness risk and is in accordance with population, a random sampling of non-EV users and direct contact to replicate the quantitative study would be advised. Alternatively, different distribution channels, like public newspapers and local government distribution channels could be considered for gathering different samples, but this method does not eliminate the interest skewness entirely.

All suggested policy interventions are preliminary and need further development and impact assessment prior to implementation.

2.4.Conclusions and Suggestions to Practitioners and Scientists

In a situation of fiscal resource scarcity and severe political challenges, inefficient policy making not only wastes resources, but may cause unwanted consequences that further waste resources and intensify the fiscal constraints. The application of behavioral insights does not eliminate but reduces that risk.

The European Commission (2025) has stated that crises and challenges, like climate change, energy scarcity, and social inequity to name a few, are increasingly complex, but the one major thing they have in common is human behavior.

Current research proposes a policy intervention plan based on behavioral insights considering their potential effect and implementation difficulty. Although this study suggests other policy intervention possibilities, these measures potentially incorporate in them a large economic impact, social disparities as well as a burdensome and expensive implementation. Therefore, one suggestion to practitioners is to use behavioral and economic feasibility analysis

prior to policy decisions. This suggestion has empirical support from the current analysis, which revealed that people perceive an acquisition grant of 4,000 euros per EV to be the least important policy measure while the fiscally cheaper motor vehicle tax measure is perceived more important, therefore has larger impact potential.

For evaluation of the impact of proposed policy intervention measures, it is suggested to carry out experimental testing prior to implementation. The experimental method enables to evaluate the effectiveness of the planned intervention measures beforehand and to minimize the wasting of any resources on ineffective interventions.

The research also revealed the importance of supporting the availability of charging infrastructure. There are obstacles to installing home chargers to apartment buildings, hence further research to determine the extent of these obstacles and addressing them is suggested.

3. Mapping of the Problem

3.1. Target Group Behavior Through Which the Problem Could Be Solved

As only 1.1% of the Estonian car fleet is electric, it reflects that people have chosen to own a combustion engine vehicle. As the aim of the research is to support the increase of the share of EV-s in Estonia, the uptake of EV-s needs to be increased, therefore the behavior this research needs to concentrate on is the selection of a vehicle by any person, who is in the position of deciding about a vehicle type. The target behavior is therefore choosing an EV over a combustion engine vehicle in the car selection process. The thesis concentrates only on zero-emission all-electric vehicles, excluding hybrid-engine vehicles from the favorable outcome of the decision of a vehicle change as the emission reduction effect of their uptake will be the biggest. This research does not aim to promote car-use uptake nor vehicle change itself. The author also suggests preferring public transport or any light transport mode, if possible.

To understand what influences people, the influence factors of the vehicle selection decision need to be further understood. As EV-s are increasingly popular in Europe (European Environment Agency, 2024a), it is a subject that has been already investigated internationally, but not thoroughly in Estonian context.

In literature, the most used behavioral model for the electric car decision process is the Theory of Planned Behavior (Ackaah, Kanton, & Osei, 2021). The theory of planned behavior determines attitudes, social norms and perceived behavioral control that influence the decision towards favoring electric vehicles. Although this model is widely used and all determinants of

behavioral intention, like attitude, subjective norms and perceived behavioral control are relevant (Hasan, 2021), according to Ajzen, the theory concentrates specifically on cognitive self-regulation as an important aspect of human behavior (Ajzen, 1991). The decision of choosing a type of vehicle is additionally dependent on external factors, like opportunities and capabilities, which the theory of planned behavior lacks.

The COM-B model of behavior is widely used to identify what needs to be changed for a behavior change intervention to be effective (West & Michie, 2020). As in this thesis, the purpose is to suggest a behavior change intervention, therefore the COM-B model is used as a basis for further model development. Based on the COM-B model, by adding elements from the theory of planned behavior, a new preliminary behavioral model is proposed.

The COM-B model covers capability, opportunity and motivation factors that need to be present for any kind of behavior to occur (West & Michie, 2020). According to West and Michie (2020), the COM-B model represents the observation that at any given moment, a particular behavior will occur only when the person concerned has the capability and opportunity to engage in the behavior and is more motivated to enact that kind of behavior compared to any other behavior. This means that for a person to choose an electric vehicle, one must have the capability and opportunity to make that decision and be motivated enough to choose an EV over a combustion engine vehicle.

In the COM-B model, capability refers to psychological and physical capabilities (knowledge, skills, physical strength) when engaging in a particular behavior (Social Change UK, 2019). In the case of choosing a vehicle, it is not directly connected to a person's physical but factual capabilities, i.e. the person must have sufficient financial resources, and the characteristics of the EV have to be suitable for the person's needs for the use of a vehicle.

Opportunity refers to external factors which make the execution of a particular behavior possible (Social Change UK, 2019). In the context of choosing a vehicle, the person must have the physical opportunity to choose a suitable vehicle model from the market, and the person must have the physical opportunity to use that vehicle, i.e. mainly the possibility to charge the vehicle.

Motivation refers to the person's internal processes which influence decision-making, i.e. reflective motivation (making plans and evaluating things that have happened) and automatic motivation (desires, impulses and inhibitions) (Social Change UK, 2019). The relationship between behavior and behavioral intention is defined by the level of motivation or

commitment to the behavior (Fishman, Lushin, & Mandell, 2020), i.e. motivation is an intrinsic process.

According to Ajzen (1991), the theory of planned behavior consists of three determinants of intention. Ajzen's theory defines attitude towards the behavior to be a degree to which a person has a favorable or unfavorable evaluation of the behavior in question. Intention is determined also by subjective norm, which represents the social pressure to perform or not to perform the behavior and perceived behavioral control to be at ease or difficulty with performing a behavior (Ajzen, 1991). According to Ajzen and Fishbein (1977), attitude is a good predictor of behavior in case the attitude is strong and specific to a situation. This means that for a person to perform the target behavior of choosing an EV over a combustion engine vehicle, one must have a positive attitude towards EV-s in general and consider choosing an EV over a combustion engine vehicle.

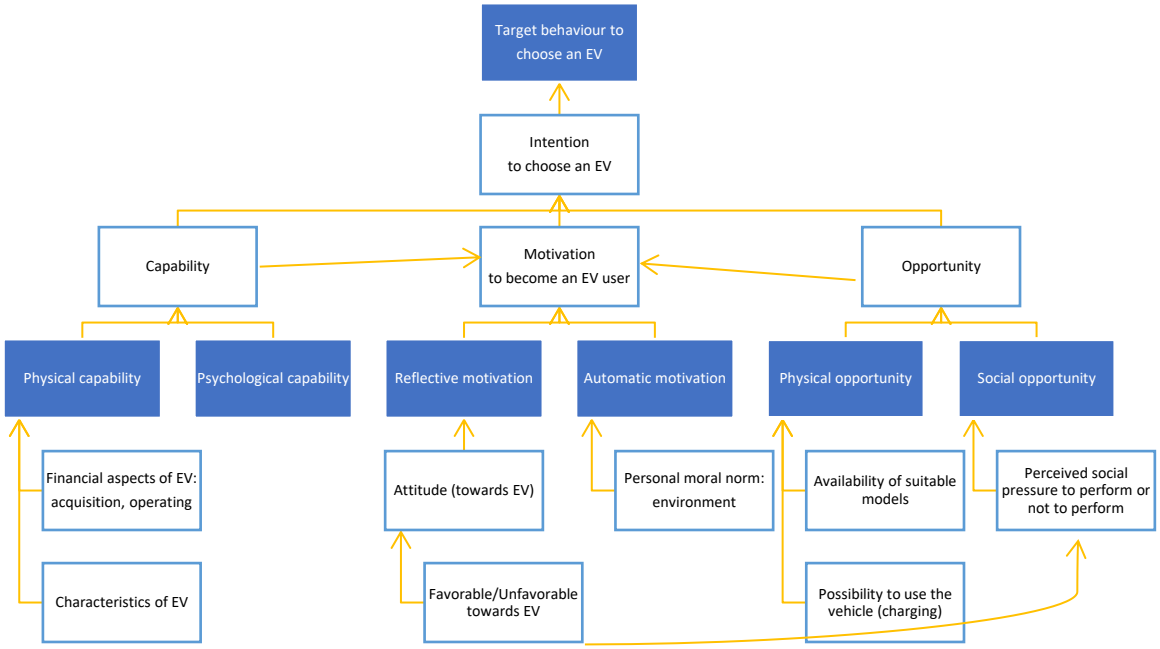
When merging those factors, it is seen that motivation is the determinant of intention to perform a behavior. The intention to perform a specific behavior is determined by the attitude towards behavior and social pressure to perform or not to perform a behavior. The COM-B model has a capability section, which covers similar factors; then for the sake of simplicity, the perceived behavioral control factor is left out and replaced with capability from the COM-B model. According to COM-B, the person must have psychological and physical capabilities to perform a behavior. Physical capabilities lie in the acquisition and suitability of EV characteristics for the person. Other external exploitation factors are considered as opportunities to perform a behavior. Besides physical external factors (model availability and charging), from the theory of planned behavior, there are external social factors as a pressure to perform or not to perform a behavior, which is incorporated into the opportunity section of COM-B. Motivation level determines the intention, which based by the theory of planned behavior is explained by the attitude and social pressure. Attitude, being an intrinsic factor, is incorporated into the motivation section of COM-B and social pressure, being an external factor, is incorporated into the opportunities section of COM-B.

Ajzen (1991) also suggests that in certain contexts, we need to consider not only social pressures, but also personal moral obligations or responsibility to perform. Electric vehicles are promoted because they are non-emitting vehicles and considered therefore environmentally sustainable. Environmental responsibility might be considered as a personal moral norm and as an intrinsic factor, it is also incorporated into the motivation section of COM-B.

The model for further studies is therefore suggested as follows in figure 1. Psychological capability is left open and will be evaluated again after research.

Figure 1

Preliminary Behavioral Model Based on The Theory of Planned Behavior and COM-B



Concluding from the previous, the target behavior is choosing an EV over combustion engine vehicle in the car selection process, for which the person must have behavioral intention. Behavioral intention is described by the level of motivation to engage in the behavior, therefore, to be intended, one must have sufficient motivation to become an EV user.

For the target behavior of choosing an EV to occur, one must have opportunities and capabilities to choose an EV and sufficient motivation to become an EV user to form an intention to choose an EV.

3.2.Research Objectives

The objective of the research is to propose an intervention plan to the policy maker to facilitate target behavior of choosing an EV over a combustion engine vehicle when deciding over a type of vehicle by concentrating on capabilities, opportunities and motivation as prerequisites for reaching towards a behavior change.

The policy maker of climate, green transition and transportation policy in Estonia is the Ministry of Climate (Kliimaministeerium, 2025b). Prior consultation with the policy maker gave the author some further dimensions to consider in the research development. The Ministry

of Climate is interested in the order between charging infrastructure and demand development, the importance of charging possibilities near apartment buildings, opinions of people on the different characteristics of EV-s (e.g. range, tyre consumption, negative impact towards environment, battery-related risks) and possible correlation of attitude towards EV and education level.

Research problem: The size of the Estonian car fleet is increasing while the share of electric vehicles is low – 1.1% (Transpordiamet, 2025a). To reduce the emissions of road transportation, the share of electric vehicles being non-emission vehicles needs to be increased.

Research questions:

1) What kind of opportunities and capabilities are more important when considering EV use?
2) What kind of opinions towards EV-s determine the attitude and motivation to choose an EV? Does motivation determine behavioral intention to choose an EV?
3) What kind of characteristics are more important to people when considering EV use? Is there a connection between attitude towards EV and education level?
4) How important are the current supportive measures for EV purchase perceived and what kind of policy fields do people find more important?
5) What is the suggested behavioral intervention plan for the policy maker to promote EV uptake and the ex-ante and ex-post impact assessment plan?

3.3.Research Methodology

3.3.1. The Sample

The research plan includes both qualitative and quantitative phases and targets samples of people deciding over a type of vehicle. Therefore, in the sample there are people that are at least 18 years old, who either own a car or are or will be car users.

The target sample size for qualitative research was 10 people, but as the saturation of additional information was identified during interviewing, the qualitative interview sample was cut at 7 people. The sample was matched to include individuals from different age groups and educational backgrounds.

Quantitative cross-sectional study enables to engage on a wider sample. The initial quantitative target sample was planned at the level of 100 people as the author used only private channels to disseminate the questionnaire. The sample for quantitative study was recruited

through publicly circulating the questionnaire on social media (LinkedIn and Facebook). The questionnaire was published on the 18th of January and remained open until the 10th of February 2025. The final sample exceeded initial expectations, reaching to 318 people.

3.3.2. Data Gathering Methods

Influence factor identification is being carried out qualitatively using semi-structured interviews based on an interview plan. Qualitative research helps to understand concepts, opinions or experiences through collecting and analyzing non-numerical data, which is useful for gathering deep insights into a problem or generating new ideas for research (Bhandari, 2020). The plan for the interviews is developed based on the preliminary behavioral model. Questions in the interview cover all elements of the behavioral model, namely financial and physical aspects of EV ownership, the current attitude towards EV (beliefs, positive or negative opinions towards EV and personal moral norms about the EV's impact towards environment) that determines the motivation of becoming an EV user and physical and social opportunity for considering an EV. To test the metric that reflects on the motivation of becoming an EV user, the assessment of the probability of the person to become an EV user is asked. See the interview plan in Annex 2.

The questionnaire for the quantitative cross-sectional study (see Annex 3) was composed based on the problem card (see figure 2 for references to questions). For assessments of different attitudes and opinions, 5-point Likert scales are used. The Likert scales have one middle value, which is equalized depending on the question to evaluation of a combustion engine vehicle ("*samaväärne tavaautoga*" – "same as an ordinary car") or middle importance level, and two lower-level and two upper-level answer possibilities (rather and very negative and rather and very positive).

Importance ranking of external characteristics (i.e. costs, EV characteristics and charging) is collected through a non-parametric arranging task. Non-parametric arranging task is used also for collecting information on the importance level of different policy intervention areas.

To assess the motivation to become an EV user, the question of "Please evaluate the probability of becoming an EV user in a 5-year perspective" was used. To assess the behavioral

intention, the question of "Please evaluate the probability of becoming an EV user during the year 2025"[1] was asked.

Data gathering in quantitative survey is anonymous and data enabling the identification of people is not collected.

3.3.3. Data Processing Methods

To analyze the information collected in qualitative research, the interviews carried out in Teams are recorded in Teams and in-person interviews are recorded with an iPhone. Based on the recordings, the transcriptions are made using Microsoft Word (dictate -> transcribe) software. Interviews are thereafter analyzed via qualitative content analysis. Based on the transcriptions, the interviews are coded and identified influence factors are linked to the elements of the preliminary behavioral model. Based on the information from the interviews and preliminary behavioral model, the problem card is developed.

Following the development of a problem card, a questionnaire for quantitative data gathering is composed. Data is collected through a web-based survey (using LimeSurvey). Once data is collected, the information is analyzed in Excel and JASP. For statistical analysis, linear regression is used to determine which influence factors predict the attitude, motivation and behavioral intention statistically significantly. Binominal testing is used to detect the importance list of different opportunity and capability characteristics which are collected through arranging tasks. For comparing different groups (EV-users and non-EV users for instance), mean differences are used and significances are checked by the t-test and ANOVA depending on the number of groups compared.

By quantitative analysis, statistically significant influence factors are identified, and the problem card and preliminary behavioral model are updated as relevant.

3.4.Outcome of the Research

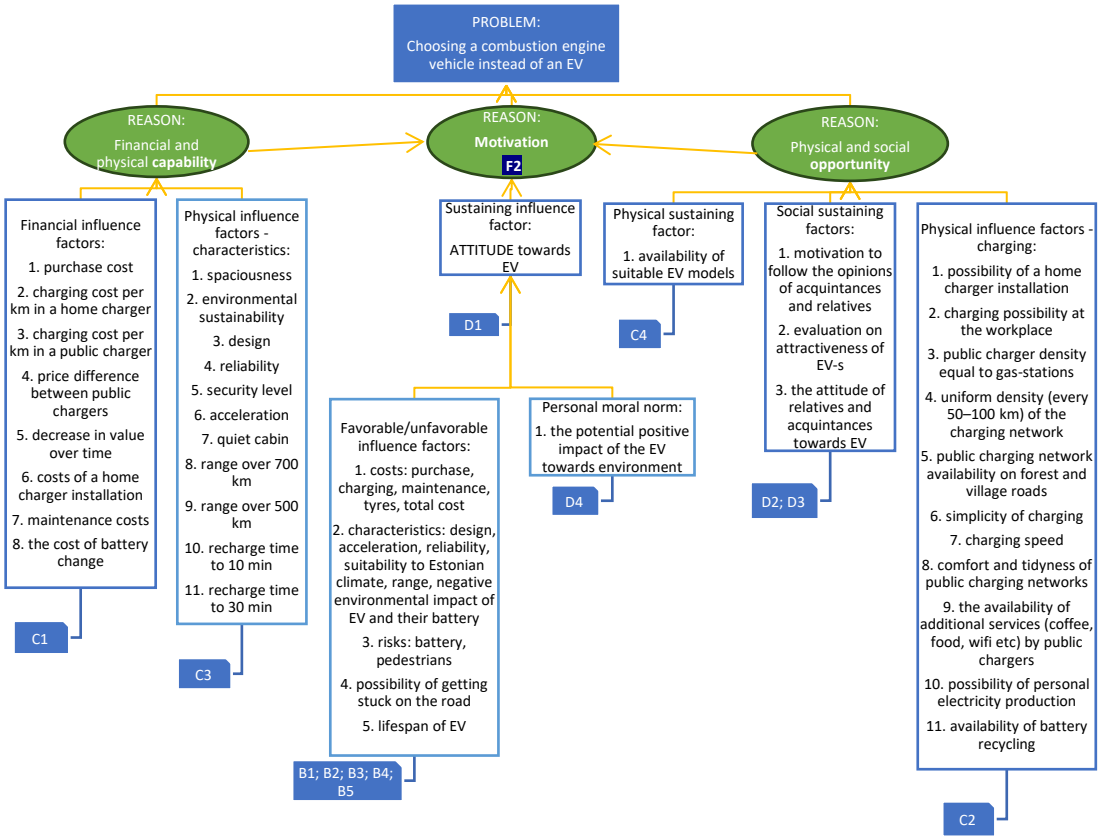
3.4.1. The Problem Card

The main purpose of qualitative research was to map influence factors that affect people when considering choosing an EV in the car selection decision. Qualitative research enables to detect a wide range of influence factors that are organized to the problem card as follows on figure 2.

[1] The questionnaire was published on the 18th of January 2025 and remained open until the 10th of February 2025

Figure 2

Systematized Problem Card of Influence Factors from Qualitative Research



Note. The figure includes Quantitative Survey – See 3.4.4. – Question Number Labels

The importance level for a wider sample of stakeholders needs further investigation quantitatively.

Besides influence factors, it was noted that participants who lived in apartment buildings (four out of four) mentioned that they cannot consider EV use because there is no possibility of installing a home charger in the apartment buildings e.g. the opportunity to engage in the target behavior is hindered because of an obstacle to perform a target behavior.

3.4.2. Engaged Sample Description

In the qualitative research a total of 7 people were interviewed. Three interviewees were men and four women, two had secondary and one vocational education and four people had higher education. Out of 7 in total, four people live in apartment buildings, of which one lived in a semi-detached house and three lived in private houses. One person was below 30 years of

age while three people were between 30 and 50 years and three were over 50 years old. Three households of the interviewees earned a net salary of below and four above 3,000 euros per month. All the interviewees were using combustion engine vehicles as their everyday drive.

In the quantitative research sample, 76% of answers were given my men, 67% had a degree in higher education, 65% were between 30 to 50 years of age and 70% earned a net salary of over 3,000 euros per household. In 54% of the answers, the household consisted of 1–3 people and in 44% between 4 to 5 people. 53% lived in private houses, while 35% lived in apartment buildings, others lived in semi-detached or twin-houses. 40% lived in a city area, 37% lived in suburban and 23% in rural areas.

62% of respondents drove over 20,000 km per year and 46% of respondents were using petrol or diesel vehicles, while 47% of respondents were using electric vehicles and almost 8% were using hybrid or plug-in hybrid vehicles. Please see the overview tables of the sample description in Annex 4.

3.4.3. Attitude, Motivation and Behavioral Intention

According to the preliminary behavioral model, higher attitude towards EV should increase motivation to become an EV user and behavioral intention is dependent on the motivation. Therefore, in this chapter, elaboration on the results of research on attitudes, motivation and behavioral intention is presented.

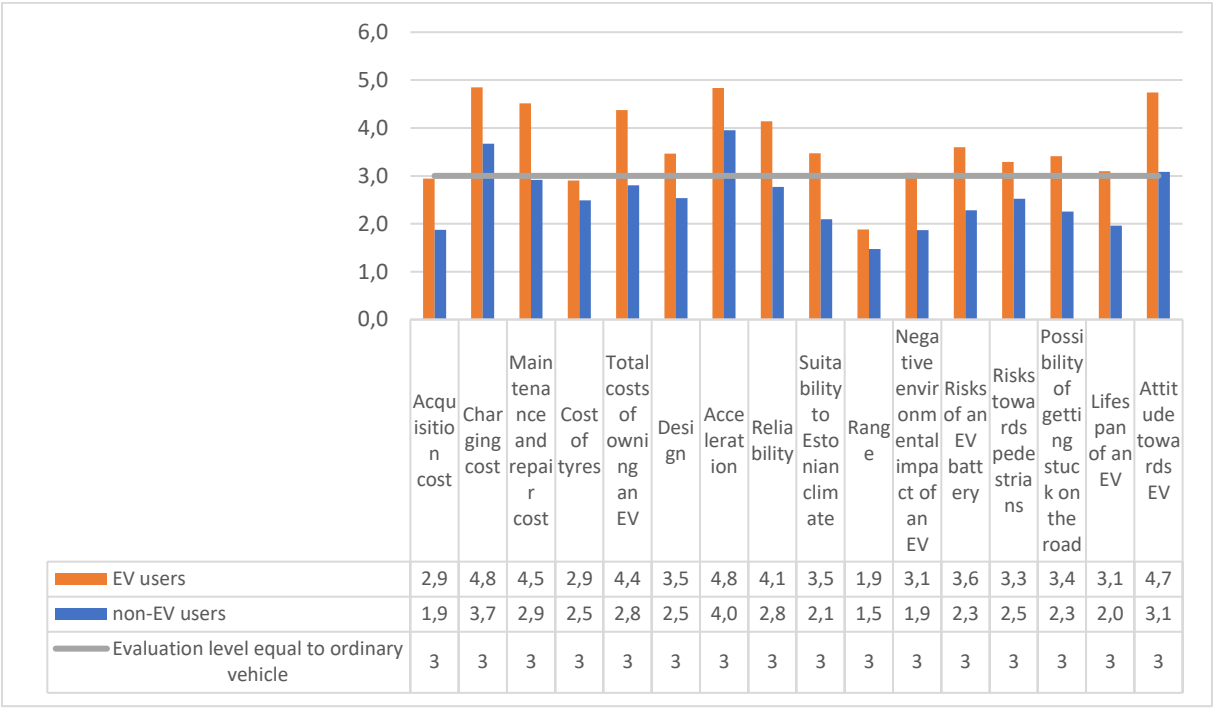
Quantitative research revealed that the overall attitude towards EV was above neutral, accounting for 3.9 points from a maximum of 5 points (“very positive”). 3.9 points was closest to the rating “rather positive”. It is important to note that 47% of the answers were given by EV users, whose attitude towards EV was the highest, accounting for an almost maximum value of 4.7, being closest to the rating “very positive”. Users of plug-in hybrids evaluated their attitude to be rather positive (value 3.9). Petrol and hybrid vehicle users evaluated the attitude towards EV to be a little above neutral (values accordingly 3.2 and 3.3) and diesel vehicle users a little below neutral (value 2.9).

Although people with a basic education level evaluated their attitude towards EV below average (value 2.5), while people with all other education levels (secondary, vocational and higher education) evaluated their attitude towards EV as above average (value 3.8–4), according to ANOVA analysis, the result is not statistically significant $(F = 2.26; p = 0.06)$.

As the target group for policy making is non-EV users, the following analysis is divided, and the ratings of EV users and non-EV users are separated. The questionnaire incorporated different attitude characteristics (Annex 3, B1, B2, B3, B4, B5) and below on figure 3, the different opinions towards different EV characteristics are presented.

Figure 3

Overview of Average Attitudes Towards EV Characteristics by EV and Non-EV Users



	Acquisition cost	Charging cost	Maintenance and repair cost	Cost of tyres	Total costs of owning an EV	Design	Acceleration	Reliability	Suitability to Estonian climate	Range	Negative environmental impact of an EV	Risks of an EV battery	Risks towards pedestrians	Possibility of getting stuck on the road	Lifespan of an EV	Attitude towards EV
EV users	2,9	4,8	4,5	2,9	4,4	3,5	4,8	4,1	3,5	1,9	3,1	3,6	3,3	3,4	3,1	4,7
non-EV users	1,9	3,7	2,9	2,5	2,8	2,5	4,0	2,8	2,1	1,5	1,9	2,3	2,5	2,3	2,0	3,1
Evaluation level equal to ordinary vehicle	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3

As it is visible from figure 4, EV users have a higher opinion on different EV characteristics than non-EV users. The opinions of both groups (EV and non-EV users) were compared by a t-test and the differences by all characteristics were statistically significant, including self-reported overall attitude towards EV. Please see the information in table 1.

Table 1

Self-Reported Differences of Opinions Between EV and Non-EV users

	EV users	Non-EV users	*t*	*p*	Same as an ordinary vehicle
Acquisition cost	2.9	1.9	*7.804*	*<0.001*	3
Charging cost	4.8	3.7	*12.227*	*<0.001*	3
Maintenance and repair cost	4.5	2.9	*14.093*	*<0.001*	3

	EV users	Non-EV users	*t*	*p*	Same as an ordinary vehicle
Cost of tyres	2.9	2.5	*5.977*	*<0.001*	3
Total costs of owning an EV	4.4	2.8	*14.196*	*<0.001*	3
Design	3.5	2.5	*9.255*	*<0.001*	3
Acceleration	4.8	4.0	*10.063*	*<0.001*	3
Reliability	4.1	2.8	*14.127*	*<0.001*	3
Suitability to Estonian climate	3.5	2.1	*12.345*	*<0.001*	3
Range	1.9	1.5	*5.534*	*<0.001*	3
Negative environmental impact of an EV	3.1	1.9	*10.778*	*<0.001*	3
Risks of an EV battery	3.6	2.3	*11.195*	*<0.001*	3
Risks towards pedestrians	3.3	2.5	*8.931*	*<0.001*	3
Possibility of getting stuck on the road	3.4	2.3	*11.333*	*<0.001*	3
Lifespan of an EV	3.1	2.0	*11.421*	*<0.001*	3
Attitude towards EV	4.7	3.1	*15.693*	*<0.001*	3

Source. Calculations of the author based on the data collected in quantitative research (annex 3)

Although the opinions of EV users are higher compared to the opinions of non-EV users in all characteristics, it is a common understanding that by one charging cycle the EV range falls behind the range that combustion engine vehicles can offer. It is also visible that the costs of acquisition and tyres are perceived to be higher than in combustion engine vehicles by both groups. Another common understanding is that the charging cost of an EV is lower than the fuel cost and the acceleration of EV-s is better compared to combustion engine vehicles. Other characteristics vary between EV and non-EV users. Non-EV users think that maintenance and the total costs of owning an EV exceed the costs for combustion engine vehicles while EV users

are of the positive opinion that EV-s have lower costs. Non-EV users also think that the design, reliability, impact towards environment, risks of the battery and towards pedestrians, the possibility of getting stuck on the road and lifespan are worse, while EV users perceive all these characteristics as better than in combustion engine vehicles. This also suggests that there is a knowledge gap present between EV and non-EV users regarding the characteristics of EV use and knowledge level is an important influence factor.

In designing a policy intervention, it is important to further find more important characteristics that describe the attitude towards EV statistically significantly. Therefore, it is important to find out which are the more important determinants of the attitude towards EV and whether attitude towards EV determines the motivation to choose an EV. To answer these questions, a linear regression analysis and the data of non-EV users was used.

According to the preliminary behavioral model (see figure 1), a higher motivation to become an EV user is affected by attitude towards EV, therefore a higher attitude towards EV should increase the motivation of becoming an EV user. In the questionnaire, (Annex 3) both the attitude towards an EV and the probability assessment of becoming an EV user are evaluated. For the analysis, the correlation between these variables and regression in which the attitude towards EV is considered as an independent and the probability assessment of becoming an EV user as a dependent variable are used. Both variables present normal distribution (skewness –0.085 and 0.321 and kurtosis -0.994 and -1.369) and are highly correlated *(Pearson's $r=0.773$ $p<0.001$)*. The linear regression shows that attitude towards EV (*Hinnang suhtumise kohta EV D1; $\beta=0.773$, $p<0.001$)* predicts the probability assessment of becoming an EV user in a 5-year perspective statistically significantly. The model described 59.5% of variability from the probability assessment of becoming an EV user in a 5-year perspective, *adjusted $R2=0.595$, $F(1, 164)=243.446$, $p<0.001$.* Thus, attitude towards EV is a statistically significant determinant of the probability assessment of becoming an EV user in a 5-year perspective, which means that the higher the attitude towards an EV, the higher the motivation to become an EV user.

To further understand, which are the more specific characteristics that predict the attitude towards EV and the motivation of becoming an EV user, a linear regression analysis was used. Ratings for questions "Please evaluate your attitude towards EV-s" *(Hinnang suhtumise kohta EV D1)* and "Please evaluate the probability that you will be an EV user in the next 5 years" (*Tõenäosushinnang EV kasutajaks saamise kohta 5 aasta jooksul F2*) were used as dependent variables and ratings for questions about EV expenses (acquisition, charging,

maintenance, tyres and total cost), characteristics (design, acceleration, reliability, suitability to Estonian climate, range and potential negative impact to environment), risks (battery and towards pedestrians), possibility of getting stuck on the road, EV lifespan and potential positive impact towards environment were used as independent variables.

Preconditions for parametric analysis were checked. Ratings were given using a 5-point Likert scale. The data also met the normal distribution criteria between groups as skewness and kurtosis values were between -2 and 2 for all independent variables.

The linear regression analysis shows that the opinions of people about charging costs (*Arvamus EV laadimiskulu B1; β=0.194, p=0.003*), maintenance and repair costs (*Arvamus EV remondi- ja hoolduskulu B1*; *β=0.178, p=0.017),* range on one charging cycle *(Arvamus EV läbitav vahemaa B2; β=0.121, p=0.041)* and potential positive impact towards environment *(Hinnang EV keskkonna aitamise kohta D4; β=0.232, p<0.001)* predicted attitude towards EV statistically significantly. The model described 67.9% of variability from the attitude towards EV, *adjusted R^2=0.679, F(16, 149)=22.83, p<0.001.* Please see the results in Annex 6. Thus, opinions about charging expenses, maintenance and repair costs, range on one charging cycle and potential positive impact towards environment are the main determinants of the attitude of non-EV users towards EV. It is also important to note that environmental impact was questioned in two ways – potential negative impact towards environment during the production phase of EV and its battery (B2) and potential positive impact of EV-s helping the environment (D4). Statistical significance stands in the opinions of people about the potential positive impact of EV-s towards the environment and not in the opinions of the negative impact of their production phase.

On the other hand, the linear regression analysis showed that the opinions of people about the EV lifespan *(EV eluea pikkus B5; β=0.189, p=0.028),* EV design *(EV disain B2; β=0.200, p=0.003)* and rating on the potential positive impact towards environment *(Hinnang EV keskkonna aitamise kohta D4; β=0.172, p=0.025)* predicted the ratings of people on the probability of becoming an EV user in a 5-year perspective statistically significantly. The model described 57.6% of variability from the rating on probability of becoming an EV user in the next 5 years, *adjusted R^2=0.576, F(16, 149)=14.866, p<0.001.* Please see results in Annex 7.

Next, the connection between the motivation and behavioral intention is checked. Behavioral intention is measured by self-reported probability assessment of becoming an EV user during the year 2025. The variable presents normal distribution (skewness 1.635 and

kurtosis 1.588). The linear regression shows that the motivation of becoming an EV user (*Tõenäosushinnang EV kasutajaks saamise kohta 5 aasta jooksul F2; β=0.536, p<0.001*) predicts the probability assessment of becoming an EV user in the year 2025 (i.e. behavioral intention) statistically significantly. The model described 46% of variability from the probability assessment of becoming an EV user in the year 2025, *adjusted R2=0.460, F(1, 164)=139.69, p<0.001*. Thus, motivation to become an EV user is a statistically significant determinant of the behavioral intention, therefore, the higher the motivation of becoming an EV user, the higher the intention to choose an EV.

In conclusion, the opinion about EV lifespan, EV design and the potential positive impact towards environment are the main determinants of the non-EV users' motivation to become an EV user, which means that EV lifespan and design were not statistically significant determinants of attitude towards EV but are statistically significant determinants of the motivation of becoming an EV user. The higher the motivation to become an EV user, the higher the behavioral intention to choose an EV.

3.4.4. Opportunities and Capabilities

Next, the analysis concentrates on selecting the statistically significantly important opportunities and capabilities that enable to choose an EV.

In the survey, people were asked about their opinion whether suitable EV models are available to them (C4), in the social opportunity section people were asked about the attitude of their acquaintances and relatives towards EV, how important they consider that attitude to be and information on real experiences (D2) and their rating about the attractiveness of EV-s (D3).

The data was checked with descriptive statistics to control preconditions for the regression analysis (normal distribution and interval scale conditions). The question of whether suitable EV models are available is on a nominal scale and is therefore used in regression as a factor and not a covariate. The linear regression analysis showed that the ratings from people about the attractiveness of EV-s *(Hinnang EV atraktiivsus D3; β=0.360, p<0.001)* and the opinion about the availability of suitable EV models *(Hinnang sobivate mudelite saadavus C4 (Jah); p<0.001)* predicted the ratings of people on the probability of becoming an EV user in a 5-year perspective statistically significantly. The model described 48.4% of variability from the rating on the probability of becoming an EV user in the next 5 years, *adjusted* R^2*=0.484, F(5, 160)=31.935, p<0.001.* Please see the results in Annex 8.

Thus, the important factors of social opportunity are people's ratings about the attractiveness of EV-s and the opinion that suitable EV models are available. The opinion of relatives and acquaintances does not seem to have a significant impact on people's motivation on becoming an EV user.

The next part of the analysis concentrates on the question of which physical external influencing characteristics people consider to be more important. To answer this research question, a non-parametric arranging task was given to people in the survey. People were asked to arrange different characteristics by importance when thinking of the possible ownership of an EV. The arranging task was divided into three sections – physical capabilities (financial and EV characteristics) and physical opportunities (charging).

The first section had 8 possible characteristics and the second and third section had 11 possible characteristics, of which at least 5 were required to be listed. To analyze the data, non-parametric binominal testing is used.

The base testing value represents the equal level of possibility for all characteristics to get selected if all choices would be equally important. As the aim is to determine choices that people find more important, it is necessary to find choices that exceed the base testing value statistically significantly. In the expenses section, the base testing value was set at 0.125 (1/8=0.125). In the charging section, the base testing value was set at 0.09 (1/11=0.09) and the same in the EV characteristics section.

The binominal testing for non-EV users showed that the most important variable in the expenses section is the acquisition cost, which was ranked as most important 64.5% of the time. The second and the following importance levels were chosen about 20% of the time and those were the decrease in EV value with time, the cost of installing a home charger and EV maintenance and repair costs.

In the charging section, the most important was the possibility to install a home charger, which was chosen 40.4% of the time. The following importance levels were listed less than 20% of the time and they covered charging speed, the possibility to charge at the workplace, charger density equal to gas-stations and charging simplicity.

It was determined that the most important EV characteristic is the range of at least 700 km, which was chosen almost 30% of the time. This was followed by charging time of up to 10

min, reliability and spaciousness that were all chosen less than 20% of the time. The table with the binominal testing results of the non-EV users is presented in Annex 9.

The importance list of EV users was somewhat different. They consider that the acquisition cost (44.1% of selections) is on the same importance level as the charging costs of a home charger (36.2%). Surprisingly, EV users do not find the decrease in value of an EV to be as important as non-EV users who do not own an EV themselves. EV users also rank the expenses in public chargers and price differences in public chargers as important variables, which is probably connected to their experience that non-EV users do not have.

In the charging section, EV users consider the possibility of installing a home charger equally as important (55.9% of selections), but do not consider public charger density equal to gas-stations important, which is also probably connected to their user experience.

It is also worth mentioning that even though non-EV users did not consider the environmental sustainability of the vehicle important, the EV-users ranked this to be the most important characteristic of EV-s 15.8% of the time. In addition to environmental sustainability, other first level choices about importance were reliability (22.4%), spaciousness (14.5%) and acceleration (13.8%). Lower importance was chosen for the security level and a quiet cabin. The table with the results is presented in Annex 10.

3.4.5. Important Policy Areas

In policy making, it is also important to know which arguments address the perceived needs of people the best. To get insight on how to direct the policy suggestions, the arranging task with five different influence areas was given to people – design, functionality, convenience of use, environmental sustainability and total cost. As there were five choices, the base testing value was set at 0.2 (1/5=0.2). As the policy will be directed to non-EV users, the analysis is performed based on their ratings.

The binominal analysis shows that the most important area for non-EV users is the total cost (*proportion=0.590, p<0.001*). The following most important areas are convenience of use (*proportion=0.367, p<0.001*) and functionality (*proportion=0.325, p<0.001*). The third level did not reveal any additional information. Thus, the policy making should in the first instance tackle the total cost area, secondly convenience of use and functionality. Please see the results in Annex 11.

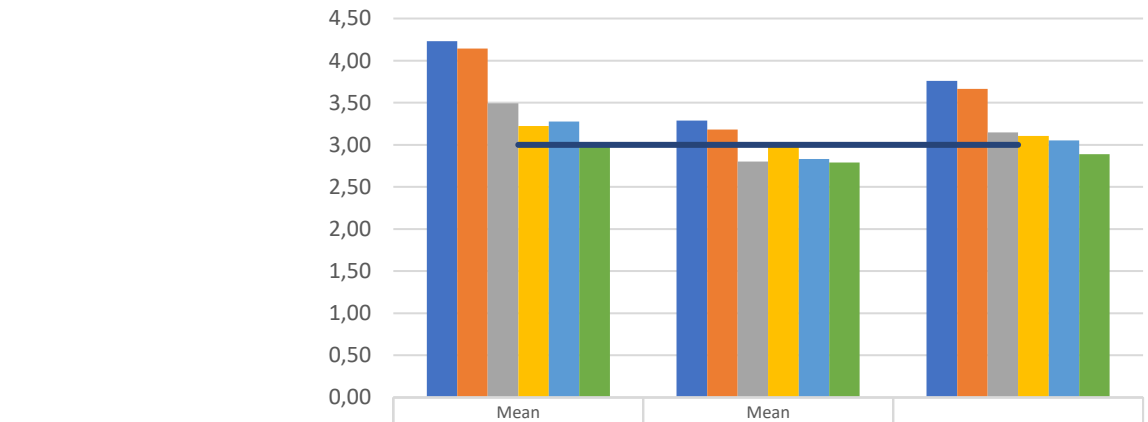
3.4.6. Perceived Importance of Current Policy Measures

In Estonia, there are some policy measures already present, e.g. the acquisition grant in the amount of 4,000 euros for the purchase of a used as well as a new vehicle, the possibility to use bus-lanes in traffic, free parking in Tallinn city center and the recently introduced lower levels of motor vehicle taxes. To gain insight into how people perceive the current measures, the importance rating was asked in the questionnaire (E1). People were asked to rate the importance of present policy measures on the 5-point Likert scale, where the middle value of 3 represented average importance and two upper and two lower levels represented the ratings of rather or very important or unimportant. The results showed statistically significant differences between ratings given to different policy measures. The single factor ANOVA analysis showed that the ratings of EV-users were statistically significantly different between policy measure groups *(F(5, 906) = 24.68, p<0.001)*, as was also the case for non-EV users *(F(5, 990) = 3.57, p=0.003)*.

The results of mean values are presented below in figure 4.

Figure 4

Importance Ratings by EV and Non-EV Users of Current Policy Support Measures for Promoting the Uptake of EV-s



	Mean EV users	Mean Non-EV users	Average
Lower motor-vehicle registration rate	4,23	3,29	3,76
Lower rate for motor vehicle yearly tax	4,15	3,18	3,66
Permission to use bus-lanes	3,49	2,80	3,15
Acquisition grant of EUR 4000 for used EV	3,22	2,99	3,11
Free parking in Tallinn city-centre	3,28	2,83	3,05
Acquisition grant of EUR 4000 for new EV	2,99	2,79	2,89
Evaluation level representing average importance	3,00	3,00	3,00

As shown in figure 4, the highest average perceived importance was given to lower rates of motor vehicle registration and yearly taxes for EV-s than for combustion engine vehicles and

the lowest perceived importance was given to the acquisition grant of 4,000 euros for purchasing a new EV. As used EV-s have lower acquisition prices, the perceived importance towards the same amount of grant is lower in case of presumably more expensive new vehicles compared to used vehicles that are a little less expensive, although the net amount of support is the same.

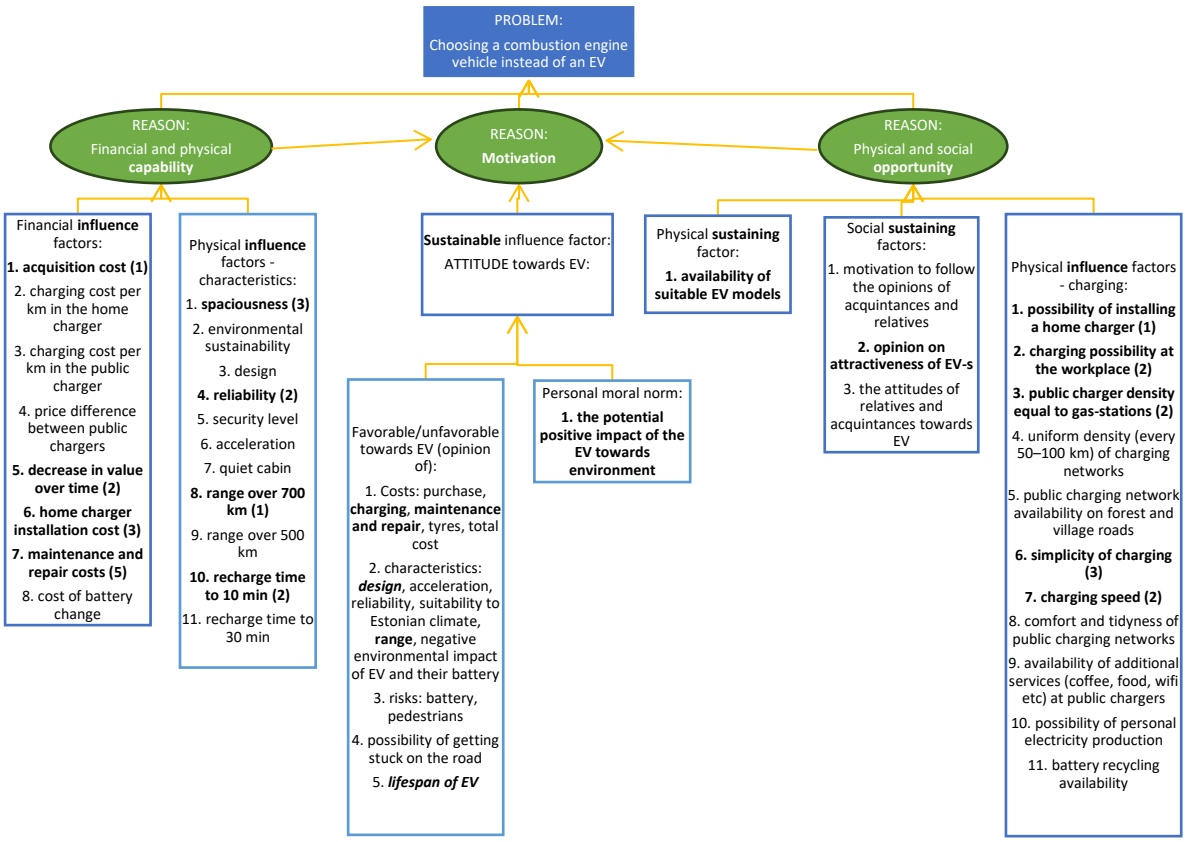
Understandingly, the benefits related to EV use (permission to use bus-lanes and free parking in Tallinn city center) have higher value for current EV users than non-EV users, especially the permission to use bus-lanes.

3.5.Model Describing the Causes of the Problematic Behavior of the Target Group

Based on the results from quantitative analysis, the problem card is updated and the statistically important influence factors highlighted. Please see the updated problem card in figure 5.

Figure 5

Updated Problem Card Highlighting the Statistically Significant Influence Factors

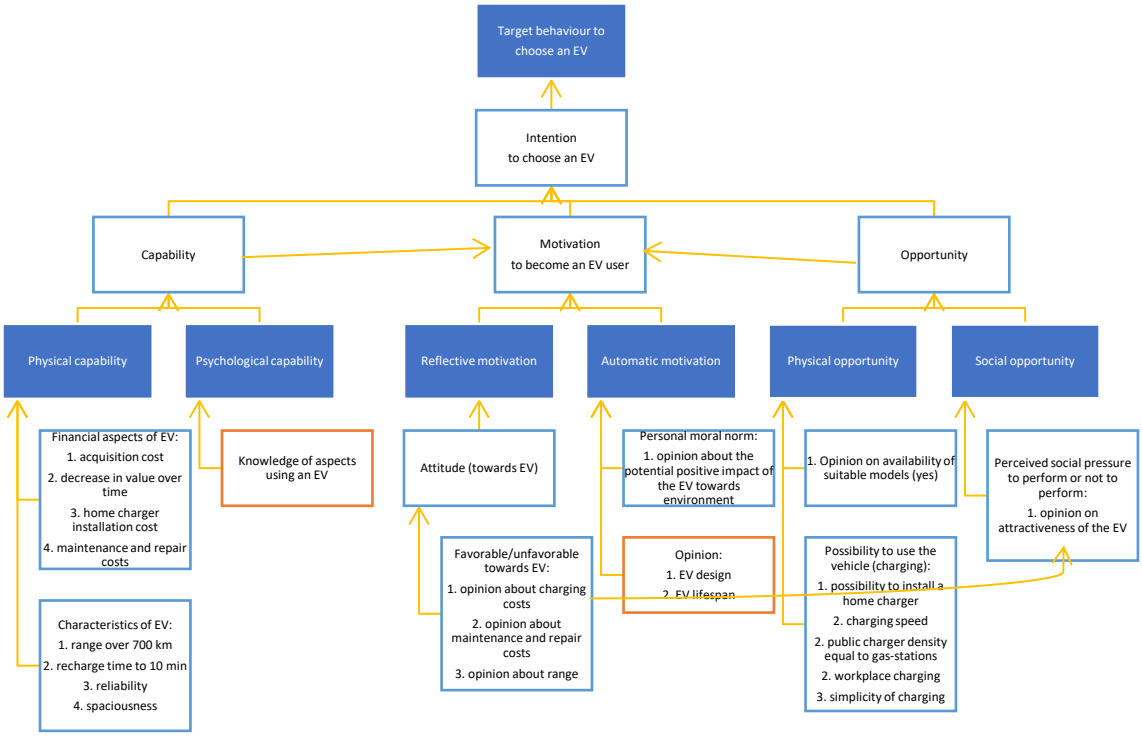


Note. Bold represents statistically significant characteristics. Italic represents additional statistically significant determinants of motivation separately from attitude. The number next to the variable represents the importance level. Importance levels are not presented if these are covered already by previous higher importance levels.

Based on the updated problem card, the preliminary behavioral model (see figure 1) is updated and presented below in figure 6.

Figure 6

Updated Behavioral Model Incorporating Statistically Significant Influence Factors



Previous research enables to gather the following insights:

a) The attitude towards EV predicts people's motivation to become an EV user, i.e. the higher the attitude, the higher the motivation to become an EV user. The motivation to become an EV user predicts behavioral intention to choose an EV.
b) Attitude towards EV is predicted by the opinion about charging expenses, maintenance and repair costs, range and potential positive impact towards environment, i.e. the more positive the opinion about charging expenses, maintenance and repair costs, range and potential positive (and not negative) impact towards environment, the higher the attitude towards EV.
c) Besides attitude towards EV, the opinion about EV lifespan and EV design influences the motivation to become an EV user. The opinion on the positive impact of EV-s towards the environment affects both, attitude and motivation.

d) Besides the opinion that suitable EV models are available, the higher the attractiveness rating of EV-s, the higher the motivation of people in becoming an EV user.
e) To improve external factors (opportunities and capabilities) to elevate the motivation of becoming an EV user and enable choosing an EV, it is important to consider the following:
    (1) In the expenses section, the acquisition cost, decrease in value of the EV, home charger installation and EV maintenance and repair costs were ranked as the most important.
    (2) In the charging section, the most important are the possibility of installing a home charger and to charge at the workplace. People also consider that charger density should be equal to gas stations and charging should be fast.
    (3) Suitable EV models should have a range of at least 700 km and charging should take up to 10 minutes, EV-s should be reliable and spacious.

From the current policy measures, the highest perceived importance was attributed to the motor vehicle tax, especially the registration tax, and the lowest importance is perceived in the acquisition grant for new EV-s. Usage-related benefits, e.g. permission to use bus-lanes and free parking, are perceived as more important by the EV-users than non-users, which might indicate the knowledge gap about the benefits of use-based measures.

The policy measures should foremost tackle the total cost area. Secondly, it is important to tackle the convenience of use, where the analysis revealed a knowledge gap.

The behavioral model needs two changes due to the analysis. The opinions about EV design and lifespan are separately from attitude influencing the motivation of becoming an EV user, therefore, these are incorporated to the automatic motivation section next to the personal moral norm of the opinion of EV's potential positive impact towards environment.

And the second update is to add a psychological capability under the capability section in the model, as the analysis revealed that people with better knowledge about EV-s have a higher attitude towards them.

4. Solution Mapping

4.1. Intervention Possibilities Based on the Updated Problem Card and Behavioral Model

Building on the insights from problem mapping, the analysis continues to map the policy intervention possibilities that support the wider uptake of EV-s.

Policy is a population-based intervention that aims to guide behavior to the optimum outcome in the most efficient way over the lifespan of the choice (Ruggeri, Steinnes, Evans, & Tantia, 2018). Ruggeri *et al* (2018) state that policies may often overlap with laws and regulations if policy is a population-level intervention that focuses on guiding behaviors and choices, but policy merely directs behavior like laws and regulations do. Therefore, the intervention possibilities suggested in this chapter aim at mapping intervention measures that guide and not direct behavior.

The scope of the intervention plan excludes the influence factors that are out of the influence field of the policy maker, i.e. characteristics of the EV and availability of suitable models and technical solutions to charging that would enable simplicity of charging.

The EAST method is applied to suggest intervention possibilities. As the objective is to encourage the behavior of choosing an EV over a combustion engine vehicle, according to EAST, it must be made easy, attractive, social and timely. Under the “easy” section, the proposed policy interventions should consider the possibility of defaults and pre-set options, reduce effort and remove hurdles and simplify messages. Under “attractive”, the policy measures should consider framing the behavior as personalized and novel, at the same time presenting incentives. Under “social”, the social networks and connections must be considered, and under “timely”, it should be kept in mind that the benefit is currently worth more than later. (Behavioural Insights Ltd, 2024)

All intervention possibilities mapped are preliminary and need further development for actual implementation.

The leading country, which has the biggest share of EV-s, is Norway (European Environment Agency, 2024a), where financial incentives like exemption from import tax, road tolls, parking and ferry fees, to promote EV uptake are implemented already from 1990 (Hasan, 2021). With this, Norway has managed to increase their EV share from the total of the new vehicle fleet to exceed 80% (European Environment Agency, 2024b). Previous analysis in this research revealed that policy measures targeting the total cost of EV-s is considered as the most

important (see 3.4.5). Estonian financial incentives to support EV purchase cost consisted of a 4,000 euro grant[2] (Keskkonnainvesteeringute Keskus, 2025) and an exemption from CO2 component in motor vehicle tax was introduced, as EV-s are non-emitting vehicles (Transpordiamet, 2025b). In Estonia, there are no road tolls. Parking is free for EV-s in Tallinn city center and there is no exemption present for ferry fees.

Current research confirmed that financial aspects are perceived as the most important policy area influencing people's decisions. To reduce the total cost of EV-s, there is a possibility to target acquisition costs and ownership costs by paying a grant or providing tax exemption or reduction. Current research discovered that people find the acquisition cost of EV-s to be the most important influence factor to consider an EV, while rating the present acquisition grant as the least important policy mechanism implemented.

Recently, Estonia implemented motor vehicle taxes, which have decreased rates for EV-s, and this was perceived as the most important policy measure despite the latter having a smaller net amount of gain compared to acquisition support grant. This is explainable by the prospect theory, according to which losses loom larger than gains (Kahneman & Tversky, 1979). People consider motor-vehicle tax as a loss, and therefore they overestimate the importance of the discount on motor-vehicle tax and underestimate the value of the acquisition grant which is considered as gain. Considering the perceived lowest importance level of the acquisition grant, the current EV purchase decisions that are already made, are probably largely not connected to the presence or absence of this grant, but other factors (e.g. environmental sustainability by EV-users, see 3.4.4). According to prospect theory, for a support grant to be perceived as an important policy intervention, it has to be considerably bigger in net gain to loom over tax reductions, which is considered as a loss, which makes grants fiscally burdensome.

The motor vehicle tax as a policy measure to promote EV use rather than combustion engines, is more effective than grants, being at the same time fiscally cheaper. Therefore, to promote wider EV uptake, one possible solution could be to increase the perceived value of tax reduction. Although the analysis suggests that further gap in motor vehicle tax rates is presumably effective, the policy maker should consider that tax measures have a direct population-wide impact for citizens and indirect impact through state budget to any other policy field that is covered by the state budget. Tax measures are also prone to exhibit social disparity

[2] Ended due to budget exhaustion: Nullheitega sõidukite ostutoetus | Keskkonnainvesteeringute keskus (21.03.2025)

risks. Estonian fiscal situation is faced with state budget cuts and tax increases (Lättemäe, 2024), therefore, any further tax exemption or restructuration needs thorough ex-ante feasibility and policy impact assessment.

The second important cost related capability was the decrease in value of an EV over time. The decrease in value is inevitable to some extent with any usable asset (including combustion engine vehicle) but linking this to the fact that EV lifespan was considered as one key predictor of the motivation of becoming an EV user, then prolonging the perceived lifespan of EV-s would improve people's motivation. Although EV batteries are expected to last 15 – 20 years, with an average degradation rate of about 1.8% per year (Argue, 2025), EV driving batteries are expensive posing a huge financial risk to the used car owner in case of breakdown. To tackle this potential huge financial risk, an EV driving battery insurance or widening the voluntary insurance cover to driving battery aging, is suggested. As insurance market is a private market, the enabling environment for market reaction might need state's intervention.

The second important policy area was perceived to be convenience of use (see 3.4.5). Norway has implemented use-based policy measures, like bus-lane access. From one side being a financial incentive, the exemption from road tolls, parking fees, and ferry fees (Hasan, 2021) are also a use-based policy field, as it provides easier practical possibility for use. Bus-lane access is granted also in Estonia, although there have been discussions of forbidding it (Särk, 2024). Bus-lane access was rated as the second important implemented policy measure after tax measures also by EV users indicating that use-based policy measures are important and bus-lane access should continue.

Convenience of use is directly connected also to the possibility of installing a home charger, which was rated as the most important opportunity. Based on qualitative interviews, there are obstacles existent to home charger installation possibilities in case of apartment buildings. The behavior to choose an EV occurs only, when the person has besides the financial capability and motivation also the charging opportunity. At least in case of apartment buildings, the charging opportunities are limited, and this hinders the decision to choose EV. Home charger installation has several preconditions, e.g. the house has to have sufficient amperage, a separate cable needs to be installed to connect the charger to the switchboard, sufficient room in the main switchboard is needed and the car model and the charger must match (Enefit, 2025).

Research on obstacles that hinder home charger installation in apartment buildings need further investigation and is not in the scope of this thesis. The infrastructure needs to support

policy objective. Therefore, the policy maker should further investigate and map those possible restrictions for home-charger installation and address them. Hence, policy intervention enabling measure proposed is a further investigation of constraints that hinder home charger installations in apartment buildings.

Shortcomings with home charger installation possibilities may be compensated to some extent by the second most important opportunity to have the possibility to charge at the workplace or the possibility to have public charging available (especially fast charging, as charging speed was rated important). As workplace charging possibility was rated as the second most important opportunity for considering EV uptake, at the same time tax measures are being perceived as most important and policy measures that support convenience of use second important interventions, fringe benefit tax exemption on private EV charging at companies could be the measure that would motivate companies to install workplace chargers, at the same providing to a better charger infrastructure availability. If workplace charging is available, it would motivate people to use the possibility of charging at the workplace, hence reducing the need for home charger installations. Simplification on reporting obligations would provide a more convenient use for both the employee and the employer, while compensation to petrol and gas is considered as a fringe benefit and under tax and reporting obligation.

The analysis (see 3.4.3) revealed that opinions of EV characteristics were statistically significantly higher for EV users than for non-EV users, including the attitude towards EV. The result is to some extent explainable by the endowment effect, which presents an increase in value that results when something becomes part of a person's endowment (Kahneman, Knetch, & Thaler, 1990). But the other and more important explanation is that experience raises knowledge of the characteristics in concern, which in turn reduces prejudice and false fears resulting in higher attitude. This also corresponds to the theoretical basis of capability in COM-B model, according to which knowledge is part of capability to perform target behavior (Social Change UK, 2019). Considering the high attitude towards EV-s by EV users (4.7 out of 5), the knowledge gap is something that the policy intervention plan must tackle.

The research on the importance of capability characteristics (3.4.4) revealed that non-EV users perceive the cost of home charger installation to be important. Home charger installation is connected solely to EV uptake and is not needed for combustion engine vehicles (results in smaller uptake cost). The effect is leveraged by the immediate loss that results in the home charger installation, while the gains from savings from liquid fuel might feel less

valuable, as these will occur in the future. Home charger wallboxes cost a minuscule amount[3] compared to the purchasing price of the car and rental models are offered, which is information that people in the target group might not be aware of and hence see this as a decisive factor.

One source of information during the process of deciding on a vehicle is usually the salesperson, as prevailing practice is that car sale is a contact-requiring transaction. In the case of information and knowledge shortage, especially while the product is considered innovative (like EV), salespeople and car dealerships are an important information source for a potential buyer. Although not initially planned under this research, the author visited a few car dealerships with an interest in seeing some EV-s. In one dealership, the EV that was promoted online was not available inside the dealership, but was parked outside like any other visitors' vehicle, whereas the sales team was unaware of the location of the EV in question. In another dealership, the salesperson misled the customer to a hybrid-vehicle, not the electric one that was inquired about. In other cases, it was noticeable that dealerships are presenting rather hybrid, petrol and diesel vehicles although there are EV models available, albeit there are exceptions to that and this was not prevailing. All of this allows to conclude that the market might not be aware of the policy objective of the state to gain a higher EV share from the car fleet to reduce road transport emissions. This again might place a restriction on the customer if it is not possible to get acquainted with EV models or to get readily available information about EV use characteristics or answers to their concerns about an unknown innovative product. Although the capacity of this research does not offer a possibility to further observational studies in car dealerships to detect the extent of these hurdles in the market, there are sufficient indications that knowledge sharing is needed.

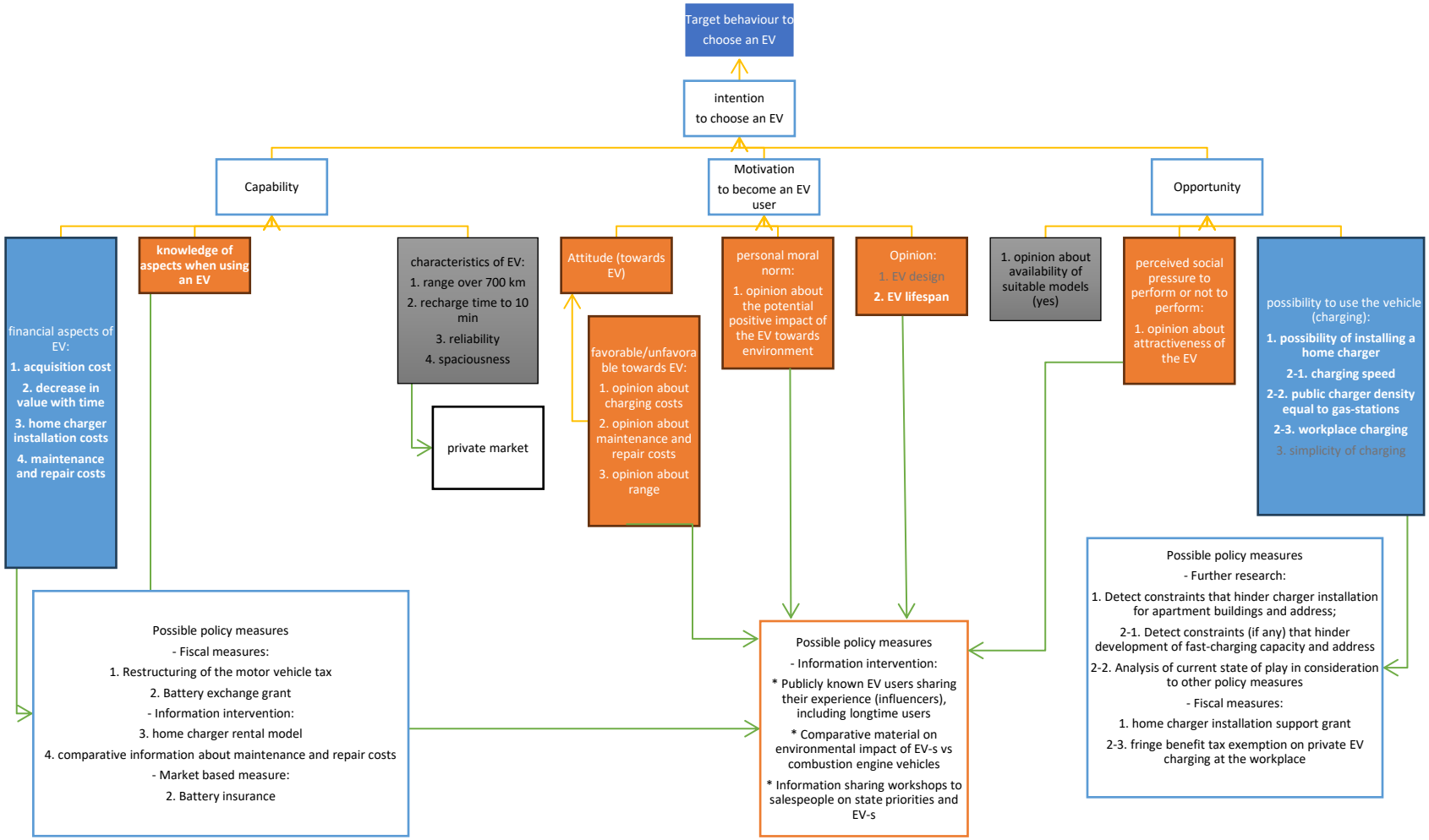
The attitude towards EV and a motivation to become an EV user are influenced by the opinion of the person about the potential positive impact towards environment, which should also be tackled by providing information.

The behavioral model with intervention possibilities is presented as follows in figure 7.

[3] Electric vehicle home chargers for private and apartment buildings (24.04.2025): Elektriauto kodulaadijad era- ja kortermajadele - Enefit

Figure 7

Intervention Possibilities Based on Updated Behavioral Model



4.2.Effectiveness Prediction of the Intervention Possibilities

Although several intervention possibilities are available based on behavioral insights, they have different effectiveness. In the next chapter, effectiveness prediction is elaborated.

For information intervention to be effective, the persuasion needs to occur, and the message must reach behavior. For the message to reach behavior, several stages need to be overcome. At first, the message must gain attention, a person needs to understand and believe the message, a person must remember the message and have a will to behave accordingly and only then, one reaches actual behavior (Myers & Twenge, 2022). As the purpose of information intervention is to evoke target behavior, the information intervention needs to meet the persuasion criteria.

Research has revealed that opinion about the potential positive impact of EV-s towards environment is a significant predictor of attitude towards EV and the motivation to become an EV user. Therefore, the information intervention needs to show people the environmental impact comparison of EV vs combustion engine vehicle to emphasize the positive environmental aspect of EV use. For the message to gain attention, understanding and remembrance, simple schematic illustrations should be most effective. To provide to credibility, the schematic illustrations must be based on scientific and controllable data. Most cost-effective would be to address places which people visit while considering vehicle change like car dealerships and web-portals to provide to timely availability.

To further provide to the attention, remembrance and credibility stages, people find those messages more trustworthy that are delivered by people they know and trust. Therefore, using publicly known (and admired) people as message carriers helps to pass several persuasion stages and makes the probability of the message to reaching behavior more likely, considering that different social groups are targeted.

Information intervention possibilities are effective if collaboration with public figures and car dealerships is active.

Fiscal measures have a potentially large effect depending on their applicability range, therefore the biggest potential and at the same time biggest side-effect risks lie in motor vehicle tax restructuring. The tax was recently introduced and is already perceived effective, hence there is no need to consider restructuring at this stage. Fringe benefit tax applies to a limited range of the target group; therefore, the possible effectiveness has low to medium effect but incentivization to companies to install workplace charging is present.

Previous analysis has shown that grant measures, including battery exchange and home-charger installation grants tend to have limited effect and are fiscally expensive as well as not sustainable solutions, therefore evaluated to be not effective.

Market-based measure of battery insurance would address important financial risk for the target group and therefore has probably a potentially large effect. As the exact solution is not available, market consultation and further analysis on possible solution development is needed. Market-based insurance measure is effective and sustainable only if a market-proof solution is developed.

Please find the overview of effectiveness prediction with intervention possibilities in the next table 2.

Table 2

Policy Intervention Possibilities

Policy intervention	Target influence factor and behavioral model element	Effectiveness prediction	EAST – where and how it contributes
Information intervention possibilities			
Information about the availability of home charger rental models: • EV leaflets in car dealerships • Car ad portals • Default charger offers	Capability: - Home charger installation costs - Knowledge of the aspects of using an EV	Effective, as it tackles the knowledge of the target group. Cheap to implement if the possibility of cooperation and dialogue with car dealers and portal operators is available.	Easy: - Removes knowledge barriers - Reduces effort Timely: - Information is available, when it is needed
Provision of comparative information about maintenance and repair costs for EV and combustion engine vehicles: • EV leaflets in car dealerships • Car ad portals	Capability: - Maintenance and repair costs - Knowledge of the aspects of using an EV	Effective, as it tackles the knowledge level of the target group. Cheap to implement if the possibility of cooperation and dialogue with car dealers and portal operators is available.	Easy: - Removes knowledge barriers - Reduces effort Timely: - Information is available when it is needed Attractive: - Fulfilled if visualization is used
Publicly known people's experience sharing of EV: • Social media • Public podcasts • Public media	Capability: - Knowledge of the aspects of using an EV Motivation - Attitude towards EV - Opinion on EV lifespan Opportunity - Opinion on EV attractiveness	Effective, as it tackles several behavioral model elements through increased knowledge level. Medium to low costs to implement, needs cooperation with public figures. Public figures have to cover different social groups.	Easy: - Removes knowledge barriers - Reduces effort Attractive: - Personalized if social media is used Social: - Covered if public figures are from different social groups

Policy intervention	Target influence factor and behavioral model element	Effectiveness prediction	EAST – where and how it contributes
Comparative illustrative material on environmental impact of EV-s towards environment in comparison to combustion engine vehicles	Motivation: - Personal moral norm towards environment	Effective, as it tackles the personal moral norm of the target group, which influences both, the attitude towards EV and motivation.	Easy: - Removes knowledge barriers - Reduces effort - Simplifies messages Attractive: - Novel - Frames positive impact
Voluntary information sharing workshops to salespeople on state priorities and EV-s	Capability: - Knowledge of the aspects of using an EV Motivation - Attitude towards EV - Opinion on EV lifespan - (personal moral norm) Opportunity - (Opinion on EV attractiveness)	If the greater awareness of the salespeople reaches customers, very effective, as it tackles capability through increase in knowledge during the process of car selection. Cheap to implement in cooperative environment.	Easy: - Removes knowledge barriers - Reduces knowledge gain effort Timely: - Contact to salespeople is timely
Fiscal intervention possibilities			
The restructuring of the motor vehicle tax to further favor EV over combustion engine vehicle	Capability: - Acquisition costs (registration) - Maintenance costs (yearly tax as part of the upkeep costs)	Effective due to loss aversion, difficult to implement due to the need of regulation change and stakeholder interests, might hurt lower-income and rural area people and increase disparities, easy to administer, as the administration system is developed.	Easy: - Communicates policy objective easily Attractive: - Presents financial incentives - Promote benefit from EV uptake Timely: - Applies immediately
Fringe benefit tax exemption for enabling private vehicle charging at workplaces	Opportunity: - Incentivizes workplace charging - Disincentivizes pressure towards fast-charging, home-	Low to medium range effect if workplace charging capacity is increased,	Easy: - Reduces effort on charging, removes barriers to charging - Frames state priorities Attractive:

Policy intervention	Target influence factor and behavioral model element	Effectiveness prediction	EAST – where and how it contributes
	charging and public charging density	difficult to implement due to regulation change, needs additional administrative arrangements.	- Promotes benefit of EV use
Battery exchange grant	Capability: - Repair cost	Probably has a small effect and is fiscally expensive and not sustainable.	Attractive: - Personalized - Novel - Removes financial risks
Home charger installation support grant	Opportunity: - Possibility of installing a home charger	Probably has a medium effect, but has a risk that the restrictions are elsewhere, difficult to administer, fiscally expensive and not sustainable.	Easy: - Reduces effort for home charging installation - Removes potential financial barriers (not detected) Timely: - Offers benefit to both, the individual and the housing cooperative
Market-based measure			
Battery insurance	Capability: - Decrease in value over time Repair costs	Probably has a large effect as it reduces ownership risks considerably, private market field, state intervention possibility limited to market regulation.	Attractive: - Reduces financial risk of EV ownership - Personal Timely: - Applies upon loss occurrence Easy: - Easy for target group to acquire if solution is developed

Note: Intervention possibilities are general suggestions that need further development for actual implementation.

4.3. Intervention Suggestions

In the scarcity of fiscal resources, it is important to choose policy interventions wisely and recognize the need for cost-effectiveness. This means that seeking the best possible results while sacrificing the least of resources is the common theme in developing any policy (Ruggeri, Steinnes, Evans, & Tantia, 2018).

Therefore, the suggested intervention suggestions are analyzed (table 3) by their potential effect and the level of difficulty for implementation.

Table 3

Analysis About the Feasibility of Intervention Suggestions

Large effect, difficult to implement Fiscal measure: - Restructuring the motor vehicle tax to further favor EV over combustion engine vehicle Market-based measure: - Battery insurance	Large effect, easy to implement Information intervention: - Experience sharing by longtime publicly known EV users in social media and the public - Information sharing workshops to salespeople on state priorities and EV-s - Comparative illustrative material on environmental impact of EV-s in comparison to combustion engine vehicles
Limited effect, difficult to implement Fiscal measures: - Fringe benefit tax exemption for enabling private charging at workplaces - Battery exchange grant - Home charger installation grant to apartment buildings	Limited effect, easy to implement Information intervention: - Information about the availability of home charger rental models for car dealerships and ads, including a default charger offer - Comparative repair and maintenance cost information to car dealerships and portals

To ensure maximum effect with minimum resources, the policy intervention plan should consist of the interventions that have a potentially large impact, and which are easy to implement with minimal resources. Therefore, the chosen intervention plan should consist of the three information interventions and a market-based insurance intervention as follows (see table 3), as the predicted effectiveness is biggest:

- Longtime publicly known EV users experience sharing i.e. “experience sharing”
- Information sharing workshops to salespeople on state priorities and EV-s i.e. “salespeople”
- Comparative illustrative material on environmental impact of EV-s in comparison to combustion engine vehicles i.e. “environmental comparison”
- EV battery insurance

The information intervention covers an important knowledge area targeting statistically significant influence factors (environmental effect, upkeep expenses, lifespan, range etc,) that suffer from knowledge gap based on the result of previous analysis. The analysis showed that higher knowledge results in higher attitude, which influences motivation to reach the behavioral intention to choose an EV. Therefore, targeting the knowledge of non-EV users with intervention mechanisms is important for elevating the motivation to become an EV user.

EV battery insurance would target the important financial risk of EV ownership which would provide to enhanced capability for choosing an EV. Financial aspects were rated as most important policy mechanisms as well as capabilities to consider an EV. EV battery insurance would also target the perceived lifespan of the EV that was a significant predictor of motivation for becoming an EV user.

As these interventions have the potential to have a large effect while being cost-effective, these measures are further evaluated by the APEASE criteria. APEASE criteria consists of affordability, practicality, effectiveness and cost-effectiveness, acceptability, side-effects/safety, and equity (Michie et al., 2014) evaluations (see table 4) to ensure implementability of the policy plan in question.

Table 4

APEASE Criteria Check of the Suggested Policy Intervention Plan

Intervention	Affordability	Practicability	Effectiveness and cost-effectiveness	Acceptability	Side-effects/ safety	Equity
Experience sharing	Yes, public channels are affordable to the target group	Yes, it can be delivered to the target group	Yes, effective, cost-effective if publicly known people are willing	Yes, acceptable to the target group if suitable public figures are covered	Yes, no unwanted consequences foreseen	Yes, no negative effect to the target group equity foreseen under normal responsibility level
Salespeople	Yes, salespeople's information is available to the target group	Yes, salespeople's information can be delivered to the target group	Yes, effective if salespeople participate and cost-effective if optimal participation is granted	Yes, acceptable to the target group, acceptable to salespeople under voluntary participation	Yes, no unwanted consequences foreseen	Yes, no negative effect to the target group equity foreseen under normal responsibility level
Environmental comparison	Yes, informative material is available to the target group	Yes, can be delivered to the target group in cooperation with dealerships	Yes, effective as easily understandable and cost-effective compared to fiscal measures	Yes, acceptable to the target group, acceptable to dealerships under voluntary use	Yes, no unwanted consequences foreseen	Yes, no negative effect to the target group equity foreseen under normal responsibility level
EV battery insurance (in case market-based solution is developed)	Yes, if solution is present	Yes, deliverable by the market	Yes, effective as it reduces financial risks of the target group	Yes, acceptable as the market is developed for other assets	Yes, if offered by a regulated insurance market	Yes, reduces risks to target group equity

Although the analyzed intervention suggestions are preliminary and need further development for actual intervention, according to the APEASE criteria, these are generally suitable for implementation, but there are some considerations. Experience sharing is cost-

effective only if public figures invited by the policy maker are willing to share their experience for free or for a minor compensation. Salespeople's workshops are effective and cost-effective if optimal participation is granted. If the workshops are under-attended, there will be no effect and no cost-effectiveness. The workshops for salespeople must be voluntary and presented as a possibility and not an obligation to rule out resistance. Therefore, the participation level risk is present. The voluntary principle applies also to the sharing of the information material of the environmental impact's comparative material. If the dealerships and/or web portals are uninterested in sharing the material, the effect will not be present. Side-effects and equity aspects are safe and covered under the normal responsibility level of target group individuals. If individuals act irresponsibly under the persuasive information intervention, it might evoke some unwanted side-effect by hurting a person's equity if their financial possibilities are not evaluated responsibly. This risk should be mitigated by financial service providers. The EV battery insurance is implementable only in case a sustainable and affordable market-based solution can be developed. Therefore, the possible solution needs market consultations and a thorough development process.

Beforementioned interventions address motivation and capability. To address the opportunity of choosing an EV, the charging opportunity must be present, therefore the home charger installation obstacles need to be identified and addressed.

5. Impact Assessment Research Plan

5.1. Objective of the Research

Besides understanding the problem behaviorally and mapping insights and possible policy interventions, it is important to make further resource-optimal decisions on choosing the most effective policy measures for implementation. Therefore, ex-ante impact assessment of the suggested policy interventions gives further basis for knowledge-based decision-making.

The aim of the ex-ante impact assessment is to determine which suggested policy interventions are more effective for influencing the motivation of the target group in becoming an EV user.

5.2. Research Methodology

To evaluate the policy interventions effectiveness, one-way between-participants experimental design using random assignment to conditions is proposed. Proposed methodology is experimental research to be conducted prior to policy measure implementation in a controlled web survey environment.

The sample to be recruited to the experiment should meet the eligibility criteria equal to the previous study, i.e. individuals at least 18 years old, who are or will be car users. As the proposed experiment is to be conducted by the policy maker, the sample could be recruited by using the vehicle user data from the Estonian Transport Administration's registry. Sample size should be big enough to ensure statistically significant results at least on a confidence level of 95%.

Participants recruited to the experiment sample should be further randomly assigned to each intervention condition as described below in table 5.

Table 5

Sample Division and Intervention Exposure

Sample division into groups	Assigned to intervention	Description of the intervention exposure
Sample group 1	Experience sharing	Video and pictures of social media posts from public figures sharing their experience with EV.
Sample group 2	Salesperson	Video of the car sale's process, where a salesperson introduces EV models and speaks about upkeep expenses and environmental impact and answers positively to clients' concerns (e.g. charging costs, maintenance and repair costs, lifespan, range).
Sample group 3	Environmental comparison	Pictures of car ads with comparative illustrative material on environmental impact of the EV and combustion engine vehicles.
Sample group 4	Insurance	Pictures of insurance offers for the EV driving battery.

The independent variable in this experiment is the intervention plan, which has four levels (intervention measures). The dependent variable to be measured is a person's self-reported assessment of the probability of becoming an EV user in a 5-year perspective, which measures the motivation of a person to become an EV user. As the motivation level of the sample is presumably different, then base level measurement should be taken first and second

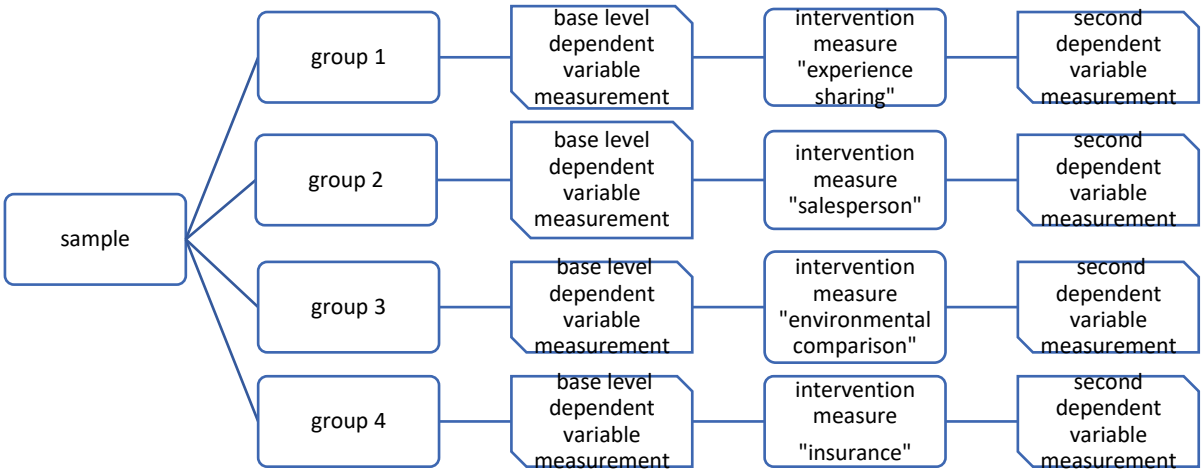
measurement after the exposure to an intervention. The result to be analyzed is the difference between measurement two and base level measurement.

Interfering variables might be the brand, color or production year of the car, people's gender, attractiveness, voice etc. To minimize the effects of interfering variables, independent variable details should vary during the experiment.

Please see the experiment plan in figure 8.

Figure 8

Research Plan for One-Way Between-Participants Experimental Design Using Random Assignment to Conditions



The data to be analyzed at first level should be the difference between the second measurement and the base level measurement of every group. If the second measurement has statistically a significantly higher value than the base level measurement, the intervention measure is effective in elevating motivation towards becoming an EV user.

To decide which intervention measures are more effective, the differences between groups should be compared.

For data analysis, t-test and ANOVA should be used to evaluate statistical significance of mean between groups.

This experimental design enables to evaluate the intervention measure effectiveness only about motivation and not behavior change itself. A person enacts in a behavior if one has capability and opportunity and is more motivated to enact in a specific behavior than any other. This means that elevated motivation does not result immediately in a behavior change but is a

precondition. Therefore, if a policy intervention elevates persons motivation while capabilities and opportunities are sufficient, then probability of behavior change to occur, is higher.

The other possibility is to use a behavioral intention measurement as a dependent variable, but this measurement has smaller variability and therefore smaller effects although the prediction level of behavior change is higher.

The proposed experimental research design is universal and enables to measure the effect of other policy measures by changing the intervention condition.

As the proposed interventions are preliminary and need further development for actual implementation, the experimental testing should be implemented only on developed interventions.

Behavior change i.e. the actual decision to choose an EV, is measurable ex-post by monitoring the share of EV-s in the Estonian vehicle fleet. Ex-post evaluation of EV share in Estonian vehicle fleet does not enable to measure the effect of specific intervention measure, but the policy intervention as a whole.

To evaluate the effect of policy intervention, Before-After measurements could be taken. For Before-After methodology, the share of EV-s in Estonian vehicle fleet must be measured before policy intervention implementation and after policy intervention (for instance after 6 months). If all other circumstances are the same, the change in EV share in vehicle fleet presumably reflects the effect of the policy intervention. The methodology though does not enable to detect causal relationship nor evaluate the effect of single policy intervention measure.

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Annexes

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Annex 2. Interview Plan for Half-Structured Interviews for Qualitative Research

Teema: Millised on elektriauto ostuotsust mõjutavad mõjutegurid?

Uurimisprobleem: Miks uurida?

Eesti on üheks Pariisi leppe osapooleks ja ühtlasi seotud ka Euroopa Fit55 eesmärkidega. Pariisi leppega, mille üks 198-st osapoolest on ka Eesti, on seatud eesmärgiks hoida kliimasoojenemine 1,5 kraadi piires. 2024. aastal avaldatud ÜRO kliimaaruande põhjal oli 2023. aastal maailma temperatuur keskmiselt juba 1,45 kraadi soojem. Euroopas on seatud Fit55 paketiga eesmärk saavutada kliimaneutraalsus 2050. aastaks ja koostatakse uut ambitsioonikamat 2040. aasta eesmärki.

Transpordisektor emiteerib Eestis üle 15% kasvuhoonegaasidest, millest enamus tuleneb sõiduautodest. Elektriautode osakaal kõigist registreeritud sõidukitest on kõigest 1%.

Selleks, et vähendada sõiduautode kasutamisest tulenevat kasvuhoonegaaside heidet, on vaja suurendada elektriautode kui heitevabade sõidukite kasutuselevõttu, seega suurendada elektriautode osakaalu registreeritud sõidukitest.

Eesmärk: kuhu tahame välja jõuda?

Intervjuu eesmärgiks on selgitada välja mõjutegurid:

1. Mis on olulised põhjused sõiduauto vahetuseks ja millised on olulised isikliku sõiduauto omadused?
2. Millised uskumused ja suhtumised valitsevad elektriautode suhtes ja millised on võimalused ja võimekused elektriautode kasutusele võtmiseks?
3. Mis peaks autoomaniku vaates tulevikus muutuma, et elektriauto muutuks kaalutavaks alternatiiviks?

Intervjuude käigus soovitakse jõuda mõjutegurite kaardistamiseni, mille tõttu isikliku sõiduauto ostuotsust tegev inimene otsustab valida elektriauto asemel sisepõlemismootoriga sõiduauto.

Küsimused põhinevad COM-B ja planeeritud käitumise teooria põhjal koostatud käitumuslikul mudelil.

Uurimisküsimused

- Milline on vastaja üldine profiil?
- Millised on põhjused, miks inimesed enda kasutuses olevat sõiduautot soovivad välja vahetada?
- Millised on olulised sõiduauto omadused?
- Milline on inimeste suhtumine elektriautode suhtes?
- Millised on sotsiaalsed ja füüsilised mõjutegurid elektriauto kasutusele võtmiseks?
- Milline on elektriautode kasutusele võtmise finantsiline ja taristuline võimekus?
- Tulevikku vaade, millised on ootused muutusteks?

Intervjuu kava

Sissejuhatus:

Intervjuu läbiviija tutvustab ennast, märgib mõne tähelepaneku keskkonna kohta, milles intervjuu läbiviija ja intervjueeritav viibivad, intervjuu pinge mahavõtmise eesmärgil.

Üldised küsimused intervjueeritava profiili määramiseks:

- Sugu: [M, N]
- Vanusevahemik: [alla 30, alla 50, üle 50]
- Haridustase: [põhiharidus, keskharidus, kõrgharidus]
- Sissetuleku tase: [alla 3000 või üle 3000]
- Leibkonna koosseis: [inimeste arv - 3]
- Elupiirkond: [maapiirkond, linna ääreala, linn]
- Aastane läbisõit: [alla 20 000, üle 20 000]
- Millise mootoriga autot intervjueeritav praegu kasutab? [Diisel, bensiin, hübriid, elekter]

Põhiosa:

1. Auto vahetamise põhjustest
    - Millised on põhjused, miks Te sooviksite oma praegust autot välja vahetada?

- Millistel põhjustel olete varem autot vahetanud?

2. Olulised isikliku sõiduauto omadused
    - Millised on Teie jaoks kõige olulisemad omadused, mis isiklikus kasutuses sõiduautol olemas olema peavad?
3. Elektriauto omadused (attitude -> motivation)
    - Milline on Sinu üldine suhtumine EV-desse – positiivne, negatiivne?
    - Kas Sa kaaluksid elektriauto ostmist, et aidata keskkonda?
    - Millist rolli Sinu arvates autod üldiselt mängivad keskkonna kahjustamise suhtes?
    - Mis oleksid Sinu jaoks olulised motivaatorid, et kaaluda EV ostmist (keskkonnaalased, rahalised, mugavus, kiirendus, välimus, prestiiž vms)?
    - Mis on Sinu arvates kõige olulisemad elektriauto plussid võrreldes sisepõlemismootoriga autoga?
    - Millised on Sinu arvates kõige olulisemad elektriauto miinused (ja hirmud) võrreldes sisepõlemismootoriga autoga?
4. Elektriauto kasutusele võtmise võimalused, sotsiaalsed ja füüsilised (opportunity)
    - Milline on arvamus elektriautode suhtes Sinu sõprade ja sugulaste seas? Kas see on pigem positiivne või negatiivne?
    - Kui oluliseks Sa pead oma sõprade ja sugulaste arvamust elektriautodest? Kas sooviksid sellest ka ise lähtuda?
    - Milline on Sinu arvamus elektriautot kasutava inimese kohta?
    - Millised oleksid olulised omadused, mis EV-l peaksid olema, et see oleks Sinu jaoks sobiv või kaalutav sõiduk?
    - Kuidas hindad, kas sellised mudelid on täna saadaval?
    - Milliseks hindad elektriauto üldist atraktiivsust võrreldes sisepõlemismootoriga autoga?
5. Võimalused elektriauto kasutusele võtmiseks (capability, opportunity)

- Milliseid EV taristuga (ntks laadimiskohad) seotud probleeme Sa näed?
- Milliseid EV taristuga (ntks laadimiskohad) seotud eeliseid Sa näed?
- Kui Sa mõtled, et peaksid ise EV-d kasutama, siis millised taristuga seotud tingimused peaksid Sinu jaoks olema täidetud?
- Milliseid eeliseid Sa näed seoses EV omandamise ja ülalpidamise kuludega seoses?
- Milliseid probleeme Sa näed seoses EV omandamise ja ülalpidamise kuludega seoses?
- Milline on Sinu hinnang elektriauto kalliduse/soodsuse kohta võrreldes sisepõlemismootoriga autoga?

6. Tulevikku vaade
    - Mis peaks muutuma, et Sa näeksid elektriautot kui ühte järgmist võimalikku valikut oma isikliku sõidukina?

Intervjuu lõpetamine: Tänamine, panuse olulisuse väljatoomine ja lisaküsimuste või -mõtete tekkimisel kontakti avatuks jätmine.

Annex 3. Questionnaire for Quantitative Cross-Sectional Study

LimeSurvey

On hea meel näha, et olete jõudnud elektriautode eelistusi käsitlevasse uuringusse!

Uuringus saate osaleda Teile sobival ajal.

Enne uuringuga alustamist lugege palun läbi "Uuringus osaleja informeerimine ja teadlik nõusolek" ning kinnitage enda nõusolekut.

Uuringus osalemiseks peate olema vähemalt 18-aastane ja kasutama regulaarselt autot.

Uuringus osaleja informeerimine ja teadlik nõusolek

Uuring „Elektriautode eelistused" keskendub inimeste elektriautodega seotud arvamustele ja eelistustele. Teie vastuste põhjal analüüsitakse tarbijate käitumist sõiduauto valikul.

Uuring algab üldiste küsimustega Teie ja praegu Teie kasutuses oleva sõiduauto kohta, seejärel küsitakse Teie hinnanguid ja arvamusi elektriautode kohta ning võrdluse kohta sisepõlemismootoriga autodega. Seejärel palutakse Teil hinnata erinevate elektriautodega seotud aspektide olulisust.

Küsimustik lõpeb kokkuvõtlike küsimuste ning lisainfo andmise võimalusega.

Uuringu eesmärgiks on koguda infot Teie arvamuste ja eelistuste kohta ja Te ei pea keskenduma faktitäpsete vastuste andmisele.

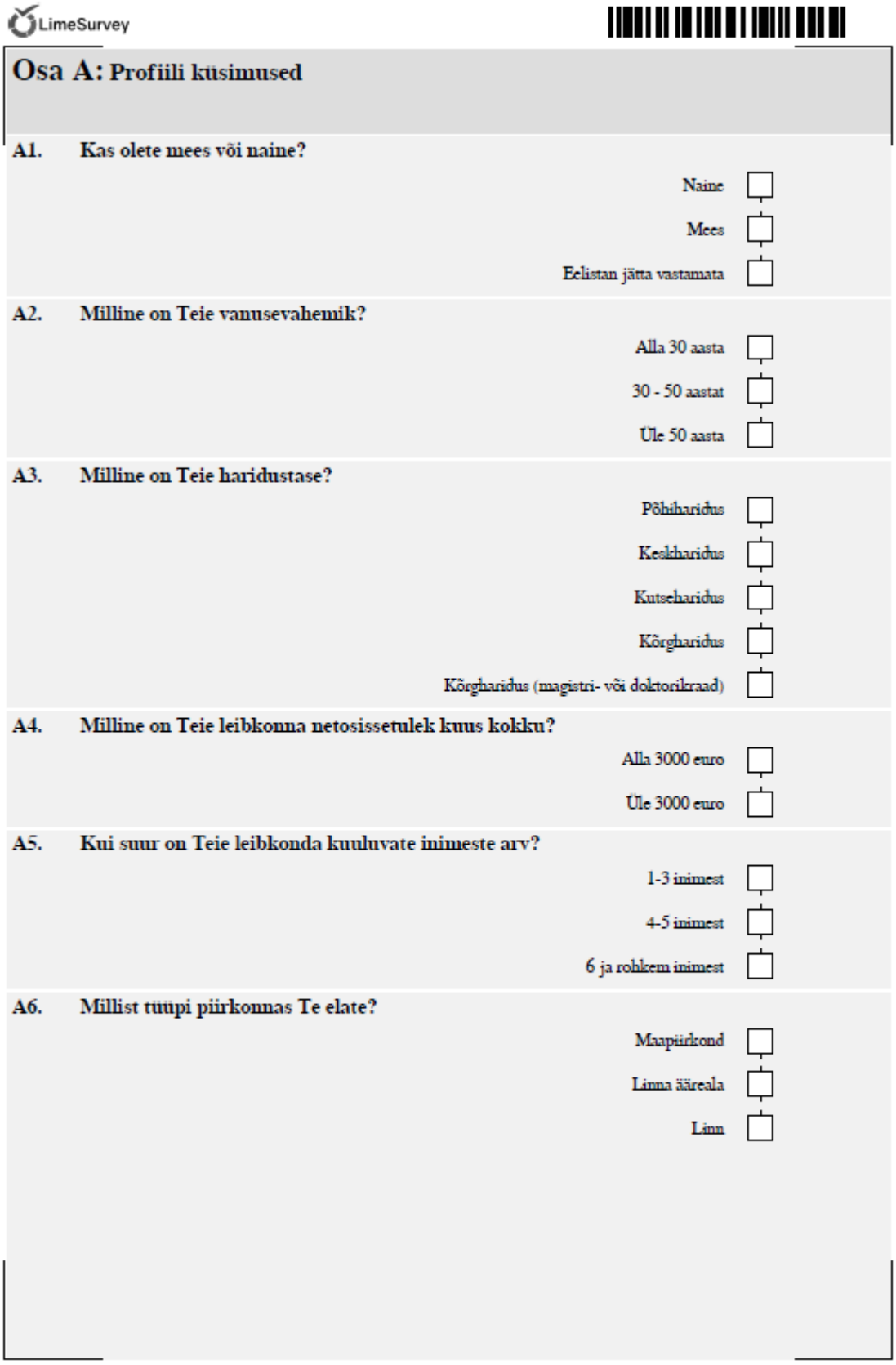
Uuringus osalemine on anonüümne ja uuringu käigus ei koguta vastaja identifitseerimist võimaldavaid andmeid.

Küsimustele vastamine võtab aega umbes 10 minutit. Osalemine uuringus on vabatahtlik ja Teil on õigus küsimustele vastamisest igal hetkel loobuda.

Hiljemalt 31.12.2025 kustutatakse küsimustik ja kõik andmed Tartu Ülikooli LimeSurvey platvormilt. Uuringu käigus kogutud andmeid säilitatakse vaid üldistatud kujul.

Kui Teil on täiendavaid küsimusi, võtke ühendust uuringu läbiviijaga (Karoli Niilus, karoli.niilus@ut.ee).

Valides "järgmine" kinnitad, et oled vähemalt 18-aastane ja oled nõus uuringus osalema.



LimeSurvey

Osa A: Profiili küsimused

A1. Kas olete mees või naine?

- ☐ Naine
- ☐ Mees
- ☐ Eelistan jätta vastamata

A2. Milline on Teie vanusevahemik?

- ☐ Alla 30 aasta
- ☐ 30 - 50 aastat
- ☐ Üle 50 aasta

A3. Milline on Teie haridustase?

- ☐ Põhiharidus
- ☐ Keskharidus
- ☐ Kutseharidus
- ☐ Kõrgharidus
- ☐ Kõrgharidus (magistri- või doktorikraad)

A4. Milline on Teie leibkonna netosissetulek kuus kokku?

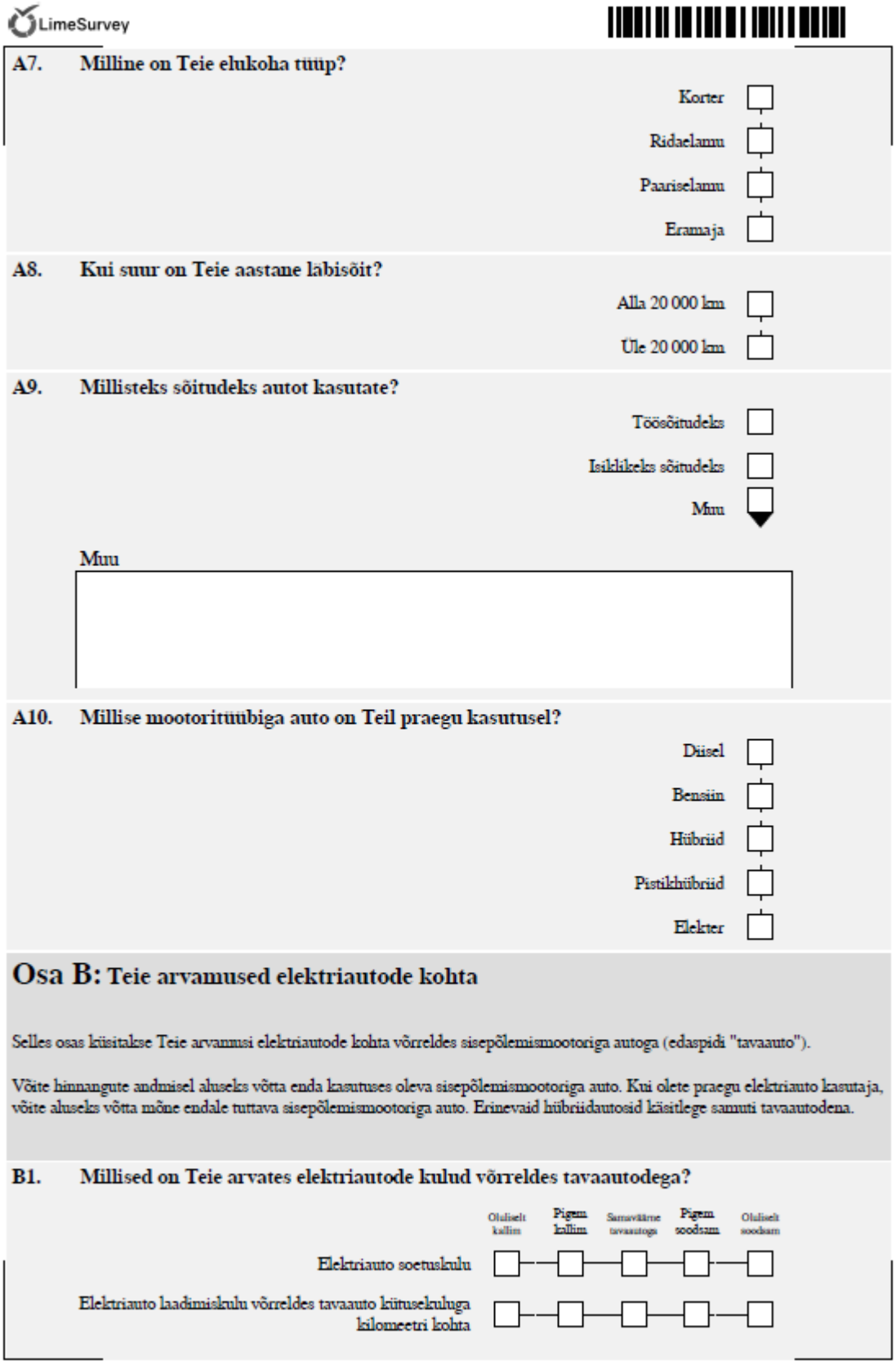
- ☐ Alla 3000 euro
- ☐ Üle 3000 euro

A5. Kui suur on Teie leibkonda kuuluvate inimeste arv?

- ☐ 1-3 inimest
- ☐ 4-5 inimest
- ☐ 6 ja rohkem inimest

A6. Millist tüüpi piirkonnas Te elate?

- ☐ Maapiirkond
- ☐ Linna ääreala
- ☐ Linn



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A7. Milline on Teie elukoha tüüp?

- Korter ☐
- Ridaelamu ☐
- Paariselamu ☐
- Eramaja ☐

A8. Kui suur on Teie aastane läbisõit?

- Alla 20 000 km ☐
- Üle 20 000 km ☐

A9. Millisteks sõitudeks autot kasutate?

- Töösõitudeks ☐
- Isiklikeks sõitudeks ☐
- Muu ☐

Muu

A10. Millise mootoritüübiga auto on Teil praegu kasutusel?

- Diisel ☐
- Bensiin ☐
- Hübriid ☐
- Pistikhübriid ☐
- Elekter ☐

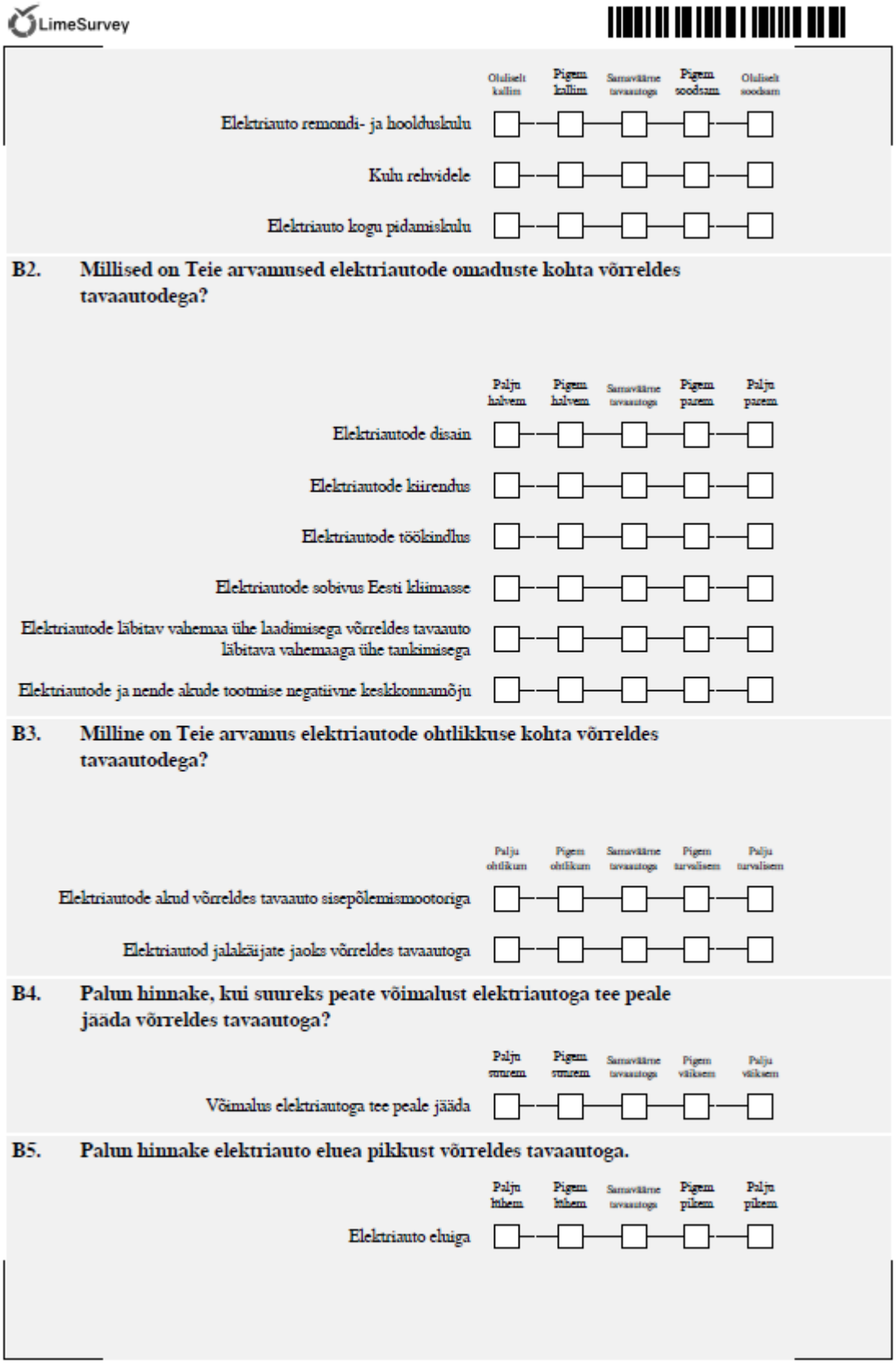
Osa B: Teie arvamused elektriautode kohta

Selles osas küsitakse Teie arvamusi elektriautode kohta võrreldes sisepõlemismootoriga autoga (edaspidi "tavaauto").

Võite hinnangute andmisel aluseks võtta enda kasutuses oleva sisepõlemismootoriga auto. Kui olete praegu elektriauto kasutaja, võite aluseks võtta mõne endale tuttava sisepõlemismootoriga auto. Erinevaid hübriidautosid käsitlege samuti tavaautodena.

B1. Millised on Teie arvates elektriautode kulud võrreldes tavaautodega?

	Oluliselt kallim	Pigem kallim	Samaväärne tavaautoga	Pigem soodsam	Oluliselt soodsam
Elektriauto soetuskulu	☐	☐	☐	☐	☐
Elektriauto laadimiskulu võrreldes tavaauto kütusekuluga kilomeetri kohta	☐	☐	☐	☐	☐



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	Oluliselt kallim	Pigem kallim	Samaväärne tavaautoga	Pigem soodsam	Oluliselt soodsam
Elektriauto remondi- ja hoolduskulu	☐	☐	☐	☐	☐
Kulu rehvidele	☐	☐	☐	☐	☐
Elektriauto kogu pidamiskulu	☐	☐	☐	☐	☐

B2. Millised on Teie arvamused elektriautode omaduste kohta võrreldes tavaautodega?

	Palju halvem	Pigem halvem	Samaväärne tavaautoga	Pigem parem	Palju parem
Elektriautode disain	☐	☐	☐	☐	☐
Elektriautode kiirendus	☐	☐	☐	☐	☐
Elektriautode töökindlus	☐	☐	☐	☐	☐
Elektriautode sobivus Eesti kliimasse	☐	☐	☐	☐	☐
Elektriautode läbitav vahemaa ühe laadimisega võrreldes tavaauto läbitava vahemaaga ühe tankimisega	☐	☐	☐	☐	☐
Elektriautode ja nende akude tootmise negatiivne keskkonnamõju	☐	☐	☐	☐	☐

B3. Milline on Teie arvamus elektriautode ohtlikkuse kohta võrreldes tavaautodega?

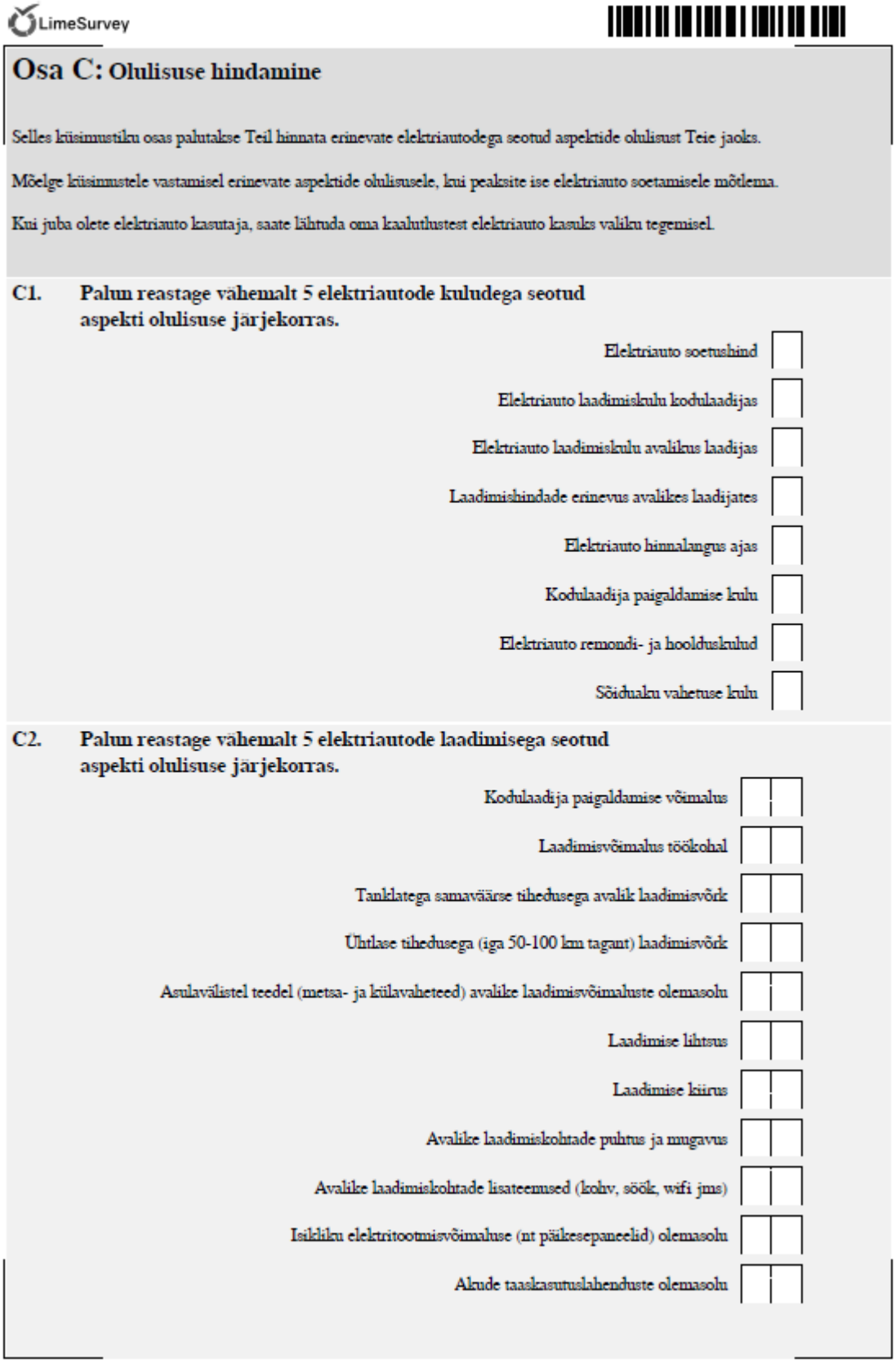
	Palju ohtlikum	Pigem ohtlikum	Samaväärne tavaautoga	Pigem turvalisem	Palju turvalisem
Elektriautode akud võrreldes tavaauto sisepõlemismootoriga	☐	☐	☐	☐	☐
Elektriautod jalakäijate jaoks võrreldes tavaautoga	☐	☐	☐	☐	☐

B4. Palun hinnake, kui suureks peate võimalust elektriautoga tee peale jääda võrreldes tavaautoga?

	Palju suurem	Pigem suurem	Samaväärne tavaautoga	Pigem väiksem	Palju väiksem
Võimalus elektriautoga tee peale jääda	☐	☐	☐	☐	☐

B5. Palun hinnake elektriauto eluea pikkust võrreldes tavaautoga.

	Palju lühem	Pigem lühem	Samaväärne tavaautoga	Pigem pikem	Palju pikem
Elektriauto eluiga	☐	☐	☐	☐	☐



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Osa C: Olulisuse hindamine

Selles küsimustiku osas palutakse Teil hinnata erinevate elektriautodega seotud aspektide olulisust Teie jaoks.

Mõelge küsimustele vastamisel erinevate aspektide olulisusele, kui peaksite ise elektriauto soetamisele mõtlema.

Kui juba olete elektriauto kasutaja, saate lähtuda oma kaalutlustest elektriauto kasuks valiku tegemisel.

C1. Palun reastage vähemalt 5 elektriautode kuludega seotud aspekti olulisuse järjekorras.

- Elektriauto soetushind
- Elektriauto laadimiskulu kodulaadijas
- Elektriauto laadimiskulu avalikus laadijas
- Laadimishindade erinevus avalikes laadijates
- Elektriauto hinnalangus ajas
- Kodulaadija paigaldamise kulu
- Elektriauto remondi- ja hoolduskulud
- Sõiduaku vahetuse kulu

C2. Palun reastage vähemalt 5 elektriautode laadimisega seotud aspekti olulisuse järjekorras.

- Kodulaadija paigaldamise võimalus
- Laadimisvõimalus töökohal
- Tanklatega samaväärse tihedusega avalik laadimisvõrk
- Ühtlase tihedusega (iga 50-100 km tagant) laadimisvõrk
- Asulavälistel teedel (metsa- ja külavaheteed) avalike laadimisvõimaluste olemasolu
- Laadimise lihtsus
- Laadimise kiirus
- Avalike laadimiskohtade puhtus ja mugavus
- Avalike laadimiskohtade lisateenused (kohv, söök, wifi jms)
- Isikliku elektritootmisvõimaluse (nt päikesepaneelid) olemasolu
- Akude taaskasutuslahenduste olemasolu

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C3. **Palun reastage vähemalt 5 elektriauto omadust olulisuse järjekorras.**

Ruumikus/mahutavus
Keskkonnasäästlikkus
Ilus disain
Töökindlus
Turvalisus
Kiirendus
Vaikne salong
Ühe laadimisega läbitav vahemaa vähemalt 500 km
Ühe laadimisega läbitav vahemaa vähemalt 700 km
Aku täislaadimise aeg kuni 10 min
Aku täislaadimise aeg kuni 30 min

C4. **Kas Teie jaoks sobivad elektriauto mudelid on praegu saadaval?**

Jah
Ei

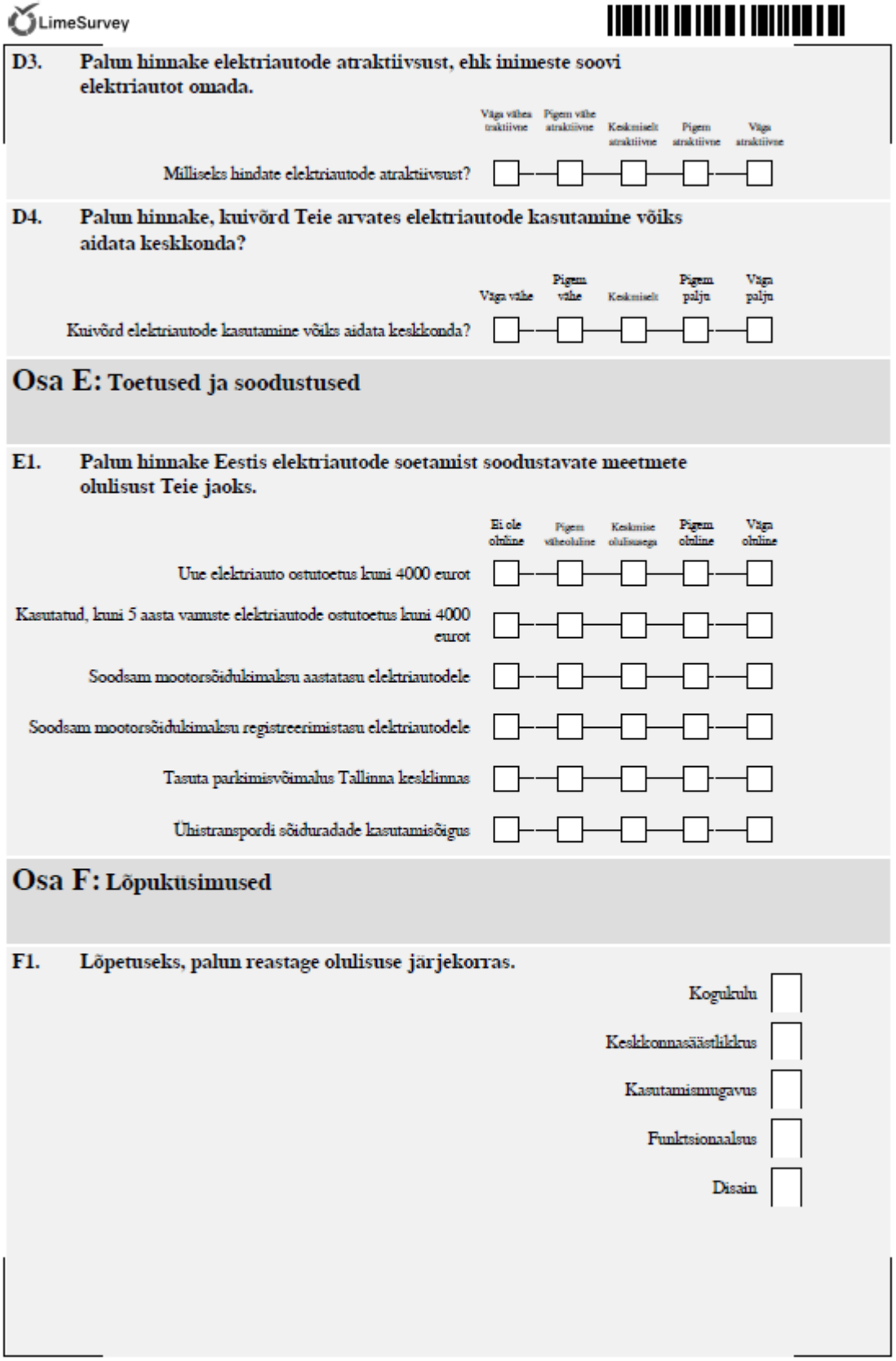
Osa D: Üldised küsimused elektriautode kohta

D1. **Palun hinnake suhtumist elektriautodesse.**

	Väga negatiivne	Pigem negatiivne	Neutraalne	Pigem positiivne	Väga positiivne
Milline on Teie suhtumine elektriautodesse?	☐	☐	☐	☐	☐
Milline on Teie sugulaste või tuttavate suhtumine elektriautodesse?	☐	☐	☐	☐	☐

D2. **Palun hinnake oma sugulaste või tuttavate hinnangu olulisust enda jaoks.**

	Üldse mitte oluliseks	Pigem väheolulise ks	Keskmiselt oluliseks	Pigem oluliseks	Väga oluliseks
Kui oluliseks peate oma sugulaste või tuttavate arvamust elektriautodest?	☐	☐	☐	☐	☐
Kui oluliseks peate oma sugulaste või tuttavate tegelikku kogemust elektriautodega?	☐	☐	☐	☐	☐



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D3. **Palun hinnake elektriautode atraktiivsust, ehk inimeste soovi elektriautot omada.**

	Väga vähea traktiivne	Pigem vähe atraktiivne	Keskmiselt atraktiivne	Pigem atraktiivne	Väga atraktiivne
Milliseks hindate elektriautode atraktiivsust?	☐	☐	☐	☐	☐

D4. **Palun hinnake, kuivõrd Teie arvates elektriautode kasutamine võiks aidata keskkonda?**

	Väga vähe	Pigem vähe	Keskmiselt	Pigem palju	Väga palju
Kuivõrd elektriautode kasutamine võiks aidata keskkonda?	☐	☐	☐	☐	☐

Osa E: Toetused ja soodustused

E1. **Palun hinnake Eestis elektriautode soetamist soodustavate meetmete olulisust Teie jaoks.**

	Ei ole olnline	Pigem väheoluline	Keskmise olulisusega	Pigem olnline	Väga olnline
Uue elektriauto ostutoetus kuni 4000 eurot	☐	☐	☐	☐	☐
Kasutatud, kuni 5 aasta vanuste elektriautode ostutoetus kuni 4000 eurot	☐	☐	☐	☐	☐
Soodsam mootorsõidukimaksu aastatasu elektriautodele	☐	☐	☐	☐	☐
Soodsam mootorsõidukimaksu registreerimistasu elektriautodele	☐	☐	☐	☐	☐
Tasuta parkimisvõimalus Tallinna kesklinnas	☐	☐	☐	☐	☐
Ühistranspordi sõiduradade kasutamisõigus	☐	☐	☐	☐	☐

Osa F: Lõpuküsimused

F1. **Lõpetuseks, palun reastage olulisuse järjekorras.**

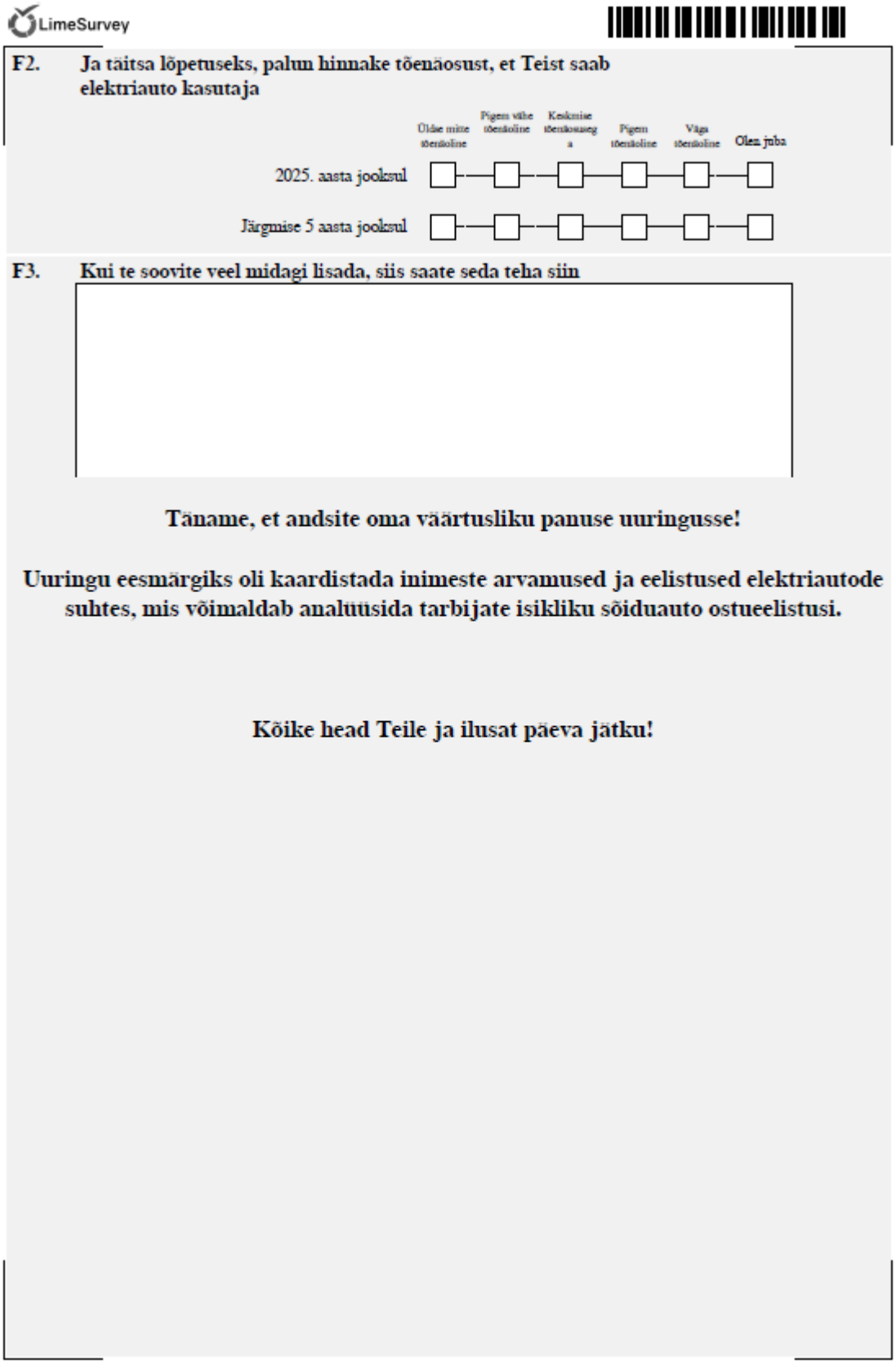
Kogukulu ☐

Keskkonnasäästlikkus ☐

Kasutamismugavus ☐

Funktsionaalsus ☐

Disain ☐



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F2. **Ja täitsa lõpetuseks, palun hinnake tõenäosust, et Teist saab elektriauto kasutaja**

	Üldse mitte tõenäoline	Pigem vähe tõenäoline	Keskmise tõenäosusega	Pigem tõenäoline	Väga tõenäoline	Olen juba
2025. aasta jooksul	☐	☐	☐	☐	☐	☐
Järgmise 5 aasta jooksul	☐	☐	☐	☐	☐	☐

F3. **Kui te soovite veel midagi lisada, siis saate seda teha siin**

Täname, et andsite oma väärtusliku panuse uuringusse!

Uuringu eesmärgiks oli kaardistada inimeste arvamused ja eelistused elektriautode suhtes, mis võimaldab analüüsida tarbijate isikliku sõiduauto ostueelistusi.

Kõike head Teile ja ilusat päeva jätku!

Annex 4. Quantitative Research Sample Description Tables

Table 6

Distribution of Sample by Gender

Gender	No. of Participants	Percent
N/A	2	0.63
Male	241	75.79
Female	75	23.59
Total	318	100.00

Table 7

Distribution of Sample by Age

Age Group	No. of Participants	Percent
30–50 years	208	65.41
Below 30 years	27	8.50
Above 50 years	83	26.10
Total	318	100.00

Table 8

Distribution of Sample by Education Level

Education Level	No. of Participants	Percent
Secondary education	50	15.72
Vocational education	50	15.72
Higher education	106	33.33
Master’s degree or PhD	106	33.33
Basic education	6	1.89
Total	318	100.00

Table 9

Distribution of Sample by Net Income Per Household

Net Income Per Household	No. of Participants	Percent
Below 3,000 euros	96	30.19
Above 3,000 euros	222	69.81
Total	318	100.00

Table 10

Distribution of Sample by Number of People Per Household

Size of the Household	Number of Participants	Percent
1–3 people	171	53.77
4–5 people	140	44.03
6 and more people	7	2.20
Total	318	100.00

Table 11

Sample Description by Type of Living Area

Living Area Type	No. of Participants	Percent
City	126	39.623
Suburban	119	37.421
Rural	73	22.956
Total	318	100.000

Table 12

Sample Description by Type of Residence

Residence Type	No. of Participants	Percent
Private house	168	52.83
Apartment	111	34.91
Twin-house	17	5.35
Semi-detached house	22	6.92
Total	318	100.00

Table 13

Sample Description by Annual Mileage

Annual Mileage Group	No. of Participants	Percent
Below 20,000 km	121	38.05
Over 20,000 km	197	61.95
Total	318	100.00

Table 14

Sample Description by Type of Vehicle in Use

Current Vehicle Type	No. of Participants	Percent
Petrol	70	22.013
Diesel	75	23.585
Electric	148	46.541
Hybrid	10	3.145
Plug-In hybrid	15	4.717
Total	318	100.000

Annex 5. General Results of the Quantitative Research

Table 15

Descriptive Statistics by Education Level

	Attitude towards EV				
	Secondary education	Vocational education	Higher education	Master's degree or PhD	Basic education
No. of participants	50	50	106	106	6
Mean	3.76	3.78	3.93	4.00	2.50
Std. Deviation	1.36	1.36	1.30	1.10	1.64

Table 16

Descriptive Statistics of Attitude Towards EV and Motivation Level by Vehicle Type

	Attitude towards EV					Probability assessment of becoming an EV user in a 5-year perspective			
	Petrol	Diesel	Electricity	Hybrid	Plug-in hybrid	Petrol	Diesel	Hybrid	Plug-in hybrid
No. of participants	70	75	148	10	15	68	73	9	13
Mean	3.16	2.92	4.74	3.30	3.87	2.60	2.64	3.33	3.46
Std. Deviation	1.15	1.37	0.54	0.95	1.06	1.47	1.54	1.50	1.45

Annex 6. Linear Regression Analysis on Attitude

Model Summary – Attitude towards EV

Model	R	R^2	Adjusted R^2	RMSE
H_0	0.000	0.000	0.000	1.243
H_1	0.843	0.710	0.679	0.704

ANOVA

Model		Sum of Squares	df	Mean Square	F	p
H_1	Regression	180.993	16	11.312	22.830	< .001
	Residual	73.827	149	0.495		
	Total	254.819	165			

Note. The intercept model is omitted, as no meaningful information can be shown.

Coefficients

Model		Unstandardized	Standard Error	Standardized	t	p
H_0	(Intercept)	3.084	0.096		31.977	< .001
H_1	(Intercept)	-0.531	0.319		-1.663	0.098
	Arvamus EV soetuskulu B1	-0.057	0.064	-0.048	-0.897	0.371
	Arvamus EV laadimiskulu B1	0.219	0.073	0.194	2.997	0.003*
	Arvamus EV remondi- ja hoolduskulu B1	0.173	0.072	0.178	2.416	0.017*
	Arvamus EV rehvikulu B1	0.012	0.088	0.007	0.139	0.889
	Arvamus EV kogu pidamiskulu B1	-0.082	0.083	-0.079	-0.993	0.322
	Arvamus EV disain B2	0.145	0.077	0.108	1.875	0.063
	Arvamus EV kiirendus B2	0.058	0.066	0.048	0.884	0.378
	Arvamus EV töökindlus B2	0.078	0.099	0.063	0.790	0.431
	Arvamus EV Eesti kliimasse sobivus B2	0.125	0.096	0.100	1.300	0.196
	Arvamus EV läbitav vahemaa B2	0.247	0.119	0.121	2.064	0.041*
	Arvamus EV ja akude tootmise neg keskkonnamõju B2	0.006	0.090	0.005	0.064	0.949
	Arvamus EV akude ohtlikkus vs sisepõlemismootor B3	0.147	0.078	0.136	1.899	0.060
	Arvamus EV ohtlikkus jalakäijate suhtes B3	0.060	0.091	0.037	0.656	0.513
	Arvamus tee peale jäämine võimaluse kohta B4	-0.093	0.082	-0.072	-1.136	0.258
	Arvamus EV eluea pikkus B5	0.172	0.105	0.122	1.637	0.104

Coefficients

Model		Unstandardized	Standard Error	Standardized	t	p
	Hinnang EV keskkonna aitamise kohta D4	0.243	0.069	0.232	3.523	< .001*

Note: * marks statistically significant coefficients

Annex 7. Linear Regression Analysis on the Rating of Probability of Becoming an EV User in a 5-year Perspective (Motivation)

Model Summary – Probability assessment of becoming an EV user in a 5-year perspective

Model	R	R^2	Adjusted R^2	RMSE
H_0	0.000	0.000	0.000	1.528
H_1	0.786	0.617	0.576	0.995

ANOVA

Model		Sum of Squares	df	Mean Square	F	p
H_1	Regression	237.862	16	14.866	15.024	< .001
	Residual	147.440	149	0.990		
	Total	385.301	165			

Note. The intercept model is omitted, as no meaningful information can be shown.

Coefficients

Model		Unstandardized	Standard Error	Standardized	t	p
H_0	(Intercept)	2.771	0.119		23.364	< .001
H_1	(Intercept)	-0.925	0.451		-2.051	0.042
	Arvamus EV soetuskulu B1	0.028	0.090	0.019	0.314	0.754
	Arvamus EV laadimiskulu B1	-0.009	0.103	-0.007	-0.091	0.927
	Arvamus EV remondi- ja hoolduskulu B1	0.196	0.101	0.164	1.940	0.054
	Arvamus EV rehvikulu B1	-0.137	0.124	-0.063	-1.110	0.269
	Arvamus EV kogu pidamiskulu B1	-0.064	0.117	-0.050	-0.544	0.587
	Arvamus EV disain B2	0.330	0.109	0.200	3.023	0.003*
	Arvamus EV kiirendus B2	0.011	0.093	0.008	0.121	0.904
	Arvamus EV töökindlus B2	0.115	0.140	0.075	0.821	0.413
	Arvamus EV Eesti kliimasse sobivus B2	0.054	0.136	0.035	0.396	0.693
	Arvamus EV läbitav vahemaa B2	0.446	0.169	0.178	2.641	0.009
	Arvamus EV ja akude tootmise neg keskkonnamõju B2	-0.104	0.127	-0.070	-0.821	0.413
	Arvamus EV akude ohtlikkus vs sisepõlemismootor B3	0.189	0.110	0.142	1.723	0.087
	Arvamus EV ohtlikkus jalakäijate suhtes B3	0.064	0.128	0.033	0.499	0.619
	Arvamus tee peale jäämine võimaluse kohta B4	0.049	0.115	0.031	0.429	0.669

Coefficients

Model		Unstandardized	Standard Error	Standardized	t	p
	Arvamus EV eluea pikkus B5	0.329	0.148	0.189	2.216	0.028*
	Hinnang EV keskkonna aitamise kohta D4	0.222	0.098	0.172	2.272	0.025*

Note. * marks statistically significant coefficients

Annex 8. Linear Regression Analysis on Opportunities

Model Summary – Probability assessment of becoming an EV user in a 5-year perspective

Model	R	R^2	Adjusted R^2	RMSE
H_0	0.000	0.000	0.000	1.528
H_1	0.707	0.499	0.484	1.098

ANOVA

Model		Sum of Squares	df	Mean Square	F	p
H_1	Regression	192.455	5	38.491	31.935	< .001
	Residual	192.846	160	1.205		
	Total	385.301	165			

Note. The intercept model is omitted, as no meaningful information can be shown.

Coefficients

Model		Unstandardized	Standard Error	Standardized[a]	t	p
H_0	(Intercept)	2.771	0.119		23.364	< .001
H_1	(Intercept)	0.253	0.362		0.698	0.486
	Hinnang sobivate mudelite saadavus C4 (Jah)	0.998	0.200		4.984	< .001*
	Hinnang EV atraktiivsus D3	0.503	0.099	0.360	5.064	< .001*
	Olulisuse hinnang sugulaste ja tuttavate EV tegeliku kogemuse kohta D2	0.022	0.081	0.018	0.278	0.782
	Olulisuse hinnang sugulaste ja tuttavate EV arvamuse kohta D2	-0.045	0.098	-0.030	-0.459	0.647
	Hinnang sugulaste ja tuttavate suhtumise kohta EV D1	0.313	0.116	0.184	2.699	0.008

Note. * marks statistically significant coefficients

Annex 9. Results of the Binominal Testing of the Importance List of Non-EV Users

Table 17

Importance Ranking of Expenses, Charging and EV Characteristics of Non-EV Users

		Variable	Percentage	Significance (p)
Ranking 1	Expenses	Acquisition cost	64.5	<0.001
Ranking 2		Decrease in EV value over time	19.3	0.013
Ranking 3		Home charger installation costs	18.1	0.034
Ranking 5		EV maintenance and repair costs	0.211	0.002
Ranking 1	Charging	Possibility to install a home charger	0.404	< 0.001
Ranking 2		Charging speed	0.175	< 0.001
Ranking 2		Possibility for charging at the workplace	0.151	0.01
Ranking 2		Equal charger density to gas-stations	0.139	0.04
Ranking 3		Charging simplicity	0.145	0.02
Ranking 1	EV characteristics	Range at least 700 km	0.289	< 0.001
Ranking 2		Charging time up to 10 min	0.175	< 0.001
Ranking 2		Reliability	0.163	0.003
Ranking 3		Spaciousness	0.139	0.04

Annex 10. Results of Binominal Testing of the Importance List of EV-Users

Table 18

Importance Ranking of Expenses, Charging and EV Characteristics of EV Users

		Variable	Percentage	Significance (p)
Ranking 1	Expenses	Acquisition cost	44.1	<0.001
Ranking 1		Charging cost with home-chargers	36.2	<0.001
Ranking 2		Maintenance and repair costs	23	<0.001
Ranking 3		Charging expenses in public chargers	23.7	<0.001
Ranking 5		Price differences in public chargers	19.1	0.019
Ranking 1	Charging	Possibility to install a home charger	55.9	< .001
Ranking 1		Possibility for charging at the workplace	13.8	0.046
Ranking 2		Charging speed	17.1	0.002
Ranking 2		Charging simplicity	15.1	0.015
Ranking 1	EV characteristics	Environmental sustainability	0.158	0.006
Ranking 1		Acceleration	0.138	0.046
Ranking 1		Spaciousness	0.145	0.023
Ranking 1		Reliability	0.224	< .001
Ranking 3		Security level	0.191	< .001
Ranking 4		Quiet cabin	0.158	0.006

Annex 11. Importance List of Policy Areas by Non-EV Users

Table 19

Importance Ranking of Policy Areas

Variable	Level	Counts	Total	Proportion	p
Importance level 1 F1	Design	10	166	0.060	< .001
	Functionality	12	166	0.072	< .001
	Convenience of use	34	166	0.205	0.847
	Environmental sustainability	12	166	0.072	< .001
	Total cost	98	166	0.590	< .001*
Importance level 2 F1	Design	8	166	0.048	< .001
	Functionality	54	166	0.325	< .001*
	Convenience of use	61	166	0.367	< .001*
	Environmental sustainability	16	166	0.096	< .001
	Total cost	27	166	0.163	0.246
Importance level 3 F1	Design	19	166	0.114	0.005
	Functionality	59	166	0.355	< .001*
	Convenience of use	48	166	0.289	0.006
	Environmental sustainability	22	166	0.133	0.032
	Total cost	18	166	0.108	0.002

Note. Proportions tested against value: 0.2. * marks statistically significant rankings above base testing value

Annex 12. Declaration on the Conflict of Interest

Author wishes to disclose that the long professional background from the Ministry of Finance of Estonia has added additional considerations to the analysis of the intervention possibilities and suggestions.