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**Exploring Individuals' Perceptions of the Sustainability  
Impact on Electric Car usage in Sweden**

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By

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## Abstract

This thesis investigates how individuals in Sweden perceive the sustainability of electric car usage, using the Triple Bottom Line framework, which encompasses environmental, economic, and social dimensions. The primary aim is to gain insight into the genuine sustainability intentions of electric car users and to understand how they interpret sustainability not only in terms of environmental impact but also in relation to economic affordability and social fairness. The findings aim to support policymakers in designing more inclusive and effective strategies to facilitate a just and sustainable transition to electric mobility. The study employs qualitative methods, including 15 semi-structured interviews and document analysis, to gather insights from both current electric car users and potential buyers. Participants recognized the environmental benefits of electric cars, such as reduced emissions and improved air quality, but showed limited awareness of issues like battery production and recycling, indicating a need for better public education on electric cars full environmental impact. Economically, concerns are centered on the high upfront cost of electric cars, despite acknowledging potential long-term savings. Many felt that financial incentives mainly support wealthier individuals, highlighting questions of fairness. Socially, participants noted unequal access to charging infrastructure between urban and rural areas and observed that EVs are often seen as status symbols, potentially affecting how people view and adopt them. From these results we can draw the conclusion that a successful and equitable transition to sustainable transportation in Sweden will require not only advancements in technology and infrastructure but also inclusive policies and targeted public awareness initiatives.

**Keywords:** Sustainability perceptions, Triple Bottom Line, Environmental sustainability, Economic sustainability, social sustainability, electric car, public awareness

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# CHAPTER ONE

## Introduction

### 1.1 Background

*“A just transition to sustainable mobility must ensure that the benefits of change are shared fairly, and that no communities are left behind.” - (Sheller, 2018)*

Electric mobility is an important step toward sustainable transportation. By replacing fossil fuel use, it helps lower greenhouse gas emissions and reduces reliance on non-renewable energy sources. Electric cars, are known for their high energy efficiency and clean operation, making them a strong alternative to internal combustion engine vehicles (ICEVs).(Rajper & Albrecht, 2020) The Swedish government has implemented various incentives such as tax reductions, free parking, and financial subsidies to promote the adoption of electric cars. These measures align with the national objective of achieving zero greenhouse gas emissions by 2045 (International Energy Agency., 2021). According to (Trafikanalys., 2024)over 60% of new cars purchased in Sweden in 2022 were either fully electric or plug-in hybrids. This reflects a significant shift in consumer preferences regarding vehicle choices in the country.

Although the adoption of electric cars is rapidly increasing, it is essential to critically assess their actual contribution to sustainability. ECs are often considered environmentally friendly due to their zero tailpipe emissions during operation. However, their overall sustainability impact depends on several additional factors such as the source of electricity used for charging, the production and disposal of batteries, the affordability and accessibility of ECs, and their long-term ownership costs (International Energy Agency., 2021)In such a context, we have recognized that individuals hold varying interpretations of what “sustainability” means, and these personal perspectives can influence their willingness to adopt environmentally friendly technologies. According to (Shove, 2010)people’s attitudes, values, and beliefs influence how they respond to incentives, new infrastructure developments, and environmental messaging. Although EVs are commonly viewed as environmentally friendly, people consider a range of factors when forming their

opinions. These include not only environmental benefits but also cost considerations, alignment with personal and social values, and the availability of supporting infrastructure such as charging stations (Rezvani et al., 2015). If these perceptions are misunderstood or ignored, even well-designed policies may fail to achieve their intended outcomes (Axsen et al., 2015)

In such a context, we aim to understand the real sustainability challenges of switching to electric cars from the perspective of current users and potential buyers.

## **1.2 Problematization**

Sweden leads in electric car adoption, emphasizing environmental benefits while overlooking issues such as economic inequality, electricity sources, and risks of exclusion. According to (Nielsen, 2021), wealthier families benefit from subsidies and convenient charging, but lower-income groups and people living far from urban areas are often unable to afford electric cars or participate in green initiatives. This highlights the importance of examining whether people's perceptions of the sustainability of electric cars align with their actual environmental, social, and economic impacts. Furthermore, the concept of sustainability is defined differently by individuals, based on their understanding and values, which vary according to personal experiences and backgrounds (O'Rourke & Lollo, 2015). Without considering these perspectives, sustainability policies risk becoming overly technical and ineffective.

Therefore, it is crucial to investigate how both electric vehicle users and potential buyers in Sweden perceive sustainability. This study will apply the Triple Bottom Line framework to explore their views on the environmental, economic, and social dimensions of sustainability. By doing so, this research aims to address existing gaps by providing a comprehensive understanding of these diverse perspectives.

### 1.3 Aim, research question and Delimitation

The main purpose of this study is to explore the genuine sustainable intentions of electric car users. We can gain a clearer understanding of their comprehension of sustainability not only in terms of environmental benefits such as emission reduction but also encompassing economic viability and social implications. This deeper insight into their true intentions and motivations allows policymakers to design more effective strategies and policies. Consequently, such policies can better facilitate and encourage electric car users to adopt behaviours and practices that achieve authentic and enduring sustainability, advancing environmental protection, economic efficiency, and social equity. To achieve this, we base our study on the following research question.

- “How do individuals in Sweden perceive the sustainability impact of electric car usage?”

Our study is significantly important as it examines electric cars and sustainability through the lens of current users and potential buyers. While much existing research focuses on factors like emissions and policy impacts, this study prioritizes people's perceptions and lived experiences with electric cars. This approach offers a practical perspective that enriches ongoing discussions on electric cars and sustainability. By applying the Triple Bottom Line framework which considers environmental, economic, and social dimensions, this study aims to explore how individuals perceive the sustainability of electric car usage.

It is important to mention that the findings of our study can offer valuable insights for Swedish policymakers, urban planners, and sustainability professionals. As Sweden continues to promote the adoption of electric vehicles, understanding public perceptions is essential to achieving the true sustainability of electric cars. This knowledge can help ensure that future policies are equitable, inclusive, and aligned with the needs and preferences of the population. Additionally, the study can identify gaps in public understanding or highlight areas where more effective communication and engagement strategies are needed.

From a research perspective, this study addresses an important gap by exploring how ordinary individuals perceive and engage with sustainability through their decision to use electric cars. It contributes to the broader body of research on sustainable lifestyles, behavioral change, and societal transitions toward new technologies and modes of living.



## **1.4 Structure of the Thesis**

The thesis is structured into six chapters. Following this introduction, the second chapter reviews previous research on electric vehicle adoption and sustainability. It focuses on environmental, economic, and social aspects relevant to the study. The third chapter introduces the theoretical framework, presenting the Triple Bottom Line model as a tool to understand individuals' perceptions of electric vehicle sustainability. The fourth chapter describes the methodology employed to collect and analyze data, including details on participant selection and interview techniques. In the fifth chapter, the key findings from the interviews are presented and discussed in relation to the theoretical framework and existing literature. Finally, the sixth chapter offers a concluding discussion, practical recommendations for policy and practice, and suggestions for future research.

# CHAPTER TWO

## Literature Review

*This chapter focuses on the growing popularity of electric cars, particularly in the context of increasing awareness of climate change. It explores the benefits and barriers associated with the adoption of electric vehicles. We reviewed previous studies to understand how electric cars relate to the three pillars of sustainability: environmental, economic, and social. Additionally, we examined the key factors that influence people's decisions regarding electric cars. Finally, the chapter highlights existing research gaps and explains how our chosen methodology and theoretical framework help address these gaps and contribute to the research field.*

### 2.1. Growing popularity of Electric Cars

Electrification of vehicles has been recognized as a key part of meeting global climate change targets and a key aspect of sustainable transport. According to (Kumar & Alok, 2020a) The transport sector, particularly in urban areas, is a major contributor to air pollution and climate change due to the emission of greenhouse gases. As a response, the shift from conventional internal combustion engine vehicles to electric cars is considered a promising step toward achieving urban sustainability emphasizes today, consumers have a broader range of options when purchasing an electric vehicle. (Haghani et al., 2023). Throughout its life cycle, an average electric vehicle generates fewer greenhouse gases, air pollutants, and noise compared to a petrol or diesel car. Although emissions are typically higher during the manufacturing phase, these are outweighed by significantly lower emissions during the operational phase over its lifetime. As fuel prices continue to rise and electric vehicle costs decrease, more consumers are opting for electric cars. The largest markets for electric cars were China, Europe, and the United States, which accounted for 95% of global electric car sales in 2023. (International Energy Agency, 2021) Electric car adoption is gaining significant attention worldwide as countries work to reduce pollution and transition to more sustainable transportation.

## 2.2 Key factors influencing individuals' decisions to adopt electric cars

Many studies have explored the factors influencing people's decision to adopt ECs. According to (Egnér & Trosvik, 2018) several factors that influence the adoption of electric cars. Key drivers include higher income, higher levels of education, greater environmental awareness, and increasing gasoline prices. However, socio-demographic factors such as age, gender, education, and income become less significant when other influencing variables are considered (Westin, 2018) Geography also plays a role, as EC adoption is more common in areas where many residents already use ECs, particularly in cities like Stockholm (Westin, 2018). According to (Schuitema et al., 2013a) numerous studies have demonstrated that psychological factors such as moral values, behaviors, and attitudes significantly influence individuals' decisions to adopt electric vehicles (EVs) Similarly, (He et al., 2018) revealed that individuals with a higher level of personal innovativeness meaning a greater openness to trying new technologies are more likely to adopt EVs. Furthermore (Schuitema et al., 2013a) found that emotions and feelings can shape people's perceptions of EVs and their intentions to use them.

The study of the (Sierzechula et al., 2014a) examined how various factors such as government financial support, the number of EC charging stations, and the existence of electric car manufacturing facilities affect the adoption of ECs across countries. The findings revealed that both the availability of charging stations and financial incentives, such as subsidies, positively influence EC adoption, with charging infrastructure emerging as the most significant driver. On the other hand, charging infrastructure consists of both fast and slow charging stations that support the use of electric cars. Many studies have identified the lack of sufficient charging facilities as one of the major barriers to the widespread adoption of ECs. (Sierzechula et al., 2014a) When charging stations are difficult to access, it reduces the convenience and appeal of using electric vehicles for drivers (Ghazale Haddadian, 2015). (Madina et al., 2016) noted that establishing charging stations is not yet highly profitable due to the relatively low number of electric cars on the road. Nevertheless, developing public charging infrastructure is essential to support early adopters of ECs. (Melliger et al., 2018) found that installing charging stations at people's homes and in nearby locations positively influenced their attitudes toward EC usage by making charging more convenient and accessible.

The cost and technology of batteries are crucial factors influencing the adoption of electric cars. They impact various aspects such as the overall ownership cost, consumer willingness to pay,

concerns about driving range, and vehicle performance. Decreasing battery prices are encouraging more people to consider purchasing ECs (Quak et al., 2016a). However, expenses related to battery replacement, recycling, or reuse remain significant components of the vehicle's lifetime cost (Letmathe & Soares, 2017). Researchers have investigated when batteries might require replacement, the associated costs, and the overall lifecycle impacts from production to disposal. Some drivers even modify their behavior, like avoiding using heaters, to preserve battery life, which can impact both comfort and safety (Jensen et al., 2013). Addressing these concerns necessitates substantial advancements in battery technology to enhance the affordability and reliability of ECs.

A willingness to pay is another important factor, which is the amount a consumer is prepared to spend on purchasing or using an electric cars and its associated services. (Kumar & Alok, 2020b) emphasize this willingness can vary depending on a person's expectations and real-life experiences. According to (Skippon et al., 2016) found that after test-driving an EC particularly those with a limited driving range, many individuals became less willing to pay for one. However, some consumers who viewed ECs as an important part of their personal identity remained open to buying models with shorter ranges. According to (Dimitropoulos et al., 2013), people are less willing to pay for an electric car as its driving range decreases.

People have varying perceptions of electric cars, with some possessing extensive knowledge and others having little to no awareness. These differences in familiarity contribute to a broad spectrum of preferences and opinions regarding EVs (Axsen et al., 2015). On the other hand, car usage patterns differ based on individuals' living environments and travel behaviors. Factors such as whether the vehicle is primarily driven in urban areas or on highways, the user's driving habits, and the population density of their neighborhood can all influence the overall cost of owning an EC(Wu et al., 2015a)

### **2.3. Government regulations and purchase-based incentive policies**

Government regulations play a crucial role in promoting the adoption of electric cars by establishing policies and rules that support manufacturers, dealers, and fuel providers in producing, selling, and distributing ECs more effectively. (Melton et al., 2017) These regulations often include setting limits on greenhouse gas (GHG) emissions, improving fuel efficiency standards, requiring a minimum number of zero-emission vehicles (ZEVs) to be sold, and encouraging the use of low-carbon fuels. Research by (Sen et al., 2017) demonstrated

that such regulatory measures, particularly the Corporate Average Fuel Economy (CAFE) standards, can significantly increase EC sales and reduce reliance on fossil fuels, especially when combined with other forms of government support.

Furthermore, many countries offer financial incentives to encourage the adoption of electric cars. These incentives include direct subsidies, exemptions from registration and emission fees, and various tax breaks. Such measures help reduce the upfront cost of purchasing an EC, making them more appealing to consumers. (Sierzchula et al., 2014b) analyzed data from 30 countries and found a strong correlation between financial incentives and increased EC sales. Regions such as Norway, the Netherlands, and California have high rates of EC and plug-in hybrid electric vehicle (PHEV) adoption, largely due to robust government support and benefits. In Norway, for instance, (Bjerkan et al., 2016) reported that over 80% of EC buyers identified tax exemptions as a major factor influencing their decision to purchase an electric vehicle.

## **2.4. The three pillars of sustainability in electric vehicles**

Sustainability theory encompasses different principles, frameworks, and concepts that promote long-term social, economic, and environmental well-being (Butler Harrington, 2016). Therefore, It is important to evaluate the three pillars of sustainability of environmental, economic, and social when exploring individuals' perceptions of the sustainability impact of electric car usage. However, according to (Onat et al., 2019), while numerous studies emphasize the environmental advantages of ECs, fewer examine their comprehensive sustainability impacts across environmental, social, and economic dimensions. In the following sections, each of these three sustainability pillars will be briefly introduced in relation to electric car usage.

### **2.4.1 Environmental sustainability**

According to (Hawkins et al., 2013a) electric cars offer several advantages over traditional fuel-powered cars. They produce zero exhaust emissions, require less maintenance, feature a more efficient engine system, and contribute to reducing air pollution in urban areas. (Tagliaferri et al., 2016) emphasize that replacing fossil fuels such as petrol, diesel, and gas with electricity for transportation has significantly contributed to reducing global greenhouse gas (GHG) emissions. However, (Verma et al., 2022) provides an overview of the life cycle assessment (LCA) and life cycle cost (LCC) of ECs compared to traditional vehicles. The study

examines GHG emissions and human toxicity levels in different countries. It finds that ECs produce fewer emissions than internal combustion engine cars, but their production increases human toxicity levels. This is due to the high use of metals, chemicals, and energy in making EC batteries and power systems.

Environmental concern is a key factor influencing the decision to adopt electric cars. The individuals who care about the environment are more likely to be attracted to ECs due to their lower carbon emissions. (Quak et al., 2016b) found that the environmental benefits of ECs, particularly their reduced emissions, appeal to environmentally conscious consumers. (Schuitema et al., 2013b) emphasized that individuals who perceive themselves as environmentally responsible tend to have more favorable attitudes toward ECs. Similarly, (Smith et al., 2017) found that people who prioritize environmental issues are more inclined to consider purchasing an EC. Other research has also shown that early adopters of ECs are typically more environmentally aware (Axsen et al., 2016). At the same time, (Zhao & Heywood, 2017) developed a model to assess the emissions associated with the electricity used to charge ECs. Their study revealed that the environmental impact of ECs largely depends on the energy sources used for electricity generation. For instance, charging ECs with electricity from renewable sources like wind or solar significantly lowers emissions compared to using electricity generated from coal or natural gas.

#### **2.4.2 Economical sustainability**

Economic sustainability in the adoption of electric cars refers to the affordability and financial viability of ECs for individuals, governments, and investors over the long term. It is essential to examine and understand whether electric cars are financially viable for consumers. According to the study by (Kumar & Alok, 2020c), the total cost of ownership (TCO) encompasses various expenses, including the purchase price, maintenance, operating costs, depreciation, and energy costs. Numerous studies conducted in different countries have explored how cost factors influence individuals' decisions to purchase electric cars (Lévay et al., 2017). Cost structures differ across countries due to variations in electricity and fuel prices, insurance, taxes, and government subsidies (Gnann et al., 2015) some researchers have developed models to forecast and manage the uncertainties associated with these cost components (Wu et al., 2015b).

However, the economic sustainability of EC usage depends on more than just upfront costs. It requires a comprehensive view of vehicle lifetime costs, policy incentives, and infrastructure accessibility. This perspective is supported by (Sierzechula et al., 2014c) who found that government incentives such as subsidies, tax reductions, and rebates plays a key role in making electric car more affordable, particularly during their early market introduction. Their study indicates that without such financial assistance, many individuals may perceive ECs as too costly, potentially hindering the transition to more sustainable transportation. Further, (Guo et al., 2022a) found that electric cars in Ireland can be between 26% and 42% less expensive to own over a four-year period compared to petrol or diesel cars. This cost advantage is primarily attributed to government subsidies and financial incentives. The study (Guo et al., 2022b) highlights that smaller EC models become economically viable more quickly, particularly for users who drive frequently or have access to home charging facilities. In contrast, larger ECs may still incur higher ownership costs than their internal combustion engine counterparts. The authors (Guo et al., 2022b) emphasize the importance of targeted government support in promoting EC adoption. Furthermore, they suggest that as battery prices continue to decline and carbon taxes increase, ECs will become an even more financially attractive option in the future. At the same time, (Azarova et al., 2020) highlights that limited access to electric cars charging infrastructure, especially affecting 42% of households lacking private charging facilities, is a major barrier to EC adoption across Europe. To tackle this challenge, the authors (Azarova et al., 2020) propose a shared, community-owned model for charging infrastructure. This approach aims to lower individual costs and improve accessibility. Implementing such shared charging solutions could not only encourage wider EC adoption but also support the economic sustainability of electric mobility by addressing crucial infrastructure gaps.

### **2.4.3 Social sustainability**

Social sustainability in the adoption of electric cars emphasizes the importance of ensuring that all individuals regardless of income, geographic location, or social background have equitable access to ECs and the supporting infrastructure, such as charging stations. It also considers public acceptance and comfort with adopting new technology. By seeking solutions for these factors helps determine whether EC adoption is contributing to a more inclusive and equitable society.

According to (Hardman et al., 2021) many low-income and disadvantaged households are not purchasing ECs due to a lack of affordable models, inequitable incentive structures, and limited

access to charging infrastructure in their communities. Addressing these challenges will require the development of more inclusive and targeted policies. Another solution, according to (Hardman et al., 2021) is leasing electric cars rather than selling them outright can accelerate the development of a second-hand EV market, as leased vehicles typically return to the market after about three years. Policymakers could promote this approach by adjusting credit systems to support leasing. However, automakers might resist such changes, as a growing used car market could potentially reduce the demand for new vehicle sales. (Hardman et al., 2021). In addition, Key minerals used in batteries for battery electric cars, such as lithium and cobalt, are often sourced from developing countries where labor protections and environmental regulations may be weak. This can result in unsafe working conditions, child labor, and worker exploitation. This represents a breakdown of social sustainability. (Haghani et al., 2024)

In our thesis introduction, we emphasize that by adopting the Triple Bottom Line approach, we aim to gain a deep understanding of how electric car users engage in sustainable practices by assessing environmental, economic, and social dimensions. It is crucial to study both how electric car users and potential buyers think about sustainability and what actually influences their actions. Currently, much research often focuses on how electric cars contribute to conserving the environment or achieving cost savings. However, there is a lack of research considering all three aspects of sustainability, environmental, economic, and social. It is crucial to not only explore users' perspectives on sustainability but also analyze empirical data on actual usage patterns.

To offer a new perspective on existing research, this thesis aims to provide qualitative insights by examining the intentions of current users and potential buyers of EVs. We strongly believe that the Triple Bottom Line approach enables us to gain a deeper understanding of intentions related to the environmental, economic, and social aspects of electric vehicle usage.



# CHAPTER THREE

## Theoretical Framework

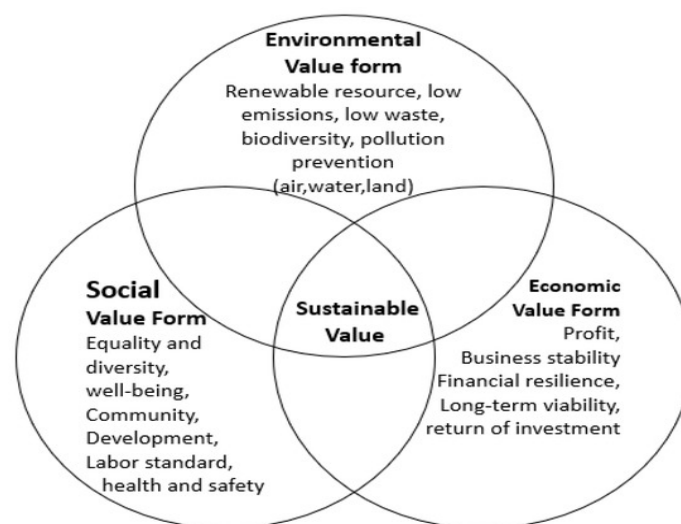
*In exploring the individual perception of sustainable impact on electric car usage in Sweden, It is crucial to look beyond a single perspective. Electric cars involve not only ecological benefits but also economic and social considerations. . The Triple Bottom Line (TBL) framework was chosen for this research because it provides a holistic approach to assessing sustainability, capturing the full scope of these intertwined dimensions. The framework is divided into four parts: first, an overview of TBL and its relevance to electric car sustainability; second, the environmental pillar, focusing on the ecological benefits and challenges; third, the economic pillar, examining financial factors like costs and incentives; and finally, the social pillar, addressing societal issues such as equity, public health, and social acceptance. The chapter concludes by synthesizing these pillars to offer a complete view of how individuals perceive the sustainability impact of electric car usage in Sweden.*

### 3.1 Triple Bottom Line Framework: Three Pillars of Sustainability

The Triple Bottom Line (TBL) framework conceptualizes sustainability as comprising three core dimensions: environmental, economic, and social. which are often summarized as “planet, profit, and people” (Timothy F. Slaper, 2011). Originally introduced in the mid-1990s by (Elkington, 1997) as an accounting and reporting framework, Tripple bottom line extends the traditional single bottom line of profit to include environmental and social performance. (Elkington, 1997). In other words, the framework suggests that the success or sustainability of any initiative should be measured not only in financial terms but also by its impact on environment and society. These three interconnected pillars suggest that achieving sustainable outcomes requires balancing of environmental health, economic viability, and social well-being (Elkington, 1997) Each part of the Triple Bottom Line framework focuses on a different aspect of sustainability, though these aspects often overlap in real life. The environmental dimension (planet) focuses the impact on natural ecosystems, resources, and global ecological integrity. This includes factors such as resource consumption, pollution, carbon emissions, biodiversity, and waste management. The economic dimension (profit) considers financial performance and economic effects, by including aspects like profitability, cost efficiency, job creation,

investment, and economic growth or resilience. Finally, the social dimension (people) emphasizes the well-being of individuals and communities, covering social equity, health, education, quality of life, and social capital. (Cordes, 2014) Together, these pillars provide a comprehensive evaluative lens a sustainable solution ideally generates environmental benefits, is economically viable, and improve social well being. The Tripple bottom line framework is widely used across business, government, and non-profit sectors to guide strategy and assess results in a broader sustainability context. It serves as a valuable theoretical tool in academic research as well, helping to organize the analysis of complex issues where multiple sustainability goals are involved.(Taramsari et al., 2025)

Further The research question in this study directly connects to this theory offers a broad theoretical view for examining how individuals in Sweden perceive sustainability impacts by exploring the environmental, economical and social dimension of electric car usage. Sweden is well known for its strong climate targets and extensive use of renewable energy, which makes it an ideal setting for promoting ECs as a key part of sustainable transport policies (IEA, 2021). By applying triple bottom line, we can explore how environmental aspects such as reducing emissions, managing resource use, and promoting biodiversity), economic aspects (like saving costs and offering market incentives), and social aspects (including public health, fairness, and overall social acceptance) work together to shape people’s perceptions of electric cars(Hawkins et al., 2013b) as illustrated in image below.



*Figure 1 -The triple bottom line (TBL) value forms [ (Taramsar, 2025)*

### **3.2 Environmental Aspect: Perceptions of Ecological Impact**

The environmental pillar of the Triple Bottom Line (TBL) framework addresses the ecological impact of human activities, particularly their effects on natural resources, ecosystems, and the environment. It emphasizes reducing negative environmental impacts while encouraging actions that support ecological health and sustainability.(Elkington, 1997) Further this pillar focuses on minimizing harm to the planet by addressing key issues like resource consumption, pollution, waste generation, and climate change. Sustainable practices, such as protecting ecosystems, using renewable resources, and reducing carbon emissions, are key to mitigating the effects of climate change (Hawkins et al., 2013a).

A key aspect of the environmental pillar is resource conservation, which focuses on using natural resources more efficiently to avoid their depletion. This includes efforts to reduce water and energy consumption and transitioning to renewable energy sources like wind and solar power.(Dyllick, 2002) Resource efficiency is crucial for sustainable development, aiming to create long-term value without exhausting natural resources. Pollution reduction is another key focus, aimed at minimizing harmful substances in the air, water, and soil, and using cleaner technologies to lower pollution levels. Protecting biodiversity is also essential, as it helps maintain balance in ecosystems and supports the health of natural systems.(Requia et al., 2018).

Waste management also plays a critical role in the environmental pillar, focusing on strategies like recycling, reusing materials, and reducing waste. Further proper waste management helps reduce the environmental impact of waste disposal which is a key issue for sustainable development. These efforts help maintain the balance between human activities and the planet's ability to sustain them, fostering long-term ecological. (Taramsari et al., 2025)In the TBL framework, the environmental pillar is closely connected with the economic and social pillars. Reducing environmental harm can lead to cost savings, through resource efficiency or sustainable technologies, benefiting both economy and society (Taramsari et al., 2025). Environmental sustainability also brings social benefits, like improved public health due to cleaner air and water, contributing to a better quality of life for future generations.This integrated approach to sustainability highlights the importance of considering environmental impacts together with economics and social outcomes to achieve a balanced and sustainable future. (Dyllick, 2002)

Furthermore, the environmental pillar of the Triple Bottom Line (TBL) framework focuses on the ecological impacts of electric cars usage, particularly how they influence natural resources, ecosystems, and overall environmental health. In the context of our research question, this pillar provides valuable insights that people understand and perceive the environment advantage and potential challenges associated with electric cars. Electric cars are widely recognized for their environmental advantages, such as reducing tailpipe emissions and noise pollution, which are particularly noticeable in urban cities (Hawkins et al., 2013a). Many individuals in Sweden, are aware of the immediate environmental benefits of electric cars, such as cleaner air and lower emissions in urban areas (IEA, 2024). However, to fully understand the sustainability impact of electric cars, it is essential to consider a broader environmental perspective that accounts for their entire life cycle. The environmental pillar not only highlights the reduction of greenhouse gas emission during the operation of electric cars but also on the impacts on production and disposals which are often overlooked by consumers key issues such as battery production, resource depletion, and recyclability of materials are essential for gaining a comprehensive understanding of the environmental footprint of electric vehicles. (Hawkins et al., 2013a). Many individuals may not fully recognize these lifecycle impacts, which is essential to the research question. Their perceptions of sustainability may focus primarily on the operational phase, which is often seen as "zero-emission," while the production phase, particularly battery manufacturing, is often overlooked. (Ellingsen et al., 2014)

In Sweden, where much of the electricity comes from renewable sources, the environmental benefits of electric cars are more significant. However, according to the (Rezvani et al., 2015) it's critical to understand that the overall sustainability of electric car is highly depends on the energy sources used for charging and the methods employed for recycling batteries. A well-rounded view of electric car sustainability involves not just the reduction of tailpipe emissions but also considering the environmental impact of resource extraction and battery disposal (Energiforsk, 2021). Basically, when applying the environmental pillar, we consider how individuals' factor in issues like battery production, resource depletion, and recyclability into their perception of electric car sustainability (Rezvani et al., 2015). These concerns relate to the circular economy, focusing on whether materials can be reused. In Sweden and the EU, there are efforts to promote battery recycling and responsible sourcing are helping increase public awareness (Gore, 2025). When consumers are aware of these aspects, their understanding of EC sustainability becomes more nuanced. While many prefer ECs over petrol cars, they also recognize that electric cars are not a perfect solution unless production and

energy sources are sustainable. (Rezvani et al., 2015) However, some users may overlook these lifecycle impacts, focusing only on direct emissions, which is a gap in awareness central to our research problem.

### **3.3 Economic Aspect: Financial and Policy Influences**

In today's world, sustainability is not just about reducing environmental impact but also ensuring longterm economic viability. The economic pillar of the Triple Bottom Line (TBL) framework emphasizes the need to balance financial growth with sustainability. It looks beyond short-term costs to evaluate how sustainable practices can drive economic development while ensuring financial stability for the future (Elkington, 1997). This includes evaluating factors such as cost effectiveness, longterm savings, and the potential for job creation and increasing economic viability. It emphasizes that economic sustainability is not just about short-term profits but about creating a foundation for lasting prosperity that benefits both the economy and society. (Taramsari et al., 2025)

At the heart of the economic pillar lies cost efficiency, which effects how accessible technologies are for consumers. The affordability of new technologies is crucial for adoption, with individuals considering whether long-term savings, like lower maintain costs, outweigh the initial price (Sierzchula et al., 2014). Moreover, economic growth is a fundamental component, as sustainable technologies can creation of jobs, contributing to broader economic resilience and diversify the market (IEA, 2024). Another important aspect is the role of government incentives and financial support, which help reduce the financial burden on consumers and promote the adoption of more sustainable technologies (Sierzchula et al., 2014). Finally, the long-term economic viability of a technology is key, as it must remain sustainable over time, considering technological advancements, market changes, and potential cost reduction. In context of research question, the economic pillar becomes essential for understanding how consumers perceive the financial costs, savings, and economic viability of electric car usage. A key aspect of economic sustainability is the cost of ownership. As (Nykqvist & Nilsson, 2015) highlighted, individuals considering typically have higher upfront costs than traditional gasoline or diesel cars, mainly due to expensive battery components. This price difference is a major barrier to adoption in Sweden and globally. (Sierzchula et al., 2014). To address this concern, In Sweden, policies like the bonus-malus system are designed to reduce

this economic barrier by offering financial incentives for those purchasing electric cars, making them more affordable in the long run (Sierzchula et al., 2014d). This policy aims to reduce the economic barrier by balancing short-term costs with long-term savings, promoting the economic sustainability of electric cars

From an economic sustainability perspective, electric car users and potential buyers often compare the long-term savings on fuel and maintenance with higher initial cost of electric cars. In Sweden, where electricity is relatively inexpensive and clean, the operating costs of electric cars are lower compared to petrol or diesel cars, which can make them more cost-effective over time (Sierzchula et al., 2014). While the upfront cost is higher, the savings over time make electric cars economically sustainable. Furthermore, Government incentives like rebates and tax breaks are key in shaping how people view the economic sustainability of electric cars. In Sweden, financial support such as subsidies and tax exemptions makes it easier for many consumers to switch to electric cars. These incentives help increase the adoption of ECs, , showing that economic sustainability is not just about individual ownership costs but also about policies that promote sustainable technologies. (Bergh, 2024)

However, there are still some economic uncertainties remain, such as concerns about the long-term depreciation of electric cars or the high costs of battery replacement (Egbue & Long, 2012). These uncertainties can affect how public perceptions of the economic sustainability of ECs. Additionally, while government incentives have helped promote EC adoption, any changes to these incentives could impact consumer confidence in the long-term affordability of electric vehicles.

### **3.4 Social Aspect: Equity, Norms, and Public Acceptance**

When imagine a society where everyone has same opportunity to thrive, where basic needs like clean air, water, healthcare and education are fairly and equally available to all. This is the essence of social sustainability with the triple bottom line framework. It focuses on creating fair society where everyone has equally access to the resources and opportunities needed to live healthy, fulfilling lives. (Taramsari et al., 2025) It ensures that everyone, regardless of their background or income, gender, race or location has access to the resources, benefits and opportunities needed to live a healthy, fulfilling life. It's about building communities that can grow and prosper over time, providing the foundation for long-term success and equality for all. (Elkington, 1997).This helps to reduce inequality and provide opportunities for marginalized groups (Bergh, 2024). Community development also plays a key role, promoting inclusive and cohesive communities where people feel connected and empowered (Sovacool & Dworkin, 2015).Another critical aspect is social acceptance, as sustainable technologies. Public perception, knowledge, and social norms influence the adoption of new technologies, making social acceptance a key factor in successful transitions to sustainable solutions (Dyllick, 2002).Finally, public participation also ensures that policies are aligned with the needs and values of communities, fostering a sense of shared responsibility. Social sustainability, within the TBL framework, highlights the importance of balancing environmental, economic, and social goals to create inclusive, equitable solutions that benefit everyone and improve overall quality of life. (Tebbe, 2024).

The social sustainability pillar of the Triple Bottom Line framework focuses on ensuring human well-being, equity, and social acceptance. In the case of electric car (EC) adoption and usage in Sweden, this pillar highlights the importance of making the transition to electric vehicles accessible and beneficial for all social groups, not only the wealthy. Social equity of electric cars means fairness for everyone by ensuring that electric cars are not only available to those who can afford them but also accessible to people from all income levels. In Sweden, while higherincome households are more likely to purchase new ECs, the malus tax aims to make the system fairer by using funds from wealthier consumers to subsidize electric vehicles for others. (Bergh, 2024). Moreover, Public perceptions of fairness influence support for EC adoption. If policies are seen as benefiting only the wealthy or urban areas, support for ECs may be weaker (Sovacool & Dworkin, 2015). However, policies perceived as inclusivesuch as expanding the markets for used electric cars or improving charging infrastructure in rural areas can strengthen

support for the transition (Lieselot Vanhaverbeke, 2024). Inclusivity is therefore important for ensuring the adoption of ECs is equitable. Additionally, the community well-being and public health benefits of electric cars also contribute to social sustainability. By reducing air pollution and traffic noise, ECs improve the quality of life, particularly in urban areas (EEA, 2023). Cleaner air and quieter neighbourhoods provide real social benefits which is aligning with Sweden's sustainable goal of creating sustainable cities and supporting the Sustainable Development Goals. Lastly, public acceptance is crucial for success of electric cars. Even environmentally and economically beneficial technologies can fail if they are not socially accepted (Dyllick, 2002). Social influence plays a major role in adoption, with early adopters acting as opinion leaders who sway others to follow their example (Figenbaum & Kolbenstvedt, 2016). Addressing knowledge gaps through education campaigns is vital for improving public trust in EC technology (Rezvani, 2015). In summary, applying the social sustainability pillar to electric car adoption in Sweden emphasizes the need for fairness, inclusivity, and public health. Ensuring that the transition benefits all groups is key to creating a socially sustainable shift to electric vehicles.

### **3.5 Synthesis: Integrating the Three Sustainability Dimensions**

By examining the environmental, economic, and social sustainability dimensions separately, we gain a clearer understanding of how each pillar shapes individuals' perceptions of electric car usage. However, these dimensions intersect and operate simultaneously in the lived experience of electric car users (Dyllick, 2002). The strength of the Triple Bottom Line framework lies in its emphasis on considering all three pillars together. An individual's perception of the "sustainability impact" of driving an electric car in Sweden is influenced by likely a mix of environmental, economic, and social factors. (Slaper, 2011). These factors often support each other for example, fuel savings can increase one's environmental satisfaction, which strengthened positive social identity as a responsible citizen. However, tensions may also arise such as, the high purchase price of an electric car might reduce enthusiasm for its environmental benefits, or limited public charging infrastructure might make the environmental benefits less practical in daily life (Rezvani, 2015).

In relation to research question, TBL framework guided our analysis by identifying how these interconnected pillars influence individuals' perceptions. This approach provides a clear structure for categorizing these perceptions as environmental, economic, or social and allows



us to explore how individuals prioritize or balance these aspects. Some peoples may focus mainly frame the sustainability of ECs in environmental benefits, while others might emphasize economic considerations, and others still might highlight the social benefits. Many participants will likely address all three pillars,

In addition, individuals' perceptions of the sustainability impact of electric cars are influenced not only by personal or economic factors but also by the social acceptance of the technology. If electric cars become widely accepted and viewed as a social norm, people may be more likely to adopt them. As more individuals embrace electric vehicles, it could shift societal expectations, making the technology a more integral part of everyday life (Rezvani, 2015).

In conclusion, the Triple Bottom Line framework provides a thorough approach to analysing perceptions of electric car usage in Sweden. By considering the environmental, economic, and social aspects, we ensure that all important factors are considered when evaluating the impact of electric vehicle adoption. This framework allows us to explore how aware Swedish individuals are of the sustainable impacts of their transportation choices in all three areas. As previous research shows, for a technology to be truly sustainable, it must be environmentally sound, economically practical, and socially accepted. Using TBL as our theoretical foundation, we can assess whether electric cars meet these criteria in the eyes of users and how these perceptions influence the shift toward sustainable mobility. Each pillar will guide our analysis, ensuring that our findings are based on a well-rounded understanding of sustainability's triple bottom line.

# CHAPTER FOUR

## Methodology

This chapter outlines the methodological approach and procedures used to explore individuals' perceptions of the sustainability impact of electric car usage in Sweden. It describes the research strategy underpinning the study, including the ontological and epistemological positions that shape how the inquiry was conducted. The chapter then details the research design, covering how participants and documents were sampled, how semi-structured interviews were designed and carried out, and how document analysis was conducted. This is followed by an explanation of the data analysis process using qualitative thematic analysis, aligned with the Triple Bottom Line sustainability framework. Finally, ethical considerations are discussed, and the measures taken to ensure research quality such as credibility, dependability, confirmability, reflexivity, and acknowledgement of limitations are presented.

### 4.1 Research strategy

This study investigates how individuals in Sweden perceive electric cars as part of the country's transition to sustainable transportation. We approach these perceptions as socially constructed formed through everyday interactions, personal experiences, and cultural influences rather than as fixed or universally agreed-upon truths (Silverman, 2022). Guided by this constructivist understanding of reality, we employ a qualitative methodology to explore how people interpret the environmental, economic, and social dimensions of electric vehicle use. This approach provides rich, contextual insights into the beliefs and experiences that shape sustainability perceptions (Bryman, 2016). Aligned with our ontological stance, we adopt a perspectivist epistemology, which recognizes that knowledge is influenced by individuals' life contexts and subjective viewpoints (Fay, 1996). This allows us to capture the nuanced and diverse ways in which sustainability is understood in relation to electric cars. Furthermore, we use an abductive research strategy, enabling a dynamic interaction between theory and empirical data. This iterative process supports a deeper, evolving understanding of how people construct meaning around electric mobility and sustainability throughout the research process (Flick, 2018)

## **4.2 Research design**

### **4.2.1 Data Collection**

#### **4.2.1.1 Collecting data for semi structured interviews**

In this study, we employed purposive sampling, meaning we deliberately selected participants who were most likely to provide valuable insights relevant to our research question (Bryman, 2016). Participants were chosen based on three main criteria to ensure they had meaningful experiences and perspectives concerning the sustainability of electric vehicle use (Silverman, 2022). First, we included individuals who either currently drive an electric car or are seriously considering purchasing one. To assess this, we asked questions about their driving habits, familiarity with electric vehicles, and their understanding of the environmental, economic, and social dimensions of electric car usage. Participants were selected based on their demonstrated awareness of sustainability issues and genuine interest in environmentally friendly transportation. Second, participants were required to reside in Sweden. Third, they needed to be proficient in English to participate effectively in the interview process. To reduce selection bias such as only recruiting young, urban professionals, we did not restrict the sample based on age, income, or occupation. Instead, we aimed for diversity in geographic location and professional background, recognizing that people's views on sustainability may differ based on their personal circumstances and regional contexts. Additionally, we adopted a sequential sampling approach, gradually adding participants in response to insights gained from earlier interviews and evolving research objectives. This flexible method allowed us to incorporate emerging themes during the study for example, whether participants had access to charging infrastructure or worked in sustainability-focused environments (Bryman, 2016).

We began recruiting participants by reaching out to individuals within our personal and professional networks, resulting in six initial participants. These contacts included employees from companies such as Northvolt in Skellefteå, Hello Fresh in Bjuv, and Boxflow in Klippan. To further diversify our sample, we extended our outreach to individuals working at Amazon in Västerås and Microsoft in Gävle. These professional networks enabled us to engage participants with a range of occupations and experiences, many of whom had some level of engagement with electric vehicles.

To broaden our participant pool, we also targeted cities in Sweden known for high rates of electric vehicle usage, including Stockholm, Gothenburg, Mölndal, Malmö, and Lund. In addition, we employed snowball sampling, through which we asked participants who had already been interviewed to recommend others who might be interested in participating. This approach resulted in three additional participants and allowed us to access individuals who may not have been reached through our initial recruitment strategies (Bryman, 2016).

As Cobern (2020) explains, in qualitative research, the number of participants is not predetermined. Instead, interviews are conducted until no new themes or insights emerge, a point known as theoretical saturation. Guided by this principle, we conducted 15 semi-structured interviews (see Table 1) with individuals residing in nine different cities across Sweden, including Stockholm, Gothenburg, Mölndal, Malmö, Lund, Skellefteå, Gävle, Helsingborg, and Västerås. The participants ranged in age from 20 to 43 years and included both men and women with diverse occupational backgrounds. Of the 15 participants, four were current electric vehicle users, while the remaining eleven were seriously considering transitioning to electric cars. Throughout the participant selection process, we remained open and responsive to emerging themes, such as interest in government subsidies, perceptions of charging infrastructure, and the influence of peers and societal attitudes on electric vehicle adoption. In accordance with qualitative research standards (Bryman, 2016), our focus was not on numerical representation or statistical generalization. Rather, our goal was to achieve theoretical saturation, that is, to conclude data collection once we had gathered sufficient information and observed a repetition of key themes without the emergence of new insights.

Semi-structured interviews enable a deeper and in-depth understanding of participants' experiences and perspectives. This method allows interviewers to adapt questions during the conversation, facilitating a natural dialogue in which clarifications and follow-up questions can be posed to enhance comprehension (Flick, 2018). Rather than relying on rigid, pre-defined questions, participants were encouraged to articulate their views freely, allowing for the emergence of meanings and values they attach to sustainability in the context of electric vehicle use (Bryman, 2016). At the same time, a basic structure was maintained to support comparability across interviews, ensuring that key themes could be identified and contrasted among participants (Bryman, 2016; May, 2011).

An interview guide (see Appendix A) was developed to structure the conversation in alignment with the Triple Bottom Line framework adopted in this research. The guide was constructed

around six thematic sections: participant background, decision-making factors, perceived barriers and challenges, understanding of sustainability, pillar-specific questions (environmental, economic, social), and future outlook. These themes were grounded in both existing literature and the theoretical framework, ensuring relevance to the research aim.

The final interview guide consisted of several types of questions, 33 in total, including ice-breaking questions such as “Could you briefly introduce yourself?”, general questions like “Do you currently own an electric car?”, and more specific ones that corresponded directly with the three theoretical dimensions of sustainability. Descriptive prompts, such as “Can you describe the last time you considered purchasing an electric car or spoke to someone about it?”, were used to encourage interviewees to recall personal experiences and give input to our discussion in a reflective and contextualized way (May, 2011). In addition, questions were adapted to both user categories current EV owners and potential buyers to allow relevance regardless of the participant’s status.

Prior to each interview, participants were emailed a detailed information sheet outlining the aim and scope of the study (see Appendix B), including clear guidance on confidentiality, voluntary participation, and data usage. Following ethical research standards and the guidelines suggested by (Bryman, 2016), we ensured that each participant fully understood their rights, including the right to withdraw at any point without explanation.

At the beginning of each session, we engaged in informal small talk to establish rapport and put participants at ease. We then reintroduced the study’s purpose, provided space for questions or clarification, and verbally reconfirmed the participant’s consent to record the interview. As recommended by qualitative research literature (Silverman, 2022) this initial stage helped create a respectful, trusting atmosphere conducive to open dialogue.

All interviews were conducted exclusively via the Zoom platform. This decision was based on both practical and methodological considerations, including the geographical distribution of participants across various cities in Sweden such as Stockholm, Gothenburg, Lund, Mölndal, Skellefteå, and Västerås and the flexibility that video interviews offer in terms of scheduling. Although online interviews are sometimes considered less personal than face-to-face formats, in this study they proved to be equally effective, with participants engaging attentively and sharing openly throughout the sessions.

During the interviews, we made use of both verbal and non-verbal cues to maintain a conversational tone and encourage elaboration. Prompts such as “Could you explain that a bit more?”, “That’s interesting,” and “I see” were used to signal active listening. Where necessary, questions were clarified or rephrased, and probing techniques were employed to obtain deeper insights (May, 2011). The flexible format of semi-structured interviews allowed us to adjust the flow of the conversation according to participant responses while still covering all relevant themes. We were careful to avoid overly technical or leading language. Instead, we used accessible terms such as “electric cars” or “EVs,” allowing participants to speak from their own perspectives without feeling constrained. To close each session, we invited participants to share any final thoughts or reflections that they believed had not been covered, which often led to unexpected but valuable insights.

Each of the 15 interviews lasted between 32 and 56 minutes, with an average length of approximately 45 minutes. Both researchers were present during each session one leading the conversation while the other took notes on tone, emphasis, and notable observations. Field notes were also compiled after the interviews to document initial reflections and contextual cues. All interviews were audio recorded via Zoom with participant consent. The recordings were securely stored and transcribed manually using Microsoft Word. Transcripts were verified for accuracy through a two-step process: one researcher transcribed the audio, and the second reviewed the transcript against the original recording. This cross-checking procedure helped ensure fidelity, consistency, and data reliability. The use of Zoom enabled us to conduct interviews efficiently and maintain high methodological standards. The combination of ethical safeguards, detailed preparation, and a flexible interviewing approach provided a strong foundation for the qualitative exploration of how individuals perceive the sustainability impacts of electric car usage in Sweden.

| Participant    | Age | Social Gender | City        | Profession              | Duration of the interview | Electric Car Status |
|----------------|-----|---------------|-------------|-------------------------|---------------------------|---------------------|
| Participant 1  | 30  | Male          | Stockholm   | Mechanical Technician   | 32 minutes                | Potential Buyer     |
| Participant 2  | 37  | Male          | Gothenburg  | Warehouse worker        | 34 minutes                | User                |
| Participant 3  | 27  | Female        | Möln dal    | Machine Operator        | 46 minutes                | Potential Buyer     |
| Participant 4  | 20  | Male          | Stockholm   | Student                 | 52 minutes                | Potential Buyer     |
| Participant 5  | 26  | Female        | Stockholm   | Quality Analyst         | 49 minutes                | Potential Buyer     |
| Participant 6  | 33  | Male          | Skelleftea  | Manufacturing Associate | 54 minutes                | User                |
| Participant 7  | 43  | Male          | Malmo       | Fodoora Rider           | 38 minutes                | Potential Buyer     |
| Participant 8  | 30  | Male          | Lund        | Machine Operator        | 56 minutes                | Potential Buyer     |
| Participant 9  | 29  | Female        | Gothenburg  | Graphic Designer        | 38 minutes                | User                |
| Participant 10 | 43  | Male          | Stockholm   | Data Centre Engineer    | 41 minutes                | User                |
| Participant 11 | 21  | Female        | Malmö       | University Student      | 35 minutes                | Potential Buyer     |
| Participant 12 | 22  | Male          | Gävle       | IT Technician           | 38 minutes                | Potential Buyer     |
| Participant 13 | 33  | Male          | Helsingborg | Warehouse Manager       | 35 minutes                | Potential Buyer     |
| Participant 14 | 32  | Male          | Västerås    | Electric Technician     | 30 minutes                | User                |
| Participant 15 | 42  | Male          | Malmö       | IT technician.          | 30 minutes                | User                |

(Table 1)

#### **4.2.1.2 Collecting data for document analysis**

This study incorporated document analysis to gain a deeper understanding of how the sustainability of electric vehicles is discussed in public discourse and media. This method allows us to examine how information is communicated and constructed within various social contexts. As Bryman (2012) notes, documents can reveal which ideas are emphasized or excluded, offering valuable insights into broader societal narratives. We selected this approach to explore how individuals, institutions, and organizations frame and debate the sustainability of electric cars, with a particular focus on environmental, economic, and social dimensions.

To enhance our understanding of how electric vehicles and sustainability are addressed in both formal and informal settings, this study included an analysis of a range of documents. The selected documents were publicly accessible and directly relevant to the research topic, including consumer reviews, business reports, blog posts, opinion articles, news stories, student theses, and social media discussions. As Bryman (2016) and Rose (2012) emphasize, documents often reflect the political, cultural, and economic conditions in which they are created. Thus, we view these materials as essential components of the broader societal conversation around sustainability and electric mobility. To ensure relevance and focus, we applied three selection criteria: the content had to relate to electric vehicle use in Sweden, address at least one of the three sustainability pillars (environmental, economic, or social), and be published within the last ten years. In total, we analyzed approximately 15 documents, including government reports, academic papers, industry publications, and materials from environmental and international organizations. These sources provided insights into how electric vehicles are framed in relation to national and global sustainability goals. We also analyzed user-generated content from platforms like Quora and Reddit (see Table 03), chosen for their accessibility, popularity among electric vehicle users and buyers, and relevance to the topic. These public forums offered authentic, unfiltered opinions that are rarely captured in official reports, and they helped us access a wider range of perspectives. By combining document analysis with interviews, the study brought together both institutional narratives and everyday experiences, enriching our understanding of how electric car sustainability is represented in media and public discourse.



| Document Name                                                                                                                      | Author(s)                                    | Year | Resource                                                                                                                                                      | Relevant Pillar used     |
|------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|
| Vehicle adoption and the bonus-malus policy in Sweden: What is the impact on economic welfare?                                     | Bergh, H.                                    | 2024 | <a href="https://gupea.ub.gu.se/handle/2077/82178">https://gupea.ub.gu.se/handle/2077/82178</a>                                                               | Economic                 |
| A global comparison of the life-cycle greenhouse gas emissions of combustion engine and electric passenger cars                    | Bieker, G.                                   | 2021 | <a href="https://theicct.org/publication/global-LCA-GHG-passenger-cars-jul2021/">https://theicct.org/publication/global-LCA-GHG-passenger-cars-jul2021/</a>   | Environmental            |
| The political logics of clean energy transitions                                                                                   | Breetz, H. L.                                | 2018 | <a href="https://doi.org/10.1017/bap.2018.11">https://doi.org/10.1017/bap.2018.11</a>                                                                         | Economic / Political     |
| Sustainability Report 2021                                                                                                         | Business Sweden                              | 2021 | <a href="https://www.business-sweden.com">https://www.business-sweden.com</a>                                                                                 | Environmental / Social   |
| The European Green Deal                                                                                                            | European Commission                          | 2019 | <a href="https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52019DC0640">https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52019DC0640</a> | Environmental            |
| A new Circular Economy Action Plan for a cleaner and more competitive Europe                                                       | European Commission                          | 2020 | <a href="https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52020DC0098">https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52020DC0098</a>     | Environmental            |
| Regulation (EU) 2023/1542 of the European Parliament and of the Council of 12 July 2023 concerning batteries and waste batteries   | European Commission                          | 2023 | <a href="https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32023R1542">https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32023R1542</a>       | Environmental            |
| Electric vehicles: A shift to cleaner, cheaper transport in Europe                                                                 | Gore, T. V.                                  | 2021 | Transport & Environment                                                                                                                                       | Economic                 |
| Global EV Outlook 2024: Trends and developments in electric vehicle markets, charging infrastructure and policy                    | International Energy Agency                  | 2024 | <a href="https://www.iea.org/reports/global-ev-outlook-2024">https://www.iea.org/reports/global-ev-outlook-2024</a>                                           | Economic / Environmental |
| The Life Cycle Energy Consumption and GHG Emissions from Lithium-Ion Batteries                                                     | IVL Swedish Environmental Research Institute | 2017 | <a href="https://www.ivl.se/">https://www.ivl.se/</a>                                                                                                         | Environmental            |
| Examining drivers of sustainable consumption: The influence of norms and opinion leadership on electric vehicle adoption in Sweden | Jansson, J. N.                               | 2017 | Journal of Cleaner Production                                                                                                                                 | Social                   |
| Conceptualizing the circular economy                                                                                               | Kirchherr, J. R.                             | 2017 | Resources, Conservation and Recycling                                                                                                                         | Environmental            |
| The psychology of sustainable consumption', in The Psychology of Sustainable Consumption, chapter 15.                              | Kotahwala, K.                                | 2023 | University College London                                                                                                                                     | Social                   |

|                                                                                             |                 |      |                                                                                                                               |               |
|---------------------------------------------------------------------------------------------|-----------------|------|-------------------------------------------------------------------------------------------------------------------------------|---------------|
| Mobility Sweden: Cost analysis of EV vs petrol                                              | Mobility Sweden | 2023 | <a href="https://www.chargepanel.com/cheaper-drive-electric-car/">https://www.chargepanel.com/cheaper-drive-electric-car/</a> | Economic      |
| Global trends in gold mining- Towards quantifying environmental and resource sustainability | Mudd, G. M.     | 2010 | Environmental and resource sustainability (journal)                                                                           | Environmental |

| Author/Platform                     | Year | Key Quote                                                                                                                                             | Relevant Pillar        |
|-------------------------------------|------|-------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|
| Reddit User - u/Totallycomputername | 2024 | "Building a battery is an environmental cost that's paid once. Burning gasoline is a cost that's paid again, and again, and again."                   | Environmental          |
| Reddit User - u/paulwesterberg      | 2024 | "Even wrecked EVs can have the battery salvaged and used for home energy systems or classic car conversions, but we're still not recycling at scale." | Environmental          |
| Quora User                          | 2023 | "Electric vehicles make for a cleaner environment and a better society overall."                                                                      | Environmental / Social |
| Reddit User                         | 2021 | "Electric cars make cities quieter."                                                                                                                  | Social                 |
| Reddit User                         | 2024 | "The true hit to EV resale value comes with the end of battery warranty."                                                                             | Economic               |
| Reddit User                         | 2024 | "Electric cars are progressing rapidly, so they lose value quickly simply because new ones are a lot better than old ones."                           | Economic               |

(Table 02)

#### **4.2.2. Data Analysis**

This study applied a qualitative, thematic analysis approach to examine two distinct but complementary data sources: semi-structured interviews and a corpus of documents, including user-generated content such as customer reviews. Thematic analysis was chosen for its capacity to uncover patterns of meaning across diverse qualitative materials, allowing for in-depth interpretation while maintaining analytic flexibility (Bryman, 2016). Manual coding was employed throughout the process to retain a close, interpretive connection to the data and to ensure contextual sensitivity in identifying patterns and meanings.

The interview data were transcribed manually using Microsoft Word. Audio recordings were listened to multiple times to ensure transcription accuracy, and notes were added during this process to capture immediate reflections and analytical cues. Initial coding was conducted manually by highlighting significant words, phrases, and passages within the transcripts, which were annotated with emerging ideas. As the data collection progressed, previously coded material was re-examined in light of new interviews, allowing for iterative refinement and the evolution of interpretive categories. This inductive process helped ensure that the coding remained grounded in participants' own expressions and experiences. (Nowell et al., 2017) The coding process done manually without digital software, allowed us to stay closely connected to the data. Codes were gradually grouped into broader thematic categories, which were refined through analytical induction, following guidance by (Rennstam, 2018). Themes were constructed by identifying not only the frequency of ideas but also their depth, emotional tone, and relevance to sustainability discourse. Through the semi-interviews, 03 main themes and 20 sub themes have been created, and 48 codes have been generated. interviews, themes captured both personal motivations and public awareness, while through the document analysis 29 codes have been generated and reflected institutional perspectives and strategic priorities. The resulting codes and subthemes were organised into three overarching thematic domains aligned with the TBL pillars.

Following this thematic structuring, a comparative analysis was conducted across the three pillars of sustainability. This phase involved re-engaging with both data sets interviews and documents with the purpose of assessing which dimension of sustainability was most emphasized, both in terms of volume and depth. Rather than comparing interviews to documents directly, the comparative analysis aimed to evaluate how each pillar was represented and engaged with across the full body of data. We considered how frequently each pillar

appeared, how extensively it was discussed, and how emotionally or cognitively salient it seemed for participants or document authors.

Throughout this analysis, we consistently returned to the theoretical framework to interpret how these themes contribute to broader understandings of sustainable mobility in Sweden. By thematically analysing both interviews and documents and comparing the salience of each pillar, we were able to uncover not only what people say about electric vehicles, but what truly shapes their attitudes and decisions highlighting which areas of sustainability are foregrounded and which may still be underemphasized or overlooked.

### **4.3 Ethical Considerations**

Since the outset of our study, we have strictly adhered to the ethical guidelines as outlined by the Swedish Research Council (2017). In line with these principles, we ensured that voluntary participation, informed consent, protection from harm, and respect for privacy and confidentiality were central to every step of the research process. From our initial communication with participants, we clearly explained the purpose and scope of the research, and participants were provided with a detailed information sheet via email. And also, at the beginning of each interview, we reiterated the study's aim, reminded participants of their rights, and asked for verbal consent to record the session.

We emphasized participants' freedom to decline to answer any question or to withdraw from the interview at any point without needing to justify their decision. This was done to ensure that they felt completely at ease and under no pressure throughout the process. We also paid particular attention to how our questions were formulated, maintaining a respectful tone and avoiding technical or sensitive language that might cause discomfort. (Bryman, 2016). The confidentiality of participant information was addressed by assuring that no identifiable data would be published. Although anonymity was not explicitly promised, all names were replaced with pseudonyms during transcription and analysis. Participants were informed about how their data would be stored securely in password-protected folders and that all materials would be permanently deleted after the research was completed and graded.

For the document analysis, we used only publicly available materials. These were handled ethically, with full citation of sources and no alteration of meaning. Given the nature of the

research and procedures followed, we consider the risk of harm to participants or data subjects to be minimal.

#### **4.4 Quality Considerations**

Reflecting upon our methodological choices, we acknowledge that semi-structured interviews and document analysis, like all qualitative methods, present certain challenges concerning validity, replicability, and generalizability (Bryman, 2016). Conducting interviews on personal perceptions, particularly around sustainability and electric vehicle usage, involves the risk that participants might respond in socially desirable ways rather than fully reflecting their actual behaviors or motivations (Martens, 2012). To minimize this risk, we ensured participants were fully aware they would not be judged or evaluated based on their answers. We emphasized participants' own expertise and encouraged genuine, reflective responses by adopting an open and non-critical interviewing style (Hitchings, 2012). Participants were frequently reminded of their right to skip uncomfortable questions, and care was taken to phrase questions neutrally and sensitively.

Additionally, qualitative research often faces critique regarding non-representative sampling and limited generalizability (Silverman, 2022). However, the purpose of this study was not to generalize findings universally, but rather to gain in-depth insights into how sustainability perceptions shape electric car usage specifically within a Swedish context. We have therefore prioritized the transferability, transparency, and trustworthiness of our research by clearly outlining our data collection methods, analytical steps, and research context (Cobern, 2020). Throughout our analysis, we explicitly described our coding processes and thematic development to enhance transparency and reliability.

Regarding our sample, despite attempting to recruit a diverse range of participants from various professional backgrounds and geographical locations within Sweden, we acknowledge limitations. Our recruitment strategy relied significantly on personal and professional networks, potentially introducing biases related to professional status or educational backgrounds. Additionally, while efforts were made to include participants from different cities such as Stockholm, Gothenburg, Lund, Skellefteå, and Västerås, the relatively small sample size and the urban-focused recruitment might not fully represent rural or less urbanized areas, potentially affecting the range of perceptions captured.

Additionally, as all interviews in this study were conducted via Zoom calls due to time and logistical constraints, this approach made it possible to involve participants from different parts of Sweden. However, technical issues such as poor internet connections or sound disturbances may have affected the flow and clarity of some conversations. Some participants were based in urban or semi-urban areas, meaning that perspectives from rural communities where access to electric cars and charging infrastructure may differ were underrepresented. Some participants also had limited knowledge of specific sustainability topics or technical details related to electric cars, which may have influenced the depth of their responses. We were aware of these limitations and made efforts to address them. For instance, participants were given the opportunity to review their interview transcripts to confirm the accuracy of their responses and were encouraged to clarify or expand on any unclear points. Nevertheless, these limitations highlight the need for future research to include a more diverse and representative sample in terms of gender, socioeconomic background, geographic location, and levels of experience with electric cars.

# CHAPTER FIVE

## Analysis of Finding

*This chapter presents the findings from 15 semi structured interviews, and document analysis analysed using the Triple Bottom Line framework. These findings directly address the research question: How do individuals in Sweden perceive the sustainability impact of Electric car usage? and, The results are organized according to the three pillars of sustainability: environmental (planet), economic (profit), and social (people).*

*Each section discusses key themes that emerged from the data, including both expected insights and new perspectives shared by participants. Moreover, the chapter begins with how participants understand the environmental effects of electric cars, such as tailpipe emission noise reductions, battery sustainability, energy sources, climate change and sustainable manufacturing practises. (Section 6.1). It then explores economic considerations, including upfront costs, government incentives, low maintenance cost, long-term savings, resale value, market expansions and job opportunities. (Section 6.2). Finally, it examines social aspects like equity access and infrastructure, social norms and identity, and public health and community well-being (Section 6.3).*

### 6.1 Environmental Pillar (Planet)

#### 6.1.1 Tailpipe Emissions & Noise Reduction

One of the most consistently mentioned themes across all interviews was the environmental benefit of electric cars, particularly through the elimination of tailpipe emissions and reduction of noise pollution. Nearly all participants expressed a clear understanding that battery electric cars produce no direct exhaust emissions, often stating that electric cars generate “no air pollution when comparing to other cars” (P4). This reflects an awareness that ECs do not emit harmful substances such as carbon dioxide (CO<sub>2</sub>), nitrogen oxides (NO<sub>x</sub>), or particulate matter during operation pollutants commonly associated with combustion-engine vehicles.

*“I think EVs really help reduce tailpipe emissions and cut down our reliance on fossil fuels, which is such a big win for the environment, specially in cities where the air quality really*

*matters. Plus, they don't release any other toxic stuff into the environment, and honestly, that's just a really good thing.*" (P2)

As participant stated above there is a strong belief that electric cars play a key role in reducing tailpipe emissions and decreasing the use of fossil fuels, which is perceived as a major environmental benefit, particularly in urban areas. This perception aligns with findings by (Sierzchula et al., 2014e), who highlight that EVs produce no direct exhaust emissions, thereby eliminating pollutants such as carbon dioxide (CO<sub>2</sub>), nitrogen oxides (NO<sub>x</sub>), and particulate matter that are typically released by internal combustion engine vehicles. Further According to above statement, electric cars do not release other harmful substances into the environment, showing an understanding of their broader environmental advantages. This view reflects that a common theme among many participants, who often linked electric cars use to better air quality and improved public health. And, there was a shared sense that having fewer petrol and diesel cars on the road could lead to cleaner air and fewer health issues such as asthma or other breathing problems. Overall, participants seemed perceive not just of the environmental benefits of electric cars, but also of the positive impact they can have on people's health and quality of life.

Beyond air pollution, noise reduction emerged as another widely acknowledged environmental benefits. One interviewee brought up this feature without prompting, describing such as below.

*"You know, what I love most about electric car aside from the fact that they don't pollute the air and how quiet they are! Sometimes you don't even notice they're running, they're that silent. It's such a peaceful change. No engine noise, no fumes... unless someone's blasting music, you barely even know it's there!"*(P9)

The quiet operation of electric vehicles was another commonly appreciated feature among participants. Without being prompted, many brought up how silently EVs run and connected this to a better living experience, especially in busy urban cities. More ever participants seems to understand that less noise from electric cars can lead to calmer and healthier environment unlike other cars which often are loud. This shows that people see electric cars as not only good for reducing pollution but also for making everyday life in neighbourhoods more peaceful. In relation to the research question, this suggests that individuals are becoming more perceive of both the environmental and social benefits of using electric cars, including how they can improve daily life and well-being in cities.



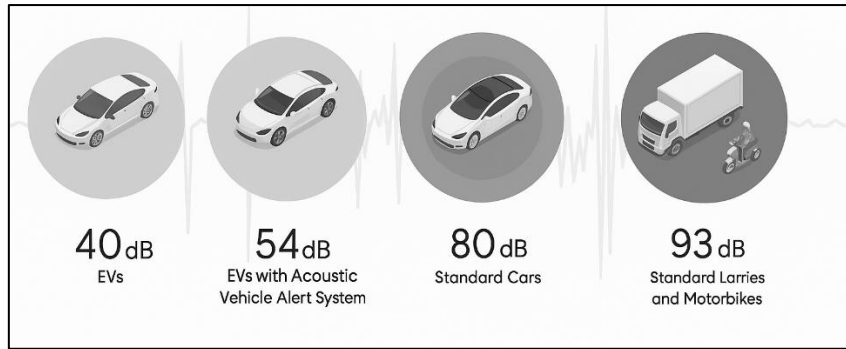


Figure 2: Noise Levels of EVs Compared to Petrol and Diesel Vehicles. Source: Clean Charge Network

These views are supported by national data and policies. For example, (Business Sweden, 2021) reports that using more electric cars in cities could cut harmful emissions by 20–30% and help prevent many early deaths caused by air pollution. Although participants didn't mention exact figures, their comments like saying electric cars are “good for public health” or that “the city air seems clearer” show they understand these benefits. This also matches Sweden's current efforts, such as planning “quiet EV zones” in cities like Stockholm to improve urban living (Swedish Transport Administration, 2024). Public online forum further support this perspective. (Quora user, 2023) noted that “*electric vehicles make for a cleaner environment and a better society overall,*” echoing participants' views on reduced emissions and environmental benefits. Likewise, a 2021 (Reddit User, 2021) highlighted how EVs contribute to quieter cities and roads, reinforcing what participants described about the calming effects of reduced noise, especially in urban cities.

Importantly, some participants showed more thoughtful understanding of sustainability by pointing out that the environmental benefits of electric cars mainly comes from how they are operate, not how they made. Several participants mentioned EC produce zero emission while driving, but the production process of especially in battery manufacturing may carries significant environmental cost. As one participant explained, “*it might not emit any harmful gases to the environment while driving... but the production process of ECs has environmental costs*”(P13). This shows that some individuals are perceive of the full life cycle of electric vehicles and are starting to think about sustainability not just during use, but also during manufacturing and energy sourcing.

These insights show that many people have a good understanding of the environmental sustainability of electric vehicles. Participants often mentioned how electric cars help reduce both air and noise pollution in cities, and some also showed awareness of the broader picture,

including the environmental impact across the vehicle's whole life cycle. This level of understanding fits well with Sweden's national environmental goals, such as the aim to reach net-zero emissions by 2045 (Naturvårdsverket., 2024). While participants did not see ECs as a perfect solution, they viewed them as an important step toward making transportation cleaner and cities more sustainable.

### 6.1.2. Battery Production & Recycling

A more critical perspective on electric car sustainability emerged through participants' reflections on battery production, disposal and recycling. While much of the discussion centered on vehicle usage, several interviewees specifically raised concern about the battery production. One participant remarked that, *"battery production isn't great for the environment"* (P11), acknowledging that manufacturing large lithium ion batteries used in ECs involves significant emissions, resource use, and industrial waste. Another participant questioned about the disposal of batteries after they are no longer in use, stating, *"I hope they are being recycled properly, like with other types of batteries"* (Interview 3). These comments suggest that people perceive the challenges and environmental costs that come with the full lifecycle of ECs. Participants also expressed concerns about the environmental impact of mining materials for EC batteries and the global supply chain involved in producing electric cars. One participant mentioned,

*"Battery production requires materials from all over the world, and transporting them isn't good for the environment"* (P4),

This shows an awareness of the carbon footprint and ecological effects of sourcing materials like lithium, cobalt, and nickel. And also highlights the global process of mining in one country, refining in another, and manufacturing in yet another, each step causing issues like habitat destruction, high energy use, and emissions from transportation. These perceptions are supported by documented evidence. Some studies have shown that the production of electric car batteries uses a lot of energy and generates significant carbon emission. As an example, a life-cycle assessment conducted by the Environmental Research Institute (IVL) in Sweden found that current battery manufacturing processes emit approximately 150–200 kg of CO<sub>2</sub>-equivalent per kWh of battery capacity. (IVL, 2017) For a 60-kWh battery pack, this results in roughly 9–12 tons of CO<sub>2</sub> just from the production process, creating a substantial "carbon debt" that must be offset through clean driving that needs to be offset by clean driving. Additionally,

mining the minerals needed for batteries causes environmental issues like habitat destruction, high water usage, and sometimes toxic waste. (Mudd, 2010)

Online discussion also reflects the same concern. On reddit platform, some users talked about the environmental impact of electric car batteries. One user pointed out that *“Building a battery is an environmental cost that’s paid once. Burning gasoline is a cost that’s paid again, and again, and again”* (Reddit User-u/Totallycomputername, 2024) showing that people understand the difference between one-time manufacturing emissions and ongoing fuel emissions. Another user highlighted the limited reuse of battery materials, with a user noting, *“Even wrecked EVs can have the battery salvaged and used for home energy systems or classic car conversions, but we’re still not recycling at scale”* (Reddit User-u/paulwesterberg., 2024)). These perspectives mirror interviewees’ concerns and highlight a broader public discourse on battery sustainability.

Battery recycling emerged as a prominent theme. Several interviewees questioned whether batteries are being properly recycled and emphasized the importance of doing so. One participant mentioned that *“We have to recycle the batteries, otherwise it defeats the purpose”* (Interview 6). This shows an understanding that the environmental gains from electric cars could be undermined if batteries are not handled sustainably at the end of their life. Another participant added that *“EC batteries should be treated with the same level of care as household batteries, which are widely recycled in Sweden”* (P12). These public concerns strongly align with Swedish and EU transportation policy goals. According to the Swedish Environmental Protection Agency (Naturvårdsverket., 2024), improving battery recycling rates is crucial to making the shift to electric car truly sustainable. Several interviewees also raised the question, *“Are we recycling the batteries?”* (P8) showing that people are becoming more perceive and involved in this issue. This growing public attention supports Sweden’s broader plan for a circular economy, which focuses on cutting waste and reusing materials whenever possible.

Expert opinion supports these concerns. (Gaines, 2014)note that Europe’s current battery recycling rate is still under 50%, meaning that over half of valuable battery materials are not being reused. This inefficiency increases both environmental costs and the need for continued raw material extraction. Participants’ worries about recycling therefore reflect not only environmental responsibility but also an emerging awareness of the need for systemwide change are needed to make electric car use truly sustainable.

Policy developments are already in progress to address these issues. According to (Naturvårdsverket., 2024) the Swedish government has funded how EC batteries can be reused in second-life applications and how recycling processes can be made more efficient. At the same time, the (European Commission., 2023) has introduced new Battery Regulations that set higher recycling targets for materials like lithium, cobalt, and nickel in the future, new rules will make it necessary for batteries to contain a certain number of recycled materials, and producers will be responsible for collecting and recycling used batteries properly.

Furthermore, these upcoming regulations reflect what many participants hoped for stricter rules and closed-loop systems. One participant shared a hopeful view, saying, *“I think in the next few years, we’ll see a certification for EV batteries, showing that it’s made with recycled materials” (P3)*. This shows a belief that clear labelling and transparency can increase consumer trust and help ensure that electric cars are truly sustainable throughout their entire lifecycle. Document analysis further supports these findings. A report by the (Swedish Climate Policy Council., 2024) emphasizes that Sweden is actively promoting policy measures to support battery recycling and the sustainable management of electronic waste. These efforts aim to ensure that the environmental benefits of electric vehicles extend beyond driving, encompassing the full lifecycle of the vehicle. Including both production and end-of-life considerations in the discussion, participants demonstrated a holistic view of EC sustainability. They have recognized that while electric cars are an environmental improvement during use, their full sustainability depends on addressing the environmental impacts associated with manufacturing and disposal, particularly concerning batteries.

While many acknowledged the climate benefits of driving electric vehicles, they also stressed that such benefits must not overshadow unresolved issues in battery sourcing, manufacturing, and recycling. As one participant summarized, *“Yes, ECs reduce pollution and help with climate change, but we need to fix the rest, especially the batteries” (Interview 10)*.

This quote reflects a thoughtful and realistic understanding among participants. They did not see electric cars as perfect solutions but understood that sustainability should be evaluated across the entire lifecycle from raw material extraction to end-of-life disposal. Their views suggest that many people in Sweden are critically aware of the broader environmental impacts of electric vehicles and believe that both industry and policymakers have a responsibility to support a more sustainable transition. This understanding is supported by a report from (Naturvårdsverket., 2024) which highlights the need for better battery lifecycle management

and circular practices. Likewise, the (Swedish Energy Agency., 2023)notes that the public increasingly expects electric mobility to address both production-related and long-term environmental impacts

### 6.1.3 Charging Energy Source for Electric Cars (ECs)

One of the key environmental themes that emerged from the interviews was the importance of the energy source used to charge electric cars. Many interviewees have recognized Sweden's advantage of having a clean energy mix, powered by renewable sources such as hydropower and wind. One participant highlighted this point by stating, *"If I'm charging my car using renewable energy like hydropower or wind, which Sweden has a lot of, then the benefits are even greater"* (P6). Another participant reinforced this view by adding, *"We have one of the cleanest grids in the world, so charging an EV here is almost like driving a nuclear-powered car"* (Interview 10). These responses highlight the awareness among Swedish EC users that the source of electricity plays a crucial role in determining the overall environmental impact of their cars.

In addition, Participants also highlighted that the environmental benefits of electric cars can differ depending on the national energy mix. For example, one interviewee noted, *"In some countries, ECs may not be as green because they rely on coal or other fossil fuels for power generation"* (Interview 4). This shows a deeper understanding of how the energy used to charge electric cars can affect their overall carbon footprint. In countries where fossil fuels are the main source of electricity, the climate benefits of EVs may not be as strong as in Sweden, where renewable energy is the primary source. Furthermore, some insights align with existing research including that *"electric vehicles in Sweden can be up to 70% lower in lifetime emissions compared to petrol cars, thanks to the low-carbon grid"* (University of Cambridge., 2020). This contextual data further highlights the importance of the energy source in determining the overall emissions reductions associated with ECs. Charging electric cars with renewable energy leads to a significantly lower carbon footprint over the vehicle's lifetime, reinforcing the idea that the environmental benefits of ECs are closely tied to the source of the electricity used to charge them.

Some participants also mentioned that they prefer to charge their cars during off-peak hours when renewable energy is more available. One participant said, *"I try to charge my car when there's a surplus of renewable energy, usually at night"* (Interview 8), showing a trend where electric car owners in Sweden actively try to reduce their carbon footprint by charging during

cleaner times. However, the source of energy used to charge electric cars is key to their environmental impact. Participants showed an understanding that charging with renewable energy maximizes the benefits of ECs, while charging with fossil fuels reduces these benefits. This growing awareness suggests that as more renewable energy is used globally, the climate advantages of ECs will keep improving.

#### **6.1.4 Climate changes and Sustainable Manufacturing Practices**

Some participants not only discussed the impacts of battery production but also offered ideas on how manufacturing could be more sustainable in the context of climate change. They showed awareness of solutions, not just problems.

Participants not only highlighted the challenges of resource extraction but also suggested solutions, showing a deeper engagement with sustainability issues. For example, one participant mentioned the need for more recycled materials in electric vehicle interiors, saying, *“I want more recycled plastics in EV interiors”* (P8). This reflects a desire to reduce the use of new materials and supports the idea of a circular economy (Kirchherr, 2017). Other interviewees shared similar ideas, stressing the importance of *“reusing materials we already have”* and *“closing the loop on resource use”* (P5). These statements suggest that some people link vehicle sustainability to overall resource efficiency, which is in line with the European Commission’s Circular Economy Action Plan (European Commission, 2020)

This awareness aligns with current efforts in the automotive industry. While most participants didn’t mention specific companies, their views reflect industry practices. For example, Volvo Cars has committed to using 25% recycled plastics in new vehicles by 2025 (Volvo Cars., 2021) and battery manufacturers like Northvolt plan to source 50% of raw materials from recycled batteries by 2030 (Northvolt, 2023). Although participants didn’t always mention this knowledge directly, their expectations show a growing understanding of sustainable manufacturing

A few participants also noted the energy used in making electric vehicles. While not a major theme, they recognized that if manufacturing depends on fossil fuels, it reduces the environmental benefits of the vehicle. Participants seemed to value that Swedish factory, like Northvolt’s gigafactory in Skellefteå, use renewable energy, which helps lower the carbon

footprint of battery production. However, they also expressed concerns about electric cars made in countries with fossil-fuel-heavy energy grids, highlighting that the sustainability of ECs can vary depending on the local electricity mix. This shows that participants view true sustainability as depending not only on the product but also on the processes used to create it. Another common point raised was the link between electric cars and climate change. Many participants saw electric cars as a key solution to national and global climate goals. For example, one participant mentioned, “*Electric cars are central to achieving our Paris climate commitments*” (P11), and another mentioned, “*Every EV on the road helps reduce global warming*” (P12). These views show a clear awareness of how EVs contribute to cutting greenhouse gas emissions. This perspective aligns with Sweden’s goal of reaching net-zero emissions by 2045. (Naturvårdsverket., 2024) and the European Green Deal, which supports clean transportation as a key part of climate neutrality ((European Commission, The European Green Deal., 2019)

Moreover, Participants also showed an understanding of the lifecycle carbon impact of EVs, including the concept of a “carbon break-even point.” One interviewee noted, “*It takes about 20,000 km of driving to break even on CO<sub>2</sub> emissions*” (P 5), acknowledging the emissions from battery production and the gradual environmental benefit of ECs over time. Studies support this estimate, suggesting that the carbon break-even point for EVs ranges from 15,000–30,000 km depending on battery size and the electricity mix. (Bieker, 2021) This view indicates that some individuals have a deeper understanding of sustainability, recognizing both the short-term challenges and long-term benefits of electric vehicles.

## 6.2 Economic Pillar (Profit)

### 6.2.1 High Upfront Costs and Government incentives.

A key theme that emerged in the economic dimension of sustainability were the high upfront cost of electric cars and government incentives. Participants frequently mentioned this as a significant barrier to ownership, showing a clear awareness of the financial challenges involved in adopting electric cars.

*“Electric cars are almost twice as expensive as fuel cars, and let’s be honest, not everyone can afford that kind of upfront cost. It’s the biggest obstacle. Even people who like the idea of going electric hesitate because of the price tag, it’s just too much for many.” (P8)*

As the participant mentioned above, cost was seen as the major barrier for many individuals considering electric car adoption. Several interviewees felt that the upfront price is simply too high, even for those who are genuinely interested in switching to electric vehicles. This concern was not just about affordability but also about the perceived value and risk of making such a large investment in a relatively new technology. Some participants expressed that the higher initial cost of electric cars compared to conventional petrol or diesel car was difficult to justify, especially in the absence of clear, immediate financial returns. For families or individuals with limited budgets, this cost difference often made electric cars seem out of reach. Others noted that the long-term savings on fuel and maintenance, although appealing, were not always enough to outweigh the burden of the initial purchase price. These findings align with previous research showing that cost-related barriers remain one of the most persistent obstacles to widespread EV adoption, especially among middle- and lower-income consumers. (Breetz, 2018)

In line with the research question, these reflections suggest that while individuals may be increasingly perceive the environmental and sustainability benefits of electric cars, economic factors especially the initial cost continue to act as a major barrier to adoption. Even though there is potential for long-term savings through lower running costs, the financial hurdle at the point of purchase remains a significant deterrent for many (Sierzechula et al., 2014f). Participants also showed awareness of government incentives designed to reduce these high costs. In Sweden, for example the government offers a climate bonus for low emission vehicles through a “bonusmalus” system was mentioned in the several interviews.



*“I was encouraged by the government climate bonus” when considering an electric car (P7),* This statement showing that that the rebate program has successfully influenced some potential buyers. However, some participants were less clear about the details of the incentives. Further one participant remarked, *“I’ve heard there are some incentives in Sweden, but they aren’t always clearly communicated” (Interview 1),* suggesting that information about these programs is not always easily accessible or well-publicized.

*“The government is giving us a discount” (P10).*

This general understanding points out to a gap in how well the government incentives are understood. Percipients who were more informed about the climate bonus felt more “confident and empowered” to consider the purchasing an electric car while others expressed uncertainty due to limited awareness. One of interviewee mentioned as *“Better communication about government incentives also could help more people to consider EVs.” (P10).* This feedback highlights the needs for better communication to ensure that all potential buyers are fully informed about the available incentives. From a policy perspective, this suggest that while designing financial incentives is important, effectively communicating them is equally crucial. Participants emphasized the need for clearer public information campaigns or more direct communication at car dealerships to ensure that all buyers are fully percieve of the incentives available to them.

Financial incentives are one of the most effective ways to encourage EC adoption (Sierzechula et al., 2014f)In Sweden, the government has introduced generous rebates (up to 70,000 SEK for qualifying electric cars) to make EVs more affordable. This system rewards low-emission vehicles with a financial bonus while penalizing high-emission vehicles with higher taxes over a three-year period. As illustrated in Figure 2, the further a vehicle's CO<sub>2</sub> emissions exceed zero, the higher the cost imposed under the *malus* component, while vehicles with zero or very low emissions receive substantial financial support under the *bonus* side. Research by (Bergh, 2024)found that the bonus-malus system has positively impacted consumer welfare and accelerated the shift to electric vehicles, with minimal cost to the public. These findings support the idea that financial incentives help make EVs more affordable and encourage people to buy them.

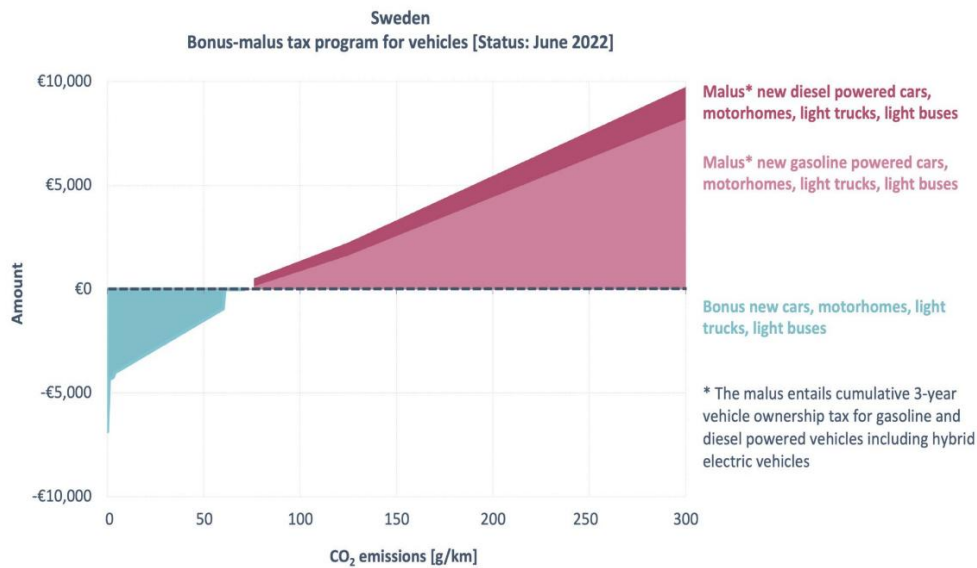


Figure 2: Sweden's Bonus-Malus Tax Program for Vehicles (as of June 2022)

A report from the Swedish Environmental Protection Agency (Naturvårdsverket., 2024) also confirms the importance of financial incentives. It found that 70% of Swedish consumers are percieve of the government's financial incentives for EV purchases, which matches the findings from the interviews. However, the report also stresses that better communication is needed to ensure consumers fully understand the benefits and application process.

### 6.2.2 Low Maintenance Costs and Long-Term Savings

Although the purchase price of electric car is high. Participants showed a clear understanding of the long-term economic benefits of electric vehicles (EVs), even though they acknowledged the higher initial purchase costs. A common theme among interviewees was the lower operational costs of EVs compared to internal combustion engine vehicles. Many pointed out that charging an EV is much cheaper than refueling a petrol car. This aligns with data showing that home charging in Sweden costs about SEK 2.25 per 10 kilometres, while petrol vehicles can cost around SEK 12 for the same distance. As one participant stated:

*“Actually...One of the biggest advantages for me is how much cheaper it is to charge the car compared to constantly buying fuel. Over time, the savings really add up. And when it comes to maintenance, it's a huge relief and no oil changes, and fewer brake repairs, and you don't have to deal with engine problems or exhaust issues like in petrol cars. The overall upkeep is*

*so much simpler and less expensive. But at the same time, I do worry a little about the long-term cost of replacing the battery. That's one thing that could be expensive down the line.” (P7)*

The participant's response highlights a strong awareness of the long-term economic advantages of electric cars, especially in terms of lower running and maintenance costs. Charging was frequently described as more affordable than refuelling, and participants also recognized that EC require less maintenance due to the absence of components like oil systems and petrol engines. This suggests that many individuals view electric cars as more cost-effective over time, even if the initial purchase is expensive. However, the mention of battery replacement costs shows that while participants appreciate the financial benefits, they also remain cautious about potential future expenses. This reflects a practical and well-rounded understanding of the economic trade-offs involved in EV ownership.

*“It's cheaper to maintain, but battery replacement could cost a lot.” (P7)*by highlighting that ECs help avoid small ongoing costs, there could be a large expense if the battery needs replacing outside of the warranty period. Despite this, most participants agreed that the long-term savings on fuel and maintenance are major advantages of ECs. Many pointed out that while the upfront price of ECs is higher, *“the cost of charging is low”* and fuel savings accumulate over time. Furthermore realworld data confirms that electricity, particularly home electricity in Sweden, is significantly cheaper per kilometer than gasoline. For example, home charging can *“cut my fuel cost in half or more,”* reflecting a 50% cost saving compared to petrol. Studies also show that EVs typically have 20–30% lower maintenance costs than internal combustion engine (ICE) vehicles due to their simpler drivetrains and fewer routine services. (Gore, 2021)

The simplicity of EVs was also highlighted by participants. For example, regenerative braking in ECs means brake pads last much longer, reducing the frequency of replacements. Moreover, without an engine, electric cars don't need parts like a timing belt or exhaust system, leading to fewer repairs. Participants were clearly perceive of these advantages and saw them as significant cost savings over time.

*“Public charging stations might be too expensive” (Interview 10)*

As indicated by above interviewee, charging fees could be higher compared to home charging or even gasoline for the same distance.

This shows that while home charging is seen as affordable, not everyone has access to it. For people who need to rely on public charging stations, especially those who drive long distances, charging costs might erode some of the savings. Despite these concerns, the consensus from participants and supporting documents is that ECs offer clear long-term economic benefits. Studies in Sweden have shown that, even when accounting for the cost of installing a home charger and typical electricity rates, owning an EC becomes competitive with or cheaper than owning a traditional gasoline car within a few years of use. For example, a report by Mobility Sweden analysed fuel costs and found that, despite increased electricity prices, it is still cheaper to drive an electric car in Sweden compared to a petrol or diesel car. The analysis highlighted that the cost of charging an electric car varies based on access to home charging versus reliance on public charging, with public charging being more expensive. (Mobility Sweden., 2023)

According to (International Energy Agency, 2024), a mid-size electric vehicle (EV) in Sweden typically costs around 450,000 SEK upfront, while a comparable petrol model costs approximately 350,000 SEK. After applying the 70,000 SEK climate bonus available for low-emission vehicles, the price gap narrows to about 30,000 SEK. For a driver covering roughly 15,000 kilometres per year, annual electricity costs are estimated at 3,000–4,000 SEK, compared to about 15,000 SEK for petrol, resulting in yearly savings of 11,000–12,000 SEK. Maintenance savings, due to the EC's simpler mechanics, can add several thousand SEK more. Over two to three years, these combined savings can compensate for the higher initial cost, making EVs a cost-effective option in the long run.

Overall participants have recognized that while ECs have a higher initial cost, the long-term savings on energy and maintenance make them a financially sensible choice. With the right policies in place, ECs “pay off” over time, which reinforces the idea that the higher upfront cost is worthwhile in the long run.

### 6.2.3 Resale Value and Battery Longevity Concerns

Participants often discussed electric cars not just in terms of daily use and savings, but also through the lens of long-term ownership. A key point that emerged was the uncertainty surrounding how well electric cars retain their value over time, especially as battery technology rapidly evolves. For many, this raised questions about whether purchasing an EV is a secure investment in the long run.

Some participants shared their hesitation, noting that resale value might decline quickly as new and more advanced models enter the market. As one participant put it, *“I do worry about resale value. Electric car technology is evolving fast.”* (P1). This concern highlights a broader issue as new models with longer range and better performance emerge rapidly, older models may depreciate quickly, reducing their attractiveness to second-hand buyers. Another participant added as,

*“Resale value is always changing... EVs are no exception.”* (P9)

This suggests that, like all other cars, electric cars also will lose value over time, possibly more quickly if buyers are cautious about used batteries. A third participant reinforced this view, saying, *“It’s hard to resell any car, and EVs are no exception.”* (P3). However, these insights show that participants are not only perceive of the financial implications during ownership but also consider long-term value and exit options as part of their decision-making process. Moreover, Battery life also was also a major concern linked to resale value and long-term ownership. Participants knew that EC batteries degrade over time and replacing them can be costly. One participant shared. *“I’m concerned... battery life will I need an expensive replacement?”* (P7). Another interviewer expressed worry about replacing the battery *“when the warranty runs out.”* (P8) These concerns show that people factor in the potential high cost of replacing the battery when thinking about the overall value of the car. If the battery needs replacing after 8-10 years, it could decrease the resale value or require a big investment from the owner.

Some of studies have shown that many potential electric car buyers are worried about battery longevity and its impact on resale value. As an example, A recent study by (Gehlmann et al., 2024) found that 40% of potential car buyers worry about battery replacement costs and how it affects resale value. Similar concerns about the second-hand market for electric cars, including how quickly the technology becomes outdated, have been identified as barriers to EC adoption.

Participants of interviews also expressed similar concerns, showing that while they understand the benefits of EVs, they are mindful of these long-term risks. This reflects the fears voiced by early EC adopters, who worry about being stuck with an outdated model if technology advances too quickly.

To address these concerns, the EV industry has introduced solutions like battery warranties, which typically last for 8 years or around 160,000 km. Some manufacturers also offer battery certification or buy-back programs for used ECs. While participants did not mention these solutions directly, they likely provided some reassurance. Furthermore, (Pereira, 2024) suggests that clear and enforceable battery warranties can reduce concerns about depreciation.

Incorporating perspectives from online forums, especially Reddit, adds more context to these findings. One user mentioned, *“The true hit to EV resale value comes with the end of battery warranty,”* pointing out how battery health affects resale value. Another user observed, *“Electric cars are progressing rapidly, so they lose value quickly simply because new ones are a lot better than old ones,”* noting how fast technological advancements impact the value of older EC models. These comments show a growing public concern about the financial sustainability of EVs over time. Overall, participants were mindful of the long-term uncertainties of owning an EC. They considered both the immediate costs and savings, as well as how the vehicle would perform over time whether it would remain a good investment or become outdated. This reflects an understanding that an electric car should be sustainable both environmentally and financially over its entire lifespan.

## 6.2.4 Market Expansion and Jobs opportunities

In addition to personal financial considerations, several participants demonstrated awareness of the broader economic effects of the transition to electric car, particularly in terms of job creation and electric car market expansion. These reflections indicate that for some individuals, sustainability is understood not only through an environmental lens but also as a driver of economic development.

*“My cousin got hired at a new EV battery plant.” (P 7)*

This statement highlights the direct connection between the rise of electric cars and the creation of new green jobs in manufacturing. For example, Northvolt’s battery factory is expected to create around 3,000 direct jobs, not counting those in the wider supply chain. This reflects the positive economic impact of the EC industry, which participants are aware of. Additionally, as car manufacturers like Volvo shift to electric models, the domestic auto industry is evolving rather than shrinking.

Interviewees expressed that they see the shift to electrification as a positive change rather than a disruptive one. One participant noted, *“I see job growth in sustainable industries linked to EVs”* (P3), highlighting new job opportunities in areas like charging infrastructure and renewable energy. This view contrasts with common concerns in other contexts, where people worry about job losses in traditional auto manufacturing and fossil fuel industries. Notably, none of the participants mentioned fears about economic decline due to EV adoption, such as layoffs in oil-related sectors, suggesting that Swedish individuals have an optimistic outlook on the economic sustainability of the EC transition. This perception is supported by recent studies showing that the shift to electric mobility can lead to a net increase in employment, particularly in sectors such as battery production, software, and charging infrastructure. (Stiglitz & Guzman, 2021)

*“More companies are offering EV benefits for employees.” (P 7)*

As per the above participant mentioned, another aspect of economic awareness included recognition of governmental support for businesses adopting EC related practices. Several participants referred to initiatives such as tax incentives, workplace charging stations, preferential parking for EVs, and EV inclusion in company car schemes that aimed at encouraging corporate participation in the green shift. For instance,

“Businesses get incentives for installing chargers.” (Interview 6)

This refers to government grants, such as those through the Klimatklivet program, that help companies expand the charging infrastructure. (Naturvårdsverket, 2023) These remarks suggest an understanding that the economic transition to EVs involves not only individual consumers but also businesses and infrastructure investments. Sweden’s policy, including grants for workplace and apartment complex charging stations, and reduced tax on electric company cars, demonstrates a broad push for EV adoption, with both public and private sectors working together.

Interestingly, none of the participants discussed negative economic impacts, such as job losses in traditional auto manufacturing or the oil industry. Instead, the focus was on the creation of new jobs and industries. For example, when talking about job creation, participants highlighted new opportunities, like the employment at battery plants, rather than potential losses in engine factories or fuel retail. This suggests a public perception that the EV transition will likely strengthen the economy, with any job losses being offset by new opportunities. It could also reflect Sweden's proactive approach to green technology, where there is optimism that workers can transition to emerging sectors



## 6.3 Social pillar (People)

### 6.3.1 Equity of Access and Infrastructure

Another significant theme identified was the uneven availability of charging infrastructure, raising concerns about equitable access to electric vehicles (EVs). Many participants pointed out the disparity in the availability of charging stations, especially outside urban areas.

*"Charging infrastructure, especially outside urban areas, still needs improvement. We don't have a lot of charging stations... it's not always convenient to charge an EV when away from home. In rural areas, chargers are few and far between, so it's hard to consider an EV."(P1)*

As above participants highlighted, one of the major challenges to EV adoption is the uneven availability of charging infrastructure, especially outside urban centers. Many interviewees pointed out that charging stations are concentrated in cities, making it easier for urban residents to adopt EVs. In contrast, rural areas face limited access to charging stations, which makes EV ownership less feasible. As one participant noted, without easy access to charging in less populated areas, owning an electric car becomes a significant challenge. The need for improvements in infrastructure is clear, particularly in underserved rural areas, where public charging stations are scarce.

*"We have lots of chargers at the grocery store here in the city, but my friend in the countryside has to drive 30 km to find a fast charger. Apartment dwellers often rely on slow public chargers that are not always free when you need them." (P3)*

Furthermore, Participants also pointed out the disparities between urban and rural charging access. In cities, charging stations are common, especially in places like grocery store parking lots. However, rural residents often face long drives to reach the nearest fast charger, with some areas lacking public chargers altogether. Apartment dwellers, in particular, face additional hurdles, as many cannot install private chargers at home. This reliance on public charging, often slow and not always available, further limits access for urban apartment residents. Participants emphasized the need for more inclusive charging infrastructure that serves both urban and rural communities to ensure broad access to EVs.

The urban-rural divide in electric vehicle (EV) ownership is supported by national data. In 2022, EV ownership in Sweden was much lower in rural areas (5%) compared to urban areas

(18%) (Levin et al., 2024). This confirms participants' concerns and highlights a structural issue that extends beyond individual choice. However, participants recognized government efforts to address this gap, such as the 2022 Charging Infrastructure Strategy by Trafikverket, which aims to place 40% of new fast chargers along non-urban highways. As one participant stated, *"The government is putting chargers on the highways up north"* (P6), reflecting public awareness of these efforts to improve access

Economic inequality was another central concern, with many participants mentioned about the affordability gap in EC adoption. The high upfront cost of ECs was repeatedly described as a barrier for students, low-income families, and single-car households. While some wealthier families own both petrol and electric cars for different needs, this was viewed as a privilege not shared by the broader population. *"Not everyone can afford an electric car... not everyone can afford to have both electric car and petrol car"* (Interviewee 9). The belief that electric vehicle (EV) ownership is typically limited to the financially privileged was a common perception among participants.

These reflections go beyond economic challenges and touch on a broader critique of social sustainability. Several participants expressed concerns about fairness and inclusion in the shift to electric mobility. One interviewee stated, *"It's not truly sustainable if only the well-off can enjoy clean electric transport while others are left with older, polluting cars"* (P 12). This quote highlights the growing awareness that sustainability must ensure equal access; otherwise, the transition could worsen existing inequalities instead of addressing them.

Overall, participants showed a critical understanding of the social aspects of EV adoption. While they supported the move towards electric mobility, they emphasized that true sustainability involves inclusivity. Accessibility, both physical and financial, became a key focus, indicating that people are now considering the EV transition not only from a technological or environmental standpoint but also through a lens of social justice. This understanding directly connects to the research question, suggesting that individuals are not only perceive of the environmental benefits of EVs but are also increasingly sensitive to the social implications of their adoption.

### 6.3.2 Social Norms and Identity

The adoption of electric vehicles (EVs) is influenced by more than just practical considerations; it is deeply rooted in social norms and personal identity. Many participants in the study noted that their interest in EVs is linked to broader cultural shifts towards sustainability. One participant shared:

*“I’ve seen more EVs on the road, which shows that adoption is picking up. It’s becoming normal, something everyone is getting involved in, which makes it feel like a good choice” (P 2).*

This statement reflects the growing acceptance of electric cars in communities. As EVs become more common, especially in urban areas, they are increasingly seen not just as a new technology, but as a responsible and modern lifestyle choice. The more EVs are seen on the road, the more they create a sense of progress and shift social norms. As more people adopt EVs, others are encouraged to follow suit, reinforcing the idea of sustainability. This demonstrates a broader social influence, where the actions of early adopters motivate others to join the movement toward cleaner, more efficient, and responsible living. (Jansson, 2017)

*“The new generation is moving towards electric cars... maybe I’m interested because of that shift. It feels like they’re the future... technologically advanced... aligns with my values” (P 4).*

This comment emphasizes the role of younger generations in driving the shift toward electric car adoption. Many participants expressed that EV ownership is a reflection of their personal values and a desire to align with sustainable and future-oriented trends. The generational shift towards EVs is central to making them more mainstream, as younger people embrace EVs as symbols of progress, technological advancement, and environmental consciousness. This cultural shift is pushing EVs into the broader social landscape, making them a desirable and socially accepted choice, particularly among those who see them as part of the future of transportation.

Experiential learning played an important role in shaping perceptions. Through direct experiences, such as participating in EV test drive programs, some individuals shared how their abstract ideas about electric cars turned into positive, tangible experiences. As one participant explained, *“I got the chance to try driving an EV through a local program... It’s not just about being eco-friendly; it also feels like a responsible and modern choice” (Interview 9).* This

highlights the value of hands-on, community-based programs in demonstrating not only the practicality of EC ownership but also how it aligns with socially responsible identities. Trying an EC firsthand helped some participants see them not as futuristic inventions, but as accessible, everyday vehicles that fit into a sustainable lifestyle.

*“Electric cars are the future” (Interview 4).*

For many participants, EVs are seen as the inevitable future of transportation. This future-oriented mindset is a significant driver of adoption. Participants expressed that owning an EV not only aligns with global sustainability trends but also reflects their personal values. As above participant explained, emphasizing that electric vehicles are seen as part of a larger societal shift toward sustainability and technological innovation. This growing belief that EVs represent the future reinforces their appeal as an essential part of the transition to cleaner and more sustainable transportation.

In addition to the interviews, one of the users in the social media also help illustrate these broader social dynamics as *“Tesla's share of the overall Swedish car market declined by half to 2.1% in the month of January from 4.2% a year prior.”* (Reuters., 2025, February 3) This comment offers insight into how EV preferences are not static and may evolve alongside public perceptions of brands, affordability, or social values. A declining market share for a high-profile EV brand like Tesla could suggest that Swedish consumers are becoming more value-conscious or that newer brands offering similar benefits are perceived as more aligned with local norms or accessibility expectations.

### 6.3.3 Public Health and Community Well-Being

A key theme that emerged under the social pillar of sustainability was participants' perception of how electric cars can improve public health and community well-being. While not the most common topic, several interviewees linked EV adoption to collective social benefits, especially through better air quality and reduced noise in urban areas. This shows that some participants viewed the impact of EVs not just in terms of individual use, but also in how they can improve shared environments.

One participant said, *"Having more EVs is good for public health because it means less pollution for everyone"* (Interview 8). This highlights that ECs, with their zero emissions and quieter operation, can improve community well-being. Cleaner air could lead to fewer health issues, while quieter streets might reduce stress and encourage people to spend more time outdoors. These benefits show that EC adoption can improve both individual lives and the community.

Even though only a few explicitly mentioned it, participants understood that EVs contribute to public health. One interviewee noted, *"EVs improve air quality, which improves community health,"*(P1) linking cleaner environments to better health outcomes. Studies (Business Sweden., 2021) support this, showing that ECs can reduce harmful emissions in cities, benefiting everyone. This understanding encourages more support for EV adoption, as people realize it improves the environment for all, not just for those who drive ECs. Additionally, (Kotahwala, 2023) emphasizes that reduced noise pollution has mental health benefits, particularly in childfriendly neighbourhoods, where it can strengthen social cohesion and improve quality of life. Stockholm's sustainability plan recognizes these benefits and has begun introducing "quiet EV zones" and enhancing green public spaces to support cleaner, quieter urban living.

In cities like Stockholm and Gothenburg, participants said, *"City air would be much easier to breathe"* and *"walking near roads would be more pleasant with less noise"* (P3) if most cars were electric. These comments reflect how ECs could make urban areas healthier and more livable. Another participant imagined a cleaner environment at Sergels Torg, saying, *"Imagine Sergels Torg with only electric buses and cars you wouldn't smell exhaust while having coffee outside."* (P5) This shows people are aware of the collective benefits EVs can bring.

Importantly, participants did not see EC adoption as a compromise. Instead, they saw it as a socially responsible and personally rewarding choice. One individual shared, *“I like EVs because they’re better for me and better for society,” (P4)* highlighting how participants viewed the personal and societal benefits as closely aligned. This attitude suggests a growing awareness that sustainable transportation can meet both individual needs and broader community goals

## Summary of Study Results

This study set out to explore how individuals in Sweden perceive the sustainability impact of electric car usage, using the **Triple Bottom Line (TBL)** framework to examine environmental, economic, and social dimensions. Drawing on insights from 15 interviews and supporting documents, the findings offer a well-rounded view of how people relate electric cars to broader sustainability concerns in everyday life.

From an environmental perspective, participants clearly perceived electric cars as contributing to cleaner air, quieter cities, and improved public health. Many connected these benefits to Sweden’s climate goals, viewing electric vehicles as a practical step toward reducing emissions. At the same time, several individuals raised concerns about the environmental footprint of battery production, the mining of raw materials, and the limited recycling systems currently in place. There was also a shared belief that charging EVs with renewable energy is essential and that Sweden’s clean electricity mix makes this more achievable. A few participants spoke of sustainability in terms of the vehicle’s full life cycle, stressing the importance of responsible sourcing, production, and end-of-life processes.

Economic considerations were also seen as highly relevant. While many participants acknowledged the cost savings on fuel and maintenance over time, the high purchase price of electric cars was often mentioned as a major barrier. This issue appeared to discourage even environmentally motivated buyers. Government incentives such as the climate bonus were generally viewed positively, though some found them unclear or hard to access. Participants also expressed uncertainty about the long-term costs of battery replacement and the resale value of electric cars. On a more optimistic note, some people highlighted the potential for economic growth through job creation in battery manufacturing and clean tech industries—suggesting that the move toward electric mobility is part of a larger societal shift.

In terms of social sustainability, participants reflected on questions of fairness and accessibility. Many pointed out that EV-related infrastructure is better developed in urban areas, especially

for those with private parking, while people in rural areas or apartment buildings may face more barriers. This raised questions about whether the benefits of electric mobility are available to everyone. Some participants felt that for electric cars to be truly sustainable, they must also be socially inclusive. Others mentioned the role of social norms and visibility saying that seeing more EVs on the road or among peers helped normalize the idea of switching. Additionally, the cleaner, quieter environment that comes with EV use was seen as improving daily life, adding to the social value of electric cars.

To answer the research question, study shows that people think about sustainability in a broad and interconnected way. Environmental benefits like cleaner air were linked to renewable energy use and responsible production. Economic issues like affordability were tied to fairness and access, and social values were seen in the context of well-being, inclusion, and influence. Participants did not view sustainability as one single factor but as a combination of elements that must work together for electric mobility to be truly sustainable.

As Sweden continues its transition to electric transport, these insights underline the importance of addressing all three sustainability dimensions together. By understanding how people perceive environmental, economic, and social impacts, policymakers and industry stakeholders can design more effective and inclusive strategies that support a balanced and practical path toward sustainable mobility.

# CHAPTER SIX

## Discussion and Conclusion

*The three pillars of the Triple Bottom Line such as environmental, economic, and social are strongly interconnected. Therefore, in this chapter, the discussion aims to explore the findings not in isolation, but in relation to each other, highlighting how these dimensions influence and reinforce one another. Following this integrated discussion, the conclusion reflects on the study's contribution to the broader academic discourse on sustainable mobility. Finally, the chapter presents practical recommendations and future directions for policymakers, industry stakeholders, and researchers to enhance public understanding and support a more inclusive transition to sustainable transport.*

### 6.1 Discussion

#### 6.1.1 Environmental and Social Impact

Many individuals primarily associate electric cars with environmental benefits, such as cleaner air and lower greenhouse gas emissions. A Swedish survey found that 36% of Swedish participants consider buying a battery electric car within the next 0–5 years, with the most important advantage cited being that BEVs are “better for the climate due to no tailpipe CO<sub>2</sub> emissions.” (Country Report: Sweden. European Commission., 2023) In our study, participants similarly highlighted reduced tailpipe pollution and quieter streets as key positives of EC usage. These environmental benefits directly contribute to social improvements, such as better public health through improved urban air quality and more liveable communities. For example, reduced local emissions like NO<sub>x</sub> and particulate matter from ECs can help reduce health issues, benefiting all societal groups. (Molnár, 2024). The findings also suggest that respondents felt a sense of pride and social value in owning an EC, as it reflects a commitment to future generations and community welfare. Therefore, environmental and social benefits of EVs are interconnected: the clean-air impact not only helps the environment but also enhances societal well-being.



However, participants had a nuanced view of social equity when it comes to electric car adoption. They frequently pointed out the lack of sufficient charging infrastructure, especially in rural and low-income areas (Swedish Energy Agency., 2023). Many expressed concern that if access to charging stations isn't evenly distributed, it could worsen socioeconomic inequalities. These observations support existing research that highlights the importance of inclusive infrastructure policies to ensure that the transition to sustainable transportation benefits everyone (Richter & Smith Stegen, 2022). Social views about electric cars also influence how people see their environmental impact. For many, driving an EV is more than just a personal choice. it's a social signal. In Sweden, nearly 70% of car owners feel that their car brand reflects their status, and ECs are often viewed as "green" status symbols.(Naturvårdsverket., 2024). This image can encourage early adoption, especially among environmentally conscious people, even if it's not always based on cost or practicality.(Trosvik, 2017) This shows that cultural values and group norms influence environmental behaviour.owning an EC can feel like the right thing to do socially or ethically.(Breschi, 2020)At the same time, some participants raised social concerns, such as needing to plan charging stops or adjust travel habits, suggesting that community expectations around convenience and reliability still affect how people adopt EVs

### **6.1.2 Economic and Environmental impact**

The link between economic and environmental factors plays a key role in how people view electric cars (EVs). On one hand, electric cars offer potential savings. electricity is cheaper than petrol, and countries like Sweden provide tax incentives for low-emission vehicles.(Sierzchula, 2014) Many participants in this study mentioned lower running costs as a clear benefit of owning an EV. On the other hand, the high upfront cost remains a major concern. Our findings show that price is often the biggest obstacle, echoing consumer reports that identify cost as the main disadvantage of driving electric cars.(Breetz, 2018)During interviews, several participants shared that the price of new EVs was simply beyond their budget. This economic barrier can reduce enthusiasm for the environmental benefits. Even when people believe EVs are better for the environment, the high initial cost makes it harder for them to commit.

Importantly, the study found a clear gap between what participants believed and what research shows about the total cost of owning an electric car. While studies have shown that EVs are

cheaper over their lifetime because of lower maintenance costs (Nykvist, 2019), many participants assumed that the high purchase price meant higher long-term costs too. This shows that there is a lack of public understanding about the full economic picture of EVs, highlighting the need for better consumer education to explain the total cost benefits over time.

Further, when it comes to policy and the total cost over a vehicle's lifetime. In Sweden, the electricity used to charge electric cars comes mostly from clean sources, which means emissions during the use phase are very low around 0.6 tons of CO<sub>2</sub> over the vehicle's life. (Mobility Sweden, 2023). Many participants were aware of this and mentioned that "charging with Swedish electricity is green." However, few brought up the emissions linked to producing the car especially the battery. As (Ellingsen, 2016) show, electric cars shift more of their environmental impact to the manufacturing stage because battery production requires a lot of energy. In other words, much of the EV's carbon footprint happens before it even hits the road. Our interviews suggested that most people hadn't perceived about this. Many assumed that if a car runs on electricity, it must be clean overlooking the emissions from its production. This shows a clear gap in awareness people tend to separate what happens during use from what happens during manufacturing, which could affect how well they understand EVs' full environmental impact.

The role of economic incentives clearly showed how policy can link economic and environmental sustainability in practice. Many participants mentioned that government subsidies made electric cars more appealing by helping with the high upfront cost, showing that such support is effective in reducing financial barriers. However, some also questioned how long these subsidies would last and whether they are fair for everyone. This shows that people are becoming more aware of how economic policies can support environmental goals, but their understanding is still developing. It suggests that future policies should more clearly explain how financial incentives help achieve broader sustainability targets.

### 6.1.3 Economic and Social impacts

The connection between economic and social aspects mainly relates to fairness and how financial policies affect different groups in society. A key theme that came up is how economic incentives such as subsidies and tax breaks are not always equally helpful for everyone. Research of (Egnér, 2018) shows that early buyers of electric cars are usually people with higher incomes, since they are more likely to benefit from these financial supports. Interview participants were aware of this. Many mentioned that most EC owners they knew were well-paid and lived in private houses. This supports wider findings that wealth is linked to EC ownership. The concern is that if mainly wealthier people can afford to buy ECs even with subsidies, then the environmental benefits, such as reduced emissions, are not equally shared. This creates a tension with the goals of sustainability. A policy that helps the environment should also aim to be fair and not increase inequality. Some participants in our study questioned this balance.

In response to these concerns, some experts suggest designing subsidies in a fairer way, for example, offering bigger incentives to low- or middle-income buyers or making cheaper EC models more affordable. This kind of policy could help make electric cars more accessible and improve social acceptance by linking economic support with social fairness. (Muehlegger, 2018) Although participants didn't suggest such technical solutions directly, they expressed a clear desire for more fairness. This shows that individuals are becoming aware of the link between economic and social factors, they notice the imbalance, even if they're not sure how to fix it.

Although participants did not always express directly, their responses suggest that they perceive the need for fairer subsidy systems for electric cars. Many participants viewed EC ownership as a sign of higher social or economic status, which could increase social inequality if lower-income groups cannot afford these vehicles. (Axsen, 2019) In contrast, the possible social benefits of EVs such as helping families save money through lower running costs were less clearly perceived. Participants also showed limited perception of wider social and economic changes, such as how the growth of the EV industry might affect jobs and employment in the future.

## 6.2 Conclusion

This study shows that individuals in Sweden hold a thoughtful and layered perception of the sustainability impacts of electric car (EC) usage, especially when viewed through the environmental, economic, and social lenses of the Triple Bottom Line framework. Most participants strongly perceived electric cars as environmentally beneficial, particularly for reducing tailpipe emissions, cutting noise pollution, and improving air quality and public health in urban areas. However, their understanding of sustainability often focused on these visible operational benefits. There was less awareness around the broader lifecycle impacts, especially those related to battery production, material sourcing, and end-of-life recycling. This highlights the need for more public education about the full environmental footprint of electric cars, including the importance of circular systems and sustainable supply chains.

From an economic perspective, individuals clearly perceived cost as a central factor in shaping their views on EC sustainability. The high purchase price was frequently mentioned as a key barrier, often outweighing recognition of long-term savings such as lower fuel and maintenance costs. While some studies revealed that ECs can be more affordable over time, many participants still felt uncertain about these benefits. This suggests a gap between actual cost-efficiency and how it is perceived, pointing to the need for clearer communication and consumer guidance. Participants also acknowledged the role of government support such as subsidies and tax incentives in making ECs more affordable. However, they expressed concern that these benefits mostly reach higher-income households, raising questions about fairness. To promote more widespread adoption, it is important that economic incentives are designed to improve accessibility for a broader range of income groups.

Further On the social sustainability perspective, participants highlighted the importance of fairness and inclusivity in the transition to electric mobility. One major concern was unequal access to charging infrastructure, especially between urban and rural areas. Some individuals worried that this gap could increase existing social inequalities. It was clear that for EC adoption to be truly sustainable, it must be socially inclusive as well as environmentally friendly. Furthermore, electric vehicle ownership in Sweden carries strong symbolic and social value, often perceived as an indicator of status or environmental responsibility. This social signalling was identified as a powerful motivator driving adoption among environmentally

conscious communities. At the same time, participants pointed out practical challenges, such as the need for behavioural changes and better planning around public charging infrastructure. These findings suggest that social norms, access, and daily usability all influence how people perceive electric vehicles.

When looking across all three dimensions environmental, economic, and social it becomes clear that while Swedish individuals have identified the interconnectedness of environmental, economic, and social factors, their perceptions frequently remain fragmented rather than fully integrated. Many people spoke about one or two aspects at a time, without clearly linking them. However, when encouraged to think more broadly, some participants did make connections for example, noting how cleaner air can lead to better public health and lower healthcare costs. This shows potential for developing a more integrated understanding of sustainability in public discussions around electric mobility.

Finally, individuals specially current users and potential buyers in Sweden generally perceive electric cars as a positive step toward achieving sustainability goals, particularly in environmental terms. However, concerns about economic barriers and social fairness remain. Promoting electric car as a truly sustainable transport option will require a more balanced and integrated approach. This includes improving public understanding of lifecycle impacts, communicating long-term economic benefits more clearly, and ensuring that policies support inclusive access for all. By addressing these interconnected issues together, Sweden can strengthen public trust and accelerate the transition to sustainable mobility and achieving sustainability goals in a way that benefits everyone.

## Recommendations and Future Directions

To conclude this master's thesis, the author provides some practical recommendations for policymakers, car manufacturers, and other relevant stakeholders to help improve how people in Sweden understand the sustainability impact of electric car usage, along with ideas for future research.

1. Many participants were not fully aware of the environmental impacts related to battery production, recycling, and the sources of electricity used to charge ECs. This gap in knowledge suggests the need for better information at the point of purchase. Car manufacturers and government agencies should provide clear and accessible explanations of these topics when people are considering buying an electric car. In the long term, it would also be useful to include basic knowledge about electric vehicle sustainability such as battery life cycles and clean energy use in school education. This could help build a deeper understanding among future generations and contribute to national sustainability goals.

2. Car manufacturers and marketers should focus more on communicating the broader environmental and social benefits of battery electric cars. These include reduced air and noise pollution, improved public health, and support for future climate goals. Aligning marketing strategies with what matters to consumers such as environmental responsibility and social fairness can help increase EV adoption and make sustainability more visible in everyday decision-making.

3. One of the main concerns raised by participants was the high upfront cost of ECs, which limits access for low-income groups. To make ECs more affordable for everyone, the government should design subsidies and incentives in a fairer way, offering more support to lower-income households. This would help ensure that the environmental benefits of electric cars are shared more equally across society.

4. Some participants were unsure about the rules and duration of government incentives. This shows the need for better communication about financial support programs. Information about incentives should be easy to understand, translated into multiple languages, and shared through local community centers, public websites, and outreach campaigns. Clear communication can help more people take advantage of these programs.

5. Participants also highlighted a lack of charging stations in rural and low-income areas, which creates barriers to EV use. To reduce this gap, public charging infrastructure should be

expanded more evenly, especially in areas that are currently underserved. Policymakers can support municipalities by funding public charging points, shared community chargers, or even mobile charging units. This would make it easier for more people to adopt EVs, regardless of where they live.

In addition, future electric car policies should focus more on social fairness. The transition to electric vehicles should not only benefit wealthier households it should be accessible and practical for everyone. Policies should ensure that electric cars are not just seen as a luxury, but as an affordable and socially fair solution for sustainable transport. Furthermore, the findings of this study offer valuable insights for Swedish policymakers, urban planners, and sustainability professionals. They provide clear evidence that can inform the design of targeted incentives and more effective communication strategies ones that highlight the full sustainability benefits of battery electric cars, not just environmental but also social and economic.

In addition, Future research could explore how digital tools, like mobile apps for charging, battery tracking, or comparing EV costs, affect how people understand the sustainability of electric cars. It would also be valuable to study underrepresented groups such as low-income families, older adults, or immigrants to understand their specific experiences with EVs. Finally, future studies could use more methods, like observing people using EVs in real life or following changes in people's opinions over time, to gain a deeper understanding of how sustainability perceptions evolve as Sweden continues its shift toward electric mobility.

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## Appendix 1 – Interview Guide

### **Ethical Considerations**

Your participation in this study is completely voluntary, and your responses will remain confidential. All data collected during the interview will be anonymized to protect your identity. If you agree, this interview will be audio-recorded solely for academic purposes, and the recordings will not be shared or used beyond this study. You are free to skip any question or withdraw from the interview at any time if you feel uncomfortable or inconvenienced. Thank you for your time and insights.

### **Introduction**

Good [morning/afternoon] and thank you very much for taking the time to participate this interview. with us today. My name is...., and I am conducting research as part of my master's thesis in Sustainable Service Management at Lund University.

The aim of my study is to explore how current electric car users understand and perceive the sustainability impacts of their vehicle use. While electric cars are widely seen as an important part of the green transition, there is still limited research on whether users are fully aware of the broader implications such as battery production, electricity sources, recycling challenges, and overall lifecycle emissions.

By hearing directly from individuals like yourself, who have already adopted electric vehicles and who are supposed to buy an electric car. We hope to gain a deeper understanding of the motivations, experiences, and perceptions that shape this transition. Your insights will contribute to a better understanding of how public awareness around electric car sustainability is evolving in Sweden. Participation in this interview is entirely voluntary, and you may skip any question or withdraw from the discussion at any time without explanation. Before we begin, I would like to walk you through a few ethical considerations to ensure that your confidentiality and rights are fully protected.

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### **3. Interview Questions**

#### **Section A : Introduction and Background –**

##### **Participant Background**

- Could you briefly introduce yourself (e.g., age, profession, location)?
- Do you have an electric car ?
- For current users: When did you purchase your electric car, and what model do you own?
- For potential buyers: Have you considered purchasing an electric car?



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## Section B : Purchase Motivation and Influencing Factors

### Decision-Making Factors

- What are the main reasons that have influenced your interest in electric cars? (e.g. saving money, caring for the environment, convenience, Maintenance cost, fuel prices, )
  - Have any financial offers, like government discounts or tax benefits, influenced your decision?
- 

## Section C: Challenges, Barriers, and Information Sources

### Barriers and Challenges

- **For current users:** What challenges have you faced in using an electric car, especially regarding issues such as charging infrastructure or sustainability-related concerns?
- **For potential buyers:** What do you perceive as the biggest barriers to purchasing an electric car (e.g., high upfront cost, inadequate charging infrastructure, concerns about battery life or sustainability claims)?

### Policy and Communication

- How effective do you find government policies and incentives in promoting electric vehicle adoption and sustainability?
- 

## Section E: TBL Dimensions

- How would you describe your understanding about sustainability?
- Do you think that electric cars are truly sustainable? Why or why not?
- Do you have any idea about sustainable impact of an electric cars ?

### Environmental Sustainability

Before deciding to buy or while considering the purchase of an electric car, did you research its environmental impact? If yes, what specific aspects did you focus on (e.g., battery production, electricity generation, battery disposal)?

- What are your thoughts about the environmental impact of electric cars compared to petrol or diesel cars?
- Have you thought about where the electricity for charging comes from? Does that affect your view of how environmentally friendly they are?

- Do you think electric cars help reduce problems like air pollution or traffic noise in your area
- Do you feel that electric cars help improve things like air quality or noise in your community?
- What do you know or think about how batteries are made or what happens to them after use?

### **Economic Sustainability**

- How do you feel about the overall cost of electric cars—from buying to charging and maintenance?
- Do you think owning an electric car helps save money in the long run?
- Are financial concerns a major reason for choosing or not choosing an electric car?
- Have you experienced (or do you expect) any cost-related challenges, like charging costs, maintenance, or resale value?
- Do you see electric cars as a smart and long term investment for the future?

### **Social Sustainability**

- Do you think electric cars are affordable and available for most people in Sweden?
- Are there any groups in society—like those living in rural areas or with lower income—that might be left out of the shift to electric cars?
- In your opinion, does using an electric car help make society more fair, healthy, or responsible?
- Have you noticed that your community or city is becoming more supportive of electric mobility?
- Do you feel part of a broader social movement when you think about electric cars?

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## **Section E: Future Outlook and Recommendations**

### **Sustainability Enhancement**

- What do you think should be done to improve the sustainability of electric vehicles in the long term?
- In your view, how could car manufacturers and policymakers better educate or support consumers in understanding the full environmental impact of electric vehicles?

### **Personal and Broader Implications**

- For current users: Reflecting on your experiences, would you make the same decision to purchase an electric car today? Why or why not?
  - For potential buyers: What additional information or support do you need before making a decision regarding the purchase of an electric car?
-

## Final Thoughts

Is there anything else you would like to share regarding your perceptions of electric vehicle sustainability or your personal experience with electric mobility?

Do you have any suggestions for how sustainability in the context of electric vehicles can be better communicated or enhanced?

Thank you very much for your valuable insights and time. Your responses will greatly contribute to our understanding of consumer awareness and perceptions of the sustainability impacts of electric vehicles in Sweden. If you have any further thoughts after our discussion, please feel free to reach out.

## Appendix 2 – Thematic Analysis Coding Matrix- Semi structured interview

### Theme 1 - Environment Aspect

| Sub Themes                                      | Codes                                                                                                                                                                                                             | Examples of Quotations                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Findings                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Tailpipe Emissions &amp; Noise Reduction</b> | -Tailpipe emissions;<br><br>- noise; near-silent operation;<br><br>zero emissions;<br><br>tailpipe-free driving;<br><br>partial production impact;<br><br>tailpipe emissions elimination ;<br><br>noise reduction | <b>Interview 1:</b> “They help reduce tailpipe emissions and lower our reliance on fossil fuels. That’s a big environmental benefit, especially in urban areas.”<br><b>Interview 2:</b> “It doesn't give any noise and no smoke I mean no air pollution when comparing to other cars.”<br><b>Interview 4:</b> “They don’t make much noise unless someone’s playing loud music. They also don’t produce emissions while driving.”<br><b>Interview 5:</b> “It was so quiet that I had to double-check whether it was actually on.”<br><b>Interview 6:</b> “I think they would help... they reduce air and | The sub-theme of Tailpipe Emissions & Noise Reduction focuses on two key environmental benefits of electric vehicles (EVs): the reduction in tailpipe emissions and noise pollution. EVs are considered environmentally advantageous because they produce zero tailpipe emissions they do not release pollutants like carbon dioxide (CO <sub>2</sub> ), nitrogen oxides (NO <sub>x</sub> ), or particulate matter (PM), which are common with fossil fuel-powered cars. These pollutants contribute significantly to air pollution, smog, and respiratory issues in urban areas. Additionally, noise reduction is an important benefit of EVs. They are much quieter than traditional vehicles, reducing noise pollution in cities. This quieter operation has significant benefits for public health and quality of life in densely populated areas where noise can be harmful. | <ul style="list-style-type: none"> <li>Participants clearly recognize that ECs do not produce tailpipe emissions, which leads to a significant reduction in air pollution. Many emphasized that this benefit is particularly important in urban areas where pollution is a major issue.</li> <li>The zero-emissions feature of EVs is seen as a major environmental advantage, contributing to improved public health and better air quality.</li> <li>Many participants noted that Ecs are much quieter than traditional cars, which contributes to a reduction in noise pollution in cities. This is appreciated not only for</li> </ul> |

|                         |                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-------------------------|----------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                         |                                  | <p>sound pollution, especially compared to petrol cars.”</p> <p><b>Interview 7:</b> “EVs don’t have tailpipe emissions, so they reduce air pollution and greenhouse gases.”</p> <p><b>Interview 8:</b> “EVs don’t produce tailpipe emissions...that’s good for public health.”</p> <p><b>Interview 9:</b> “EVs are cleaner in terms of what comes out of them, for sure.”</p> <p><b>Interview 9:</b> “It doesn’t emit any other toxic emission to the environment and that’s a really good thing.”</p> <p><b>Interview 10:</b> “Overall I believe that electric cars much better than much Much better than the fossil fuel vehicles.”</p> <p><b>Interview 11:</b> “I think electric cars are supposed to be better.”</p> <p><b>Interview 12:</b> “electric vehicle, yeah, I mean, when it comes to electric vehicle, there's so there's no noise on those cars...they are so quiet.”</p> <p><b>Interview 13:</b> “it might not emit any...harmful gases to the environment and so less noise.”</p> <p><b>Interview 14:</b> “there are very many silent cars.”</p> <p><b>Interview 15:</b> “they prevent air pollution and they don't create any noise when it comes to noise.”</p> | <p>While participants recognize the advantages of zero emissions and noise reduction, they also acknowledge that the production process of EVs, particularly battery manufacturing, has environmental costs. Despite these concerns, most participants still view EVs as more environmentally friendly than conventional petrol or diesel vehicles, contributing positively to sustainability.</p> | <p>comfort but also for its environmental benefits, enhancing the quality of life in urban areas.</p> <ul style="list-style-type: none"> <li>Overall, participants are highly aware that EVs contribute to environmental sustainability, primarily through the elimination of tailpipe emissions and the reduction of noise pollution. They view EVs as a key solution to urban environmental issues such as air quality and noise pollution.</li> </ul> |
| <b>Battery Producti</b> | Battery manufactur<br>ing impact | Interview 7 - “Electric cars have battery waste, but some                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Participants recognize that while electric car batteries are necessary for clean transportation, their                                                                                                                                                                                                                                                                                             | - Participants are aware that battery production for EVs has a negative environmental                                                                                                                                                                                                                                                                                                                                                                    |

|                                  |                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
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| <p><b>on &amp; Recycling</b></p> |                             | <p>companies are working on battery recycling...they can be reused.”</p> <p>Interview 11: “Battery production isn't great for the environment</p> <p>Interview 3: “I hope they are being recycled properly. Like with other types of batteries, we have to dispose of them in special bins.”</p> <p>Interview 5: “I’ve seen how Northvolt handles battery recycling. They have a good system to recover materials and reuse them</p> <p>Interview 15: “I don't have a clear picture of what happens to them. But what I know is that for the batteries, they need to go through a specific process so that they are recycled properly without any impact to the environment.”</p> | <p>production can have a negative impact on the environment. The process of extracting materials like lithium and cobalt for batteries requires a lot of resources and energy, which can cause harm to nature. Some participants also express concern about whether battery recycling is effective enough, even though they acknowledge that some companies are working on improving it.</p>          | <p>impact, especially due to the extraction of lithium and cobalt.</p> <ul style="list-style-type: none"> <li>- While respondents acknowledge the benefits of EVs in reducing emissions and pollution, they also see the environmental costs of battery production as a concern.</li> <li>- There is recognition of efforts by some companies, like Northvolt, to improve battery recycling and reduce the environmental impact.</li> <li>- Battery recycling is seen as important, but many participants express uncertainty about whether current recycling processes are sufficient to make EVs truly sustainable in the long run.</li> </ul> |
|                                  | <p>Recycling challenges</p> | <p>Interview 6 “I’ve heard only a small fraction of battery materials get reused.”</p> <p>Interview 12: “some people...when it comes to replace batteries...they're not reused.”</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | <p>Participants recognize that battery recycling for electric cars is still in the early stages. Many express concerns that only a small fraction of the materials from old batteries are being recycled. Some also note that when EV batteries need to be replaced, they are not always reused. This inefficiency in recycling is seen as a significant barrier to making EVs truly sustainable.</p> | <p>-People are aware that battery recycling is still limited, and only a small portion of materials are currently being reused.</p> <ul style="list-style-type: none"> <li>- While respondents acknowledge the environmental benefits of electric cars, they are concerned about the sustainability of EVs due to challenges in battery recycling and material recovery at the end of the vehicle’s life.</li> <li>- Recycling limitations are seen as an area needing</li> </ul>                                                                                                                                                                |

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|                                          |                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | improvement to ensure that EV adoption contributes to a sustainable future.                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>3. Charging Energy Source for EVs</b> | Renewable energy for charging    | <p>Interview 1: “If I’m charging my car using renewable energy—like hydropower or wind, which Sweden has a lot of—then the benefits are even greater.”</p> <p>Interview 4: “Where I live, most electricity comes from hydro plants, so charging is very green.”</p> <p>Interview 6: “If someone is using fossil fuels to generate electricity to charge the EV, it’s not sustainable</p> <p>“Our workplaces...giving free charging for the whole day</p> | <p>Participants recognize that using renewable energy like hydropower or wind to charge electric vehicles (EVs) greatly improves their sustainability. Many mention that when the electricity used to charge EVs comes from clean sources, the overall environmental impact of the EV is much lower. However, they also point out that if the charging energy comes from fossil fuels, the benefits of electric cars are reduced, making them less sustainable. Charging with renewable energy is considered the ideal situation for maximizing EVs’ positive environmental effect</p> | <p>-Participants understand that the sustainability of EVs isn’t just about driving without emissions, but also about the source of electricity used for charging.</p> <p>- Many respondents see renewable energy as the key to making EVs truly sustainable, reducing their overall lifecycle emissions.</p> <p>- Charging infrastructure powered by clean energy is recognized as a major factor for ensuring that electric car adoption leads to real environmental benefits</p>     |
|                                          | Grid dependence and fossil fuels | <p>• “I worry about charging in winter when the grid demands spike on fossil sources.” (Interview 14)</p> <p>“If the electricity comes from coal, EVs aren’t much better for the climate.” (Interview 9)</p> <p>Interview 12 - Charging on a fossil-fuel powered grid reduces EV’s environmental gains.”</p>                                                                                                                                             | <p>Participants are aware that the source of electricity used for charging electric vehicles (EVs) plays a critical role in determining their overall environmental benefits. Many respondents recognize that if charging relies on fossil fuels, such as coal or gas, the environmental advantages of EVs are significantly reduced. In particular, concerns are raised about winter months, when grid demand spikes and more fossil fuels are used. There is a clear understanding that to achieve true sustainability, EVs must be charged with renewable energy.</p>               | <p>-A significant portion of participants recognize that fossil-fuel-dependent grids reduce the environmental gains of EVs.</p> <p>-Many are perceive that charging EVs on a grid powered by coal or natural gas impacts their overall carbon footprint, making them less sustainable.</p> <p>-Participants show a sophisticated understanding that for EVs to be fully environmentally sustainable, they need to be paired with green energy sources, such as solar or wind power.</p> |
| <b>4. Lifecycle</b>                      | Full-lifecycle emissions         | Interview 16 - Even with zero tailpipe output, EVs still have                                                                                                                                                                                                                                                                                                                                                                                            | Participants recognize that while electric vehicles (EVs) produce zero emissions during operation,                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | - Respondents show strong understanding that EVs’ sustainability isn’t just about                                                                                                                                                                                                                                                                                                                                                                                                       |

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| <b>Carbon Footprint</b>                                    |                                  | a carbon footprint upstream.”                                                                                                                                                                                                                                                                                        | they still have a carbon footprint from the manufacturing process and materials used in production, such as batteries. They acknowledge that the full lifecycle of EVs—from production to operation to disposal—needs to be considered to fully understand their environmental impact. While EVs are seen as environmentally friendly, participants point out that upstream emissions from battery production still contribute to their overall carbon footprint                                                                                                         | operational emissions, but also about the emissions during manufacturing and end-of-life disposal.<br><br>- While zero emissions during driving are recognized as a significant advantage, participants are aware of the carbon footprint involved in producing and disposing of EVs, indicating a comprehensive view of their environmental impact.                                                                                                                                      |
|                                                            | Production vs. operation balance | <p>“I’m aware of the trade-off between making the battery and driving clean.” (Sarah)</p> <p>Interview 12 - “It takes about 20 000 km of driving to break even on CO<sub>2</sub> emissions.”</p>                                                                                                                     | Participants have understood that while electric car produce very low emissions during operation, the production process, especially the manufacturing of batteries, still results in significant emissions. Many respondents refer to the "break-even" point—the distance after which the environmental benefits of driving EVs outweigh the emissions produced during manufacturing. This shows a deeper understanding that EV sustainability is tied to both production and operation, and battery manufacturing is a key factor in the overall environmental impact. | <p>- Respondents show an advanced understanding of the “trade-off” between the emissions from battery production and the lower emissions during EV operation.</p> <p>- Many participants are aware of the break-even point, where the environmental benefits of driving EVs become greater than the initial production emissions, indicating a sophisticated awareness of EV lifecycle sustainability.</p>                                                                                |
| <b>5.Resource Consumption in Electric car x§Production</b> | Raw-material impacts             | <p>Interview 4: “Battery production requires materials from all over the world, and transporting them isn’t good for the environment</p> <p>“Interview 1: “I have learned that mining for battery materials, like lithium and cobalt, has environmental and ethical issues, especially in developing countries.”</p> | Participants understand that battery production for electric vehicles (EVs) relies on the extraction of materials such as lithium, cobalt, and nickel, which have significant environmental impacts. This includes ecosystem damage, water use, and transportation emissions from sourcing materials around the world. Many respondents are aware that mining these materials often takes place in developing countries, where there may also be ethical concerns related to labor practices and environmental protection.                                               | <p>-Participants are aware of the environmental and ethical costs involved in the mining of materials like lithium and cobalt, indicating that they consider both short-term and long-term sustainability when thinking about EVs.</p> <p>- While they recognize the environmental benefits of EVs, they are also concerned about the hidden costs of resource extraction and its impact on ecosystems, showing a comprehensive understanding of EVs’ full life-cycle sustainability.</p> |

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|                                 | Energy consumption in manufacturing  | <p>“EV factories use enormous amounts of power to make batteries.” (Interview 5)</p> <p>“We need greener factory energy to improve EV sustainability.” (Kirill)</p> | Many participants recognize that while electric vehicles (EVs) offer environmental benefits, the manufacturing process, particularly the production of batteries, requires significant amounts of energy. This energy consumption, often overlooked, can contribute to emissions if the energy sources used in the manufacturing plants are not renewable. Participants highlight the importance of ensuring that greener production processes are used to minimize the environmental impact of manufacturing, especially in terms of energy use. | <ul style="list-style-type: none"> <li>- There is a strong belief that for EVs to be truly sustainable, cleaner and more energy-efficient manufacturing processes are required.</li> <li>- Many respondents express the need for industry-wide innovation to reduce the energy consumption involved in producing EVs, emphasizing that sustainability should extend beyond the operation of the vehicle to include production practices as well.</li> </ul>                                                                                                                   |
| 5. Urban Environmental Benefits | Reduction in urban smog              | Interview 3- I think that...if more people switched to EVs, the city air seems clearer.”                                                                            | Participants commonly link the increased adoption of electric vehicles (EVs) to visible reductions in urban smog and particulate matter. Many respondents note that as more people switch to EVs, the air quality in cities improves, leading to healthier urban environments. These observations suggest that participants not only see the environmental benefits of EVs but also recognize their direct impact on public health, especially in urban areas where air pollution is a major concern.                                             | <ul style="list-style-type: none"> <li>-Participants are aware that EV adoption leads to a reduction in urban smog and improves air quality in cities, which is often linked to healthier environments.</li> <li>- They connect the use of EVs not just to environmental benefits but also to real-world improvements in public health, particularly in areas with high pollution.- This shows that individuals understand the health benefits of EVs, beyond just their ecological advantages, and recognize how they help create cleaner, healthier urban spaces</li> </ul> |
| 6. Climate Change               | Contribution to climate change goals | Interview 11. Electric cars are central to achieving our Paris climate commitments.                                                                                 | When asked about the role of electric vehicles (EVs) in fighting climate change, participants emphasized that EVs are crucial for meeting global climate goals. They highlighted how EVs can help reduce greenhouse gas emissions, making them central to efforts like the Paris Agreement to keep global warming below 1.5°C. In interviews, many explained that transitioning to electric cars is a necessary step for countries like Sweden, and for the world, to achieve climate sustainability.                                             | <ul style="list-style-type: none"> <li>- Participants are aware that widespread EV adoption is critical for reducing emissions and achieving international climate targets like the Paris Agreement.</li> <li>- They see EVs as an important solution to mitigating climate change, helping to limit global warming and reach climate goals.</li> <li>- Respondents understand that electric vehicles are a necessary step toward a sustainable future, aligning</li> </ul>                                                                                                   |



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|                                               |                         |                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | with Sweden's and the world's climate object                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|                                               | GHG reduction potential | Interview 12 - "Every EV on the road helps reduce global warming." (Interview 12) | This refers to how electric vehicles (EVs) contribute to reducing greenhouse gas (GHG) emissions on a large scale. Even though EVs reduce emissions at the individual level, they are also a key part of global efforts to reduce overall carbon emissions and fight climate change. The adoption of more EVs can help achieve major climate goals, such as those set by the Paris Agreement. By replacing traditional vehicles, EVs play a crucial role in lowering the amount of harmful gases in the atmosphere, making them a vital part of sustainable mobility.                                                                                                    | <ul style="list-style-type: none"> <li>- Respondents recognize that EVs help reduce global GHG emissions, not just individual carbon footprints, making them essential in tackling climate change.</li> <li>- They see EVs as a key solution to global emissions reduction, supporting a systemic view of sustainable mobility.</li> <li>- This understanding reflects a shift in how participants view transportation and climate policy, with many seeing EVs as directly contributing to achieving global climate goals.</li> </ul>                                            |
| <b>7. Sustainable Manufacturing Practices</b> | Recycled materials      | Interview 18 - "I want more recycled plastics in EV interiors."                   | This refers to the use of recycled materials in the production of electric vehicles (EVs). Using materials like recycled plastics and metals in car manufacturing helps reduce the need for extracting new resources from the environment. This practice is important because resource extraction such as mining for metals and plastics can have significant environmental impacts, including damage to ecosystems and high carbon emissions. By using recycled materials, the manufacturing process becomes more sustainable, helping to close the loop on resource use and align with circular economy principles, where materials are reused rather than discarded.. | <ul style="list-style-type: none"> <li>- Participants emphasize that sustainable manufacturing practices, like using recycled materials, are critical for making EVs more environmentally friendly.</li> <li>- There's a growing awareness that resource extraction for car production has a significant environmental impact, and recycling is an important way to reduce this impact.</li> <li>- Where materials are reused and recycled instead of being discarded—are increasingly seen as a key factor in reducing the environmental footprint of EV production..</li> </ul> |

## Theme 2 - Economic Aspect

| Sub Themes | Codes | Examples of Quotations | Description | Findings |
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| Purchase Cost & Incentives | Initial cost        | <ul style="list-style-type: none"> <li>• “Electric cars are almost twice as expensive as fuel cars.” (Interview 6)</li> <li>• “Not everyone can afford the upfront cost.” (Interview 9)</li> <li>• “The initial cost is definitely the biggest obstacle.” (Interview 1)</li> </ul>                                | The initial cost of electric vehicles (EVs) is often seen as a significant barrier to adoption. EVs tend to be more expensive upfront compared to traditional gasoline vehicles, making them out of reach for many potential buyers. While government subsidies, tax incentives, and loans can help alleviate some of this financial burden, the higher initial cost remains a key challenge. Despite the long-term savings in fuel and maintenance, the price premium is still considered a major factor that limits broader adoption of EVs..  | <ul style="list-style-type: none"> <li>- Participants recognize that the high initial cost of EVs is a major barrier to adoption, even though they understand the long-term environmental benefits.</li> <li>- Government subsidies and incentives help, but the price premium for EVs compared to traditional vehicles remains a significant financial obstacle for many, especially those in lower-income groups.</li> <li>- While there is awareness of the fuel and maintenance savings over time, the upfront cost still limits many people from adopting EVs, impacting their perception of the overall sustainability of EVs.</li> </ul>                                                                                                      |
|                            | Incentive awareness | <ul style="list-style-type: none"> <li>• “I was encouraged by the government climate bonus.” (Interview 7)</li> <li>• “I’ve heard there are some incentives in Sweden, but they aren’t always clearly communicated.” (Interview 1)</li> <li>• “The government is giving us a discount.” (Interview 10)</li> </ul> | Awareness of financial incentives, such as tax rebates, government climate bonuses, and subsidies, is an important factor in helping individuals afford electric vehicles (EVs). While many participants are aware of these programs, they feel that the incentives are not always well-publicized or clearly communicated. Those who are aware of the incentives feel more confident and empowered to make an EV purchase, but there is a noticeable gap in knowledge, indicating a need for better communication about these support programs. | <ul style="list-style-type: none"> <li>- Participants who are aware of financial incentives like government bonuses and subsidies feel more empowered to purchase an EV, recognizing the economic benefits of these programs.</li> <li>- However, many participants feel that information about these incentives is often unclear or difficult to find, which limits their ability to take full advantage of the available support.</li> <li>- The lack of effective communication about these incentives suggests that while individuals understand the potential benefits of EVs, they may not be fully aware of the financial assistance available, impacting their decision to adopt EVs and hindering the sustainability transition.</li> </ul> |

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| <b>2. Operating Costs &amp; TCO</b>               | <b>Charging cost</b>       | <ul style="list-style-type: none"> <li>• “Charging is cheaper than fuel... you can save money over time.” (Interview 4)</li> <li>• “Charging is cheaper... there are no oil changes, fewer brake repairs.” (Interview 8)</li> <li>• “The cost of charging is low, but I worry about public charging stations being too expensive.” (Interview 10)</li> </ul> | <p>Charging an electric vehicle (EV) is typically much cheaper than refueling a conventional car, and many participants highlight that they save money over time, especially when they can charge at home. However, there are concerns about the cost of public charging stations, as some participants feel these can be too expensive compared to home charging or traditional fuel costs. The affordability of charging is an important factor for those considering EVs, as it directly affects the overall long-term cost savings.</p>                                                             | <p>-Home charging is seen as the most cost-effective option for long-term savings, with many participants noting it as a key reason for choosing EVs.</p> <p>-While charging at home is cheaper, public charging stations are still a concern for some, as they can be relatively expensive compared to fuel.</p> <p>-The cost of charging plays a crucial role in making EVs affordable in the long term, and public charging costs remain a significant factor that could influence the wider adoption of EVs.</p>                                                                                                                                                              |
|                                                   | <b>Maintenance savings</b> | <ul style="list-style-type: none"> <li>• “Maintenance is much cheaper... no petrol engine breakdowns.” (Interview 5)</li> <li>• “It’s cheaper to maintain, but battery replacement could cost a lot.” (Interview 7)</li> <li>• “No oil changes mean less hassle and cost.” (Interview 13)</li> </ul>                                                         | <p>When it comes to maintenance savings, people are aware that electric vehicles (EVs) tend to require a lot less routine maintenance compared to traditional cars. For example, there are no oil changes and fewer engine breakdowns, which reduces the long-term costs. Some participants mention that battery replacement can still be a big cost, but overall, the maintenance costs are much lower for EVs. This is seen as a positive for EV ownership, not only because it saves money, but also because it means fewer resources are used for repairs, which is better for the environment.</p> | <p>- Many people understand that EVs need fewer repairs, especially since they don't require things like oil changes. This means less waste and fewer resources are used over time, which contributes to the overall sustainability of EVs.</p> <p>- While battery replacement can still be a concern, most participants feel that the long-term savings on things like maintenance make EVs more sustainable and affordable in the long run.</p> <p>- People see lower maintenance costs as not just a financial benefit, but also a sustainable impact, since it reduces the need for frequent repairs and resources that are typically required for conventional vehicles.</p> |
| <b>3. Resale Value &amp; Long-Term Investment</b> | Resale uncertainty         | <ul style="list-style-type: none"> <li>• “I do worry about resale value. Electric car technology is evolving fast.” (Interview 1)</li> </ul>                                                                                                                                                                                                                 | <p>The resale value of electric vehicles (EVs) is often seen as uncertain. Many participants express concerns about how evolving technology, like improvements in battery capacity and the release of new models, can affect the</p>                                                                                                                                                                                                                                                                                                                                                                    | <p>-People are aware that the resale value of EVs can be unpredictable, especially as technology advances quickly, making it hard to maintain value over time.</p> <p>-The concern about resale value is tied to the fear that rapid improvements in</p>                                                                                                                                                                                                                                                                                                                                                                                                                          |

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|                                        |                                 | <ul style="list-style-type: none"> <li>• “Resale value is always changing.” (Interview 9)</li> <li>• “I expect challenges with resale value. It's hard to resell any car, and EVs are no exception.” (Interview 3)</li> </ul>                                                                                          | <p>second-hand value of EVs. With the rapid changes in electric car technology, it's difficult for buyers to predict how well they will be able to resell their EV in the future. This uncertainty about resale value can make some people hesitant about committing to an EV, even though they understand its benefits for the environment.</p>                                                                                                                                                                                                   | <p>battery technology and the introduction of new EV models could lead to faster depreciation in older models, which could affect their long-term value.</p> <ul style="list-style-type: none"> <li>- While participants recognize the environmental benefits of EVs, their uncertainty about resale value reflects a concern about long-term investment and how technology changes might affect the overall sustainability of EV ownership.</li> </ul>                                                                                                                                                        |
|                                        | Battery life uncertainty        | <ul style="list-style-type: none"> <li>• “I'm concerned...battery life will I need an expensive replacement?” (Interview 7)</li> <li>• “Battery replacement is a big cost when the warranty runs out.” (Interview 8)</li> <li>• “Will the battery last long enough to make the car worth it?” (Interview 5)</li> </ul> | <p>A major concern for potential electric car buyers is the uncertainty around battery life. Many participants worry about how long the battery will last and whether they will face high replacement costs once the warranty runs out. This uncertainty is especially important as it affects both the performance of the car and its resale value. As battery degradation over time is inevitable, participants are concerned about how it will impact the overall cost-effectiveness and long-term sustainability of owning an Electric car</p> | <ul style="list-style-type: none"> <li>-Participants are aware that battery wear is a significant factor in the sustainability of EV ownership, as it impacts both the performance of the car and its resale value.</li> <li>- The uncertainty around battery life makes some people hesitant to purchase EVs, as they are concerned about the cost of battery replacement once the warranty expires.</li> <li>- Clear warranty options are seen as crucial for buyers to feel confident about the long-term investment in EVs, particularly regarding the sustainability of the vehicle over time.</li> </ul> |
| <b>4. EV Market &amp; Job Creation</b> | Growth of EV-related businesses | <ul style="list-style-type: none"> <li>• “My cousin got hired at a new EV battery plant.” (Interview 7)</li> <li>• “I see job growth in sustainable industries linked to EVs.” (Interview 3)</li> </ul>                                                                                                                | <p>As the EV market grows, more jobs are created in areas like battery manufacturing, charging infrastructure, and vehicle production. This economic shift has created new opportunities for sustainable employment.</p>                                                                                                                                                                                                                                                                                                                           | <ul style="list-style-type: none"> <li>-Participants are aware of the economic growth tied to the EV market, particularly in terms of job creation in sectors like battery plants and charging infrastructure. And many recognize that the expansion of the EV sector is contributing to the creation of sustainable jobs, which is seen as a positive impact on the economy.</li> <li>-This awareness reflects a broader understanding that</li> </ul>                                                                                                                                                        |

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|                                           |                                      |                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | EV adoption not only benefits the environment but also creates a stronger, more sustainable economy, demonstrating the interconnected nature of economic and environmental sustainability.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|                                           | Government incentives for businesses | <ul style="list-style-type: none"> <li>• “More companies are offering EV benefits for employees.” (Interview 7)</li> <li>• “Businesses get incentives for installing chargers.” (Interview 6)</li> </ul>                                                          | Government incentives for businesses play a crucial role in supporting the transition to sustainability by encouraging companies to invest in EV infrastructure, such as charging stations and fleet electrification. These policies help businesses adopt electric vehicles and make charging infrastructure more accessible. By incentivizing companies to offer EV benefits to their employees, the government promotes a broader shift towards sustainable mobility across both individuals and organizations. | <p>-Participants are aware that government incentives for businesses, such as tax breaks and grants, are helping to increase EV adoption by making it more affordable for businesses to install charging stations and electrify their fleets.</p> <p>- Many participants see these policy incentives as crucial for not just encouraging individual EV purchases, but also for creating a more widespread infrastructure that supports EV adoption across industries.</p> <p>- This reflects a holistic understanding that government support for businesses is essential in creating a sustainable ecosystem, where both consumer adoption and infrastructure development are aligned to accelerate the EV transition.</p> |
| <b>5. Depreciation &amp; Resale Value</b> | Depreciation rate                    | <ul style="list-style-type: none"> <li>• “I’m worried my EV will lose half its value in a few years.” (Interview 8)</li> <li>• “The resale value drops fast with older models.” (Interview 5)</li> <li>• “I think depreciation is more significant for</li> </ul> | The depreciation rate of electric vehicles (EVs) is a significant concern for potential buyers, with many participants noting that EVs lose value faster than traditional cars. This rapid value loss is often linked to advancements in EV technology, such as improvements in battery capacity and the release of newer models. As the technology evolves quickly, older EV models, especially                                                                                                                   | <p>-Electric cars are seen as having a higher depreciation rate compared to traditional cars, mainly due to rapid technological advancements and shorter battery life in older models.</p> <p>-Many participants are concerned that their EV’s resale value will drop quickly, particularly as new technologies make older models less valuable.</p>                                                                                                                                                                                                                                                                                                                                                                        |

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|                                |                                | EVs than for petrol cars.” (Interview 9)                                                                                                                                                                                                                                                                   | those with shorter battery life, tend to depreciate more sharply, making resale value a major factor in the decision to purchase.                                                                                                                                                                                                                                                                                                                                | -The depreciation of EVs is a significant consideration for buyers, as they seek assurance that their vehicle will retain value over time.                                                                                                                                                                                                                                                                                                                                                                                                  |
|                                | Warranty vs post-warranty risk | <ul style="list-style-type: none"> <li>• “Battery warranty is a huge selling point for me.” (Interview 7)</li> <li>• “I’m not sure how much the car will be worth once the warranty ends.” (Interview 6)</li> <li>• “The warranty covers most of my concerns about depreciation.” (Interview 5)</li> </ul> | Many participants express concerns about the risks associated with electric vehicle (EV) ownership once the warranty expires, particularly regarding battery life and resale value. A strong battery warranty is seen as a key factor in mitigating these risks, offering peace of mind that battery performance will be covered. However, the uncertainty about the post-warranty period and its impact on depreciation is a concern for many potential buyers. | <ul style="list-style-type: none"> <li>-Warranty coverage is essential for buyers, as it helps mitigate depreciation and ensures battery performance over time.</li> <li>-Many participants are unsure about the value of their EV once the warranty ends, making longer warranties a preferred option to reduce financial risks.</li> <li>- The warranty is viewed as a way to build confidence in the long-term sustainability of EVs, especially regarding resale value and battery life.</li> </ul>                                     |
| <b>6. Affordable EV Models</b> | Low cost entry models          | <ul style="list-style-type: none"> <li>• “The Leaf is affordable but the range isn’t ideal for long trips.” (Interview 7)</li> <li>• “The lower price means I can’t get the features I need.” (Interview 5)</li> <li>• “Affordable EVs don’t have the range for my commute.” (Interview 3)</li> </ul>      | Affordable EV models like the Nissan Leaf or Renault Zoe provide a lower-cost option for entering the EV market. However, many consumers feel that these budget models come with trade-offs, such as limited range or fewer features, which may not meet their driving needs. For long-distance drivers, the range limitations of these models are often seen as a barrier to adoption, even though the lower price makes them more accessible.                  | <ul style="list-style-type: none"> <li>- Participants see budget EV models as an affordable way to enter EV ownership, but they note that these models often have limited range and fewer features.</li> <li>- Range limitations in these models are a concern, especially for those who need a car for long trips or commutes.</li> <li>- While these affordable models lower the initial cost, participants feel that the trade-offs in range and features could limit the sustainability of EV adoption for some individuals.</li> </ul> |
|                                | Incentives for affordable EVs  | <ul style="list-style-type: none"> <li>• “Subsidies help a lot with the cost of an affordable EV.” (Interview 13)</li> <li>• “I would never have bought an EV without the</li> </ul>                                                                                                                       | Government incentives, such as subsidies and tax credits, are an important factor in making affordable electric vehicles (EVs) more accessible to people, especially those with lower incomes. These incentives                                                                                                                                                                                                                                                  | - Participants recognize that government incentives, such as subsidies and tax credits, play a key role in making affordable EVs more accessible, especially for those with lower incomes.                                                                                                                                                                                                                                                                                                                                                  |

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|                                  |                             | <p>government incentives.” (Interview 5)</p> <p>• “Incentives for budget models make them more feasible.” (Interview 2)</p>                                | <p>help reduce the upfront cost of EVs, making them more attractive to potential buyers who might otherwise find them financially out of reach. The support from government programs is seen as crucial for encouraging EV adoption, especially among consumers who face financial barriers.</p>                                                                                                                                  | <p>- Many respondents mention that they wouldn’t have bought an EV without these incentives, highlighting the financial relief they provide.</p> <p>- Incentives for budget EV models are seen as essential for broadening adoption, making it easier for individuals with financial constraints to consider EVs as a viable option</p>                                                                                                                                                                                                                                                 |
| <b>8. Future Economic Impact</b> | Long term financial benefit | <p>• “In the long run, it’s worth the investment.” (Interview 3)</p> <p>• “I can save a lot on fuel and repairs over the next 10 years.” (Interview 4)</p> | <p>Many participants see purchasing an electric vehicle (EV) as a long-term investment. While the initial cost of an EV may be higher, they recognize that the savings on fuel, maintenance, and taxes over several years will eventually make up for this higher upfront cost. This long-term financial outlook is a key factor in their decision to choose EVs, as they expect the benefits to outweigh the costs over time</p> | <p>-Long-term savings on fuel, maintenance, and taxes are seen as major financial benefits of owning an EV, with participants viewing the purchase as an investment that will pay off in the coming years.</p> <p>- While the initial cost can be a concern, many participants are willing to make short-term sacrifices for the long-term financial benefits that come with owning an electric car</p> <p>- This highlights that financial sustainability plays a critical role in EV adoption, with many consumers recognizing that EVs offer substantial savings in the long run</p> |

### Theme 3 - Social Aspect

| Sub Themes                 | Codes                          | Examples of Quotations                                                                                     | Description                                                                                                                                                                                                               | Findings                                                                                                                                                                                               |
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| <b>Equity &amp; Access</b> | <b>Charging infrastructure</b> | <p>• “Charging infrastructure, especially outside urban areas, still needs improvement.” (Interview 1)</p> | <p>A major barrier to electric vehicle (EV) adoption is the uneven distribution of charging infrastructure. While urban areas tend to have more charging stations, many participants pointed out that rural areas and</p> | <p>Participants are aware that charging infrastructure is not equally available everywhere, with rural areas and apartment buildings facing significant challenges in accessing charging stations.</p> |

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|  |                                   | <ul style="list-style-type: none"> <li>• “We don’t have a lot of charging stations. It’s possible to charge at the grocery store, but it’s not always convenient.” (Interview 3)</li> </ul>                                                              | <p>apartment settings are often lacking in charging options. The difficulty in charging at home or finding a charger outside of urban zones is a key concern for those considering EV ownership. This issue reflects the challenge of ensuring geographic access to sustainable charging infrastructure for all potential users.</p>                                                  | <p>-Many participants recognize that the lack of convenient charging options outside urban areas is a barrier to EV adoption, particularly for those who cannot charge at home.</p> <p>-This awareness suggests that unequal access to sustainable infrastructure remains a key challenge in making EVs accessible to a broader population, especially those living in rural or non-urban settings.</p>                                                                                          |
|  | <b>Rural access</b>               | <ul style="list-style-type: none"> <li>• “If they have their own charging point at home, that’s not a big issue.” (Interview 10)</li> <li>• “In rural areas, chargers are few and far between, so it’s hard to consider an EV.” (Interview 6)</li> </ul> | <p>In rural areas, access to EV charging stations is limited, making it harder for residents to consider EVs as a viable option. While having a home charging point can resolve this for some, the lack of charging stations in less populated areas remains a major barrier to EV adoption, affecting those far from urban infrastructure</p>                                        | <p>-Rural areas face significant charging infrastructure gaps, making it difficult for people to adopt EVs without access to home chargers.</p> <p>-Participants recognize that rural areas are disproportionately affected by this issue, and improving charging access in these areas is crucial for wider EV adoption.</p> <p>-Many believe that prioritizing rural charging infrastructure is essential for making EV adoption a nationwide reality.</p>                                     |
|  | <b>Income based affordability</b> | <ul style="list-style-type: none"> <li>• “Not everyone can afford an electric car.” (Interview 9)</li> <li>• “Students with lower income...out of reach.” (Interview 11)</li> </ul>                                                                      | <p>The high upfront cost of electric vehicles (EVs) is a major barrier, especially for low-income individuals and families. Even with subsidies or financial incentives, many participants acknowledge that EVs are still out of reach for certain groups, such as students or those with lower incomes, making them less accessible for a significant portion of the population.</p> | <p>-Affordability is recognized as a significant barrier to EV adoption, particularly for low-income groups.</p> <p>-Many participants are aware that, despite subsidies, the initial cost of EVs remains a major obstacle, making them less accessible for financially constrained individuals.</p> <p>-This reflects a broader awareness of the economic disparities that exist in sustainable transportation, impacting the sustainability of EV adoption across different income groups.</p> |



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|                                    | <b>Apartment charging challenges</b> | <ul style="list-style-type: none"> <li>• “I live in an apartment without a driveway... I worry about finding public chargers.” (Interview 8)</li> <li>• “In cities, many don’t have the option to charge at home.” (Interview 12)</li> </ul>                                               | For many living in apartment complexes, charging an EV can be difficult, especially if they don't have a private driveway. Limited parking and lack of charging points in apartment settings make it harder to charge EVs at home, which creates a significant barrier to EV adoption, particularly in high-density urban areas.                                                              | <ul style="list-style-type: none"> <li>- Charging infrastructure is a major barrier for people in apartment buildings, where access to private charging is often not possible.</li> <li>-Participants recognize that without charging options in apartment settings, EV adoption becomes much harder, particularly in urban areas where parking is limited.</li> <li>-Many see shared charging solutions within apartment complexes as essential to making EVs more accessible and sustainable for urban residents</li> </ul>         |
|                                    | <b>Dual vehicle strategies</b>       | <ul style="list-style-type: none"> <li>• “They always buy...one electric vehicle and one petrol vehicle...not everyone can afford both.” (Interview 12)</li> <li>• “People in rural areas buy one EV and one petrol car for longer trips.” (Interview 10)</li> </ul>                       | Many households adopt a dual vehicle strategy, using an EV for short commutes and a petrol/diesel car for longer trips. This helps manage range anxiety and lack of charging infrastructure, providing a practical solution for families.                                                                                                                                                     | <ul style="list-style-type: none"> <li>- Participants see the dual vehicle strategy as a way to make EV adoption feasible, balancing range concerns and charging limitations.</li> <li>- However, it suggests that full EV adoption may not be viable for everyone in the short term due to charging challenges and long-distance driving needs.</li> </ul>                                                                                                                                                                           |
| <b>Social Norms &amp; Identity</b> | Peer visibility                      | <ul style="list-style-type: none"> <li>• “I’ve also seen more EVs on the road, which shows that adoption is picking up.” (Interview 2)</li> <li>• “Definitely. It feels like we’re moving toward something better—cleaner, more efficient, and more responsible.” (Interview 1)</li> </ul> | When people see more electric vehicles (EVs) on the road, it makes them feel like owning one is becoming socially accepted. As EVs become more common in social circles and communities, people start to think of them as just part of the mainstream shift to cleaner, more efficient cars. It's no longer just an environmentally driven choice but something that feels normal in society. | <ul style="list-style-type: none"> <li>-When people see more EVs on the road, they start to think, "Hey, this is becoming the norm," and that makes them more comfortable with the idea of buying one.</li> <li>-The more visible EVs are in social circles, the more they are seen as a socially responsible choice rather than just a green one. It's like EVs are becoming part of the broader shift toward a more sustainable world.</li> <li>-This shows that peer influence and the growing social acceptance of EVs</li> </ul> |

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|  |                             |                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | play a big role in helping people decide to switch to an electric car.                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|  | Movement identity           | <ul style="list-style-type: none"> <li>• “It feels like they’re the future...technologically advanced...aligns with my values.” (Interview 4)</li> <li>• “It feels like being part of a shift toward a cleaner and smarter future...there’s a sense of community around EVs.” (Interview 8)</li> </ul> | Owning an electric car isn’t just about getting from one place to another it’s about being part of a bigger movement toward a cleaner future. People see EVs as a way to align with the values of reducing carbon footprints and contributing to environmental action. For many, it’s about feeling like they’re part of a community that’s working together for a more sustainable world.                                                                      | <p>-People view owning an EV as a way to be part of a social movement that’s all about progress and sustainability, which really aligns with their personal values.</p> <p>- Many see EVs as symbols of progress and feel a strong sense of belonging to a group that’s working toward a better, greener future.</p> <p>-This sense of community around EVs helps reinforce the idea that adopting an electric car is not just a personal choice it’s about contributing to a collective effort for a sustainable world.</p> |
|  | Community momentum          | <ul style="list-style-type: none"> <li>• “It feels like being part of a shift toward a cleaner and smarter future...there’s a sense of community around EVs.” (Interview 8)</li> <li>• “I feel part of a broader social movement.” (Interview 9)</li> </ul>                                            | More and more people are starting to see EV adoption as a shared goal in their communities. It’s not just about getting a car it’s about being part of a bigger movement toward a cleaner, smarter future. As communities become more aware of the environmental benefits of EVs, it feels like local culture is shifting toward sustainability. For many, choosing an EV is part of something much larger a community effort to reduce our impact on the plane | <p>-For a lot of people, adopting an EV is seen as part of a broader social movement, with everyone working together toward a greener future.</p> <p>-As more communities embrace sustainability, it feels like their personal choice to get an EV is helping to move the larger environmental effort forward.</p> <p>-This shows a real cultural shift more and more people are connecting their individual choices with community goals to create a more sustainable world.</p>                                            |
|  | Generational/peer influence | <ul style="list-style-type: none"> <li>• “The new generation is moving towards electric cars...maybe I’m interested because of that shift.” (Interview 7)</li> </ul>                                                                                                                                   | A lot of younger generations are really pushing the shift toward electric cars (EVs). They’re driven by sustainability values, and it’s starting to feel like owning an EV is just part of being in the next generation of transportation. As more young people adopt EVs,                                                                                                                                                                                      | <p>-Peer influence is huge when it comes to EV adoption, especially among younger people who are more focused on sustainability.</p> <p>- Many participants feel that this shift to electric cars is being driven by younger generations, who are leading</p>                                                                                                                                                                                                                                                                |

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|                                                 |                                          | <ul style="list-style-type: none"> <li>• “It feels like being part of the next generation of transport.” (Interview 4)</li> </ul>                                                                                      | they’re encouraging their friends and peers to follow suit. It’s becoming a cultural norm where choosing an EV is not just about the car it’s about being part of something bigger, like a movement toward a greener future                                                                                                                                                                                                | <p>the charge in sustainable transportation.</p> <ul style="list-style-type: none"> <li>- It shows how sustainability is becoming deeply ingrained in youth culture, with more people seeing EVs as the natural choice for a cleaner, greener future.</li> </ul>                                                                                                                                                                                                                                                                                         |
|                                                 | <b>Future readiness mentality</b>        | <ul style="list-style-type: none"> <li>• “It feels like being part of a shift toward a cleaner and smarter future.” (Interview 8)</li> <li>• “It aligns with my values...EVs are the future.” (Interview 4)</li> </ul> | For many people, choosing an electric car isn’t just about meeting their current needs; it’s about being part of a shift toward a smarter, cleaner future. They see EVs as more than just a practical choice it’s an investment in a sustainable world. They believe that EVs are future-ready and contribute to achieving broader global sustainability goals, helping create a climate-positive future                   | <p>-Many people view EVs as part of a future-oriented decision, where they’re investing in a sustainable future rather than just solving today’s transportation needs.</p> <ul style="list-style-type: none"> <li>- EVs are seen as the future by many, aligning with personal values of environmental responsibility and contributing to global sustainability efforts.</li> <li>-This shift in mindset shows that future readiness plays a big role in EV adoption, with many seeing it as a step toward a greener, more sustainable world.</li> </ul> |
| <b>Public Health &amp; Community Well-being</b> | Health benefits of Electric car adoption | “They prevent air pollution and don’t create any noise.” (Interview 11)                                                                                                                                                | Participants have understood that electric car contribute to better public health by reducing air pollution and noise. By not emitting harmful pollutants and being much quieter than traditional vehicles, EVs help improve air quality and reduce particulate pollution. These benefits are seen as key factors in promoting community well-being, demonstrating how EC adoption has a positive impact on public health. | <p>-EC adoption is often seen as a way to improve public health by reducing air pollution and noise, it makes the community healthier.</p> <ul style="list-style-type: none"> <li>- People understand that EVs are not just a personal environmental choice but also play a role in creating healthier, cleaner communities.</li> <li>- This shows that EVs offer social benefits too, helping improve quality of life for everyone, not just the person driving the car.</li> </ul>                                                                     |
|                                                 | Public transport synergy                 | • “They’re reducing congestion, which is a big issue in                                                                                                                                                                | Participants see electric cars not just as an alternative to traditional cars but as part of                                                                                                                                                                                                                                                                                                                               | -ECs aren’t just a <b>replacement</b> for regular cars; they’re seen as part of a                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |

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|                                              |                              | <p>cities.” (Interview 9)</p> <ul style="list-style-type: none"> <li>• “They prevent air pollution and they don't create any noise when it comes to noise.” (Interview 11)</li> </ul>                                      | <p>a larger transportation system that includes public transport. ECs help reduce congestion in cities, which is a big issue in urban areas. They also make the streets quieter and cleaner by preventing air pollution. The idea is that EVs can work in synergy with public transport, offering a more sustainable mobility option that complements, rather than replaces, existing public transport networks.</p>                                      | <p>system that works alongside public transport to reduce traffic and pollution in cities.</p> <ul style="list-style-type: none"> <li>- A lot of participants believe that using a combination of ECs and public transport is a more sustainable option than relying on personal cars alone.</li> <li>- This shows that EC adoption can be part of a larger push toward multi-modal transport, where different transportation options work together to create a cleaner and more efficient way to get around.</li> </ul> |
| <b>Cultural Shifts Toward Sustainability</b> | Shifting cultural perception | <ul style="list-style-type: none"> <li>• “It feels like they’re the future... technologically advanced.” (Interview 4)</li> <li>• “Driving an EV shows people you care.” (Interview 5)</li> </ul>                          | <p>Owning an electric car today is about more than just having a car it’s becoming a cultural statement. People are starting to see EVs as symbols of progress. They represent modern technology that’s helping create a more sustainable future. Driving an EC shows others that you care about the environment and want to be part of the shift toward greener, more sustainable technologies.</p>                                                      | <p>-ECs are becoming a sign of being part of the future—they’re seen as innovative and a way to contribute to sustainability.</p> <p>-A lot of people feel that by owning an EC, they’re showing that they care about the environment and are helping fight climate change.</p> <ul style="list-style-type: none"> <li>- This reflects a cultural change, where driving an EV is more about being part of a movement for a greener, cleaner world.</li> </ul>                                                            |
|                                              | Mainstreaming sustainability | <ul style="list-style-type: none"> <li>• “I’ve seen more EVs on the road, which shows that adoption is picking up.” (Interview 2)</li> <li>• “The new generation is moving toward electric cars.” (Interview 7)</li> </ul> | <p>It’s clear that sustainability is becoming more and more mainstream these days, and electric vehicles (EVs) are a big part of that shift. People are starting to see EVs on the road everywhere, and it's no longer just something for a select few. They’re becoming a normal part of everyday life. This shows that EV adoption isn’t just a trend for a niche group anymore it’s becoming a natural step in the movement toward greener living.</p> | <p>-Participants are noticing more EVs on the road, which shows that EV adoption is really picking up and becoming part of the mainstream.</p> <ul style="list-style-type: none"> <li>- EVs are no longer just for the elite or environmentally focused few they’re starting to feel like the next logical step for everyone.</li> <li>- This shows that sustainability is moving from something that’s separate to</li> </ul>                                                                                           |

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|                                            |                                 |                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                   | something that's part of everyday life, with EVs leading the way as a sign of progress in society.                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Public Policy &amp; Social Behavior</b> | Low emission zones              | <ul style="list-style-type: none"> <li>• “Low-emission zones forced me to consider EVs.” (Interview 1)</li> <li>• “It’s easier to drive an EV in the city with these policies.” (Interview 9)</li> </ul> | So, low-emission zones (LEZs) are really pushing people to think about getting an electric car , especially in cities. With these zones limiting access to high-emission vehicles, many people are seeing EVs as the easier option. It's making it simpler for people to drive an.                                                | <p>-Low-emission zones are making people more likely to consider ECs, as they make it easier to drive without facing city restrictions.</p> <p>-A lot of people see these policy incentives as a strong motivator to switch to EVs, which helps speed up the adoption process.</p> <p>- It shows that government policies are really shaping how people make decisions about sustainability, showing how policy and social behavior are connected.</p>                                                         |
|                                            | <b>Incentives and subsidies</b> | <ul style="list-style-type: none"> <li>• “The government grant made it affordable.” (Interview 7)</li> <li>• “Subsidies helped me make the transition.” (Interview 12)</li> </ul>                        | Financial incentives and subsidies play a huge role in making electric vehicles (EVs) more affordable. A lot of participants mention how government grants or subsidies helped make the initial purchase much easier. These policies reduce the upfront cost, allowing more people to invest in ECs and support the green economy | <p>-Subsidies and incentives are seen as essential for making ECs more affordable, especially for those who might not have been able to buy one otherwise.</p> <p>-Participants recognize that these financial incentives are key to overcoming the economic barriers to EC adoption, making it easier for lower-income groups and the broader society to access ECs.</p> <p>-This shows that government support is crucial in helping people move toward sustainable choices and expanding the EC market.</p> |

### Appendix 3 – Thematic Analysis Coding Matrix – Document Analysis

| Document Name                                                | Author(s)       | Year | Relevant Pillar        | Codes                             | Findings                                                                                                         |
|--------------------------------------------------------------|-----------------|------|------------------------|-----------------------------------|------------------------------------------------------------------------------------------------------------------|
| <b>Vehicle adoption and the bonus-malus policy in Sweden</b> | Bergh, H.       | 2024 | Economic               | bonus-malus policy, incentives    | Shows how government incentives influence individual decisions and economic perceptions of EV adoption.          |
| <b>GHG emissions of combustion vs electric cars</b>          | Bieker, G.      | 2021 | Environmental          | lifecycle GHG, emissions          | Supports participants' perception that EVs are cleaner, but also raises awareness of hidden lifecycle emissions. |
| <b>The political logics of clean energy transitions</b>      | Breetz, H. L.   | 2018 | Economic / Political   | energy transition politics        | Helps explain why individuals may be uncertain or divided in their trust of policy and institutional motives.    |
| <b>Sustainability Report 2021 (Sweden)</b>                   | Business Sweden | 2021 | Environmental / Social | corporate goals, public messaging | Reflects how sustainability messaging from official sources shapes public perception of EV benefits.             |
| <b>The European Green Deal</b>                               | EU Commission   | 2019 | Environmental          | climate policy, emission targets  | Aligns with how people perceive EVs as key to national and EU climate efforts.                                   |
| <b>Circular Economy Action Plan</b>                          | EU Commission   | 2020 | Environmental          | recycling, resource recovery      | Encourages public awareness of circular economy important for understanding sustainability beyond just driving.  |
| <b>Battery &amp; Waste Regulation (2023)</b>                 | EU Commission   | 2023 | Environmental          | battery lifecycle, regulation     | Reinforces concerns participants expressed about battery recycling and                                           |

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|                                                        |                  |      |                          |                                        | lifecycle sustainability.                                                                              |
| <b>EVs: A shift to cleaner, cheaper transport</b>      | Gore, T. V.      | 2021 | Economic                 | affordability, efficiency              | Supports participant views that EVs offer running cost savings, but upfront cost remains a barrier.    |
| <b>Global EV Outlook 2024</b>                          | IEA              | 2024 | Economic / Environmental | EV adoption trends, infrastructure     | Helps contextualize participants' views with real-world infrastructure progress and policy incentives. |
| <b>GHG Emissions from Lithium-Ion Batteries</b>        | IVL Institute    | 2017 | Environmental            | battery production, lifecycle          | Backs up participant concerns that EVs have environmental impacts at the production stage.             |
| <b>Social norms &amp; opinion leadership in Sweden</b> | Jansson, J.      | 2017 | Social                   | social influence, peer effects         | Directly relates to how Swedes' EV choices are shaped by social norms, status, and community values.   |
| <b>Conceptualizing the circular economy</b>            | Kirchherr, J. R. | 2017 | Environmental            | reuse, material flow                   | Supports deeper perceptions of sustainability that go beyond emissions—toward full lifecycle thinking. |
| <b>Psychology of Sustainable Consumption</b>           | Kotahwala, K.    | 2023 | Social                   | sustainable behavior, value alignment  | Explains why some individuals perceive EVs as an ethical or identity-driven choice.                    |
| <b>EV vs Petrol Cost Analysis (Sweden)</b>             | Mobility Sweden  | 2023 | Economic                 | cost comparison, fuel savings          | Mirrors individuals' mixed perceptions many value long-term savings but hesitate due to upfront cost.  |
| <b>Gold mining and sustainability</b>                  | Mudd, G. M.      | 2010 | Environmental            | resource extraction, ecological impact | Helps explain why some participants express concern over mining impacts tied to battery production.    |

