

# "We may want the transition, but we don't actually want the transition"

A discourse analysis of Swedish policies to incentivise charging infrastructure development for electric vehicles

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Independent project • 30 credits Swedish University of Agricultural Sciences, SLU Faculty of Natural Resources and Agricultural Sciences Department of Urban and Rural Development Environmental Communication and Management - Master's Programme Uppsala 2022

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Credits:	30 credits
Level:	Second cycle, A2E
Course title:	Master thesis in Environmental science, A2E
Course code:	EX0897
Programme/education:	Environmental Communication and Management - Master's Programme
Course coordinating dept:	Department of Aquatic Sciences and Assessment
Place of publication:	Uppsala
Year of publication:	2022
Copyright:	All featured images are used with permission from the copyright owner.
Online publication:	https://stud.epsilon.slu.se
Keywords:	Policy analysis, discourse analysis, electric vehicles, charging infrastructure, fleet electrification, fossil free transport sector.

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#### Abstract

As Swedish government aims for the transition to a fossil fuel-free transport sector by 2030, it becomes clear that the electrification of the fleet is one of the biggest ambitions to achieve that goal. The process is hindered by various factors and one of them is the development of charging infrastructure which has been proven a bottleneck in the transition to a fossil free passenger car fleet.

Drawing on Bacchi's approach "What's the problem represented to be?" this paper conducts an analysis of policy discourses on the development of charging infrastructure and further investigate the hindrances in policymaking. Building on an analysis of policy documents and interviews with stakeholders within the sector, it was possible to identify three problem representation clusters: uneven development of charging infrastructure that hinders the electric vehicle uptake, socio-economic dilemmas in the development of the charging infrastructure, and the mandate of the public sector. The paper therefore further systematized the knowledge connected to what hinders the development of charging infrastructure for electric vehicles in the Swedish context.

*Keywords:* Policy analysis, discourse analysis, electric vehicles, charging infrastructure, fleet electrification, fossil-free transport sector.

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## Abbreviations

EV	Electric Vehicles
ER	Report "Analysis and proposals for better access to
	charging infrastructure for home charging regardless of
	housing type" conducted by the Swedish Energy Agency
SLU	Swedish University of Agricultural Sciences
WPR	"What's the problem represented to be"

### Preface

It has long been clear that the withdrawal from a fossil fuel-based industry is a necessary step for climate change mitigation. Now once more, the fossil fuel industry showed its nature as Europe found itself dependent on Russian oil in times when paying for the oil of the aggressor country indirectly causes the death of civilians in Ukraine. I have one reason of a personal character to mention it here:

This thesis was written in the times of war when every day before opening my laptop I had to check if my relatives and close ones are still alive and sometimes it was not the case.

Metaphorically speaking, yesterday was the most favorable moment to make a transition to a fossil-fuel-free era and it is a shame that today we have not taken this step to a full extent yet. This research will not aim to solve all the world's problems but hopefully contribute with an insight on how to develop a more synchronized decision-making process and further research for a more effective transition to the electrification of the fleet and refusal of petroleum-based cars. With this thesis, I hope to develop a discussion on what hinders the transition to the petroleum-free transport sector. It may be a drop in the ocean but at least it is not made of oil.

I am convinced that with every decision, policy, and purchase made, we vote for the future that we choose to have, so let us vote for the future that excludes violence and petroleum.

## 1. Introduction

Reducing and ultimately removing society's dependence on the fossil fuel industry is crucial for climate change mitigation. The transport sector has a large share of Sweden's overall domestic greenhouse emissions (Swedish Climate Policy Council, 2022).

The target of net-zero emissions was set by the Swedish parliament aiming for the transition to a fossil-fuel-free transport sector by 2030 (SOU, 2013). The commitment is to reduce emissions by 70 percent by 2030 compared to 2010 levels. Electric vehicle (EV) adoption plays a central role in this process. Electrification of the fleet is a necessary but problematic step that is characterized by recurring obstacles. There is an ongoing discussion among researchers (e.g. Peng et al, 2017; Franzò & Nasca, 2021) on the extent to which electric vehicles perform better in terms of greenhouse gas emissions in comparison with internal combustion engine vehicles. This discussion notwithstanding, and despite the consequences of lithium mining that is needed for battery production as well as the battery supply chain (Egbue & Long, 2012), EVs are generally portrayed as one of the ways to decrease the dependency on fossil fuels from the transport sector (Guo & Clinch, 2021; Jochem et al., 2015). Naturally, this is based on the premise that the electricity used by EVs is generated from nuclear or renewable energy sources (ibid). It has also become evident that the electrification of the fleet cannot be limited to passenger cars but there is a demand for it to be extended to public transport and beyond as a preferred system for the future (Martin et al., 2021).

Given that there are these ambitions, it has been diagnosed that progress along this trajectory is too slow to reach targets in time (SVT, 2022) and that the effectiveness of financial incentives from the Swedish government in the adoption of EVs is inefficient (Harrysson et al. 2015). There is a need to further investigate the factors that hinder the process of electrification of the fleet in a Swedish context.

#### 1.1 Background and literature overview

The transport sector is currently responsible for a total of 32% of Sweden's domestic CO2 emissions and several overarching policy instruments aim to decrease carbon emissions (Swedish Climate Policy Council, 2022).

In this thesis, public policies are understood as "a process comprising the goals, decisions, actions, and inactions that are important in governing a system" (Olsson et al. 2015, p.12), while also adopting the view that the process of policymaking is not static and evolves (ibid). When it comes to policy development in the context of technological innovations and energy efficiency Rosenow et al. (2017) mention the policies increasingly come in complex packages, so called "policy mixes". Kotilainen et al. (2019) emphasized that policies connected to EV adoption are derived from the following policy streams: environmental, energy, transport, taxation, innovation and industrial policies. The same study mentions that there is a need for improved layering of policy instruments and the call for policy mixes for cross-institutional cooperation. The Section 3.1 will further explore these policy mixes in the context of charging infrastructure development for EVs.

The most prominent of policies in this context is probably Sweden's long-term strategy for reducing greenhouse gas emissions offered by the Ministry of Environment (2020). It presents a description of several policy instruments in the transport sector that can be seen as an incentive for the shift towards the electrification of the fleet. The strategy emphasizes the importance of renewable fuels and the development of infrastructure for alternative fuels including electrification, as well as energy-efficient and climate-smart vehicles and ships. To a large extent the transition to fossil fuel independent transport sector is a priority of and managed by the Swedish Energy Agency (Energimyndigheten), Swedish Transport Administration (Trafikverket), and Swedish Environmental Protection Agency (Naturvårdsverket) in cooperation with local governmental entities and other agencies as further elaborated in the stakeholder map (Section 2.3).

When discussing the electrification of the fleet, three general directions are appearing in the debate of policymakers and market actors: the problems connected with the large-scale adoption of (a) heavy-duty vehicles, (b) public transport, and (c) passenger cars. This thesis will be limited to investigating the latter.

#### 1.1.1 The role of charging infrastructure

When it comes to policies and commitments in place, Swedish authorities continuously develop instruments to transform the transportation sector. As the number of EVs is growing, there is a need to address the issues that come with EV maintenance such as the development and optimization of public charging infrastructure. Along with other governmental incentives, such as tax deductions on EVs and support schemes for investments in EV charging infrastructure, it is also vital to make charging infrastructure available for the public, which will be further explored in Section 3.1.

It is important to distinguish between three kinds of charging infrastructure. The first one is public charging infrastructure which refers to the charging stations that are accessible for anyone (usually at a cost), for example, along public highways, in multi-store car parks, at shopping centers, at park-and-ride facilities, or in travel centers. (ER, 2021). The second kind is private charging which has a straightforward meaning and refers to charging stations that are privately owned and not accessible to the public, usually located at a home or a place of work (ibid.). The third kind refers to semi-public charging stations, that are only available for people who belong to a certain group e.g. employees of a company, customers of a shopping center, and similar (Tietge et al., 2016). Consequently, the decision-making when it comes to the development of charging infrastructure may vary depending on the type of charging infrastructure and the stakeholders involved in the process.

Wolbertus et al. (2020) explored stakeholder perspectives on future electric vehicle charging infrastructure developments, resulting in the conclusion that stakeholders within the field mainly differ in their views on a) the extent to which fast charging should play an important role, b) the degree to which smart charging should be the standard in charging, and c) how much the government should intervene in the infrastructure roll-out.

Reviewing studies on policy analysis related to EVs (e.g. Egnér & Trosvik 2018, Mersky et al., 2016), and on behavioral patterns of EV drivers (e.g. Azadfar et al., 2015, Tal et al., 2014), along with research conducted on other external factors that affect the development of charging infrastructure, is relatively recent and published after 2010. This can be connected to several factors: the fact that it is an emerging field and the novelty of the problems that derive in connection to it, as well as the need to further investigate the problems since there is a clear gap between EV adoption and the rollout of charging stations. This gap is one of the main factors that hinder further electrification of the fleet (Bischoff et al., 2019).

A study conducted by Lieven (2015) highlighted the necessity of the development of charging infrastructure through the results of the surveys that were conducted in 20 countries. The results indicated that missing charging facilities and a missing charging network on freeways were considered most problematic for EV drivers. It had also become evident that high financial support for installing charging infrastructure was considered attractive, although the same positive results for EV drivers could be achieved through the combination of lower grants with developed charging infrastructure.

It has been confirmed that among the policies that aim to accelerate EV adoption, the development of charging infrastructure is proven to be one of the most efficient measures (European Court of Auditors, 2021, Lieven, 2015, Mersky et al., 2016,

Sierzchula et al., 2014). The support of charging infrastructure development as a policy instrument that is aimed at EV promotion is previously investigated in other studies (e.g. Mersky et al., 2016, Sierzchula et al., 2014).

When it comes to policy analysis, an empirical study of policy instruments in Sweden within the context of charging infrastructure was previously conducted by Egnér & Trosvik (2018) using an economic theoretical approach where the main findings indicated that the increase in the number of public charging points is directly linked to the growth of the EV adoption rate, especially in urban municipalities. Furthermore, the research suggests that by adjusting policy instruments to the specific characteristics of municipalities and making them visible to the public, their effectiveness can be increased.

As the state of art and policy practice outside Europe is vastly different from the processes in the EU due to the differences in regulatory processes. This paper, therefore, focuses on research conducted in the context of the European Union.

#### 1.2 Problem Formulation

Sweden has developed a range of policies that are aimed to develop charging infrastructure and therefore facilitate the transition to a largely zero-emission vehicle fleet by 2030.

While the policies concerning charging infrastructure are constantly developing, there seems to be a mismatch between the intended and the actual outcome of these policies.

One of the main reasons why I decided to approach the topic of policy analysis specifically targeting the development of charging infrastructure in the Swedish context emerged from my observations as a trainee at a small company that aims to solve challenges in this field. This company is a startup that works on developing a platform aimed to improve cross-sector cooperation among the multiple stakeholders that work with the electrification of the fleet, with a particular focus on the improvement of charging infrastructure for electric vehicles.

Since the development of charging infrastructure is directly influencing the speed of transition to the fossil-free transport sector, many companies work on developing different solutions for issues connected to this industry. The stakeholder map (Section 2.3) illustrates the complexity of the issue as it becomes clear that the problem formulation can be differentiated throughout the sector and can hinder cooperation as well as prolong the decision-making process. There is a clear need to disassemble the problem representation and the formulation of the solution for the above-mentioned issue. The following paragraphs further elaborate on how a discursive perspective is intertwined with policymaking.

There is a need to investigate the processes and connections between technology adoption and the different actors, as well as the mechanisms that govern these interactions. All of these influence the development of electromobility (Swedish Electromobility Center, 2020). To explore the factors that connect technology adoption, governance mechanisms, and various stakeholders, it could be beneficial to discursively examine the problem perceptions underpinning policy development when it comes to charging infrastructure, and why certain solutions are proposed.

Another point of departure for this thesis is related to the premise that the path dependence of institutions has three intertwined components: technical, institutional, and discursive (Low et al., 2006). This thesis refers to the third and examines the assumptions and beliefs about the structure of problems to be solved. The 'discourse network' explains the connection between ideas, decision-makers, and their ideas of what is 'important', what 'the problem is, and how to go about solving it (ibid.).

Understanding how (proposals for) policy interventions are created requires an understanding of how the problems are represented in the first place. Rather than taking shortcuts and directly attempting to generate alternative approaches to the actions of policymakers, this paper will examine the discourses and problem representations as expressed through policies that are aimed at developing charging infrastructure. In this way, it will be possible to explore the underlying assumptions and norms that generate the problem formulations and their possible alternatives.

#### 1.3 Research questions

This master thesis aims to explore the following key questions:

- How is the development of EV charging infrastructure discursively framed and operationalized in Swedish policy-making?
- How does this discursive framing enable and constrain certain social and technological/infrastructural innovations?
- What could an alternative framing look like that enables different approaches to social and technological innovation in the future?

## 2. Research design

To bridge the problem of a technical character such as charging infrastructure with the social science-based nature of communication studies, this paper draws on the WPR approach. This section aims to clarify how this approach is beneficial for the analysis of the discourses underpinning political decision-making and policy implementation. The theoretical framework of this thesis is therefore based on Carol Bacchi's (2009) social constructivist understanding of discourse and her theories of discursive power and problem representation.

#### 2.1 Theoretical Framework

The section seeks to outline the role of discourse in this paper, and at the same time argues for my choice of a theoretical framework. Discourse analysis is a method used to examine the argumentative structure in documents and other written or spoken statements, where discourse is defined as a collection of ideas, concepts, and categories through which meaning is given to various social and physical phenomena (Hajer, 2006).

Discourses, according to Bacchi (2009, p. 35), can be understood as "socially produced forms of knowledge that set limits upon what it is possible to think, write or speak". In this sense, discourse can be considered as a way of expressing an idea about a particular topic or phenomenon, and the language that is used in the process is a way of interpreting and understanding reality (Bacchi 2009). This poststructuralist understanding of language is inspired by Foucault, who in turn describes discourses as practices that form the objects of which we speak in a systematic way (Jørgensen & Phillips, 2002). This view of language is based on a social constructivist approach, as it assumes that our understanding of the world is shaped by various social and political preconditions (Bacchi 2009).

Discourses are thus the way we talk about and understand reality. Shaping and reshaping discourses, therefore, has an influence on our behavior as the way we talk about and understand reality also guides our actions. Discourse analysis aims to examine how a specific knowledge can be created, maintained, and reproduced, and what societal effects it may have (Jørgensen & Phillips, 2002). Since discourses

limit what can be thought or said about a particular phenomenon, they also influence what decisions can be made when it comes to policymaking as an action.

The discourse can be used to identify ways in which problems can be reframed and adjusted to be suited better for the reality of the problem.

Thus, using a discourse analytical approach in this study, we can examine how the discourses underpinning Swedish policies related to charging infrastructure are created and maintained and what effects they may have on policy making and from a wider societal perspective. This approach may elucidate why and how certain policy decisions come about and possibly outline suggestions on how these could be made in different ways.

One of the central concepts of Bacchi's work (2009) is problem representation. Since Bacchi starts from the idea that there are many ways of looking at what is happening in society, there are also many ways of defining what we call "problems". "Problems" defined in various documents and policies are, according to Bacchi, not real problems, but rather interpretations of a problem - a problem representation. Problems are therefore never objective and cannot be considered to have an unambiguous basis. Bacchi stresses that there is a difference between written or stated problems that someone has formulated (problem representations) and real problems that people experience in their everyday lives. Instead of real problems, Bacchi's discourse-analytical approach addresses the problem representations to reach the link between different discourses and the effects they may have on society. One of the examples from her work would be the examination of population, immigration, and citizenship as an interconnected policy area that influences the level and character of the population through several policies implemented e.g. maternity payment, the New Citizen Act, and so on (Bacchi, 2009).

According to Bacchi (ibid), we can make visible how problems are formulated within different discourses by asking the question "What's the 'problem' represented to be?" to a material. The idea is to analyze how problems are formulated and how these formulations constrain and guide what actions can be taken. By examining how the problem is formulated it is possible to attain a deeper understanding of how possible solutions are being framed, and why they are seen as meaningful in the context (ibid.). Following the same way of thinking, it is possible to look at proposed solutions to reconstruct how the problem is understood. A key consequence of implicit problem statements is that the issue is simplified and only part of the story is included: "Problematizations are framing mechanisms; they determine what is considered to be significant and what is left out of consideration" (Bacchi 2009, p. 263).

Examining problematizations also helps us to understand what lies behind different forms of governance. Those who hold public power have a central role in determining which problem representations are given the most space, which in turn influences the political decisions that are being taken. (ibid)

This thesis is not unique in adopting Bacchi's approach to analyzing policyrelated discourse connected to the mobility sector. The research conducted by Rye & Hrelja (2020) presents a policy analysis where the main goal was to investigate the means of cutting car use. Even though the findings were mainly connected to limiting car traffic in cities and therefore not completely relevant to this thesis, the research presents a good explanation of what silences can be recognized in the policy documents and promotes a critical perspective on how to manage suburban and regional car use.

At the same time, the approach was found to be useful for understanding the dynamics of policy problematizations influencing the development of a transport system to reduce car traffic (Hrelja 2019). One of the highlights of the research shows that policy problems are actively forged by planners and politicians in policymaking rather than simply reacting to issues that emerge from societal needs (ibid.). In conclusion, Bacchi's concept (2009) points out that policies are guided by problematization and it is important to interrogate those problematizations and examine the effects that they produce. In the context of this thesis, it means the need to examine further the process of problem formulation in policymaking regarding the development of charging infrastructure as the consequences have a direct impact on certain societal practices (e.g. convenient access to a charging station).

#### 2.2 Methodology

This thesis uses qualitative data, consisting of policy documents, reports, and semistructured interviews, as well as personal observations that were gathered during my internship at the startup that develops a solution for improving charging infrastructure called Eljun. The work that was done in the communication department contributed to this research by providing an insight into the market perspective on the issues connected with the development of charging infrastructure. The main focus was on discovering what practices are limited and enabled by certain documents and tensions concerning different perceptions on how to make charging infrastructure available for everyone.

#### 2.2.1 Data collection

For the largest part of the policy overview, the digital tool Panorama was used to identify relevant policies. The tool summons most of the policies that have been proposed and/or put in place by the Swedish government throughout the years to mitigate greenhouse gas emissions (Swedish Climate Policy Council, 2022). Panorama is developed by the Swedish Climate Policy Council, Energy Agency, and Environmental Protection Agency to create a better understanding of climaterelated policies to achieve the Net Zero 2045 goal. By applying Panorama, it was possible to understand the systematization of a wide range of policies, which simplified the process of data collection and provided an overview of the policy instruments in place. Panorama was used mainly as a guideline for selecting the policy instruments in place. When it comes to the traffic sector, Panorama lists 119 policies taken in relation to the issue for Sweden, dividing them into "Policies in place", "Suggestions" and those that are in the state of "Investigation". For the purpose of this master thesis, only the 9 actions that are related to the development of charging infrastructure for electric vehicles were selected for the analysis and presented in Section 3.1. The main drawback when it comes to using the tool was that some of the data could be outdated as the field of study is characterized by rapid development. That is why the additional scanning of the official governmental websites was done as a complementary method to identify the commitments in place.

Data gathering was therefore complemented by integrating publicly available media resources to identify narratives related to charging infrastructure development of electric vehicles. These included:

- Press releases retrieved from the Swedish Government website
- Articles in various scientific publications
- Reports from organizations that contribute to charging infrastructure development for EVs in a Swedish context

One of the main challenges that emerged during the data gathering process was connected to the selection of what policy instruments should be included in the research and which ones should be left out. On the one hand, focusing on the already implemented policy documents would mean a better insight into politically sanctioned proposals for action (Rehnlund, 2019). With that said, the choice was made for a discussion to include both already implemented actions as well as those that are currently under investigation for a more developed overview of the complexity of the processes that the public sector is engaged in.

The research is further developed by conducting semi-structured interviews with representatives of Trafikverket, Energimyndigheten, Swedish Research Institute, and one of the companies that work within the sector to identify how the available regulations meet their needs and expectations. The interviews were conducted online with an approximate duration of 45 minutes each. In total 4 interviews were conducted and transcribed fully although due to the language barrier, this thesis was

mainly guided by the data gathered from 3 interviewees (see Appendix). The choice of interviewees was carefully made based on the participant's experience within the field. The interviewees were found through the website page of the agency that indicated that they were responsible for the projects within the area. The process of finding interviewees was of a selective nature which resulted in fewer interviews yet providing in-depth insights. Another challenge was also connected to the late or a lack of response from certain stakeholders which limited the number of interviewees to four.

#### 2.2.2 Data analysis

The first step of data analysis was to conduct a discourse analysis of the policy documents, identifying the underpinning problem formulations. During this stage, the main tool for the analysis was the "What's the problem represented to be" approach introduced by Bacchi. Section 2.1 argues that the approach is beneficial for identifying the assumptions that lie behind certain policies and discovering which assessment of the policy can be offered. The analysis was guided by the following questions that are derived from Bacchi's WPR approach (2009):

1. What's the 'problem' represented to be in a specific policy or policy proposal?

2. What presuppositions or assumptions underpin this representation of the 'problem'?

3. How has this representation of the 'problem' come about?

4. What is left unproblematic in this problem representation? Where are the silences? Can the 'problem' be thought about differently?

5. What effects are produced by this representation of the 'problem'?

Throughout the research, the main emphasis was on the first question which helped to identify the problem formulation clusters. The questions that follow were answered within the framework of the problem representation clusters and can be considered a supportive analytical tool for this paper.

Based on the document scanning as well as the policy overview and the interview results it was possible to identify a few strong patterns that seemed to be central to the problem formulations within the development of charging infrastructure. This process was done through "try and error", and the attempt was made to color code the results although, in the end, the decision was made to focus on general patterns without limiting it to keywords as various actors often did not use the same language when framing certain issues and the original language of many documents reviewed was Swedish e.g. Elektrifieringsstrategi (Regeringen, 2022). Stage two

included contrasting these findings with the analysis of the discourses used in interviews and personal observations from the last 6 months that I spent working with a company that is involved in the sector. The original WPR approach has one more set of questions that is excluded from stage one of the research. The question "How has it [the problem representation] been (or could it be) questioned, disrupted, and replaced?" is partly integrated in the results section where the silences of the problem representation are examined and further developed in the discussion to the best of my ability. The alternative solutions were gathered from an interview with a researcher within the field and scanning of the reports from organizations such as E-mobility Sweden and Fossil Free Sweden.

#### 2.3 Research context and limitations

Throughout the period of the thesis writing, contact was established with 7 actors that are in one way or another involved in charging infrastructure discourse while aiming to solve issues that are related to it on various levels. A large part of the interaction was done through email which puts certain limitations on the whole process of research. One of the key reflections that were made from the general approach of the actors to the topic was that the complexity of the problem at hand is approached by each of them differently.

The image below is attempting to illustrate the way I see stakeholders that are working with the sector. The map mirrors mostly personal perception and possibly can be expanded to include a wider range of actors given more time and resources.

One of the observations about stakeholder mapping when it comes to this industry is that throughout the research, new actors kept appearing. To keep it grounded for the reader, this thesis will limit the map to the number of stakeholders that had the most content available in their media channels.



Figure 1. Stakeholder map of the industry.

There are a few insights about the map that gives a good grasp of how the stakeholders relate to each other. The public sector is characterized by a long decision-making process that is targeting long-term strategic planning while the processes in the private sector are more dynamic and agile which contributes to general faster implementation of the projects but implies higher risk. The EV owners are located in the center as they are directly influenced by the actions taken by the actors from both sides of the map. Governmental authorities are operationalizing the development of charging infrastructure through guidelines, strategies, and various initiatives that will be further elaborated on in the results section of this thesis. Each of the actors within the public sector has a specific responsibility but at the same time, their activities are directly intertwined with other actors. For example, a special electrification committee announced by the Ministry of Infrastructure (Regeringskansliet, 2020) included representatives from local governmental bodies (regioner, kommuner), the representatives of grid companies as well as membership organizations and other initiatives. The work of the committee is connected with the investigations of financing issues, possible business models, and how electricity can be quickly distributed to electric roads and fast-charging infrastructure on demand. The Research Institute of Sweden and the Swedish Electromobility Center is placed between the private and the public sector as their research projects have an impact on the development of the stakeholder activity within both public and private sectors.

When it comes to the private sector, market players are organized through an organization called Power Circle, through which they can be to a certain extent involved in policymaking. Power Circle is an organization that aims to disseminate information concerning electrification processes (Power Circle, 2021) with more than 100 various stakeholders involved. A large number of them are startups that work with the development of charging infrastructure but also some actors that at first seem unconnected to the electrification of the car fleet, such as Microsoft and CircleK. The work that is done by startups is also intertwined with municipalities, the energy agency, or other government agencies through various cooperation initiatives.

One of the important stakeholders that were not included in the map is the industry actor Mobility Sweden which works with the process of implementing the roadmap for fossil-free competitiveness within the passenger car industry (Fossilfritt Sverige, 2020). The reason for that is the lack of information on their website which made it difficult for me to proceed with further inquiry. That is how the thought that there is a need to investigate the different problem formulations emerged.

I suggest that the reader views the discourse analysis that is presented in this paper with consideration of the limitations that appeared throughout the process of research. The first is related to the originally narrow knowledge of the author in this field which affected the choice of texts to analyze. It took a long time to identify what sources needed to be prioritized. In the end, the decision was made based on how vivid the problem representations appeared in the parts of the document that presented a material regarding charging infrastructure.

In addition, that order of analysis could have been more consistent. The research started by analyzing the policy incentives as well as investigating the tendencies on the market and then used that information to look at interviews, perhaps the results would be different if it was done in the other way as the lens of the researcher would have been different.

Another point that needs to be taken into account is personal subjectivity (both author's and throughout the interviews) which might have affected the results of discourse analysis. When applying the WPR approach and using Bacchi's guiding questions it is difficult to say to what extent my subjective thinking influenced the results in some parts of the process. Due to a high quantity of data, certain analytical choices needed to be made in a way that seemed the most appropriate for the author, it is possible that these choices could have been made differently by a person with another background.

Due to time restrictions, difficulties with reaching out to certain stakeholders, as well as external issues, the research was adjusted to explore the problem representations largely from the perspective of Swedish governmental authorities.

## 3. Results

This section presents an overview of the commitments taken by the public sector to develop the charging infrastructure for electric vehicles combined with the analysis of problem representations that emerged from policy analysis and information retrieved from the interviews. Three clusters of problem representations were identified and further elaborated after the policy overview.

#### 3.1 Policy overview

While there are several policy instruments, which are aiming to accelerate the adoption of EVs, the main focus of this paper rests on those that are connected to charging infrastructure development.

This section presents a summary of the policy instruments that target the development of charging infrastructure in Sweden. To begin with, the reader will be presented with a short overview of the policies that are already in place, followed by those that are in a stage of investigation.

Tabell 1. An overview of the	policy instruments	taken by the	Swedish government	to develop
charging infrastructure				

Title	Туре	Status	Responsible authority	Problem Representation Cluster
Climate change initiative	Financial action	Implemented	Swedish Environmental Protection Agency	Socio-economic, uneven development
Charging subsidies within Charge the car project	Financial action	Implemented	Swedish Environmental Protection Agency	Socio-economic, uneven development
Energy Performance in Buildings Directive	Policy	Implemented	Government Offices Of Sweden	Socio-Economic, Uneven Deployment,
Rapid charging aid	Financial action	Implemented	Swedish Transport Administration Agency	Socio-economic, uneven deployment
Electrification committee	Cross cutting commitment	Implemented	Swedish Government	Mandate of public sector
Mandatory charging infrastructure	Policy	Under investigation	National Board Of Housing, Building And Planning	Socio-economic, uneven development
Home charging	Administrative action	Under investigation	Swedish Energy Agency	Socio-economic, uneven development
Common payment solution for EV charging	Commitment	Under investigation	Swedish Government	Mandate of public sector, socio- economic
National Electrification strategy	Administrative action	Implemented	Swedish Government	Mandate of public sector, socio- economic, uneven development

The majority of the actions that are currently implemented by the government can be related to a "Financial action", which results in providing financial support for the development of charging infrastructre. The list starts with the Climate Change Initiative (henceforth Klimatklivet) which is a framework that facilitates investments for the reduction of greenhouse gas emissions. A wide range of projects that are related to climate change mitigation is eligible to apply for support. They are evaluated based on how much greenhouse gas emissions are mitigated in relation to the total cost of the project. This means that projects that have the most efficient emission mitigation to cost ratio will have higher chances when comes to receiving support.

The second refers to subsidies within the Charge the Car (Ladda bilen) project and consists of financial support for housing associations, municipalities, organizations and companies, offering up to 15000 SEK compensation per charging station. The scheme does not support private individuals and is managed by the Swedish Environmental Protection Agency.

The last action under the umbrella of "financial action" is state aid for rapid charging stations for electric vehicles along major roads. The aim is to ensure that the main roads of Sweden are sufficiently covered by charging points. In the press release of the Infrastructure department (Government Offices of Sweden, 2020), it is mentioned that state aid is granted for the development of public charging stations for fast charging of electric vehicles in connection with major roads. The purpose of the aid is to cover those areas on the charging infrastructure map where public charging stations would not otherwise be built. The Transport Agency is responsible for the identification of routes for which it is possible to apply for support. It is based on the need for an appropriate distribution of public charging stations.

The next group of policy instruments that I would like to present are marked in the table as "Policies", the definition of which was presented in Section 1.1. The first one is the Directive on energy performance in buildings (EUR-lex, 2018) that was adopted by the Swedish government. It outlines the framework for energy performance when it comes to newly built buildings. The regulation provides the requirement to provide sufficient infrastructure for EV charging. When comes to the policy that was initiated by the National Board of Housing, Building, and Planning, it is the project that is currently under investigation (Boverket, 2019) and refers to mandatory access to charging infrastructure for electric vehicles when building new houses and performing extensive renovations.

As a cross-cutting commitment initiated by the government, a special Electrification Committee was created by the government, which conducts investigations on financing issues, possible business models, and how electricity can be quickly distributed to electric roads and fast-charging infrastructure on demand. The committee will also examine how electrification through hydrogen can contribute to the electrification of the transport sector and the impact of

transport electrification on electricity supply ensuring the capacity of charging infrastructure. The Infrastructure Department lists both policymakers and market actors (Swedish Governmental Offices, 2021) that are involved in the committee work. The result of the committee's work was summarized in a new Electrification Strategy (2022) that presented a detailed overview for further development of charging infrastructure as well as the overall state of the art within the sector.

The next action is connected to the ongoing investigation on home charging optimization (Swedish Governmental Offices, 2022), which outlines that the Swedish Energy Agency is responsible for offering solutions to ensure that all demographic groups who own an electric vehicle have access to charging infrastructure where they park their cars at home. This is mentioned to be a challenge for people who can only park their car in the street rather than in a driveway or a designated parking space.

Finally, the last action concerns an issue that was also mentioned by the European Court of Auditors (2021) as one of the hindrances for EV drivers to travel across the European Union. The press release (Swedish Governmental Offices, 2020) from the Infrastructure Department states that several public actors had a meeting concerning a possible solution for developing a common payment method for public charging of electric vehicles emphasizing that the silo solutions make it inconvenient for the EV drivers to pay for charging.

Many of the policy instruments presented in the table are mutually interlinked, address similar issues, and involve the same agencies in dealing with them. That is why it was possible to identify the problem formulations that are described in the section below.

#### 3.2 Analysis of problem representations

Analysing the policy instruments taken by the government to develop the charging infrastructure for EV, it was possible to identify three prominent problem representation clusters (Table 1). Each cluster reflected sets of ideas that combined to form problem representations that were identified in policy instruments that target the development of charging infrastructure. With that said, I would like to mention that these problem representations should be viewed as intertwined and co-dependent even though they are presented in separate clusters. This will be further elaborated on in the discussion section.

1. The uneven development of charging infrastructure hinders EV uptake

This problem representation was the most prevalent problem representation during the scanning of the policy commitments, press releases, media channels, and other sources. The problematization appears to be central to the development of most political instruments. Referring to the second of Bacchi's questions on what assumptions underpin this representation of the problem, it comes as no surprise that the idea behind this problematization is that the development of charging infrastructure is crucial to speed up the electrification of the fleet.

It is possible that this representation of the problem came about from the following: the optimal use of electric cars is possible if there is an extensive network of charging stations, but charging stations are only built if there are enough electric cars (Swedish Government 2019, p.20). It resulted in the public sector providing initiatives such as "Klimatklivet" as well as other financial support schemes mentioned in Section 3.1 to subsidize charging station rollout that will enable the expansion of electric vehicles. In Klimatklivet these measures are assessed primarily in terms of indirect climate benefits. However, the same document also states that when the project is considered to contribute to market introduction, they have been assessed based on a lower climate benefit ratio (ibid.). The findings indicate that Klimatklivet applies "total reduction in emissions" divided by "total additional project costs". While calculating the reduction in emissions can be beneficial to identify climate benefits, it may be considered contradictory that projects with a higher cost should be down prioritized for being newly introduced to the market.

However, one of the interviewees highlighted that this problem representation left fundamental problems of the economic system unarticulated. The interviewee indicated that there might be a conflict of interests when it comes to the development of charging infrastructure. This conflict is embedded in an unwillingness to integrate the real cost of the fossil fuel industry into the taxation system:

So many societal costs that are associated with combustion engine car use that is externalized today. Sweden sets the social cost of carbon at approximately 7 kr per kg fossil CO2, tax associated with CO2 emissions on fossil fuels is about 5% of that externalities in the form of noise, air pollution, land allocation in cities, public space that can be used for something else. When these costs are not internalized into the system then whatever you want to change has to be either subsidized by as much or has to be as much cheaper. The unwillingness to make the current system more expensive despite the fact that we want to get rid of it is really holding back change. It is an unwillingness to tax fossil fuel emissions in proportion to the level that is equivalent to social cost. If we did that, it would be impossible to use fossil fuels. We may want the transition but we don't actually want the transition. (Respondent 1)

Another point on what was left unproblematic by this representation of the problem refers to the Prop. (2019) which states that the goal of the development of public fast-charging stations is not only to provide a significant share of the charging infrastructure but to build confidence in electric cars and enable longer journeys. The possibility to charge the electric vehicle close to one's home or workplace is a prerequisite for more people to choose electric vehicles. Building confidence around charging for electric vehicles is necessary but can also be done through information-sharing actions and other kinds of cooperation.

When it comes to the effects that are produced by this representation of the problem, there is a clear link to the fact that policy instruments for electric vehicles have changed rapidly over a short period of time. To remove hindrances to the positive change rate, it is important not to cut down too early on the support that makes it easier for private car owners and companies to buy and drive rechargeable cars (Fossilfritt Sverige, 2021).

# 2. Socio-economic factors affect the development of Swedish charging infrastructure.

The problem representation that is described in this section emerged from the commitments of the state to provide significant financial support for the charging station installation of private actors as well as organizations and municipalities. The problem seems to be represented as the lack of financial means for certain groups, which hinders the development of *private* charging infrastructure.

The assumptions that underpin this representation of the problem is that there is need for different demographics regardless of the income group to get access to charging points and the installment of charging stations is often related to financial restrictions. Moreover, when referring to the lack of sufficient access to charging infrastructure for certain demographics there are a few dimensions to take into consideration: (a) the right of disposition, (b) belonging to a certain income group, and (c) the municipality type.

From the National Electrification Strategy (2021) as well as "Analysis and proposals for better access to charging infrastructure for home charging regardless of housing type" (2022) as well as "A comprehensive policy for the climate - climate policy action plan" (2019) it had become evident that one of the challenges accessing charging stations for certain demographics is a big part of the discourse when it comes to the development of charging infrastructure. Usually, the problematization varies depending on two factors. The first refers to how municipalities manage the problem and the second depends on the type of housing that EV drivers chose. A similar idea came around during one of the interviews:

Electrification will save money and the municipality does not want it to be accessible only to people with a lot of capital (because they are the only ones who are most likely to buy a new car). Some of the problems are intrinsic to the challenge of electrification itself, some demographics use older cars, so it is hard to electrification the entire fleet itself. Where you will build infrastructure now it will affect the opportunity of electrification in a long-term charging a cost for different demographics. (Respondent 1)

When it comes to the question of how this representation of the problem has come about, it could be linked to the combination of factors that influenced it. One of them can be a reaction to statistics (SVT, 2022) indicating that the areas closer to Stockholm, Gothenburg, and Malmö have a more developed charging infrastructure, which means that the decisions made within municipalities directly affect the availability of charging stations throughout Sweden.

The right to disposition plays a big role in this debate. As suggested by Swedish Energy in ER (2022, p.19) it is defined as "the required right to decide (on land, parking, necessary infrastructure, etc.) to install a recharging point regardless of permission or approval from others." Simply put, the actors with the right of disposition can have recharging points installed, while actors that do not have the right of disposition for installation are dependent on the other stakeholders. People who reside in rented accommodation, or a housing co-operative, do not normally have the right of disposition. Taking into account that a range of individuals does not have the right to disposition, the decision to install the station is granted to other residents, an association of residents, or real property owners.

When it comes to belonging to a certain income group, the discourse suggests that demographics that can afford the purchase of a charging station for the EV are often residing in one-family homes. The assumption is that these actors are generally households with higher incomes. That is why the residents of rental homes, shared housing and other types of housing have more complications when it comes to installing their own charging stations. That can be one of the reasons why multiple policy documents mention the need to make charging accessible to a broader public regardless of the income group and living situation.

An observation that is connected to what is left unproblematic by this problem representation appeared during one of the interviews. The interviewee argued that vehicles that use fossil fuels should not be an option at all if the aim was to achieve the transition to an electric fleet. The alternative was to tax them to an extent that discouraged individuals to use fossil fuel-driven cars, but this could not be done until more favorable conditions for EV drivers were introduced to a full extent: Policy instruments that do not create behavioral change are unnecessary and should not have been introduced. E.g. raising fuel prices for people who continue to take the car to work due to (actual or perceived) lack of alternatives. (Respondent 1).

It is directly linked to the number of effects that are produced by this representation of the problem. When municipalities apply for financial support for the development of public infrastructure this generally means that such investment leads to the process that requires a long waiting time and assessment procedure. Certain demographics depending on the income and location within the country might have different opportunities when it comes to access to charging infrastructure. At the same time, financial incentives might not be a sufficient policy incentive for the development of charging infrastructure due to external factors such as grid connection and long permitting processes (SVT, 2022) which tend to delay the development of charging infrastructure.

# 3. The limits of the public sector's mandate – and the interplay between market and governmental actors

This problem representation refers to the mandate and limitations that are placed on the public sector. Through the research, it became clear that the discourse around policymaking for charging infrastructure is influenced from three angles: Swedish governmental authorities, market actors, and the EU framework. The interaction between the three often places constraints on each of the other actors and this perception is a possible explanation for how this problem representation came about. One of the most frequently appearing patterns during the policy scanning was that policy instruments were influenced by the necessity to synchronize with the EU framework, which often leads to a longer decision-making process, and may cause additional limitations for the public sector. That is also directly linked to the question on the assumptions that underpin this representation of the problem, namely that the problem can be solved by market actors without the interference of public sector and is well described by one of the respondents during the interview session:

We have a possibility to interpret the EU legislation, so it is freedom for us because they give us a framework on how to think, and it is not detailed legislation, but it is important to follow it. How we can do investment support is dependent on the EU and limited by the EU regulations. The EU changed their policies in July, which complicates for us the process of supporting the market. It limits Energimyndigheten because we are supposed to wait and see how the market regulates this problem on its own and then fill in the gap. We are supposed to assess the market first. (Respondent 4) When we look at the effects that are produced by this representation of the problem, it can be related to the generally high expectations from the market actors that are placed on governmental authorities, considering that the mandate of the public sector is limited. The policy overview indicates that investment support of various kinds will be required until the market is sufficiently mature. This support is necessary for individuals and organizations when it comes to the installation and purchase of charging stations. Moreover, it is needed for the development of fast charging infrastructure along our major roads. In addition, the government needs to step in and expand charging infrastructure in areas where market conditions are not sufficient for investing in charging infrastructure, the so-called "white spots". The dilemma at hand is that the state agencies are more interested than private actors in mitigating greenhouse gas emissions through electrification projects and by accelerating the shift toward a fossil-free transport sector. At the same time, the government lacks the mandate to operationalize this process. To a large extent, this prerogative belongs to the private sector although it might not always be the priority for all market players. This emerged from the interviews and was later confirmed by the scanning of reports as well as a policy overview.

Another effect produced can be related to the rapid development of the market with no unified framework for the regulation. The stakeholder mapping (Section 2.3) indicates that there are multiple solutions offered by the market players for the improvement of charging infrastructure. For example, apps that connect EV drivers with private charging stations as a way to compensate for the lack of public charging infrastructure. Some of the solutions that are offered by the market might not yet have a clear regulatory framework or sufficient support from the governmental agencies, which is directly linked to the extended period of time that is needed to assess the impact of the solution.

How could we underpin the development of digital services without being too involved in the area in this field ourselves ... We are not interested in being involved too much in different apps and services. Anything that could be provided by market players and competition should more or less be provided by the markets but sometimes we can support market development and we can enable market players to become more active... where's the borderline between the role as a government agency and the market player; how far should we go into the market area, or should we refrain from going into the market area at all? (Respondent 3)

This is directly linked to the question of what is left unproblematic in this problem representation, namely how and if the framework for the cooperation between the governmental sector and market actors is created and managed. In a way, it means that the public sector needs to balance between the long-term strategic thinking and a more agile reaction from the market players but in practice, it might result in a misunderstanding concerning how innovative solutions should be supported and operationalized between the governmental agencies and other actors:

As a government agency, we are thinking in the long term if we should support a solution or a specific technology. We want to be sure that it's viable also over a longer term than just a few years and we worked with the social cost-benefit analysis often to understand whether we could or should use government funding for different purposes. If you look at the market players, they are rather short-term thinkers.(Respondent 3)

With that said, through the lens of Bacchi's WPR approach it was possible to identify the three problem representation clusters and suggest an overview of what links these problem representations have to the different spectrums of problems connected with the development of charging infrastructure and how they are manifested in different processes. These problem representation clusters indicate that there is a need to further investigate how the various policy instruments interact and what societal effects they produce.

## 4. Discussion

This section aims to incorporate the research questions that this thesis set out to address with the findings presented in the section above. The question "How is the development of EV charging infrastructure discursively framed and operationalized in Swedish policymaking?" was answered by providing an overview of the three problem representation clusters that were identified in the process of research. The socio-economic cluster was directly linked to the problem representation of uneven development as it was often expressed in the same sources and was enacted through significant financial support from the government that is provided for the development of charging infrastructure. Both problem representation clusters also touch upon the challenges connected to mitigating greenhouse emission through taxation and other financial support schemes, showing the need to further investigate the effects of policies on different demographics. It is interesting that in the discourse about the development of charging infrastructure, another issue indirectly manifested itself in these two clusters, namely the discussion about the increase of taxation for combustion vehicles as a way to reduce fossil fuel use. There is a fine line between making regulations stricter to limit the use of combustion vehicles and not limiting the freedom of movement for those demographics that might be more dependent on fossil fuel-driven cars.

At the same time, the developments within both problem representation clusters are dependent on the mandate of the public sector as this is where the process of policymaking takes place.

It brings us to a second research question "How does this discursive framing enable and constrain certain social and technological/infrastructural innovation?" It is a complex issue and was to a large extent connected to the first question and answered through the analysis of problem clusters. Bacchi's (2009, p. 17) representations of a problem are often linked to assumptions around who is responsible for the perceived problem. There is an ongoing discussion about the degree to which both state and market representatives should be involved in the solution of the problem. In the Electrification Strategy (2021), the public sector states that it needs to take a coordinating role in the roll-out of charging infrastructure.

The discourse analysis indicated that it might be difficult to keep the balance between coordination, providing financial support, and giving the market the freedom to solve the issue. Through the analysis of the last problem representation connected to the limitations of the mandate of the public sector, it can be seen that conflicting views on long-term vision of the sector put certain constraints on the innovative approaches within the of charging infrastructure development. These constraints are connected to the legislative framework as well as the need to fit within the three-dimensional approval process (e.g. government – market – EU).

The quote from one of the interviewees "We may want the transition but we don't actually want the transition" can be related to the contradictions in the discourses around the development of charging infrastructure. These contradictions can be related to the statement from Langbroek et al. (2016) about "the efficiency in policymaking and avoiding side effects from certain decisions might be conflicting policy goals in the process of policymaking for electrical vehicle adoption". The process of assessment of long-term side effects, though necessary for policymakers, can be one of the causes that hinder innovative approaches within the sector.

On the other hand, the limitation of the public sector's mandate enables technological innovations through the space and time that is given to the market actors to regulate the issue connected with the development of charging infrastructure. At the same time, it is important to keep in mind that the sector is relatively new and problems that occur within it hardly have a precedent of the processes that would be proven efficient over the long term. This system that involves multiple stakeholders and directly affects long-term infrastructure planning

My last research question: "What could an alternative framing look like that enables different approaches to social and technological innovation in the future?" is directly linked to Bacchi's "How has [the problem representation] been (or could it be) questioned, disrupted and replaced?" and was partly left out of the problem representation analysis. In one way the silences that are described in each cluster are the key components to further develop how the problem can be questioned and disrupted. Another way to consider can be suggested through developing a tighter cooperation with the market actors and is partly implemented, for example, through the creation of the Electrification Committee that includes representatives from both governmental agencies and the market sector. Since the development of regulations is changing rapidly within a short period, there is a need to further explore the connections between the discursive framing of the problem and how they are linked to path dependencies for technological innovations that are explored by Rosenow et al. (2017) and Kotilainen et al. (2019).

One of the limitations of this research is that it did not leave the space for the discourse on the disadvantages related to the development of charging infrastructure, which might include additional problems for municipalities when it comes to maintenance and operation, and the local electricity grid may need to be strengthened in order to supply enough electricity for EV charging (Van der Kam et al., 2020, Eising et al., 2014). Moreover, the development of charging

infrastructure could lead to problems in urban areas with limited public (parking) space available (ibid.)

Analyzing the process of this research, it is important to mention that Bacchi's approach was useful for identifying problem representations and bringing up the connections between the policy effects and intentions, as well as identifying the silences in the discourse. At the same time, it should be mentioned that the questions suggested by Bacchi created a certain frame for the analysis and it was challenging at times to define clear answers, considering the complexity of the field.

## 5. Conclusion

This thesis set out to contribute to a deeper understanding of the intersection between problem formulations within policymaking to promote charging infrastructure for electric vehicles. This research provides an analysis of problem representations in the context of initiatives taken by Swedish authorities to improve the charging infrastructure for electric vehicles, focusing specifically on public infrastructure for passenger cars. The thesis bridges the technical character of the sector with the social science perspective and contributes to knowledge of what the problem is represented to be in policymaking when it comes to charging infrastructure development for electric vehicles. This work also contains an overview of policies as well as a stakeholder map for a better understanding of the ongoing processes within the sector.

Drawing on Bacchi's approach it was possible to identify three problem representation clusters that emerged from policy analysis as well as supportive material. The first one refers to the uneven development of charging infrastructure which is hindering the EV uptake. The second is describing the socio-economic factors that affect the development of Swedish charging infrastructure. The third one is emphasizing the limits of the public sector's mandate and connects it to the interplay between market and governmental actors. All these problem representations exist simultaneously and operate in relation to each other. The analysis also identified certain conflicts in worldviews between the different stakeholders in the sector (e.g. short term and long term pattern of thinking as well as unwillingness to introduce the full cost of fossil fuels into the system) that can be seen as an opportunity for further investigating the development of policymaking within this field.

Bacchi's discourse-analytical approach also contributed by providing a framework for identifying the problem representations and investigating the link between different discourses and the effects they may have on society. An example of that would be a policy that provides financial support for the development of charging infrastructure. The implication is that the perceived problem lies in a lack of financial resources and that this lack hinders the development of charging infrastructure. From the context of this paper, it becomes clear that some policies that are aimed at supporting electric vehicle adoption and the development of infrastructure by offering financial incentives for the installation of charging stations are not always taking into consideration the broader societal effects. For

example in certain areas financial incentives might not be sufficient due to external factors such as grid connection and the long permitting process. At the same time the difficulties connected to equal access to charging station for all demographics were investigated. With that said, the discourse analysis contributed to analysis of a range of problem representations produced by policy instruments that target development of charging infrastructure. Although, it would be beneficial to further investigate other discursive perspectives connected to market actors as well as other stakeholders involved.

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### Popular science summary

Governments and companies have high expectations for Electric Vehicles as there is a need to make mobility cleaner and less dependent on fossil fuels. The idea to make the transport sector fully electrical and liberated from petroleum sounds appealing to many. To achieve this, there is a need to improve charging solutions for electric vehicles so that charging would not be a factor that stops drivers from shifting to electric vehicle. Since the problems connected with the development of charging infrastructure become more widespread over time, there are many actors who are involved in finding the solutions for it. One of them is governmental authorities of Sweden, which put a lot of effort into incentivizing the development of charging infrastructure. One of the components of the policy development from their side is discursive representation of the problem (e.g. defining what the problem is).

Understanding how proposals for policy interventions are created requires an understanding of how the problems are represented in the first place and that is why this process was studied in this research. This thesis presents an overview of policy incentives in combination with the analysis of 4 interviews to give a reader a deeper understanding on what the problem is represented to be when it comes to development of charging infrastructure in Sweden.

The research outlines three major problem representations clusters. The first one refers to the uneven development of charging infrastructure which is hindering the uptake of electric vehicles. The second is describing the socio-economic factors that affect the development of Swedish charging infrastructure. The third one is emphasizing the limits of the public sector's mandate and connects it to the interplay between market and governmental actors. By understanding the discourses that emerge from policymaking it is possible to see what problems they underpin and what societal effects they have. This work can be a stepping stone for understanding the system that lies behind development of charging infrastructure for electric vehicles in Swedish context. The results can be used to improve the understanding of discourses that emerge around long term infrastructural planning as well as policy analysis of incentives for the adoption of electric vehicles.

## Acknowledgements

This piece would not be possible without the contribution of my most resilient and realistic supervisor, whose words of wisdom always brought me back on track. The insights provided by the team of Eljun and all interview participants are much appreciated. I am also very grateful to my classmates Filippa Morner and Caroline Kumlin who shortened my procrastination time. Significant credit to my friends Wanja Kaufmann, Björn Svensson, Elin Kinnman, Teo Wallentin, Nadia Olausson, Andreas Klawitter, Isabelle Göransson, Britta Högberg, Johan Bergengren, Lukas Farghauson, Emil Sjöstedt, Sofia Amanda, Linus Kanestad, Johan Book, Elise who helped me get back to real life when the war started. Finally, my parents and my brother Bohdan deserve a special word of gratitude for staying alive and supporting me along the way in the best way they knew how to.

# Appendix 1

Table 2. List of interviewees

Code name	Found through	Entity represented	
Respondent 1	Report that was relevant	RISE	
	to the study		
Respondent 2	Press	Trafikverket	
Respondent 3	Personal contacts	Trafikverket	
Respondent 4	The section about	Energimyndigheten	
	charging infrastructure on		
	the official website.		

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