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Mobility Solutions in Swedish Municipalities

by

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Despite that transports contribute to around a quarter of all global energy-related CO2 emissions, the question of how the sector's emissions are best reduced remains unclear. To fill this gap, this thesis investigates what both academia and the Swedish Climate Policy Council recommend to be the best ways of reducing transport emissions. These findings are then compared with the mobility strategies of six Swedish municipalities. The review of academic literature found that going car-free has the highest emission mitigation potential among the reviewed options – at a median of 2.1 tCO2eq/cap pear year. Both academic literature and the Swedish Climate Policy Council argues that shifting over to electric vehicles – which was found to have a median emission mitigation potential of 2.0 tons of CO2eq/cap per year – is necessary if transport emissions are to be substantially reduced. While the general strategy of most Swedish municipalities matches well with going car-free, the review of municipal transport strategies showed an evident lack of planning and consideration for the electrification of vehicle fleets. Based on the Swedish Climate Policy Council's recommendations, academic literature, and the municipalities' strategies, the thesis identifies obstacles that municipalities face in reducing emissions, areas in which Swedish municipalities are lagging, and policies and strategies which could help municipalities reach their environmental goals. Of particular importance are the municipalities' lack of long-term planning and clarity in their documents, their lack of evaluation of the effect of specific policies, and their lack of ability to promote electric vehicles due to laws and regulations at the national level.

Keywords: transport solutions, sustainable transports, mobility transitions, car lock-in, automobile lock in

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1   Introduction

In December 2015, at the UN climate conference in Paris, most countries across the world agreed to fight climate change through the 2015 Paris Climate Agreement. The central goal and most frequently cited part of the Paris Climate Agreement is to reduce humanity's contribution to global warming by "holding the increase in the global average temperature to well below 2°C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels" (IPCC, 2020, p. 79). However, at the current pace we will reach the 1.5°C mark by 2040 (IPCC, 2020). Going beyond the 1.5°C increase is connected to crossing planetary boundaries and entering stages of uncertainty in which science is not sure what waits, as well as an increased risk of passing 'tipping points' which refer to irreversible changes to the biosphere (IPCC, 2019; Rockström et al., 2009; Steffen et al., 2015).

According to the IPCC's (2014) report on climate change, the transport sector was responsible for 27% of global final energy use in 2010. The report argues that road transport is responsible for most transport emissions, although aviation may play an increasingly larger role in the future. On top of this, the transport sector is one of the fastest-growing sectors, and transport emissions are estimated to double by 2050, making it a key priority when trying to reduce greenhouse gas emissions (Creutzig, Jochem, Edelenbosch, Mattauch, Vuuren, McCollum, and Minx, 2015).

In connection with the discussion of the best way to reduce transport emissions, is a discussion of the sharing economy. The sharing economy offers the potential of a new paradigm where members of society can gain access to goods and services without ownership (Machado, Hue, Berssaneti & Quintanilha, 2018). Such a paradigm shift has the potential to create more efficient use of underutilized resources. The sharing economy in the transport sector is usually referred to as 'shared mobility' which is defined as "the shared use of a vehicle, bicycle, or other mode … that enables users to gain access to transportation modes on an "as-needed" basis" (Shaheen, Chan, Bansal & Cohen, 2015, p. 3). Shared mobility solutions are becoming increasingly popular around the world (Shaheen et al., 2015). However, there are also worries that shared mobility might lead to an increase in car kilometers driven as it could draw people away from public transport into using their shared cars instead (Institute for Global Environmental Strategies, Aalto University, and D-mat ltd., 2019; Transport & Environment, 2019; Union of Concerned Scientists, 2019).

Although shared mobility solutions have the potential to reduce greenhouse gas emissions in the transport sector, it is unclear how large this potential reduction is and how it compares to other mobility solutions. Moreover, while Sweden is a country at the forefront of fighting climate change, there is still a lot of uncertainty about if and how the Paris Climate Agreement's goals will be achieved. Therefore, the thesis has aimed to examine the results of

academic literature on the emission reduction potential of mobility solutions. It also aims to investigate Swedish municipalities' sustainable transport strategies to determine whether they match with what experts and research argue to be the best tools to do so. The following research questions have functioned as guiding instruments during this process:

1. What mobility solutions most reduce greenhouse gas emissions, and how does mobility sharing reduce greenhouse gas emissions?
2. How do Swedish municipalities promote sustainable transport, and how well do their approaches match the recommendations of current academic research?
3. How well does Swedish municipalities' approach to promote sustainable transport match with the Swedish Climate Policy Council's recommendations?

1.1   Outline of the Thesis

The remainder of the thesis is structured in the following way. Section two describes the primary frameworks related to sustainability in Sweden. Section three and four explain the data and method used, as well as the limitations of the study. Section 5 consists of an analysis of municipal transport documents and a comparison of the documents, academic literature, and recommendations from the Swedish Climate Policy Council. The final chapter consists of conclusions and potential topics for future research.

2   Background

Sweden is often seen as a country at the forefront of fighting climate change, and for more than a decade, Sweden has placed in the top 10 in the Environmental Performance Index (EPI), which is produced by Yale University and Columbia University (EPI, 2020). However, according to a report from the Institute for Global Environmental Strategies, Aalto University, and D-mat ltd. (2019), the global consumption-based emission levels required to reach the 1.5°C target from the Paris Climate Agreement is 2.5 tons CO_2 equivalents per person (CO2eq/cap) per year by 2030, 1.4 CO2eq/cap by 2040, and 0.7 CO2eq/cap by 2050. These numbers can be put in contrast with Sweden's approximately 8.9 tons CO2eq/cap per year in 2017 (Environmental Protection Agency, 2020a). In other words, Sweden needs to reduce its emissions by almost 72% from 2017 levels by 2030 if the 1.5°C target is to be reached. This is similar to Sweden's national goal of reducing domestic transport emissions by 70% by 2030, compared to 2010 levels (Environmental Protection Agency, 2019a). However, according to the Swedish Climate Policy Council (2019), the current conditions and decisions will only take Sweden halfway to their 70% reduction target. While being viewed as one of the more sustainable nations in the world, Sweden's consumption levels do not match its reputation. It is therefore of interest to examine the country closer.

Sustainability frameworks in Sweden

Sweden has two primary frameworks related to emission reductions. These frameworks are the Swedish Environmental Objectives system and the Swedish Climate Policy Framework. The frameworks' design, the parts that build the frameworks, and their connection to each other can be seen in the text below, as well as in figure 1.

Agenda 2030's primary goal is to achieve sustainable development, which in turn has three dimensions, economic, social, and ecological (United Nations, 2020). The Swedish Environmental Objectives system consists of three parts and contributes to Sweden's efforts to achieve Agenda 2030's ecological dimension.[1] The Generation Goal, together with the 16 Environmental Quality Objectives together form a promise of leaving fresh air and a healthy environment for the next generation. The Milestone Targets are sub-goals that are needed to reach the Generation Goal and the Environmental Quality Objectives. Moreover, the Milestone Targets consists of six categories, which in turn, consist of sub-goals. Out of these six categories, the most important for the transport sector is reduced climate impact, which consists of 5 sub-goals that set up emission reduction goals for activities outside of the EU Emissions Trading Scheme. These 5 sub-goals are:

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[1] More information about the Environmental objectives is available at http://www.swedishepa.se/Environmental-objectives-and-cooperation/Swedens-environmental-objectives/

- "By **2020**, emissions of greenhouse gases in Sweden should be reduced by 40% compared to 1990 levels" (Environmental Protection Agency, 2019a, n.p.).
- "By **2030**, emissions in Sweden should be at least 63% lower than emissions in 1990." (Environmental Protection Agency, 2019a, n.p.).
- "By **2030**, emissions from **domestic transport**, excluding domestic aviation, are to be reduced by at least 70% compared with 2010" (Environmental Protection Agency, 2019a, n.p.).
- "By **2040**, emissions in Sweden should be at least 75% lower than emissions in 1990" (Environmental Protection Agency, 2019a, n.p.).
- "By **2045**, Sweden is to have no net emissions of greenhouse gases into the atmosphere and should thereafter achieve negative emissions. To achieve zero net emissions, supplementary measures may be counted. By 2045, emissions from activities in Swedish territory are to be at least 85 per cent lower than emissions in 1990"[2] (Swedish Environmental Protection Agency, 2019a, n.p.).

The other Swedish framework related to emission reductions is the Climate Policy Framework, which was implemented in 2018. Its primary purpose is to create the circumstances that are needed to enable the required changes for Sweden to reach its climate goals. It is also an essential component of Sweden's efforts to live up to the targets in the Paris Climate Agreement.

The Climate Policy Framework consists of three components. First, the Climate Goals, which are identical to the five sub-goals in the reduced climate impact category of the Milestone Targets presented above. Second, the Climate Act, which puts certain requirements on the national government. For example, the Swedish government has to submit an annual report which contains a description of the most critical decisions that have been made each year, what effect these decisions have had concerning the climate goals, and an assessment of whether more needs to be done to achieve the Climate Goals. Moreover, every fourth year, the government has to present an action plan that describes how the Climate Goals are to be achieved. Finally, the Climate Policy Council is also a part of the Climate Policy Framework. The council consists of experts that each year create an annual report which reviews the development of emissions and Sweden's work to reduce emissions and gives recommendations on what needs to be done to achieve the climate goals.

While the frameworks and goals are national, the different municipalities in Sweden can be considered the building blocks where the change needed to meet the national goals has to occur. To the author's knowledge, there is no academic work that has examined Swedish municipalities' approach to reducing transport emissions and to what degree their methods agree with academic results and the recommendations of the Swedish Climate Policy Council. Gathering a greater understanding of what is happening at a more disaggregated level may lead to the identification of more efficient ways to reduce transport emissions that are not visible at the national level.

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[2] Supplementary measures refer to approaches and technologies that capture, bind, or store CO2 or mitigate CO2 elsewhere. Examples of such approaches and technologies are using forests and soil as carbon sinks, capturing and storing CO2, and reducing greenhouse gas emissions in other countries.

Ecological dimension of the United Nation's Agenda 2030

2015 Paris Climate Agreement

Environmental Objectives System

Swedish Climate Policy Framework

Climate Goals

Climate Act

Climate Policy Council

Milestone Targets

Environmental Quality Objectives

The Generation Goal

Reduced climate impact

By **2020**, emissions of greenhouse gases in Sweden should be reduced by 40% compared to 1990 levels

By **2030**, emissions in Sweden should be at least 63% lower than emissions in 1990

By **2030**, emissions from **domestic transport**, excluding domestic aviation, are to be reduced by at least 70% compared with 2010

By **2040**, emissions in Sweden should be at least 75% lower than emissions in 1990

By **2045**, Sweden is to have no net emissions of greenhouse gases (85% reduction since 1990) into the atmosphere. To achieve zero net emissions, supplementary measures (15%) may be counted.
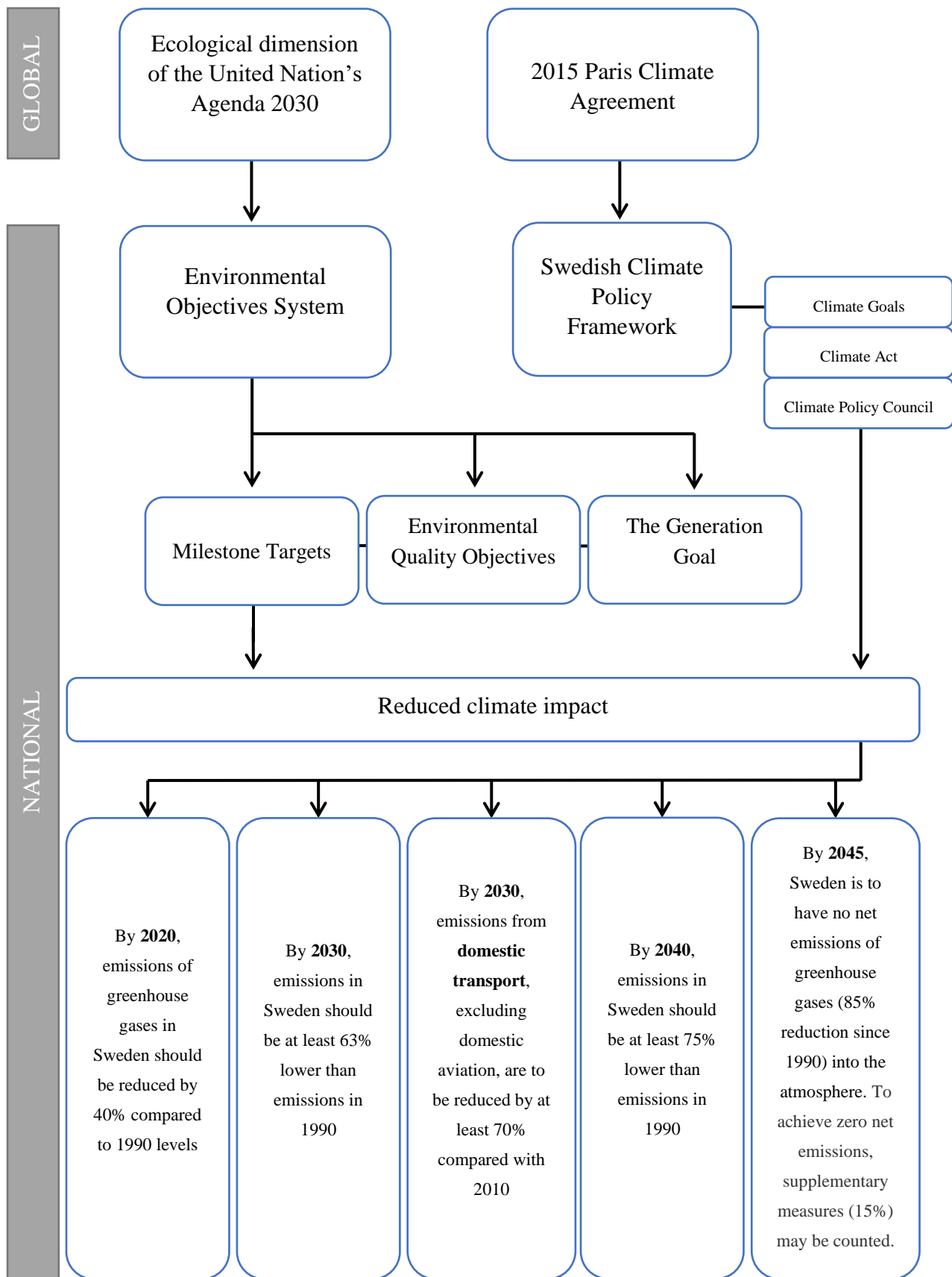
Figure 1: Flowchart of the Swedish Environmental Objectives System and Climate Policy Framework
Source: Based on information from Environmental Protection Agency (2018a, 2019b)

3 Data

3.1 Source Material

The first data source used in the thesis was academic literature found through the website Scopus which is frequently used to perform literature reviews by scholars. According to Scopus's website, it is the most extensive database for peer-reviewed literature (Scopus, 2020). Another data source that was used in the study is a systematic literature by Ivanova, Barett, Widerhofer, Macura, Callaghan, and Creutzig (2020). Their literature review used peer-reviewed academic literature from Scopus and Web of Science Core Collections. The different texts that were found used a variety of methods to find the results. In other words, the findings of such literature are often estimations and should be considered as estimations rather than facts. However, considering that the literature is peer-reviewed, their results should be sufficient to use as a crude indicator of different mobility solution's effects.

Municipal policy documents and websites relating to transport and environmental aspects of city planning have also been used. The document publication dates range from 1999 to 2020, but the majority are less than a decade old.

The choice of municipalities followed a simple procedure. First, the three largest municipalities Stockholm, Gothenburg, and Malmö, were chosen. Second, three middle-sized municipalities were selected. Uppsala and Linköping were chosen based on their relatively large populations, and Lund was chosen primarily since the author was given access to survey data, which ended up not being used in the final draft. The choice of including both large and middle-sized municipalities was made to create representativity and with the hope that the results could prove useful for municipalities in other European countries as well.

4 Methods

4.1 What mobility solutions most reduce greenhouse gas emissions, and how does mobility sharing reduce greenhouse gas emissions?

To answer the first research question, the results of a systematic literature review performed by the author were combined with a systematic literature review conducted by Ivanova et al. (2020). The database Scopus was used to go through titles, abstracts, and keywords of articles to determine whether research so far has been able to quantify the emission reduction effect of different mobility sharing solutions. More specifically, the literature review was performed to find articles that reported results about potential emission reductions from mobility sharing solutions in tons of CO_2 equivalents per capita (CO_2 eq/cap). The results were then merged with the results of Ivanova et al. (2020) who have looked at mobility solutions in general rather than specifically at mobility sharing solutions.

The reasoning behind only including results that can be transformed into tons of CO_2 eq/cap was twofold. First, the results of most studies of this kind are reported in CO_2 mitigation potential, and comparing CO_2 eq/cap mitigation potential with functional units (such as per MJ of fuel) makes comparisons hard. Second, Ivanova et al. (2020) present their results in CO_2 eq/cap, and to be able to compare mobility sharing solutions with other mobility solutions, they had to be the same unit.

The review was performed using different search terms related to mobility sharing solutions. The search terms used can be seen in table 1. All searches were done in the following categories: Social Sciences; Energy; Environmental Science; Business, management and Accounting; Decision Sciences; Earth and planetary sciences; Economics, econometrics and Finance. The titles and abstracts of the found texts were then read to determine whether they provide quantified results of emission reductions. If the abstract or title suggested that there were quantified results, but none were found in the abstract, the conclusion was read as well.

Table 1: Search terms used in Scopus

Search term	Number of hits
{shared mobility}	203
e-bike	309
"shared bikes"	124
carpooling	325

4.2 How do Swedish municipalities promote sustainable transports and do their approach match the recommendations of current academic research?

The second research question was answered through information found during a review of six Swedish municipality's transport policy documents and websites. More specifically, policy documents and webpages relating to sustainable transports were read to examine the transport situation and strategy for sustainable transport development in each of the six municipalities. Other than the municipalities' overall strategy, particular attention was given to initiatives with quantified evaluations of their effect, as well as unique initiatives. The results were then compared with the results for the first research question to determine how well municipalities' strategies match with what academic research argues to be the best solution to reducing greenhouse gas emissions in the transport sector.

The documents were initially identified by searching each municipality's website for keywords through their database. The keywords used are in Swedish as most documents are in Swedish. The keywords that were used are hållbar transport, översiktsplan, klimat, fossilbränslefritt, framkomlighet. Municipal documents frequently refer to each other, and these keywords were, therefore, enough to identify an initial group of documents which then referred to related documents.

4.3 How well does Swedish municipalities' approach to promote sustainable transport match with the Swedish Climate Policy Council's recommendations

The third research question was also answered through data and information gathered during the review of six municipality's transport policy documents. The review made it possible to

determine to what degree Swedish municipalities follow the recommendations made by the Swedish Climate Policy Council (2019) relating to transport to be able to answer the third research question.

4.4   Limitations

Due to the number and length of documents that each city has and the lack of organization in some municipality's websites, it is possible that key documents could have been missed. To combat this limitation, people working within sustainable transport from each of the six municipalities were emailed to ask what documents they had that contained information about what had already been done for sustainable transport within the municipality. However, most of the municipalities simply referred to their website.

Many of the documents present planned approaches, which means they may be altered or not implemented at all in practice. It is therefore possible that the documents do not represent what will end up being implemented in the future.

5   Empirical Analysis

5.1   Results – Systematic literature review of mobility solutions

The author of this study has performed a literature review to examine possible emission reductions from different sharing options in the transport sector, such as car-pooling and bike-sharing. In the middle of the process of performing the systematic literature review, Ivanova et al. (2020) published their article, which had a similar approach; only it included mobility solutions in general and solutions to reduce greenhouse gas emissions in other sectors as well. Rather than to continue and likely find similar results, the results of this paper were merged with the results of Ivanova et al. (2020). The idea was to follow the inclusion and exclusion criteria of Ivanova et al. (2020); however, no articles would have been found if their criteria had been followed. Therefore, the criteria were relaxed, and this study's systematic literature review instead included any articles which reported potential greenhouse gas emissions in tons or kilograms CO2eq/cap from mobility sharing. Even though the criteria were relaxed, only two (except for duplicates that Ivanova et al. (2020) also found) out of the close to 1000 abstracts that were examined reported quantitative results in tCO2 eq/cap and could be included. Both of these articles examined car-pooling/sharing.

Ivanova et al. (2020) have systematically gone through 6,990 records using Web of Science and Scopus to search for lifecycle assessment studies and multiregional input-output studies that have quantified household emissions to determine the options which have the highest emission reduction potential. The screening of titles, abstracts, and keywords was done partially by the authors themselves, but the process was also supported by a machine learning model.

6,762 of the original 6,990 records were left after duplicates had been removed. 228 records were left after title and abstracts had been screened for relevant records, and 215 records were retrievable as full text. Finally, the full text of these 215 articles was read by Ivanova et al. (2020), leading to either exclusion or inclusion in the analysis based on a set of criteria. Put briefly, the decisions to include or exclude papers were based on whether the paper followed criteria in population, intervention, mitigation potential, and study type (see Appendix A for a more detailed list). This process led to the removal of 169 articles, leaving 44 remaining articles. Finally, nine pre-screened articles from other sources were included, making the total amount of articles in the final review 53. The 53 studies contained 771 emission reduction

options, which were summarized in 61 consumption options in the four categories: transport, food, housing, and other consumption. Additional information about the process – such as more information about the exclusion and inclusion criteria and search strings – can be found in the accepted manuscript.[3]

The data of Ivanova et al. (2020) are publicly available, and the results for transport options have been reconstructed and are presented in figure 2 below. The options are ordered by their median CO2eq/cap emission reduction. Each circle and the top and bottom whisker represent one reported result, and the X represents the mean. The red circles are the options which were found during the literature review on mobility sharing.
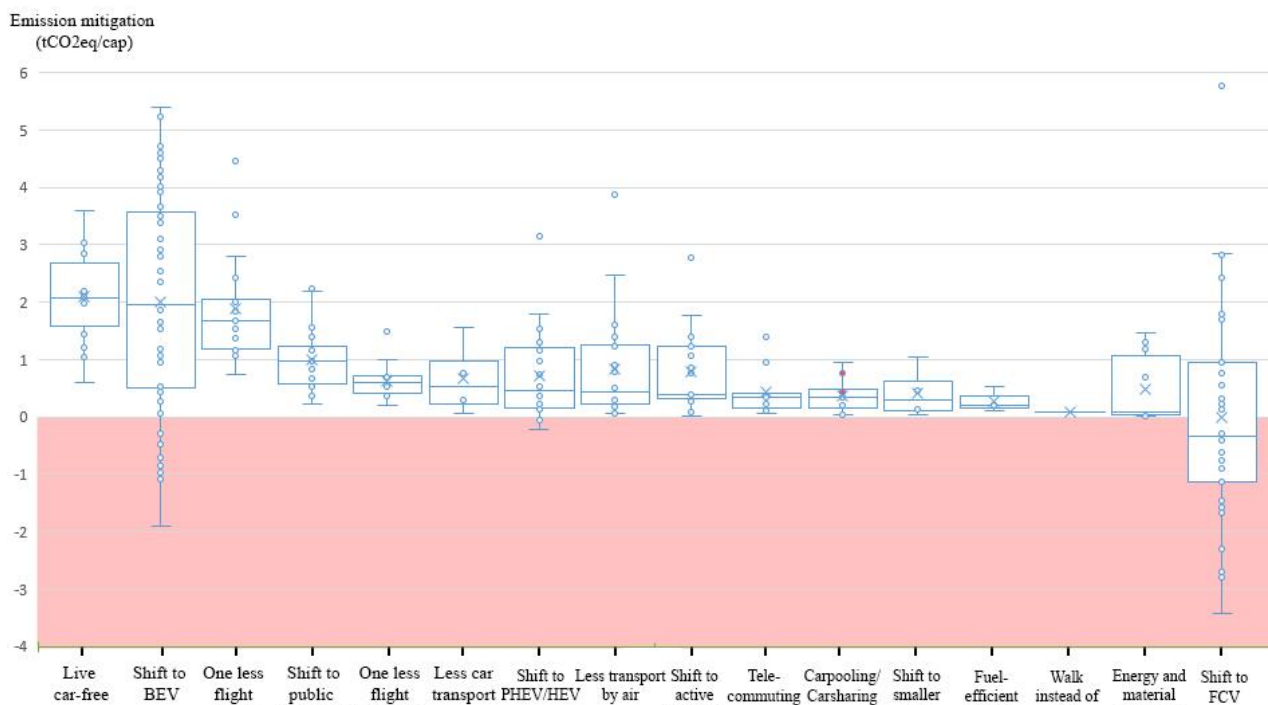

Figure 2: Potential emission mitigation from different mobility solutions
Source: Adapted from figure 3 in Ivanova et al. (2020)

Out of all options included in Ivanova et al. (2020), going car-free had the highest emission mitigation potential with a median close to 2.1 tCO2 eq/cap (tons of CO2 equivalents per capita). The authors explain that going car-free not only had the highest potential emission reduction out of the 16 transport-related consumption options, but out of all the 61 consumption options spread out over transport, food, housing, and other consumption. Moreover, the range of potential emission mitigation for going car-free was found to be between 0.6 and 3.6 tCO2 eq/cap. The authors also explain that the reason behind the large range is the different assumptions that different articles made regarding the vehicle, travel distance, and fuel. Furthermore, driving less – as shown by the options less car transport, shift to active transport, and shift to public transport – do not have as high of a mitigation potential since they tend to replace shorter car trips (Institute for Global Environmental Strategies,

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[3] The accepted manuscript can be found at https://iopscience.iop.org/article/10.1088/1748-9326/ab8589

Aalto University, and D-mat ltd., 2019; Lekve Bjelle, Steen-Olsen & Wood, 2018). The potential emission mitigation from using vehicles fueled by different kinds of fuel varies a great deal (Ivanova et al., 2020).

The results of Ivanova et al. (2020) also showed that making a shift from an internal combustion engine vehicle to a battery electric vehicle (BEV) has a considerable potential emission mitigation range from -1.9 to 5.4 tCO2 eq/cap with a median of 2.0 tCO2 eq/cap. They found that shifting to a plug-in hybrid electric vehicles and hybrid electric vehicles (PHEV/HEV) were found to have a potential emission reduction between -0.2 and 3.1 tCO2 eq/cap with a mean of 0.7 tCO2 eq/cap and a median of 0.5 tCO2 eq/cap. The electricity mix in the grid, which is used to power electric vehicles is a critical factor in terms of emissions as it can determine up to almost 70% of the variability (Marmiroli, Messagie, Dotelli & Van Mierlo, 2018; Onat, Kucukvar, Aboushaqrah & Jabbar, 2019). Fuel cell vehicles (FCV) were found to have a range between -3.4 and 5.8 tCO2 eq/cap with a mean of 0.0 tCO2 eq/cap and a median of -0.3 tCO2 eq/cap (Ivanova et al., 2020).

Car-pooling and car-sharing had a potential emission reduction range of 0.05 to 0.95 CO2eq/cap per year and a median of 0.34 tCO2 eq/cap. Even with the addition of the two new results, the median did not noticeably change compared to the results of Ivanova et al. (2020). Moreover, according to a report from the Union of Concerned Scientists (2019), ride-hailing (e.g., Uber and Lyft) as a single passenger could lead to a higher level of emissions compared to using personal vehicles due to the distance traveled between rides when there are no passengers in the vehicle.

Sadly, Ivanova et al. (2020) were not able to evaluate the emission mitigation potential of biofuel vehicles since most studies used functional units and did not report indicators such as distance traveled and vehicle efficiency. Furthermore, the emission mitigation potential of biofuels is still poorly understood due to a variety of factors, such as whether the impacts on biodiversity and land use should be included in the calculations and what technology and data are used (Creutzig et al., 2012; Farrell, 2006; Haberl et al., 2010).

5.1.1   Discussion

The discussion below has attempted to answer the first research question: what mobility solutions most reduce greenhouse gas emissions, and how does mobility sharing reduce greenhouse gas emissions?

The highest potential for reducing greenhouse gas emissions was found to be living without a car, shifting to a battery electric vehicle, and making one less long return flight with medians of 2.1 tCO2eq/cap, 2.0 tCO2eq/cap, and 1.7 tCO2eq/cap respectively. It is worth highlighting again that the emission reduction of shifting over to a battery electric vehicle is largely dependent on the electricity mix (Marmiroli et al., 2018; Onat et al., 2019). As previously noted, driving less – represented by less car transport, shift to active transport, and shift to public transport – tends to replace shorter and urban car trips and therefore have a relatively low potential to reduce emissions (Institute for Global Environmental Strategies, Aalto

University, and D-mat ltd., 2019; Lekve Bjelle, Steen-Olsen & Wood, 2018). This is despite public transportation and active transportation emitting far less carbon compared to driving an internal combustion engine car or other motorized vehicles (Ivanova, Vita, Wood, Lausselet, Dumitru, Krause, Macsinga & Hertwich, 2018; Aamaas, Borken-Kleefeld & Peters, 2013; Aamaas & Peters, 2017). In other words, there is potential for high emission reductions per person by driving less, but to reach that high potential longer trips have to be replaced as well (Ivanova et al., 2020).

It is clear from the results that the potential emission mitigation from the only mobility sharing options on the list, car-sharing and carpooling, which had a median of 0.3 tCO2eq/cap, were relatively low. However, the results suggest that the potential emission reductions of mobility sharing options could be improved by using electric carpools. Moreover, According to the Institute for Global Environmental Strategies, Aalto University, and D-mat ltd., (2019), the effect of mobility sharing can be both positive and negative depending on how prevalent the rebound effect is in each circumstance. The rebound effect is defined as "the unintended consequences of actions by households to reduce their energy consumption and/or greenhouse gas (GHG) emissions" (Sorrell, 2012, p. 8) An example of the rebound effect in relation to mobility sharing is that car-sharing can lead to increased emissions when individuals who did not have access to a car replace public transport trips with car trips (Institute for Global Environmental Strategies, Aalto University, and D-mat ltd., 2019).

Put differently, mobility sharing, such as carsharing, can have adverse environmental effects if it replaces more sustainable options but can also have a positive impact if carsharing leads to, say, driving a shared vehicle to work two days a week and taking public transport three days rather than using a private car to get to work every workday. The conclusion, then, is that mobility sharing solutions should be implemented in a way that minimizes the rebound effect (Institute for Global Environmental Strategies, Aalto University, and D-mat ltd., 2019).

Finally, the results clearly show that more research is required to quantify the potential emission mitigation from sharing initiatives in the transport sector. Out of the close to 1,000 abstracts that were reviewed by the author, only two options were found that could be transformed into CO2 eq/capita. Ivanova et al. (2020) found only six articles that contained nine estimations of emission reductions from carsharing and carpooling. Similar to these results, Wynes, Nicholas, Zhao, and Donner, (2018) performed a systematic literature review to examine to what degree academic literature has been able to quantify greenhouse gas emission reductions from behavioral interventions to reduce driving, consumption of meat, and household energy use. Out of the 949 texts they found in their initial search relating to transport, the authors found only five studies investigating transport emissions which had measured CO2 reductions.

5.2 Results – municipalities' transport strategies

For the following reviews of Swedish municipalities, it is important to know that Sweden is divided into counties, such as Skåne, which in turn is made up of different municipalities, such as Lund municipality. Each municipality consists of a central town (for example, the city of Lund in Lund municipality) and other inhabited areas and villages within the municipality borders. It should also be mentioned that some municipalities go by the name of cities rather than municipalities, but the difference is only in name. For example, Stockholm municipality is referred to as Stockholm city while Lund is referred to as Lund municipality, but both are legally considered municipalities.

What follows are summaries of six municipalities' work to tackle environmental problems and reduce emissions from the transport sector (see Appendix B for a list with links to the documents used to create the summaries of each of the six cities studied below). It should be noted that the texts below are not complete reviews of all policies and approaches that the municipalities have used to reduce transport emissions but rather summaries with highlights of specific topics and elements of their transport strategies.

5.2.1 Lund

Lund municipality's (2018a) overview plan presents a plan for future development and usage of resources in the municipality. The overview plan sets out the following environmental goals for Lund:

- reduce emissions in Lund from the baseline emission level of levels from 1990 by 50% until 2020,
- reduce emissions in Lund by 80% until 2030,
- and for emissions in Lund to be close to zero by 2050.

In 2017 and 2018, Lund had reached a reduction of emissions by 41% and 45% respectively, which has set the municipality on track to achieve its goal of a 50% reduction by 2020 (Lund's Municipality, 2018b). However, reports from the municipality estimate that the 2030 goal will not be reached with current measures (Lund's Climate Policy Council, 2019, 2020).

Lund's overview plan's approach to sustainability is to improve the attractiveness of low-emission forms of transport and to primarily grow the municipality inwards, close to areas in which public transport is well-developed to make better use of public transport rather than to expand the city boundaries. An example of this is one of the overview plan's goals of all increases in traveling being in walking, biking, or public transport. Yet Lund Municipality (2018c, p. 40) has written that "planning must be done with the assumption that passenger cars will be a very important part of the future transport system [Author's translation]." Planning city development according to current transport habits with the passenger car as the dominant form of transport contradicts the overview plan's approach of improving the

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attractiveness of low-emission forms of transport.[4] Considering the municipality's focus on passenger cars, the lack of information and planning for green vehicles in the municipality's documents, and especially electric passenger cars, is surprising. While the review did find that the municipality has invested in infrastructure for electric cars by building more public charging stations, but there does not seem to be any metrics reported.

Related to this, Lund's Climate Policy Council was created in 2018 as a way to bring experts together to each year review Lund municipality's approach and progress to reduce the adverse effects that the municipality has on the climate. In their most recent report, Lund's Climate Policy Council (2020) questions the municipality's decision to construct a highway ramp close to Ideon (planned finish in 2021) as research has shown that improving accessibility for cars leads to increased traffic (e.g., Næss, Nicolaisen & Strand, 2012; Noland & Lem, 2002). Additionally, the Climate Policy Council highlights that a great deal of planning seems to have cars in focus while bikes are given little attention, as seen in the lack of mentions of parking spaces for different kinds of bikes in the municipality's documents.

Continuing on the topic of parking, municipalities have the jurisdiction to control the number of required parking spaces for newly built or renovated buildings, such as apartment buildings or offices, through their "parking norms" (Lund's Municipality, 2018d). Lund's parking norm has split the city into three areas with different requirements for the required number of parking spots depending on each area's need for parking, however, but the parking norm for bikes only has one zone (Lund's Municipality, 2018d).

Lund's Climate Policy Council (2020) makes two recommendations based on Lund's parking norm. First, the council argues that with the overall increase in biking happening in the city, it would be better to implement different zones based on the demand for parking spots for bikes. Second, they argue that Lund municipality should work to make the parking norm stricter to make it less convenient to own a car. However, one of the reasons the municipality gives for not reducing the parking norm for apartment buildings is that if there are not enough parking spaces for cars to be able to park 24 hours a day, people may be forced to move the car or take the car their working places (Lund's Municipality, 2018d).

Lund also has a strategy for sustainable transport called LundaMaTs 3 (Lund's Municipality, 2014). One of the essential strategies within Lund Municipality's (2014) LundaMaTs 3 is to replace passenger car trips with public transport or biking trips across Lund municipality by making public transport and biking paths as convenient and attractive as possible. This strategy also goes into one of the significant components of LundaMaTs 3, which is to make the surrounding villages in the municipality more appealing to reduce the need for inhabitants outside of the city of Lund to make trips to and from the city.

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[4] The definition of a green vehicle or climate efficient vehicle in Sweden is currently uncertain as it has changed several times during the recent decade and different organizations, including municipalities, use different definitions. According to the website Miljofordon.se (2020), which is created and run by Stockholm City, Gothenburg City, and Malmö City, an environmental car is a car driven by climate-friendly fuels, such as electricity, ethanol, and biogas but very gasoline-efficient and diesel-efficient cars can also be defined as green cars.

LundaMaTs 3 has its own set of 13 goals to achieve, which have their progress measured every other year. The goals can be split into different categories that relate to emissions, share of total trips by transport mode, transport mode increases and decreases, and accessibility and safety. In Lund municipality's (2019) environmental report from 2019, seven of the goals from LundaMaTs 3 were on a trend to be achieved, the trends were uncertain on three of the goals, two of the goals are in danger of not being completed, and progress in the final goal was not measured. The most important goal concerning this study is the goal to have an annual reduction of CO2 emissions from transport per inhabitant of 2.5%, which is one of the goals which are on a trend to be achieved.

In Lund's Climate Policy Council's report (2020), they explain that there has been a reduction of greenhouse gas emissions in Lund municipality by 41% from 1990 to 2017, but starting around 2015, the decline slowed down and stagnated. Moreover, the report shows that the majority of the emission reductions in Lund since 1990 has been from changes in electricity and heating which were made possible mainly by the primary electricity and heating provider Kraftringen (which is owned by Lund and other nearby municipalities) and their work to achieve a fossil-fuel-free district heating system. Since the district heating system became 100% fossil-free in April 2018 (Kraftringen, 2020), emission reductions will not continue at the same pace unless other sectors are tackled as well. Moreover, Lund's Climate Policy Council's report (2020) shows that if Lund municipality wants to reach their 2030 goal of reducing greenhouse gas emissions by 80% compared to 1990, the reductions will have to reach other sectors beyond electricity and heating, and in particular, the transport sector which has only seen a decrease in emissions in Lund by 10% since 1990 and now accounts for close to half of all emissions in Lund.

According to a report by the Climate Policy Council (2020), Lund municipality has attempted a variety of different approaches to reduce greenhouse gas emissions from the transport sector during recent years. Examples of these approaches are the 167 million SEK that was invested in new bike lanes, bike parking, and safety improvements between 2013 and 2017 to promote biking and the 110 million SEK that was spent on operating and maintaining the infrastructure for bikes for the same period (Lund's Municipality, 2017). Despite these efforts, biking kilometers per capita in Lund municipality has gone down by approximately 1% per year for several years, but the decline can primarily be explained by population growth (Lund's Municipality, 2019). Moreover, the total length of biking paths in the municipality has increased from around 235 kilometers in 2004 to 297 kilometers in 2017 (Lund's Municipality, 2017).

There has also been a reduction in bus traveling within the city of Lund by 3% but an increase of total bus and train travel in the municipality by 15% since 2011 (Lund's Municipality, 2019). Furthermore, according to Lund municipality's environmental report (2018e), commuters in Lund have been given a trial for electric bikes for three weeks or free public transport for two weeks. The report states that the trials have been successful as the individuals who have participated have continued their sustainable habits after the trials, but no metrics are reported. Another example is that Lund is building a tram route which is

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expected to open for the public in December 2020 with the hope of reducing the number of passenger car trips into and out of the city center (Lund's Municipality, 2020a).

Another example from the report is the environmental zone class 1, which was introduced in the city center in 2013. The Swedish Transport Agency's website (2020b) explains that environmental zones classes 1, 2, and 3 are zones with restrictions for certain vehicles that municipalities have been able to implement since January 2020 – but class 1 zones have existed in some municipalities for over two decades. Environmental zone class 1 ensures that heavy trucks and busses are up to fuel efficiency standards by only allowing heavy vehicles that were first registered in the last six years or if they fulfill a certain emission standard. Heavy vehicles that fulfill the European emission standard Euro 3 are instead allowed for eight years after the first registration, and those that fulfill Euro 4 do not have a restriction.[5] Class 2 puts emission standard restrictions on passenger cars, light trucks, and light busses to pass the emission requirements for Euro V or Euro VI. Finally, environmental zone class 3 only allows electric vehicles, fuel cell vehicles, and gas-driven (such as biogas) vehicles if they pass the emission requirements for Euro VI.

The Climate Policy Council (2020) also explains that the municipality has been a part of different mobility sharing initiatives. One of these initiatives is that major property owners, such as LKF (Lunds Kommuns Fastigheter), have the option of receiving a 25% reduction in the number of required parking spots for cars if they offer their residents a free membership for carpooling for five years. They also have the option of building what Lund municipality calls "car-free accommodation" with a 90-95% reduction in the number of required parking spots for residents, if the major property owners provide their residents access to a carpool with an electric car and e-bikes (Lund's Municipality, 2018d). An example of a car-free accommodation coming from LKF is the residential area Xplorion which is expected to be ready for residents to move in by late 2020 (LKF, 2020). Moreover, there are 17 bike renting stations with 250 bikes across Lund municipality, which are free during the first 30 minutes of each ride. Additionally, since 2018 inhabitants of Lund can try out e-bikes for free during three weeks of the summer months (Lund's Climate Policy Council, 2020).

5.2.2   Uppsala

40-60 minutes north of Stockholm by train sits the city of Uppsala which was named Sweden's best biking city in 2018 and 2019 and was awarded the title of the world's best climate city in the WWF's One Planet City Challenge in 2018 with the motivation that it has set long-term goals and worked systematically with improving the environment in the municipality (Uppsala Municipality, 2020a). The WWF challenge is the world's largest competition of its kind, with over 256 participating cities in 2020 (WWF, 2020).

Uppsala municipality has a unique position among municipalities as it is a relatively large city with approximately 230,000 inhabitants, yet it is also the Swedish municipality with the most

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[5] Specific requirements for each emission standard can be found on https://www.transportpolicy.net/standard/eu-light-duty-emissions/ and https://www.transportpolicy.net/standard/eu-heavy-duty-emissions/

rural inhabitants (Uppsala Municipality, 2016a). This leads to challenges such as making the city center easy to get to by using public transport but at the same time making sure inhabited areas close to Uppsala city is attractive for both industry and its citizens to reduce the number of trips inhabitants of surrounding villages need to make into the city of Uppsala.

Uppsala's local climate goals were introduced in the document environmental and climate program 2014-2023 (2015) but have since their introduction been tightened. There are now four goals, all of which use the year 1990 as a baseline. The goals are:

- to reduce greenhouse gas emissions from energy use, transports, and machines in Uppsala municipality to a level close to zero by 2030,
- The emissions of all greenhouse gases in Uppsala municipality should be close to zero (a reduction of 90%) by 2040,
- a reduction of greenhouse gases in Uppsala municipality corresponding to a 100% reduction by 2050,
- a reduction of greenhouse gases in Uppsala municipality corresponding to a 110% reduction by 2070.

The primary document of Uppsala municipality is their overview plan from 2016 which guides the city's development into the 2050s and just like many other municipalities, Uppsala's focus lies on improving the attractiveness of walking, biking, and public transport services and increasing the density of the city rather than trying to expand the city's boundaries (Uppsala Municipality, 2016b). The overview plan of Uppsala city (2016a) presents a vision of Uppsala in 2050 in which there have been limited investments in new roads and the focus has instead been on improving public transport through new train stations in urban areas outside of Uppsala city and moving space from passenger cars to public transport, biking, and walking. However, in connection with the writing of the overview plan, a traffic analysis was performed that showed that if the plan is followed, the share of trips done by passenger cars within the city would still increase from 37% of trips to 44% of trips from 2016 to 2050 due to population increases (Uppsala Municipality, 2016c). The traffic analysis also made calculations on the effect that a combination of parking fees, changes to speed limits, carpooling systems, increased fuel prices, and shared tax incomes from public transport with Stockholm County. Their estimations showed that implementing all these measures could lead to a share of total trips by passenger cars reaching as low as 25% (Uppsala Municipality, 2016c).

The answer to the question of how Uppsala's emission goals are to be reached seems to be unclear since Uppsala municipality is currently in the process of writing a mobility and traffic strategy as well as a climate roadmap (Uppsala Municipality, 2016a). However, one example of what has been done is to prioritize biking paths during winter when infrastructure is cleared of snow to ensure that as many as possible continue their habit of biking even during winter (Uppsala Municipality, 2019a).

Moreover, Uppsala has since 2014 implemented an initiative called "the Winter Cyclist" in which participants promise to bike at least three kilometers, three days per week from December to March and in exchange they get spiked bike tires and other helpful biking gear

and according to evaluations, 90% of participants continue their habit of biking during winter after their participation (Uppsala Municipality, 2019b, 2019a). Uppsala municipality has a goal to achieve a 100% fossil-free vehicle fleet within the organization. The municipality has come a long way toward their goal by using HVO to fuel their vehicles, and 80% of the organization's vehicles were fossil-free in 2019 (Uppsala Municipality, 2019c). However, the municipality seems to be lacking a concrete plan of how it will achieve an electrification of other vehicles active in the region.

It is also interesting to note that Uppsala's budget has 47 million SEK or 9,2% of the entire budget for infrastructure reserved for promoting walking and biking in various ways (Uppsala Municipality, 2020b). Another example of Uppsala's work to improve its environment is the introduction of commuter parking spaces (in connection to train stations and other public transport locations) in the suburbs (Uppsala Municipality, 2020c). Moreover, just as Lund and several other municipalities in Sweden, Uppsala has an environmental zone class 1 in the city center (Uppsala Municipality, 2020c).

An interesting aspect of Uppsala's approach is the Uppsala Climate Protocol. Created in 2010, the Uppsala Climate Protocol (2020a) is a network consisting of actors that cooperate to reduce greenhouse gas emissions. The members range from the Swedish University of Agricultural Sciences to the Swedish church. The group is organized into different focus groups, and the focus group, which works with sustainable transport, has introduced a variety of successful initiatives. For example, during 2014 and 2015, four projects were active that together led to a reduction of 350 tons of CO2 (Uppsala Climate Protocol, 2020b). One of these projects was the creation of a certification called "Cykelvänlig Arbetsplats", which workplaces can get if they fulfill requirements that make it easier to commute using bikes. The project continues today, and at the time of writing, there are 91 participants in Uppsala Municipality. The Protocol has also created "Testresenären" which is an initiative where around 200 participants that usually commuted to work with cars were offered free access to public transport for one month if they stopped commuting with their cars. 85% of the participants planned to continue using public transport after the trial period (Uppsala Climate Protocol, 2020b).

5.2.3   Linköping

The municipality aims to expand the city inwards to create a denser and more cohesive municipality to make better use of the already existing infrastructure and to promote sustainable forms of transport at the expense of passenger cars (Linköping's Municipality, 2010a). However, according to the municipality's traffic plan (2010b), the current layout of the city is sparsely built, more suitable for cars, and banana-shaped rather than round, which would be optimal for public transport. Moreover, the traffic plan makes it clear that while infrastructure for biking is well-developed, there is a lot of overlap for biking and walking spaces, which have to be separated to make both alternatives more attractive.

Since 2013, Linköping municipality has a goal to become carbon neutral by 2025; however, this goal is not represented in their overview plan or traffic plan, which are instead based on the national environmental quality goals as well as goals from the European Union (Linköping's Municipality, 2010a, 2013). It is odd that such an ambitious goal is not a part of the overarching documents that guide the municipality's work to reduce emissions. According to a follow-up of the municipality's 2025 goal done in 2017, Linköping municipality has reduced their CO_2 emissions by 17% in total and by 25% per capita when using 2009 emission levels as a baseline (Linköping's Municipality, 2017). The follow-up document also explains that the reduction in emissions is primarily due to a shift to a higher share of bio-based fuels used in heating and that more measures are needed to achieve carbon neutrality by 2025. There are also three local goals for 2030: lower the share of car traffic from 60% to 40%; to increase the share of travelers in public transport from 12% to 20%; and to increase the share of bikers from 28% to 40% (Linköping's Municipality, 2019a). In 2018, the share of trips done by cars had been reduced to 47% (Linköping's Municipality, 2018).

Linköping's traffic plan (2010b, p. 20) claims that Linköping is "a forerunner" in environmental cars, yet there is surprisingly little information about the municipality's work to introduce these vehicles in their documents. The majority of the information about green vehicles is about the municipality's vehicle fleet rather than the population's vehicle fleet. Moreover, Linköping's traffic plan (2010a) also says that the municipality's ability to affect the vehicles used in Linköping is limited, but they do argue that measures such as lower parking fees for green vehicles (which was ruled unlawful by the supreme administrative court in 2015 (Linköping's Municipality, 2019b), marketing of biogas, information campaigns, environmental zones, and road tolls could work.

Another approach that is used in Linköping's traffic strategy (2010b) and in several other Swedish municipalities is the four-step principle. The idea behind the four steps is that when policies or approaches are developed to fix or prevent problems, they go through four steps to find solutions, starting with the first and ending with the fourth step. The Swedish transport administration (2018) explains the principle as the four steps: rethink, optimize, rebuild, and build new. Rethink entails options that can affect the choice of and need of transport, for example, marketing campaigns to promote public transport. Optimize means options that make more effective use of the already existing infrastructure, such as promoting carpooling. Rebuilding represents actions such as widening bike paths while the final path means building new. The steps are arranged to start at the root of issues and manage demand first rather than simply focus on supply, which makes it so approaches such as building new roads rather than using them more efficiently are less likely to occur.

There are several other examples of what Linköping municipality has done to reduce transport emissions. For example, in 2018, Linköping municipality (2019c) opened up its first express bicycle path, which was extended in 2019 and now reaches from the core of Linköping city to two of the more distant districts of the city. The express bicycle path is wider than typical bicycle paths and separates pedestrians from bikers. The path is also better lit and maintained than other bicycle paths, especially during winter. The purpose of the path is to tie together the more distant parts of Linköping with the rest of the city, drawing more people away from cars.

Another example is the recently opened bike garage in the city center and time regulations for parking bikes by the train station to ensure that the parking spaces do not fill up with unused bikes (Dukaten, 2020). Moreover, there are 200 electric bikes available for hire through an app across Linköping's 19 charging stations (LinBike, 2020). Another interesting initiative is the Linköping Initiative, which was started by Linköpings Municipality (2020) and other public actors. The initiative is a group of companies that cooperate with Linköping Municipality and other regional actors to reduce emissions. Participants have to set goals to reduce their carbon dioxide emissions and make annual follow-ups on these goals. Companies such as Arla, Cloetta, and Ericsson are participating.

5.2.4   Malmö

Malmö is located about 18km south from Lund and similar to other municipalities, the focus in Malmö's sustainable transport strategy is on making more efficient use of space and to replace car trips with more sustainable options by making walking, biking, and public transport trips more attractive (Malmö City, 2018a, 2016). So far, the city has made impressive progress in reducing its transport emissions. According to Lund's Climate Policy Council (2020) which performed a comparison of the reduction in transport emissions, Malmö has reduced their transport emissions by 40% since 1990 while the national average lies at 10%.

The overarching goal of Malmö city's (2016, p. 10) approach to sustainability is to become Sweden's most climate-smart city and to "become a socially, environmentally and economically sustainable city to visit, live and work in" and to have their entire use of electricity be 100% renewable by 2030. There was also a goal to achieve a reduction of greenhouse gas emissions by 40% by 2020 compared to 1990. In 2018, the reduction had reached 26% (Malmö City, 2019a). Malmö city (2016) also provides more concrete sub-goals to reach for the transport sector by 2030:

- 30% of trips being done by cars, 30% by bike, 25% by public transport and 15% by walking within the city;
- the sub-goal for commuting trips to and from Malmö is to reach 50% by car, 45% by public transport and 5% by bike.

According to a travel survey, the city performed in 2013, the share of trips being done with cars were at 40%, 22% by bike, 21% by public transport and 15% by walking (Malmö City, 2019a). The survey from 2013 showed that the corresponding numbers for commuting trips were 62%, 33%, and 3%. In 2018, most of the goals for trips within the city were close to being achieved as 34% of trips were done by passenger cars, 25% by bike, and 14% by foot (Malmö City, 2019a).

To achieve these goals, Malmö City (2016) presents some of the city's efforts that have been implemented or are planned to be implemented to promote sustainable transport. For example, in 2010, the Malmö city (2010) council adopted the parking policy and parking norm which has the aim of using land more efficiently and to reduce traffic through measures like building

multi-story car parks, decreasing the number of parking spots close to workplaces, and by promoting carsharing. Furthermore, Malmö implemented an environmental zone class 1 in 1996 which was expanded in 2007 (The Swedish Transport Administration, 2010).

Moreover, a bike-sharing system was introduced in 2016 and the first phase of a tram route is set to begin in 2021 (Malmö City, 2016). Furthermore, investments have been made in a variety of locations across Malmö to promote biking, walking and public transport over car trips and biking has increased by 80% in central parts of Malmö from 2003 to 2018 while the population has increased by about 25% in the same period (Malmö City, 2019a). Related to this is the fact that 92,4% of inhabitants in Malmö have access to a bus stop within 500 meters of their home (Malmö City, 2019a).

Another example related to biking investments is the introduction of the "Bike & Ride" system which increases security and convenience of using a bike to traverse the city by making it possible to park bikes indoors (Malmö City, 2016). Additionally, Malmö's environmental report (2018b) states that biking paths were expanded by 5 kilometers during 2017 while roads for cars were extended by 4 kilometers. The report also explains that more electric busses will be introduced to eventually achieve a public transport fleet fueled entirely by sustainable sources. Moreover, in 2019, 92% of the vehicles used within the organization were green vehicles (Miljöbarometern, 2020).

Another interesting approach mentioned in Malmö's environmental report (2018b) is the MalmöExpress bus line, which was implemented in 2014 and consists of 24-meter-long busses that are driven primarily by biogas but electricity is generated when the busses break which can then be used to power the engine as well. The MalmöExpress busses travel along bus lanes and are prioritized in intersections through smart traffic lights (Lund's Municipality, 2019). Malmö also has green obligations which they use to fund different projects to reduce emissions. According to Malmö city's (2019b) report on green obligations from 2019, 60.3 million SEK, out of the total 1,000 million SEK spent during 2018, was spent on building 31.4 kilometers of road for sustainable transport in the shape of biking lanes and infrastructure for electric busses. According to their calculations, these investments will lead to a reduction of 2793 tons of CO2 equivalents per year.

Just as in the case of Lund municipality, Malmö's documents are rather vague about the electrification of the vehicle fleet. In Malmö's (2016, p. 36) sustainable urban mobility plan, it is written that:

> Malmö's future car traffic should be constituted by green vehicles driven by renewable and fossil free fuels. The City Administration should work towards making this possible through continued collaboration and coordination with private business, organisations and civic society.

While it is written that the goal is to achieve a green vehicle fleet and that the goal is to be achieved by collaborating with different actors, it is not explained who these actors are, how the collaborations are to be designed, and in what way these collaborations would help with achieving the goal.

5.2.5 Gothenburg

Gothenburg city has two critical documents in relation to sustainable transports. First, the city (2009) has an overview plan to set out a vision for the city. Second, the city (2018a) has an environmental plan for 2013-2020, which was updated in 2018. The plan is based on the Swedish environmental goals that were adapted in 1999 with the primary goal of leaving the next generation a sustainable society where the largest environmental problems are solved (Environmental Protection Agency, 2020b). Most of Gothenburg's environmental sub-goals were set to last until 2020 and a new environmental plan for 2021-2030 is currently being written but has not yet been adopted.

Similarly, Gothenburg city (2018b) has developed a plan called "Fossil free Gothenburg – what is needed?" which describes what Gothenburg can feasibly do to become fossil fuel-free within the framework of UN's 2015 Paris Agreement. The main conclusions related to transport were that significant incentives are needed to replace the fossil fuel-driven vehicle fleet with electric vehicles and biogas vehicles; city planning must be done by using policies to make active transport and public transport more attractive at the expense of passenger cars to reduce the number of cars in Gothenburg. Examples of these policies are to reduce the number of parking spots, promote research and development in autonomous vehicles, and implement more environmental zones, Gothenburg city has also collaborated with industry actors and other experts to write the strategic climate program for Gothenburg (2014a), which has the purpose of steering the city's long-term efforts to achieve net-zero levels of emission of greenhouse gases by 2050.

Looking through these different documents, there seems to be an oversaturation in the documents which deal with environmental problems in Gothenburg city. Moreover, most of these documents do not seem to be binding but rather work much like the overview plan of guiding future developments. The lack of clarity in how the different documents are connected makes it hard for citizens, industry actors, and other relevant actors to follow what the city is doing and planning to do to reach different goals. In fact, it is written in Gothenburg's (2018c) environmental action plan for 2018-2020 that while there is a lot of important information about the city's effect on the environment, it is not easy to find, understand and use.

Gothenburg's (2014a) strategic climate program presents several goals as well, but the goals that are most relevant for the transport sector are:

- the overarching goal of achieving net-zero emissions by 2050,
- reducing CO2 emissions from road transports in Gothenburg by at least 80% until 2030 with 2010 as the baseline year.

According to Göteborg's calculations (2014b; 2020), the overarching goal will be tough to achieve, and the current trend is neutral, meaning that the greenhouse gases are not increasing nor decreasing.

Similar to Malmö, Gothenburg has set a goal for the share of trips being taken by different modes of transport. However, according to Gothenburg city (2019), 48% of all trips were done by passenger cars in 2011, 25% by public transport, 22% by foot, and 5% by bike. In 2019, the shares were 43% by car, 30% by public transport, 21% on foot, and 7% by bike.

Gothenburg's 2035 goal is to have 29% of trips being done by car, 36% by public transport, 12% by bike, and 23% by foot. 7% of all trips being done by bike in Gothenburg can be compared to Malmö's 22% in 2013 (Malmö City, 2019a). This low share of biking will make it particularly challenging for Gothenburg to be able to make its goal of reducing emissions from road transports by 80% until 2030.

To reach these goals and reduce emissions, Gothenburg (2019) reports that a variety of approaches have been implemented. For example, during 2019, 535 new parking places for bikes were built, and the city has also worked with making it more convenient to use different modes of transport by, among other instruments, built 300 new parking places close to public transport to make public transport more attractive. It is also reported that more electric busses were introduced into the bus system, making it a total of 25 active electric busses.

Similar to other cities in Sweden, Gothenburg's traffic strategy is to improve conditions for walking, biking, and public transport as well as to make more efficient use of land. At the same time, the program for climate strategy (2014a) notes that Gothenburg wants to consolidate its role as the Nordic center for logistics but argues that this will be done while also reducing the environmental consequences that come with that role. However, it is not clear how this feat would be accomplished. Furthermore, the city mentions that it has made investments in infrastructure for public transport, electric public transport, and bike lanes, although it remains unclear how large these investments are (Gothenburg City, 2018d). Since January 2013, there is a congestion tax active from 6 am to 6:30 pm for vehicles driving in and out of Gothenburg with prices ranging from 9 SEK to 22 SEK depending on when the vehicles pass the automatic sensors (The Swedish Transport Agency, 2020b).

5.2.6   Stockholm

Just as many of the other cities and municipalities in Sweden, the city of Stockholm has a variety of documents that guide and control the development of the city. The documents that are key to transport are the overview plan (2018) and Vision 2030 (2007) and Vision 2040 (2017a), which both have similar functions to that of an overview plan. Moreover, the Urban Mobility Strategy (2012) and its related plans describe more concretely what is being done and what needs to be done to achieve Vision 2030. The city has also adopted a goal to become fossil fuel-free by 2040 and had been able to reduce emissions in Stockholm by approximately 40% by 2017 since 1990, primarily by increasing renewable sources of energy in the heating sector (Stockholm City, 2019a, 2016). In Stockholm's climate action plan 2020-2023 (2019a), it is stated that there are many challenges to becoming fossil-free by 2040 and to achieve the national goal of reducing transport emissions by 70% by 2030. It is argued in the document that some policies have to come from the EU and national levels since the city does not have the required jurisdiction to overcome some of these challenges. An example that is given in the document is that the EU and the national government have to promote the development of renewable fuels.

Stockholm is a part of the Stockholm-Mälaren Region, which is one of the fastest growing regions in Europe with an expected population growth of 15,000 annually or a 17% increase from 2015 to 2025 (Stockholm City, 2018). Because of this and the current housing shortage,

Stockholm differs from other cities in its primary strategy to city development. Rather than growing inwards, Stockholm's overview plan states that the city's strategy is to "create dense city districts around the city center and let the city grow successively outwards [Author's translation]" (Stockholm City, 2018, p. 7). Combined with the fact that the city has a vision of Stockholm becoming known as "the capital of Scandinavia", it differs from most other cities in that there is a certain acknowledgment that the area of the city will be expanded. According to Stockholm city's Vision 2040 (2017a), the expansion of the city will happen by connecting Stockholm city with newly built areas through expanded public transport networks, and both the new and old areas will have an "excellent infrastructure for travel, energy and waste, and thought-out urban planning … [which] makes living an eco-friendly life an easy and obvious choice" (Stockholm City, 2017b, p. 13).

Stockholm (2017c) has implemented a variety of measures that will help achieve its long-term goal of attaining a fossil-fuel-free Stockholm by 2040. For example, a congestion tax was implemented in 2006 for trips in and out of central Stockholm, which led to a reduction of traffic into and out of the inner-city during fee-hours by 30% in 2017 compared to the period between 2000 and 2005. However, passenger car traffic has also increased outside of the inner city. Similar to other cities in Sweden, Stockholm has an environmental zone class 1, and since January 2020, the stricter environmental zone class 2 – which puts restrictions on older passenger cars and light trucks and buses – was introduced on the street called Hornsgatan (Stockholm City, 2020). As is the case for the other cities, there is no clear strategy for increasing the number of electric cars. However, one of Stockholms City's (2017c) reports does briefly mention the goal of having a total of 500 public charging stations for electric vehicles by 2020, but no metrics were found on their progress. The report also mentions that Stockholm has been a part of different projects from the EU to introduce biogas-fueled vehicles, but there is a lack of metrics in how well these went. A report on the environment in Stockholm (Stockholm City, 2019b) does mention that none of the busses in Stockholm are fueled by fossil fuels.

Stockholm has plans for continued investments in infrastructure for biking and public transport, although the size of these investments is not specified (Stockholm City, 2017c). Examples presented are bike and bus lanes to give them more space and new tunnels for the city metro as well as for passenger cars to draw traffic away from the inner city. Moreover, the promotion of biking has become a significant part of Stockholm City's approach to sustainable transports. For example, in a report from 2019, Stockholm City (2019b) explains that these measures seem to have a positive effect as the number of passages by bike in the inner city has increased by 65-75% during the last decade. The report also makes it clear that while some of the increase is due to the population growth of 20% during the same period, it does not account for all of it.

5.2.7 Discussion

The presented results and the following section have attempted to answer the research question of: How do Swedish municipalities promote sustainable transport, and how well do their approaches match the recommendation of current academic research?

It appears that the studied municipalities, at least partially, are following what academic research is proposing to be the most effective way of reducing transport emissions: namely, to reduce cars. More specifically, the municipalities' approach to making public transport, biking, and walking more convenient by "growing inwards" even if it is at the cost of cars is in line with going car-free and driving less. The two notable exceptions to this strategy are Lund and Stockholm. Lund has an overall strategy that is contradicted by the municipality's documents since city planning is done under the assumption that passenger cars will still be an essential part of its transport system in the future, which may not necessarily be the case if public transport, biking, and walking become a more attractive option compared to driving passenger cars. Stockholm has a strategy to let the city grow successively outwards due to the pressure of a rapidly increasing population, although the city also plans to make the inner city denser.

Moreover, many of the municipalities have included efforts to improve public transport and biking conditions in smaller and middle-sized areas within the municipalities. For instance, one of the key principles in Lund municipality's traffic plan LundaMaTs 3 is to reduce the number trips needed to and from the city of Lund by making surrounding villages and middle-sized areas more attractive while Linköping is testing express bicycle paths between the city center and more distant parts of Linköping City (Linköping's Municipality, 2019c; Lund's Municipality, 2014). If these plans are successful, they will hopefully attract people driving longer distances using passenger cars to instead use public transport in addition to doing the same for people making shorter, urban trips (Institute for Global Environmental Strategies, Aalto University, and D-mat ltd., 2019; Lekve Bjelle, Steen-Olsen & Wood, 2018).

However, while the plans do match well with academic suggestions, municipalities do not always stay true to their plans. For example, referring to the need to develop Gothenburg in a way which makes it so it is less necessary to use a car to get around the city, Gothenburg's Strategic Climate Program (2014a, p. 53) writes that "Unfortunately, we do not always build the way we say we should, and the challenge therefore lies in following Gothenburg's goals [Author's translation]."

An approach that could be valuable to other municipalities is to follow in the footsteps of Lund which was the first Swedish municipality to create a local Climate Policy Council consisting of experts from different fields whose goal it is to create an annual report to review the municipality's environmental work and provide recommendations for what needs to be done to achieve the municipality's goals. Other than to create a closer connection between academia and municipalities, the councils should also point out and question decisions. For instance, Lund's Climate Policy Council (2020) questioned Lund municipality's decision to build a new highway ramp even though it was likely to lead to more traffic (Næss, Nicolaisen & Strand, 2012; Noland & Lem, 2002).

However, while both the Swedish Climate Policy Council and Lund's Climate Policy Council were created in 2018 and have not had much time to inspire changes, neither Lund nor Sweden as a whole is currently on the trajectory to achieve their environmental goals. This is reflected by the Swedish Climate Policy Council's claim (2019) that policies currently in place are only enough to reach halfway to Sweden's goal of reducing transport emissions by 70% by 2030, as well as a report from Statistics Sweden which states that Sweden's goal of achieving net-zero emissions of greenhouse gases will not be achieved by 2045 unless there is a rapid acceleration in the reduction of greenhouse gases (Statistics Sweden, 2019; Swedish Climate Policy Council, 2019). Put bluntly, Sweden as a whole, and municipalities as its building blocks, have to actually listen to these councils rather than use them as trophies to show how responsible they are.

Moving on to parking, Lund's Climate Policy Council (2020) recommended the municipality to create a stricter parking norm as well as a dynamic parking norm for bikes with different requirements for the number of required parking spots based on the demand for these spots as is the case for parking spots for passenger cars. At the same time, Lund's municipality (2018d) argues that too few parking spaces for cars may lead to more people using their cars to get to work. However, if Lund municipality and other municipalities continue working to improve the attractiveness and accessibility of public transport and active transport, the need for car ownership, and thereby parking spots for cars, would be decreased.

A reoccurring theme in the municipalities' documents was that they argued that even in 2050, when most municipalities have set a goal to have achieved net-zero emissions, they are still planning for the passenger car to be an important part of the transport system. Despite their goals, none of the six reviewed municipalities had a clear strategy on how to increase the share of electric passenger cars. The available information was mostly unclear and was rarely accompanied by metrics, such as the number of installed charging poles, to back claims up. There was also little information and no concrete strategies to promote passenger cars driven by other sustainable fuels, such as biofuels. This is worrying considering that about one-third of Sweden's domestic emissions (The Swedish Transport Administration, 2019) come from transport, and it is therefore unlikely that municipalities will be able to reach local or national goals unless more is done to promote sustainable transports (Lund's Climate Policy Council, 2019).

The Swedish Climate Policy Council (2019) explains that blending biofuels with petrol and diesel have functioned as an alternative to electrification since the approach does not require new infrastructure and new vehicles. It is also explained that biofuels and more efficient vehicles have been the primary reasons behind the reduction in road traffic emissions in Sweden and Sweden's policies to promote biofuels has led Sweden to become the European country with the highest biofuel share of total fuel use in the transport sector at 20%. Although the Council argues that biofuels will continue to play an important role in Sweden's transport sector, they also argue that biofuels will have to be complemented by rapid electrification to reach the 2030 goal of reducing transport emissions by 70%. On top of this, the Swedish Climate Policy Council (2019) brings up that there is a lot of uncertainty in the future supply of bioenergy as the demand is expected to increase as more and more nations promote vehicles fueled with biofuels.

However, the important discussion of the sustainability of biofuels is largely left out of both municipal documents and the Swedish Climate Policy Council's reports. The chapters on bioenergy (Chum et al., 2011) and sustainable development (Sathaye et al., 2011) in the IPCC's special report on renewable energy sources and climate change mitigation brings up the disagreement in the literature on the greenhouse gas emissions from biofuels since studies have shown that biofuels lead to lower greenhouse gas emissions compared to fossil fuels, yet life-cycle analyses of biofuels have shown that biofuels can lead to significant greenhouse gas emissions through factors such as increased land use and have other detrimental effects on the environment. On this topic, several authors argue that more research is required as the life-cycle emissions of bioenergy is uncertain (Creutzig et al., 2012; Farrell, 2006; Haberl et al., 2010).

5.3   Results - the Climate Policy Council's recommendations

The recommendations from the Swedish Climate Policy Council's report are meant for the national government, and as such, certain parts of the recommended instruments are outside of municipalities' jurisdiction. Therefore, nine (1, 4, 5, 6, 8, 11, 12, 13, 15) out of the sixteen recommendations were removed from the analysis while seven (2, 3, 7, 9, 10, 14, 16) remain (see Appendix C for all 16 original recommendations). The criteria for inclusion were whether they were relevant for the thesis and whether they are within the jurisdiction of municipalities. For example, recommendation 4 – phase out remaining exceptions to the carbon tax for industries outside the EU Emission Trading System – was excluded as there is little municipalities can do to have an impact on it. Contrary to this, recommendation 14 – to accelerate the electrification of road transport throughout Sweden – was included as municipalities can take concrete actions to promote the adoption of electric vehicles, such as making investments in public charging stations for electric vehicles.

The Climate Policy Council also offers advice on how to best achieve their recommendations, however, the advice is tailored to the national government. Therefore, a municipality can be considered as following the recommendation even if it does not follow the specific advice for that recommendation. For example, one of the advice for recommendation 16 – increase policy incentives to adopt more climate-efficient vehicles – is to "introduce a requirement for all new cars sold to be able to run on a fossil-free fuel (including electricity) or a fuel with a high biofuel blend" (Swedish Climate Policy Council, 2019, p. 70). Introducing such a requirement is outside of municipality jurisdiction. Municipalities are still considered to have followed the recommendation if they have implemented or plan to implement the other advice for that recommendation or if they have taken additional measures which contribute to the recommendation. For example, a municipality would be considered to do well in working towards recommendation 16 if they introduced an environmental zone class 2 or 3, even if it is not a part of the council's advice.

Table 2 shows to what degree the six municipalities follow the Swedish Climate Policy Council's recommendations from their 2019 report (see Appendix D for examples of what these results are based on). The results are visually represented through colors and numbers:

- 0 (red) entails that the municipality goes against the recommendation;
- 1 (pink) means that the recommendation is not mentioned;
- 2 (yellow) means that the recommendation is mentioned in some way, but without concrete measures to solve the problems the recommendation refers to;
- 3 (light green) means that the recommendation is mentioned and partially follows the Swedish Climate Policy Council's recommended instruments to solve the problem related to the recommendation, or in other ways attempt to fulfill the recommendation;
- 4 (dark green) means that the recommendation is mentioned and that the municipality fully follows the Swedish Climate Policy Council's recommended instruments to solve the problem related to the recommendation or, in other ways, fulfill the recommendation.

Table 2: Municipality alignment with the national Swedish Climate Policy Council's (2019) recommendations
Source: Swedish Climate Policy Council's (2019)

Rek	Recommendation	Lund	Uppsala	Linköping	Malmö	Gothenburg	Stockholm
2	Include implications for climate targets in all impact assessments in public inquiries and government bills.	1	1	1	0	1	1
3	Stimulate broad engagement and coordinate different initiatives.	2	4	3	2	3	2
7	Decide on a time-bound action plan to achieve fossil-free transport beyond the 2030 target.	2	2	2	1	2	2
9	Strengthen regulations and processes for community planning that decrease car dependence	3	3	3	3	3	3
10	Take into account diverse conditions and offset negative distributional effects, for example between urban and rural areas	3	3	2	3	2	3
14	Speed up the electrification of road transport across all of Sweden.	3	3	3	3	3	3
16	Develop additional policy instruments to promote climate-efficient vehicles.	3	3	3	3	3	3

Overall, the alignment between municipalities' documents and the recommendations from the Swedish Climate Policy Council is good for some of the recommendations but worse for others. Out of the seven recommendations that were deemed relevant for municipalities, recommendation #9 (Strengthen regulations and processes for community planning that decrease car dependence), recommendation #14 (Speed up the electrification of road transport across all of Sweden), and recommendation #16 (Develop additional policy instruments to promote climate-efficient vehicles) were adequately addressed by all six municipalities. For recommendations 2 (Include implications for climate targets in all impact assessments in public inquiries and government bills), 3 (Stimulate broad engagement and coordinate different initiatives), 7 (Decide on a time-bound action plan to achieve fossil-free transport beyond the 2030 target), 10 (Take into account diverse conditions and offset adverse distributional effects, for example between urban and rural areas), and 14 (Speed up the electrification of road transport across all of Sweden), the results were mixed.

5.3.1   Discussion

The following section will attempt to answer the research question: How well does Swedish municipalities' approach to promote sustainable transport match with the Swedish Climate Policy Council's recommendations?

Recommendation #2 – "Include the implications for climate targets in all impact assessments in public inquiries and government bills. New policy instruments should be preceded by plans for follow-up and evaluation to ensure high climate benefits and cost-effectiveness**"** (Swedish Climate Policy Council, 2019, p. 29).

The examined municipalities have overarching environmental goals that, in most cases, are similar to the national climate goals. Moreover, some municipalities also have sub-goals related to traffic and transport, which are designed with overarching goals in mind. The exception to this is Malmö, which has instead set goals of reducing the share of all trips by passenger cars and increasing the share of sustainable trips.

The problem is that none of the municipalities are on the required trajectory to achieve their overarching goals. Using Lund municipality as an example, transport emissions in Lund has only decreased by 10% during the last three decades, and as mentioned previously, the national goals will not be achieved with the policies currently in place (Statistics Sweden, 2019; Swedish Climate Policy Council, 2019).

Another problem is the lack of follow-ups on the effect of specific approaches and policies. The reviewed municipalities followed up their work to reduce transport emissions primarily through evaluating progress on a set number of predetermined goals, such as Lund's (2014) LundaMaTs 3 transport goals, rather than the effect that specific policies have. This approach could lead to inefficient policies as their full effect are unlikely to be captured when their

follow up consists of general goals. As discussed previously, Climate Policy Councils or similar approaches could be a way to reach the goals better as long as municipalities and the national government listen to these councils. Another approach that could be helpful in reaching the goals is a change of perspective.

The Climate Policy Council's recommendation #2 that planning documents and processes must be steered by meeting the National Climate Goals and not by continuing business as usual represents an important paradigm shift from weak to strong sustainability. The traditional view over the last decades has been to make economic growth and manufactured capital the priority, a view known as weak sustainability where "it does not matter whether the current generation uses up non-renewable resources or dumps CO_2 in the atmosphere, as long as enough machineries, roads and ports are built in compensation" (Neumayer, 2003, p. 1). However, there is increasing agreement that such an approach risks exceeding fundamental limits of the earth system, which in turn jeopardizes human development (Rockström et al., 2009; Steffen et al., 2015). The strong sustainability perspective instead views natural capital as non-substitutable, complex systems that determine earth's ability to provide society with essential services and functions and should therefore be preserved (Brand, 2009; Ekins, Simon, Deutsch, Folke, and De Groot, 2003). Changing to a strong sustainability perspective could help municipalities and other actors to view the required decisions not as potential economic losses but rather as the conservation of crucial natural capital.

Recommendation #3 – "Stimulate broad engagement and coordinate different initiatives. All stakeholders are needed: businesses, trade unions, municipalities and regions, academia, government agencies and civil society**"** (Swedish Climate Policy Council, 2019, p. 30).

The third recommendation is related to the cooperation that is required if the climate goals are to be achieved. All of the reviewed municipalities brought up the topic of collaboration with different actors in their documents, however, it was only Uppsala, Linköping, and Gothenburg which had concrete proposals on how the cooperation and partnerships would be implemented or had been implemented. The Uppsala Climate Protocol was especially interesting as it has members from all parts of society who work together to reduce emissions through different approaches. The Uppsala Climate Protocol could work as inspiration for other municipalities in Sweden as it would not only allow for the identification of willing actors but also help members hold each other accountable for working towards a fossil-free future.

According to the Swedish Climate Policy Council (2019, pp. 30-31),

> A successful climate policy will also be grounded in legitimacy, trust, fairness and acceptance. Trust … is vital when implementing major societal changes. A climate policy that is perceived as unfair or, for whatever reason, has low public acceptance, cannot be implemented successfully.

The implication behind this recommendation is that citizens play a vital role in the success of different policies and initiatives. Therefore, transparency and accessibility are key to achieving success. One way this is done is through the transport surveys that all municipalities

perform with regular intervals to determine the thoughts and transport habits of citizens. What stood out during the review of municipal documents was Gothenburg city's website, which required the user to sign in using BankID to access certain documents. BankID is an app with which you can electronically sign in using your personal number and code or password to identify yourself online. It is used to, for example, access online banks. The approach of requiring identification of accessing municipal documents could deter individuals from accessing these documents and taking part in the plans and development of the municipality which in turn could mean the loss of valuable feedback, ideas, or even potential partnerships with businesses. It should be noted that these documents could also be accessed without BankID by googling the title of the document, but doing so makes it hard to find all relevant documents since they are not all in one searchable database, which is often the case on the municipalities' websites.

During the review of municipal documents, it also became clear that another problem related to accessibility is that it is hard to gain a grasp on what municipalities do to reduce emissions from the transport sector. This is primarily due to the number of documents that are part of municipalities' plans to reduce emissions and the lack of clarity and purpose behind the documents. Many documents are simply considered as guiding documents that create a vision to strive for, and these documents do not always align with each other. Moreover, to increase accessibility and make the results of different initiatives easier to understand for citizens and other actors, it would be beneficial for municipalities to include clear and easily understood graphs.

A possible solution to counteract the problems that have been discussed for recommendation 3 is for municipalities to create annual reports which discuss all implemented policies, initiatives, and approaches and their results, along with follow-ups of more general goals. Having such a report would make municipalities' work and development more accessible and easier to understand for citizens and other actors and therefore increase trust between actors and make cooperation easier to set up. Making a condensed version of such a document could further increase its accessibility to citizens. For example, Lund's Climate Policy Council (2020) claims that Malmö has reduced its transport emissions by 40% since 1990, while the national average lies at 10%. The current approach of having many spread out documents with an unclear purpose makes it hard to grasp what led to Malmö's success in reducing transport emissions. In fact, such a document falls in line with one of the advice from recommendation 7: "The Government, the agencies and the municipalities should use a common, clear and transparent approach – not the current approach of different strategies and action plans with an uncertain status" (Swedish Climate Policy Council, 2019, p. 64).

Having an annual report which presents what has been done each year and the effect each instrument and approach has had would make it easier for citizens and actors such as other municipalities and companies to understand what instruments are effective and how they work. Moreover, such a document also has the potential to lead to more efficient policies being implemented in the future as municipalities would gain a greater understanding of the effects of specific policies. Furthermore, such a document could contribute to recommendation 2 – to include the evaluation of new policy instruments to ensure cost-

effectiveness and high climate benefits. However, this idea rests on the assumption that the effect of all policies can be measured at reasonable costs, which may not always be the case.

Recommendation #7 – "Decide on a time-bound action plan to achieve fossil-free transport beyond the 2030 target" (Swedish Climate Policy Council, 2019, p. 63).

None of the municipalities had developed an action plan for how to achieve fossil fuel-free transports. It seems to be the case that only Uppsala is in the process of creating a concrete action plan to achieve a fossil-free and climate positive municipality in collaboration with the Uppsala Climate protocol, but it is yet to be released and could therefore not be assessed. Malmö performed worse than the other municipalities. This is because no documents that mentioned fossil-free transports, other than within the transports of the municipal organization itself.

Many of the municipalities have produced documents that contain strategies of what needs to be done to achieve fossil-free transports or visions which draw up a scenario to strive for. An example of this is Stockholm's (2016) strategy for a fossil-free Stockholm 2040. However, these documents do not act as action plans but rather recommendations with brief descriptions of what could be done to achieve the goals. The lack of long-term planning of concrete measures could be due to uncertainty of how much money that can be used for different measures, but remains a problem.

Recommendation #9 – "Strengthen regulations and processes for community planning that decrease car dependence" (Swedish Climate Policy Council, 2019, p. 8).

The ninth goal is related to shifting processes towards including a focus which reduces dependency on cars. All of the municipalities have in some way implemented this recommendation into their documents. It has primarily been done by creating an overview plan which guides other documents into focusing on improving the attractiveness of sustainable forms of transport at the cost of passenger car convenience. An example of this is Lund municipality's strategy for sustainable transport called LundaMaTs, which has been a part of the municipality's transport documents for over two decades (Lund's Municipality, 2014)

A more concrete measure is the four-step principle which Linköping and several other Swedish municipalities apply in their work. Using the principle is an easy way to consider more sustainable options before deciding to build new roads and could therefore be a valuable addition for municipalities that have not yet adopted the principle (The Swedish Transport Administration, 2018).

Another interesting initiative was the reduction in the required parking spots for cars in newly built or renovated buildings in Lund municipality, such as the "car-free accommodations" where residents have access to shared vehicles but have little access to parking spots (Lund's Municipality, 2018d). This gives major property owners an economic incentive, in the form of reductions in the required parking spots, to promote less car dependency and could also help

with municipal strategies to grow inwards as less space is needed when fewer parking spots are required.

Recommendation #10 – "Take into account diverse conditions and offset negative distributional effects, for example between urban and rural areas" (Swedish Climate Policy Council, 2019, p. 8).

Recommendation 10 was achieved by most of the reviewed municipalities with the exceptions of Gothenburg and Linköping, which did mention the problem briefly but offered little in terms of concrete actions.

Recommendation 10 is especially important for middle-sized municipalities as they tend to have surrounding villages but not enough infrastructure to support public transport to and from those villages. Focusing only on a city in a municipality and ignoring the surrounding villages will likely lead to more car trips as the public transport system would not be expanded to reach surrounding villages or would not be convenient enough to attract travelers from using their cars. Lund municipality's document for sustainable transport, LundaMaTs 3 (2014) is an example of doing this well since it has a clear focus on making surrounding villages more attractive to reduce the need to travel to the city but at the same time improving public transport connections to the villages to ensure that as many of the trips as possible are made with public transport.

Recommendation #14 – "Speed up the electrification of road transport across all of Sweden" (Swedish Climate Policy Council, 2019, p. 69).

Although all the municipalities did clear the recommendation as all of them are investing in public charging infrastructure for electric vehicles, it was also one of the most concerning results from the review of the municipal documents. The reason behind the concern is the general lack of information and planning about electrification in the municipal documents. While many of the municipalities have documents that do mention that electrification of the vehicle fleet does have the potential to lead to substantial decreases in greenhouse gas emissions, none of the municipalities had a concrete plan on how to achieve electrification. This result was especially surprising since the municipalities are expecting passenger cars to still be a major mode of transport by 2050. Most information about electrification often comes from their websites, where municipalities seem to update website visitors if there have been new charging poles installed. The discussion for recommendation #16 below can be seen as an extension of this section as the promotion of green vehicles and electric vehicles face many of the same obstacles.

Recommendation #16 – "Develop additional policy instruments to promote climate-efficient vehicles" (Swedish Climate Policy Council, 2019, p. 70).

Just as for electric vehicles, the municipalities did not have concrete plans on how to increase green vehicles' share of the vehicle fleet, but all of the municipalities still cleared the recommendation. This is because of two reasons. First, the reviewed municipalities use the guiding principle of making sustainable forms of transport more convenient in planning for

municipality development. An important part of this strategy is to promote public transport which all of the reviewed municipalities are in the process of making more efficient through a variety of measures, such as replacing fossil-fuel driven vehicles with sustainable fueled vehicles or making public transport faster through public transport-specific lanes. Second, one of the advice that the Swedish Climate Policy Council (2019) gives in relation to recommendation #16 is to use public procurement to set higher standards when purchasing vehicles and transport services. However, there are still major obstacles for municipalities to promote sustainable transports.

According to the Swedish Climate Policy Council (2019), one of the inhibiting factors behind why many municipalities have problems with reducing emissions from transport is that they do not have the jurisdiction or legal tools that they require. In fact, the Swedish Climate Policy Council's (2019, p. 68) recommendation #13 is to "Strengthen the municipalities' mandates and tools to encourage fossil-free transport." For example, the council argues that municipalities cannot circumvent or remove subsidized parking and cannot sufficiently promote carpooling since they are not allowed to implement carpooling parking spots. This point is mirrored by the Swedish Environmental Protection Agency (2018b), which explains that the laws currently in place do not allow municipalities to change or introduce parking fees to promote sustainable transports even if it is done to achieve municipal or national environmental goals. An example of this can be found in Linköping's traffic plan (2010a) which argues that municipalities do not have the required jurisdiction to sufficiently promote cleaner vehicles. This is exemplified by the fact that Linköping's policy to implement lower parking fees for green vehicles was ruled unlawful in 2015 (Linköping's Municipality, 2019b).

Similar to the Swedish Climate Policy Council's argument that municipalities need to have more tools to reduce transport emissions, the Swedish Environmental Protection Agency (2018) argues that municipalities need to be able to use parking fees and parking access as policy tools not only on land owned by the municipality but also on private land, such as workplaces and places where parking is free and therefore risks leading to considerably more traffic. Furthermore, the Swedish Environmental Protection Agency (2018) explains that such a tax would be a better tool to reduce traffic in smaller and middle-sized areas compared to a congestion tax, which may work better in larger cities.

On top of this, the Swedish Climate Policy Council (2019) explains that the national government subsidizes driving and car ownership in ways that go against the climate goals. The council uses the example of the travel expense deduction (reseavdrag in Swedish) which makes it more beneficial to commute long distances using cars compared to using public transport, however, a new vehicle-neutral travel expense deduction based on the distance to a person's workplace is currently being investigated but its exact design has yet to be decided. Even with a revision of the travel expense deduction, it incentivizes living further from the workplace while incentivizing living closer to a person's place of work has a potential for high emission mitigation (Institute for Global Environmental Strategies, Aalto University & D-mat ltd., 2019).

The Swedish Climate Policy Council (2019) also advises the Swedish government to enable municipalities to introduce congestion pricing to reduce emissions either as a substitute or as a complementary instrument to environmental zones. After decisions at the national level, congestion pricing was implemented in Gothenburg and Stockholm. As mentioned previously, the congestion tax in Stockholm has led to quite substantial reductions in traffic where the tax is active, although traffic has increased outside of the taxed area (Stockholm City, 2017c). As explained in the previous sections, Stockholm, Göteborg, Malmö, Uppsala, and Lund have environmental zone class 1 implemented, which puts restrictions on heavy trucks and busses. The only municipality that has an environmental zone class 2 implemented is Stockholm. Municipalities have only been able to implement environmental zones class 2 and 3 since January 2020 (The Swedish Transport Agency, 2020b), however considering that municipalities are arguing that they lack the required tools to promote sustainable transports we should see an increasing number of environmental zones class 2 and 3 being implemented the coming years.

6   Conclusion

6.1   Research Aims and Practical Implications

The present study has aimed to examine what mobility solutions have the highest potential for emission mitigations and how mobility sharing solutions compare to other mobility solutions. It also aims to investigate to what degree Swedish municipalities – in their pursuit of achieving a sustainable transport system – follow the recommendations of academia and the Swedish Climate Policy Council. To do this, six Swedish municipalities' transport strategies were compared with academic literature and the Swedish Climate Policy Council's recommendations on the transport sector.

The results showed that the reviewed municipalities' strategies of growing inwards and creating a denser urban environment overall match well with what academic research argues is the best way to mitigate greenhouse gas emissions, that is to say, going car-free. However, there is an evident lack of strategies and specific and informative presentations of the approaches implemented to promote electric vehicles, which the Swedish Climate Policy Council and – according to the results of the study – academia argues is one of the most potent ways of reducing greenhouse gas emissions. Moreover, while the municipalities were found to be following a strategy that overall match with what academia argues works best, the reviewed municipalities are currently not on track to reach their local or national environmental goals, and they should therefore further strengthen their efforts (Statistics Sweden, 2019; Swedish Climate Policy Council, 2019). It was also found that mobility sharing approaches have relatively low emissions mitigation potential (Ivanova et al., 2020), which can potentially be increased if sharing initiatives are implemented in a way which ensures that participants replace unsustainable transport habits with mobility sharing that uses sustainable modes of transports, such as electric vehicles fueled by green energy (Institute for Global Environmental Strategies, Aalto University, and D-mat ltd., 2019). Furthermore, it was found that more research is needed to quantify the impacts of mobility sharing.

The comparison between the municipalities' documents and the Swedish Climate Policy Council's recommendation found some of the obstacles and potential solutions for Swedish municipalities to reduce emissions from their transport sectors. These results could be of particular value to anyone working within city planning and sustainable transports, such as employees in municipalities, policymakers, and politicians.

More specifically, it was found that Swedish municipalities' toolsets to promote climate-efficient vehicles and electric vehicles are currently limited by national rules and regulations (Environmental Protection Agency, 2018b; Swedish Climate Policy Council, 2019). However,

the lack of tools does not justify the municipalities' lack of clarity and planning in their current efforts for promoting climate-efficient vehicles. Additionally, the problem of clarity seems to be a problem with municipal transport documents in general, as it is hard to grasp exactly what has been done to reduce transport emissions in the past and what effect different initiatives have had. A document created annually which clearly and with transparency states what has been done to promote sustainable transport each year and tries to assess the effect of each implemented instrument could therefore be beneficial for municipalities, and the improved clarity could also make cooperation between municipalities and other actors easier to accomplish.

Moreover, during the review of the municipal documents, it became clear that municipalities do not always follow their set-out plans. One way to combat this is to follow Lund's lead and create a group of experts that each year review what the municipality has done and how it relates to their environmental goals. However, this requires municipalities to take these groups' advice to heart and try their best to implement them because the trajectory Sweden and other countries are currently following will not be enough to reach the 1.5°C target of the 2015 Climate Paris Agreement (IPCC, 2020; Swedish Climate Policy Council, 2019).

Several interesting initiatives were also found during the review of the municipalities' documents which could prove valuable for other municipalities. For instance, Uppsala municipality led the creation of the Uppsala Climate Protocol, which includes actors from all across society in working together to reduce emissions through a variety of approaches. Another interesting example is Lund municipality's initiative to give major property owners a reduced number of required parking places when building new apartment buildings if the property owners provide shared cars and other shared vehicles to their residents.

6.2   Future Research

First, similar studies in other countries could prove valuable to gather a better understanding of how municipalities' strategies for sustainable transports differ across countries and whether the obstacles remain the same. While the current study focused on road transport, it was found that there is substantial emission mitigation potential in flying less. Future research could therefore identify municipalities with an airport in close proximity to determine whether municipalities are promoting flying or trying to deter flying and in what ways this is done.

It could also be interesting to determine the effect of initiatives such as Lund's car-free accommodations where major property owners are offered reduced parking space requirements if they offer vehicle sharing solutions to their residents. Specifically, it could be studied what kind of people move into these car-free accommodations. Are the people who chose to live in car-free accommodations already living car free or did they have cars prior to moving in? If so, does the change last after they move out? It could also be interesting to investigate whether such approaches have been deployed in other municipalities in Sweden and globally.

Moreover, in connection with the Covid-19 outbreak, traffic has gone down considerably across the world as people are staying at home. In preparation for when restrictions are lifted, cities such as New York City (Wamsley, 2020), Milan, and Paris (O'Sullivan, 2020) are announcing plans of closing off streets to cars but keeping them open to cyclists and pedestrians to allow for more space. Although terrible, the virus could open a window of opportunity for cities (and municipalities) to promote active transport and prevent a reappearance and perhaps strengthening of passenger cars as people return to commuting but stay away from public transport.

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7   Appendix A: Inclusion and exclusion criteria from Ivanova et al., (2020)

Table 3: Inclusion and exclusion criteria applied in Ivanova et al., (2020)
Source: reprinted verbatim from Table 2 in Ivanova et al., (2020)

	Inclusion criteria	**Exclusion criteria**
Eligible population/ setting	No geographical restriction and focus on household consumption	Mitigation potential not directly linked to households (e.g. government spending)
Eligible intervention: Consumption options by consumption domain	• Direct reduction –consumption reduction, shift between consumption categories, and curtailment. Examples include living car-free or avoiding flights (transport), consuming fewer calories (food and conserve energy at home (housing) • Indirect reduction –changes in consumption patterns, changes in use behavior and changes in disposal patterns. Examples include carpooling (transport), sharing of food surplus (food), or equipment maintenance (housing) • Direct improvement –purchases of products that are more efficient in use or produced more efficiently. Examples include opting for electric vehicles (transport), plant-based diet (food) and renewable energy (housing). • Indirect improvement –changes in disposal behavior. Examples include recycling batteries (transport), food packaging (food), electrical appliances (housing).	Mitigation options beyond the adopted framework58 were out of scope. This includes macro-economic or industrial energy efficiency measures and technological solutions, producer incentives or other options on the supply side; population11 measures; mitigation potential of policies

Outcome: Mitigation potential and lifecycle emissions	Mitigation potential assessed through annual carbon savings in kilograms/tons CO2-equivalents per capita, converting GHGs (e.g. CO2, CH4, N2O, SF6) to equivalent amounts of CO2 (e.g. GWP100).	Focus only on direct emissions (e.g. well-to-wheel LCAs) or carbon intensities in functional units with no estimate of consumption; system-wide effects and potential for income rebound effects. Consumption activities with high carbon intensity should be considered to avoid rebound
Study types	Supply chain lifecycle GHG emissions through LCA review studies and MRIO studies, physical trade flow or hybrid modelling studies, studies on re-designing of consumption.	Systematic maps and reviews with only narrative synthesis; mitigation assessment through regression coefficients.

8   Appendix B: Documents used to create the summaries for each municipality

Municipality	Year	Document	Summary
Lund	2002	**Noland & Lem**	"A review of the evidence for induced travel and changes in transportation and environmental policy in the US and the UK"
	2014	LundaMaTs 3	Lund's guiding mobility strategy
	2017	Cykelbokslut	Powerpoint summary of Lund's approach to promote biking
	2012	**Naes, Nicolaisen & Strand**	"Traffic forecasts iugnoring induced demand: A shaky fundament for cost-benefit analyses"
	2018a	Översiktsplan 2018	Builds a vision for Lund's future that is supposed to guide other documents
	2018b	Årsredovisning 2018	Annual report on what goes on in Lund
	2018c	Översiktsplanens målområden	A summary of the main areas of the overview plan
	2018d	Parkeringsnorm	Document for parking rules and regulations
	2018e	Miljöredovisning 2018	Annual report on environmental work in Lund
	2019	Miljöredovisning 2019	
	2019	Lund's Climate Policy Council annual report 2019	A group of experts' annual review of Lund municipality's environmental work
	2020	Lund's Climate Policy Council annual report 2020	
	2020	**Kraftringen**	Kraftringen's website
	2020	Buss, spårvagn och tåg	Lund municipality's website with information on the tram
	2020b	**Swedish Transport Agency**	Information on the environmental zones
	2020	**LKF (Lunds Kommuns Fastigheter)**	LKF's webpage on Xplorion

				Summary of rewards that Uppsala has received
Uppsala	2020a	Prisregn	Summary of rewards that Uppsala has received
	2020	**WWF**	Information about the WWF One Planet City Challenge
	2016a	Översiktsplan (Del A Huvudhandling)	Builds a vision for how Uppsala should develop all the way into the 2050s
	2015	Miljö och klimatprogram 2014-2023	A part of Uppsala's long-term work to achieve a sustainable development
	2016b	Översiktsplan Kortversion 2016	Shorter version of the overview plan
	2016c	Översiktsplan Del C (Samlad konsekvensebeskrivning)	Part C of the overview plan
	2019a	Cykelåret 2019	A summary of Uppsala's work with biking
	2019b	Vintercyklisten	Information about Uppsala's campaign to increase cycling during winter
	2019c	Årsredovisning 2019	Annual report on what goes on in Linköping
	2020b	Mål och budget 2020	Follow up of goals and budget for 2020
	2020c	På väg mot ett klimatpositivt 2050	Summary of approaches, goals, and responsible actors
	2020a	**Uppsala Climate Protocol**	A website for a group of both public and private actors working to reduce emissions
	2020b	**Uppsala Climate Protocol**	
Linköping	2010a	Översiktsplan	Creates a vision for the future development of Linköping
	2010b	Trafikstrategi	Seems to fills a similar function to that of an overview plan but for transport
	2013	Miljöbladet	Newsletter on the environment in Linköping
	2017	Linköping koldioxidneutralt 2025	A report on what is needed for Linköping to become carbon-neutral by 2025
	2019a	Hållbart resande	Main webpage for sustainable transport in Linköping
	2018	Rapport Grön Resplan	A rapport of Linköping's environmental work
	2019b	Parkering	Webpage with information on parking in Linköping

	2019c	Cykellänken - en bättre väg!	Website about Cykellänken
	2020	**Dukaten**	Information on the bike garage in Linköping
	2020	**LinBike**	Information on the rentable e-bikes in Linköping
	2020	Linköpingsinitiativet	Information about Linköpingsinitiativet
Malmö	2010	Parkeringspolicy och parkeringsnorm	Describe different measures that are to be taken to improve parking and traffic in Malmö
	2010	**The Swedish Transport Administration**	Information on environmental zones
	2016	Sustainable Urban Mobility Plan	Presents a more concrete approach to planning mobility in Malmö
	2018a	Översiktsplan	Gives an overview of the future plans for Malmö
	2018b	Miljöredovisning 2018	Report on environmental work in Malmö
	2019a	Hållbarhetsrapport 2019	Report on sustainability in Malmö
	2019b	Grön obligationsrapport 2019	Report on green obligations
	2020	**Miljöbarometern**	Data on Malmö City
Gothenburg	2009	Översiktsplan	Gives an overview of the future plans for Gothenburg
	2014a	Klimatstrategiskt program	A collaboration between different actors to come up with a strategic programme
	2014b	Trafikstrategi för en nära storstad	A strategy to reduce emissions from transport in Gothenburg
	2018a	Göteborgs Stads miljöprogram 2013-2020	Describes a plan to achieve the Gothenburg's 2013-2020 environmental plan
	2018b	Fossilfritt Göteborg - vad krävs?	Describes what Gothenburg can feasibly do to become fossil fuel free
	2018c	Handlingsplan för miljön 2018-2020	Describes a plan to achieve the Gothenburg's 2018-2020 environmental plan
	2018d	Miljö- och klimatprogram 2021-2030	Preliminary environmental program for 2021-2030

	2019	Årsredovisning 2019	Annual report 2019
	2020a	Mål: Begränsda klimatpåverkan	Describes how Gothenburg is doing in regards to its environmental goals
	2020b	**Environmental Protection Agency**	Describes Swedens environmental goals
	2020a	**The Swedish Transport Agency**	Information on congestion pricing in Sweden
Stockholm	2007	Vision 2030	Sets out a vision for how Stockholm has developed until 2030
	2012	Framkomplighetsstrategin	Describes what needs to be done for vision 2030 to be achieved
	2016	Strategi fossilbränslefritt Stockholm 2040	Strategy to achieve a fossil fuel free Stockholm by 2040
	2017a	Vision 2040	Sets out a vision for how Stockholm has developed until 2040
	2017b	Vision 2040 (English)	Sets out a vision for how Stockholm has developed until 2040
	2017c	Stockholm stads miljöarbete	Describes what has been done to improve the environment in Stockholm
	2018	Översiktsplan	Gives an overview of the future of Stockholm
	2019a	Klimathandlingsplan 2020-2023	Climate action plan 2020-2023
	2019b	Miljön i Stockholm 2019	Report on the environment in Stockholm
	2020	Miljözon på Hornsgatan	Information about the environmental zone at Hornsgatan

9 Appendix C: National Swedish Climate Policy Council's recommendations

Table 4: 16 recommendations from the Swedish Climate Policy Council
Source: Reprinted verbatim from (Swedish Climate Policy Council, 2019)

#	Category	Recommendation
1	**Government leadership and governance**	Clarify that net-zero emissions imply zero emissions in most sectors (Swedish Climate Policy Council, p. 6).
2	**Government leadership and governance**	Include the implications for climate targets in all impact assessments in public inquiries and government bills. New policy instruments should be preceded by plans for follow-up and evaluation to ensure high climate benefits and cost-effectiveness (Swedish Climate Policy Council, 2019, p. 29).
3	**Government leadership and governance**	Stimulate broad engagement and coordinate different initiatives. All stakeholders are needed: businesses, trade unions, municipalities and regions, academia, government agencies and civil society (Swedish Climate Policy Council, 2019, p. 30).
4	**Cross-sectoral policy instruments**	Phase out remaining exceptions to the carbon tax for industries outside the EU Emissions Trading System (Swedish Climate Policy Council, 2019, p. 7).
5	**Cross-sectoral policy instruments**	Work proactively within the EU to improve the trading system and simultaneously introduce cost-effective national policy instruments to reduce emissions from Swedish facilities within the system (Swedish Climate Policy Council, 2019, p. 7).
6	**Cross-sectoral policy instruments**	Introduce and adopt legislation that gives the Government the right to review the establishment of operations and businesses that may run counter to achieving the national climate targets (Swedish Climate Policy Council, 2019, p. 7).
7	**Leadership and governance for achieving the climate targets for the transport sector**	Decide on a time-bound action plan to achieve fossil-free transport beyond the 2030 target (Swedish Climate Policy Council, 2019, p. 63).
8	**Leadership and governance for achieving the climate targets for the transport sector**	Align the transport policy targets with the climate targets (Swedish Climate Policy Council, 2019, p. 64).
9	**Leadership and governance for achieving the climate targets for the transport sector**	Strengthen regulations and processes for community planning that decrease car dependence (Swedish Climate Policy Council, 2019, p. 64).

10	**Leadership and governance for achieving the climate targets for the transport sector**	Take into account diverse conditions and offset negative distributional effects, for example between urban and rural areas (Swedish Climate Policy Council, 2019, p. 65).
11	**Stricter policy instruments for a fossil-free transport sector**	Prepare a reform of road traffic taxes that takes into account increased electrification and the use of autonomous vehicles, while ensuring just treatment of all regions in Sweden (Swedish Climate Policy Council, 2019, p. 67).
12	**Stricter policy instruments for a fossil-free transport sector**	Stop subsidising car ownership, driving and parking (Swedish Climate Policy Council, 2019, p. 68).
13	**Stricter policy instruments for a fossil-free transport sector**	Strengthen the municipalities' mandates and tools to encourage fossil-free transport (Swedish Climate Policy Council, 2019, p. 68).
14	**Stricter policy instruments for a fossil-free transport sector**	Speed up the electrification of road transport across all of Sweden (Swedish Climate Policy Council, 2019, p. 69).
15	**Stricter policy instruments for a fossil-free transport sector**	Set a date when fossil fuel sales will end in Sweden (Swedish Climate Policy Council, 2019, p. 69).
16	**Stricter policy instruments for a fossil-free transport sector**	Develop additional policy instruments to promote climate-efficient vehicles (Swedish Climate Policy Council, 2019, p. 70).

10 Appendix D: National Swedish Climate Policy Council's recommendations – comparison with municipalities

Rek	Recommendation	Stockholm	Göteborg	Malmö	Lund	Uppsala	Linköping
2	Include the implications for climate targets in all impact assessments in public inquiries and government	"Rapporten redovisar konsekvenserna av översiktsplanen och dokumenterar den hållbarhetsbedömning som pågått parallellt med planarbetet. Det övergripande syftet är att så långt som möjligt integrera miljö- och andra	Enligt stadens dokument ska det ske årliga uppföljningar av Göteborgs lokala miljömål (som antogs 2013). Av de 12 mål som finns är de två mest relevanta begränsad klimatpåverkan och frisk luft som både två med stor sannolikhet inte	"Utvecklingen av trafiken i Malmö och dess effekter ska årligen följas upp. Utifrån de övergripande målen som formulerats i Trafik- och mobilitetsplanen ska uppföljningsansvarig för planen årligen upprätta en samlad	"Lunds kommunfullmäktiga har beslutat om målsättningen; en halvering av växthusgaser till år 2020 och en utsläppsnivå nära noll år 2050. I översiktsplan 2010 bedöms det inte vara möjligt att trafiken kan minska sina utsläpp i den omfattningen." Med	"Fossilfritt Uppsala 2030 och Klimatpositivt Uppsala 2050 … De långsiktiga miljö- och klimatmålen liksom etappmålen följs upp årligen. Programmet som sådant utvärderades 2016-17. Det	"Utgår från de nationella miljökvalitetsmålen och mål på europeisk nivå. Utvärdering sker regelbundet."

bills. New policy instruments should be preceded by plans for follow-up and evaluation to ensure high climate benefits and cost-effectiveness (Swedish Climate Policy Council, 2019, p. 29)..	hållbarhetsaspekter i planen." (Översiktsplan, 2018) "Rapporten [Miljön i Stockholm 2019] miljön i Stockholm 2019 beskriver miljötillståndet och miljöutvecklingen i staden med fokus på förändringar under det senaste decenniet. Rapporten beskriver också vilka källor och faktorer som påverkar miljön lokalt eller globalt. Utgångspunkten för tillståndsbeskrivningen är dels de lagreglerade miljökvalitetsnormer och gränsvärden som ska´uppnås i staden och dels	kommer att nås men i en uppföljning av stadens lokala miljömål rekommenderas en mängd åtgärder för att sänka klimatpåverkan och luftföroreningar. T.ex. "Staden behöver satsa på energieffektivisering i bostäder, lokaler och i transporter såväl som utbyte av fossila energikällor till förmån för biobaserade bränslen och andra förnybara alternativ såsom vind- och solel. Stadsplanering och andra styrmedel behöver användas för att minska	bedömning av utvecklingen för de undersökningar, strategier, program, handlingsplaner och indikatorer" (Trafik och mobilitetsplanen 2016).	dessa mål som bas finns även ett antal delmål inom olika områden, såsom att "CO2-utsläppen från trafiken i kommunen ska minska per invånare med 2,5 % per år." och att "motorfordonstrafiken per invånare på det kommunala vägnätet skall minska med 1% per år." "Enligt Trafikverkets basprognos kommer personbilstrafiken i Sverige öka 31% under perioden 2014-2040, och än mer i Skåne. Teknikutvecklingen är stark och användningen av alternativa bränslen ökar hela tiden vilket förväntas minska utsläppen per körd kilometer. Men	ska utvärderas igen 2020. Revideringar kan då ske. Uppföljningen redovisas till kommunfullmäktige. En slutlig utvärdering genomförs 2024. Noteras kan att de nationella miljökvalitetsmålen har 2020 som målår. Kommunstyrelsen är ansvarig att samordna och sammanställa uppföljning och utvärdering." (Miljö och klimatprogram 2014-2023 reviderad). https://www.uppsala.se/organis	

		nationella miljökvalitetsmål och andra nationella, europeiska eller internationella miljömål... Den senaste genomfördes 2015"	biltrafiken och för att främja alternativen, såsom kollektivtrafik och cykel." (Uppföljning av stadens lokala miljömål, 2017)		trafikökningen verkar i motsatt riktning, och även med förväntad teknikutveckling, elektrifiering och ökad användning av alternativa bränslen kommer inte klimatmålen att nås utan ytterligare insatser. Enligt Trafikverkets klimatscenario måste personbilsresandet ändå minska med ca 12 % under samma period, för att nå uppsatta klimatmål." (Översiktsplan 2018) Den utvärdering som jag hittat är inte specifik för individuella planer eller metoder utan istället för LundaMaTs3 mål 13 mål.	ation-och-styrning/amnen/miljo-och-klimat/kommunens-arbete-inom-miljo-och-klimat/klimatfardplan-uppsala/	
3	Stimulate broad	"Många av de viktiga satsningar	"För att främja kloka	"Samarbete med Köpenhamn och	"Affärer, skolor och idrottsföreningar är	Uppsala klimatprotokoll	"Ett hållbart transportsystem

engagement and coordinate different initiatives. All stakeholders are needed: businesses, trade unions, municipalities and regions, academia, government agencies and civil society (Swedish	som pågår i Stockholmsregionen bygger på ett väl utvecklat samarbete och olika former av partnerskap mellan staden, andra offentliga aktörer, akademin och näringslivet. För att kunna realisera visionen och säkra en fortsatt stark och hållbar tillväxt är det nödvändigt att utveckla dessa samarbetsformer, särskilt mellan kommunerna, landstinget och statliga aktörer i Stockholmsområdet." Vision 2040, 2017) "Områdesplaneringen möjliggör ett brett samarbete	investeringsbeslut och för att förändra beteendemönster är det viktigt att vi stödjer de som vill ställa om och leva mer klimatsmart samtidigt som vi arbetar för att sprida förståelse och kunskap för klimatfrågan … Strategin kan genomföras genom att vi vidareutvecklar vår opartiska energi- och klimatrådgivning till privatpersoner, organisationer och små och medelstora företag i kommunen. Vi kan också arbeta kontinuerligt med kampanjer, evenemang, dialog	dess unika cykelkultur kan ge erfarenhetsutbyte så att hela Öresundsregionen kan fortsätta utvecklas som en världsledande cykelmetropol." (översiktsplan 2018) "I exploateringen av nya boendemiljöer ska förutsättningar ges till ett mer hållbart resande. Dialog med exploatörer och byggherrar är i detta avseende något som ska stärkas … Malmös framtida biltrafik ska utgöras av miljöfordon som drivs av förnyelsebara och fossilfria bränslen. Malmö stad ska	idag centrala målpunkter i byarna. I samarbete med dessa verksamheter kan gång- och cykelresor uppmuntras till och från verksamheterna." (Lundamats3) "Samarbetet med byggherrar fungerar bra idag men kan utvecklas och ge utrymme för mer innovation. Europeiska exempel och erfarenheter kan inspirera." (Lundamats3) "Den komplexitet som kännetecknar transportsystemet och dess effekter på samhället ger särskilda utmaningar och ett tydligt behov av samarbete mellan olika kommunala förvaltningar,	är "ett nätverk av företag, offentliga verksamheter, universitet och föreningar som samverkar och inspirerar varandra och andra för att nå Uppsalas klimatmål och bidra till en hållbar värld." (https://klimatprotokollet.uppsala.se/om-klimatprotokollet/) I klimatprotokollet ingår medlemmar från olika delar av samhället, exempelvis hittas allt från Vattenfall till Svenska Kyrkan i gruppen.	uppnås inte med enbart åtgärder inom transportsektorn. En samsyn och samordning behövs därför mellan trafikplanering, stadsplanering, användare av transportsystemen, regionen och näringslivet." (Översiktsplan 2010) "Kommunen ska arbeta med MM-verksamheten [Mobility management] i bred samverkan med andra viktiga aötrer som medborgare, organisationer, det lokala näringslivet samt andra kommuner."

	Climate Policy Council , 2019, p. 30)...	inom staden, där olika perspektiv blir tidigt belysta och där berörda nämnder och bolagsstyrelser kan samordna sin planering." (Översiktsplan 2018)	och kommunikation med olika målgrupper och bistå med råd och tekniska hjälpmedel." (Klimatstrategiskt program för Göteborg, 2014) "Göteborg ska även fortsatt fungera som testarena för ny teknik. I Göteborg finns en stark industri och akademi som tillsammans med Göteborgs Stad arbetar aktivt med att medverka och initiera projekt där utveckling av transporttjänster, informationslösningar och fordonsutveckling testas i praktiken.	främja möjligheten till detta genom fortsatt samarbete och samverkan med näringsliv och andra organisationer." (Transport och mobilitetsplan 2016) "In order to open up for sustainable commuting in the region, it is important that new buildings are constructed in close connection to strong routes for public transport and bicycles. To achieve this, cooperation with regional actors (neighbouring municipalities, the County Administrative	forskningsddiscipliner, statliga och regionala aktörer. I detta fokusområde arbetas systematiskt med att ta fram fruktsamma metoder för att ta vara på den innovativa kraft som finns i den egna organisationen, inom andra verksamheter och bland allmänheten. " (Lundamats3) "Vägledning vid genomförande - att tänka på: 6. Arbetet ska genomsyras av samarbete och en stark dmeokratisk förankring." Även om Lundamats3 ofta nämner samarbete med flera olika aktörer så finns det en brist på konkreta exempel på dessa samarbeten. Däremot	Klimatprotokoll et består av olika fokus gruppen varav en är Hållbart resande som "arbetar främst i olika projekt med lösningar för att minska utsläppen från persontransport er ... Ett av gruppens mest framgångsrika projekt är certifieringen Cykelvänlig arbetsplats, som innebär att arbetsplatsen arbetar för att uppfylla särskilda kriterier som underlättar pendling och tjänsteresor med cykel. Ett	(Trafikplan 2010) "För att nå koldioxidmålet samarbetar kommunen både med sina egna bolag och inom Linköpingsinitiativ et, ett nätverk där även det privata näringslivet ingår med några av de mest elintensiva företagen. Ett sätt att bli mer klimatsmart är att lära av varandra. Det sker inom Linköpingsinitiativ et som startade 2018. Förutom Linköpings kommun, Region Östergötland och kommunens största bolag består nätverket av elintensiva företag

			Innovativa lösningar kan sedan göras tillgängliga för andra aktörer. "(Klimatstrategiskt program för Göteborg, 2014)	Board (Länsstyrelsen), the Swedish Traffic Administration (Trafikverket), Region Skåne, other organisations as well as the commuters themselves) is very important." (Transport och mobilitetsplan 2016)	så finns det ett antal rekommendationer för att lyckas med samarbete (Lyhördhet, Dialog, Mål- och problemformulering, Tydlig ordergivning och mandat, politiskt deltagande och enighet, finansiering, projektorganisation)	annat exempel på projekt som drivits är Miljöresan, där deltagare som pendlade med bil istället erbjöds att resa gratis med kollektivtrafik." (https://klimatprotokollet.uppsala.se/om-klimatprotokollet/)	verksamma i Linköping." (https://www.linkoping.se/klimatsmart-linkoping/linkopingsinitiativet/) Liknar Uppsala klimatprotokoll men saknar den diversitet bland medlemmarna som Uppsalas klimatprotokoll har
7	Decide on a time-bound action plan to achieve fossil-free transport beyond the 2030 target	"Detta är visionen om ett klimatsmart Stockholm som ligger till grund för Strategin för fossilbränslefritt Stockholm 2040, en strategi som beskriver hur staden ska arbeta för att möta och mota klimatförändringarna, en av vår tids	Ett av stadens mål är att nå "nettonollutsläpp från växthusgaser" men det bedöms i utvärderingen från 2017 "att målet kommer att bli mycket svårt att nå, även om ytterligare åtgärder sätts in. Trenden är neutral."		"Teknikutvecklingen är stark och användningen av alternativa bränslen ökar hela tiden vilket förväntas minska utsläppen per körd kilometer. Men trafikökningen verkar i motsatt riktning, och även med förväntad teknikutveckling, elektrifiering och ökad användning av	Uppsala har ett mål där "Utsläppen av växthusgaser från energianvändning, transporter och arbetsmaskiner inom Uppsalakommungeografi ska senast år 2030 vara nära noll	Their primary goals seem to achieve the Swedish climate goals but the traffic strategy (2010) also has its own local goals which seem to be based on the climate goals. The most important out of these 16 goals is that the

	<u>(Swedish Climate Policy Council, 2019, p. 63)</u>.	största utmaningar. " (Strategi fossilbränslefritt Stockholm 2040, 2016) "Ambitionen är att all fordonstrafik i Stockholm ska vara fossilbränslefri år 2050." (framkomlighetsstrategin för Stockholm 2030	(Uppföljning av stadens lokala miljömål, 2017) Det finns planer för vad som krävs för att kunna nå målen men de verkar fungera mer som rekommendatione r eller för att skapa underlag för beslutsprocesser istället för att fungera som tidsbestämda handlingsplaner. Exempel på detta är dokument Fossilfritt Göteborg - vad behövs och klimatstrategiska programmet för Göteborg, 2014		alternativa bränslen kommer inte klimatmålen att nås utan ytterligare insatser. Enligt Trafikverkets klimatscenario måste personbilsresandet ändå minska med ca 12 % under samma period, för att nå uppsatta klimatmål." (Översiktsplan 2018) Med det sagt är nuvarande metoder för att minska utsläppen i Lunds kommun inte tillräckliga för att nå dessa mål och det verkar inte finnas någon tidsbestämt handlingsplan för de ändringar som krävs.	samt baseras på förnybara energikällor." "För att nå de långsiktiga målen 2030, 2040, 2050 och 2070 krävs en större omställning på de flesta samhällsområde n. En klimatfärdplan tas fram inom ramen för samarbetet i Uppsala klimatprotokoll. " (Miljö och klimatprogram 2014-2023 reviderad) "För att nå klimatmålen ska Uppsala kommun, tillsammans med de 40	total amount of emissions from traffic within the city of Linköping should be reduced by 50% by 2030 and 85% by 2050, with the base year 1990. (Trafik strategi 2010). Sedan 2013 har det däremot införts ett mål att uppnå ett klimatneutralt Linköping redan 2025. Det saknas fortfarande en konkret plan för att uppnå målet men det finns en grön resplan med potentiella lösningar för att minska utsläppen från transporter (https://www.link oping.se/globalass ets/bygga-bo-och-

| | | | | | medlemmarna i nätverket Uppsala klimatprotokoll, leda arbetet med att ta fram en färdplan för klimatet. Den blir en konkret vägledning på resan mot en fossilfri välfärdskommun och lägger grunden för de innovationer och systemskiften som krävs för ett klimatpositivt samhälle … Färdplanen för klimatet kommer samskapas med Uppsala klimatprotokoll, men också med | miljo/hallbara-linkoping/hallbart-resande/grona-resplaner/broschyr_gronresplan_city-digital-enkelsidigt.pdf?4909b2) |

						Uppsalas invånare. Det är bara tillsammans som vi kan möta utmaningen med klimatförändringar. Uppsalas invånare kommer bjudas in till dialog på olika sätt under 2020 och 2021 och färdplanen för klimatet ska vara färdig i september 2021."	
9	Strengthen regulations and processes for community planning that decreas	"Visionen innebär att oavsett var du bor ska det vara möjligt att ta sig till jobb och skola med goda kommunikationer, det ska finnas tillgång till kvalitativa torg,	"Vi ska uthålligt bygga staden inifrån och ut i riktning med vår översiktsplan, strategi för utbyggnadsplanering och trafikstrategi...Vi ska skapa plats för	Fokus inom både översiktsplanen från 2018 och hållbarhetsplanen från 2016 ligger på att fotgängare, cyklister och kollektivtrafik prioriteras framför annan	"Många av åtgärderna från LundaMaTs I och II är idag införlivade i kommunens löpande verksamhet. Synsättet som vuxit fram sedan 1970-talet är starkt etablerat både bland	"Lagstiftningen kräver att kommunfullmäktige minst en gång per mandatperiod ska ta ställning till översiktsplanens aktualitet.	"Trafikstrrategi för Linköping, som är en del av översiktsplanen för staden, har som syfte att skapa en helhetssyn för hur Linköpings kommun ska

	e car depend ence (Swedis h Climate Policy Council , 2019, p. 64)	parker och grönområden och det ska finnas offentlig och kommersiell service." (Översiktsplan 2018) " Hur våra gatumiljöer utformas har stor betydelse för att Stockholm, även i förhållande till grannkommunerna , ska vara en tillgänglig, sammanhållen och levande stad. Det är därför viktigt att redan i ett tidigt skede samordna planeringen av bebyggelse med trafikplaneringen – där berörda aktörer samarbetar." (Översiktsplan, 2018) "	och prioritera fotgängare, cyklister och kollektivtrafik...Vi ska verka för att de regionala resorna i mycket högre utsträckning än idag sker med kollektivtrafik" (Klimatstrategiskt program för Göteborg, 2014) "Strategin innebär en omställning i trafikplaneringen där tidigare planering utgått från prognoser baserade på historisk data där bilen är basfärdmedlet. Istället ska staden planeras utifrån styrning mot hållbarhet." (Klimatstrategiskt	motorfordonstrafik . T.ex. "Kollektivtrafikens stomlinjer ska prioriteteras i hela staden. I stadens centrala delar och andra tättbebyggda platser ska stråk för fotgängare och cyklister prioriteras framför annan motorfordonstrafik ." (Översiktsplan 2018)	tjänstemän och politiker. LundaMaTs III omfattar därför fokusområden för att ta sig an de utmaningar som kommunen står inför såsom minskade koldioxidutsläpp, expansion, omställning till mer hållbart transportsystem. Helhetssynen är idag väletablerad och inkluderad i alla delar av verksamheten." (Lundamats3)	Med hänvisning till den snabba utvecklingen i kommunen har kommunfullmäk tige beslutat (2014) att aktualitetsprövn ingen av översiktsplanen fortsättningsvis ska ske mer på årsbasis ... Översiktsplaneri ngen är alltså en kontinuerlig process där uppföljningar och uppdateringar görs löpande. Arbetssättet säkerställer att översiktsplanen över tid uppfattas som aktuell och relevantoch att den utan hinder	arbeta för att åstadkomma ett långsiktigt hållbart trafiksystem. Trafikstrategin fördjupar och utvecklar de strategier som ska styra trafikplaneringen och dess innehåll ligger till grund för de inriktningar och åtgärder som föreslås i översiktplanens trafiksystem." (Översiktsplanen 2010) "För att uppnå ett mer hållbart trafiksystem krävs en förändring av fördelningen mellan de olika färdssätten. Huvudstrategin har därför fokus på prioriteringen

		Exempel på åtgärder som har genomförts under senare år ... Cykelplanering tidigt i exploateringsproje kt" (Miljön i Stockholm, 2019)	program för Göteborg, 2014)			kan användas som stöd i det dagliga beslutsfattandet ." (Översiktsplan 2016)	mellan olika trafikslag. Där huvudnäten korsar varandra eller konkurrerar om samma utrymme förelsås följande prioritering: 1 - Gående, 2 - kollektivtrafik, 3 - biltrafik" (Översiktsplan 2010) "Fyrstegsprincipen , se sid 67, används i arbetet med att lösa trafikproblem vilket innebär att Linköpings kommun aktivt ska söka efter alternativ till att bygga ut biltrafiknätet." (översiktsplan 2010)
1 0	Take into	"Det har också blivit allt tydligare	"Det pågår idag ett arbete med att få	"Kvinnors och mäns, flickors och	"Förutsättningarna ser olika ut i olika	"Uppsalas innerstad	"Säkra och trygga transportmöjlighet

account diverse conditions and offset negative distributional effects, for example between urban and rural areas (Swedish Climate Policy Council, 2019, p. 65).	att vi måste bli bättre på att överbrygga de sociala skillnaderna som finns i staden så att alla stockholmare ges goda möjligheter att förverkliga sina drömmar." (Vision 2040, 2017) "Regionens invånare rör sig alltmer över kommungränserna, vilket är positivt för tillväxten. Förändringar i regionens centrala delar påverkar transportsystemet i ett allt större omland. Ökad tillgänglighet är avgörande för stadens och angränsande kommuners	staden mer tillgänglig mellan stadsdelarna och attm inska segregationen i boendet. Detta behöver vara mer klart uttryckt än idag och vara det mest prioriterade målet när vi bygger staden … Vi behöver integrera våra stadsdelar med varandra" (Översiktsplan 2009) "Genom bland annat förbättrade pendlingsmöjligheter kan strategin ge socialt positiva effekter såsom ökad jämlikhet och integration." (Klimatstrategiskts program, 2014)	pojkars olika erfarenheter, kultur och behov ska synliggöras, belysas och beaktas i stadsplaneringen… .Hela staden ska göras tillgänglig för alla grupper i samhället. Tillgänglighet för människor med olika funktionshinder behöver kontinuerligt förbättras och ska alltid beaktas vid utformning av det offentliga rummet... Ett varierat utbud av bostadstyper ska eftersträvas i alla stadsdelar för att uppnå en mer jämlik bostadsmarknad."	delar av kommunen och hållbar tillväxt handlar även om att fördela tillväxten jämt. Med rätt utbyggnadsstrategier ska vi få hela Lund att fortsätta leva. En tredjedel av de planerade bostäderna möjliggörs i de östra tätorterna. "(översiktsplan 2018) "Hela kommunen ska inkluderas, huvudort, byarna och landsbygden." (LundaMats3)	kommer att fortsätta vara kommunens största centrum. Men till år 2050 har fyra nya stadsnoder vuxit fram: Gränby, Gottsunda-Ultuna, Bergsbrunna och Börjetull. De kompletterar innerstaden och här finns en blandning av bostäder, arbetsplatser, service och parker. Starka kollektivtrafikstråk binder samman stadsnoderna med varandra och innerstaden." (Översiktsplan kortversion	er ska vara en självklarhet för alla samhällsgrupper." (Översiktsplan 2010)

| | | positiva utveckling." (Översiktsplan, 2018) " Stockholm ska vara en sammanhängande stad, där det är naturligt att röra sig mellan olika stadsdelar och besöka nya platser. Människor med olika bakgrund ska kunna mötas i vardagen och stadens många stadsmiljöer med sina olika kvaliteter ska vara tillgängliga för alla invånare." (Översiktsplan 2018) "De administrativa gränserna ska helst inte heller märkas för dem som rör sig i länet. Det | | (Översiktsplan 2018) "The impression of having good accessibility, regardless of gender, age, socioeconomic conditions or physical and mental ability, is a democratic right increasing the citizens' empowerment and mobility. The possibility to easier being able to choose between different modes of transport strengthens the inhabitants' mobility and leads to changed modal shares. [Used a survey]" ... e.g. ""The results show that 80% of the | | 2016) "Alla människor i kommunen, oavsett kön, könsöverskridan de identitet eller uttryck, etnisk tillhörighet, religion eller annan trosuppfattning, funktionsnedsät tning, sexuell läggning eller ålder, ska ha likvärdiga förutsättningar att ta del av service och delta i samhället. Därför ska all planering och alla beslut, alla verksamheter, projekt och utvecklingsarbet en utformas | |

		behövs en samplanering mellan staden och angränsande kommuner så att bebyggelse och infrastruktur hänger samman." (översiktsplan, 2018) "Områden med dålig kollektivtrafikkoppling riskerar att isoleras och hamna utanför stadens sammanhang. När stadens kollektivtrafik byggs ut är det angeläget att stödja rörelsemönster som kan påverka den sociala hållbarheten i positiv riktning. Dagens radiella kollektivtrafiknät		inhabitants are in favour of an inner city traffic that is more restrictive towards car traffic and parking than today" (Översiktsplan 2018)		utifrån kunskap om behov, erfarenheter och intressen hos olika grupper. Så skapar vi en kommun för alla." (Översiktsplan 2016) "Med utgångspunkt att det ska vara möjligt att bo, verka och leva på landsbygderna är fyra utvecklingsområden prioriterade. Inom dessa områden krävs det särskilda strategier och specifika mål för att Uppsala ska bli en av	

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		behöver kompletteras med effektiv kollektivtrafik som kopplar samman staden på tvären." (översiktsplan 2018)				Sveriges bästa landsbygdskom muner ... Bostadsbyggand e, närinbgslivsutve ckling i ett land/stadsperps ektiv, service och inf rastruktur, lokalt engagemang" (Översiktsplan 2016) Det finns även ett landsbygdsprogr am och en innerstadsstrate gi	
1 4	Speed up the electrifi cation of road transpo rt across all of Sweden	"Till år 2040 ska fossila drivmedel vara helt avvecklade och det är centralt att infasningen av framför allt el- och laddhybrider samt elbilar sker i en	"Göteborgs Stad arbetar för ett elektrifierat transportsystem, fossilfria drivmedel och laddinfrastruktur för stadens egna fordon samt	"Fram till 2031 är planen att införa elbussar på huvudlinjerna 1-7, samt linje 33, successivt fram till 2031." (https://malmo.se/ Sa-arbetar-vi-	"Sammantaget bedöms elbilarnas intåg bli positiv för samhället och Lunds kommun bör välkomna och understödja utvecklingen. I första hand kan detta ske	"Kommunen ska driva en aktiv planering för transportsektor ns elektrifiering med inriktning på gemensamma lösningar för	"Kommunen har ett ansvar att verka för att infrastrukturen för förnybara fordonsbränslen byggs ut så att fler företag och invånare

| (Swedish Climate Policy Council, 2019, p. 69). | takt som möjliggör en fossilbränslefri fordonsflotta till 2040. Stockholms stad behöver utarbeta och följa upp långsiktiga mål för laddinfrastrukture n för att på så sätt säkerställa den omvandling av fordonsflottan som måste inledas snarast möjligt." (Strategi fossilbränslefritt Stockholm 2040, 2016) "Arbetet med publik laddinfrastruktur för eldrivna fordon har fortsatt med att nyttjanderättsavtal har tecknats för ett tiotal nya laddgator som kan | skapar förutsättningar för utvecklingen i göteborgssamhälle t i samverkan med näringsliv och andra regionala aktörer." (Miljö- och klimatprogram 2021-2030) "Inom ramen för ElectriCity trafikeras busslinje 55 och delar av linje 16 i Göteborg av eldrivna bussar och elhybridsbussar. Även inom annan tung trafik är elfordonen på frammarsch i Göteborg, exempelvis finns idag en elsopbil i bruk." (Hållbart resande och transporter, 2020 [Hemsida]) | med.../Malmo-stads-miljoarbete/Elbuss .html) "En ökad använding av elcyklar innebär att cykeltrafiken kan vara en större konkurrent till biltrafiken. Elektrifiering av kollektivtrafiken, med elbuss och spårvagn, bidrar till tystare, renare och mer attraktiva stadsmiljöer. Störst miljövinster uppnås om kollektivtrafiksyste met attraherar bilister. Ett modernt spårsystem bedöms ha bäst möjlighet att locka dessa resenärer till kollektivtrafiken." (Trafik och | genom att understödja en utveckling av laddinfrastruktur, och därför föreslås att kommunen tar fram en förvaltningsövergripa nde strategi för hur detta kan göras på bästa sätt" (Översiktsplan). "Prioritera infrastruktursatsninga r för hållbara transporter" (Översiktsplan) "Det pågår en omställning av fordonsflottan där andelen elektrifierade fordon ökar, vilket är po-sitivt ur ett miljöperspektiv. För att stödja denna utveckling rekommenderas fastighetsägare att utrusta en andel av | flera transportslag, framförallt den tunga trafiken. På kommunal och regional nivå samt i dialog med den nationella nivån. Det avser både direkt matning, laddning samt bränsleceller med vätgas." (Energiprogram 2050 https://www.up psala.se/conten tassets/8c70693 a41a74dd1a7ca 4662f63fcd82/e nergiprogram- kf-2018-03- 15.pdf) Rekommendatio n bara "(Övervägas) Beakta möjligheter för | uppmuntras och ser födelarna med att köra miljöbil." (trafikplan 2010) Det finns även en grön resplan från 2019 som går igenom hur utsläpp kan minskas från transporter. Där finns en åtgärd som relaterar till elbilar "Fler laddningsmöjlighet er för elbilar" (Grön resplan 2019) |

| | | tas i drift under 2019. Stockholms stad blev för femte året i rad utsedd till Sveriges Bästa Miljöbilskommun." (https://start.stockholm/globalassets/start/om-stockholms-stad/sa-anvands-dina-skattepengar/arsredovisningar/stockholms-stads-arsredovisning-2018.pdf) | | mobilitetsplan 2016)   " Eftersom en betydande andel motorfordonsresor även kommer göras i framtiden behövs fortsatta satsningar på miljöfordon och förnybara bränslen. Andelen motorfordon som drivs av biogas, vätgas och el måste öka för att ytterligare minska motorfordonssektorns miljöpåverkan. Satsningar på eldrivna stads- och regionbussar hade haft stor effekt på luftkvalitet och bullermiljön i centrala Malmö." (Trafik och | sina parkeringsplatser med laddmöjlighet. Detta är inget kommunalt krav, och det ger inte möjlighet till reducerade parkeringstal då efterfrågan på parkering inte påverkas av vilken motortyp och drivmedel som används. Lunds kommun planerar att genom-föra en utredning av hur kommunen kan bidra till och stimulera en utveckling av laddinfra-struktur för elfordon." Parkeringsnorm (2018)   Trots att planeringen för Lunds kommun transportsystem sker med antagandet att personbilar kommer att vara en väldigt | bilpooler och stöd för elektrifiering av fordonsflottan." (Översiktsplan 2016) "Kommunen fortsätter bland annat att bygga ut infrastruktur för gång, cykel, kollektivtrafik, bilpooler, laddstolpar och biogas." (Mål och budget 2020 med plan för 20201-2022) | |

				mobilitetsplan 2016)	viktig del av framtidens transportssystem så saknas någon konkret plan av elektrifieringen i kommunens strategi för hållbara transporter. Faktum är att elektrifieringen av bilflottan inte nämns en enda gång i LundaMats3.		
1 6	Develop additional policy instruments to promote climate-efficient vehicles (Swedish	"Bebyggelsestrukturer och transportsystem ska möjliggöra låga klimatutsläpp. Planeringen behöver genomsyras av hållbar energianvändning, miljöanpassade transporter och resurseffektiva kretslopp … Genom att planera för täthet och	"Göteborgs Stad arbetar för ett elektrifierat transportsystem, fossilfria drivmedel och laddinfrastruktur för stadens egna fordon samt skapar förutsättningar för utvecklingen i göteborgssamhället i samverkan med näringsliv och andra regionala	Malmö stad ska främja användning av fordon som drivs med förnybara drivmedel, och bereda plats för den infrastruktur som gör det möjligt. " En fortsatt expansion av bilpooler ska främjas för att möjliggöra tillgången till en	"Bilberoendet kan minska genom att bra förutsättningar för mer hållbara alternativ skapas, och att hållbara färdsätt blir det självklara valet" (Lundamats3) Dessutom fokuserar flera av LundaMaTs3 mål på att ersätta bilresor med mer hållbara färdmedel såsom kollektivtrafik, gång och cykel	"Uppsalas snabba utveckling förutsätter att transportinfrastrukturen används både klokt och effektivt. Fler människor ska kunna välja yteffektiva och miljövänliga färdmedel. Även godstransporter behöver	"Linköpings framtida utbyggnad ska planeras med en helhetssyn där trafik- och bebyggelseplanering samverkar. En tätare och mera sammanhängande stad ger bättre förutsättningar för ågng-, cykel- och kollektivtrafik … Linköpings kommun ska bidra

	Climate Policy Council , 2019, p. 70).	blandade funktioner blir gång-, cykel- och kollektivtrafik de självklara valen." (Översiktsplan 2018) "Kollektivtrafiken utökas bland annat med en ny pendeltågstunnel under de centrala delarna av Stockholm. Fyra nya tunnelbanelinjer planeras och spårvägsnätet byggs ut.........Minska de negativa effekterna som trafiken kan ha på storstadslivet. För att avleda trafiken från innerstaden byggs nya vägtunnlar för att föra ner trafiken	aktörer ... Göteborgs Stad utvecklar och använder kontinuerligt olika typer av styrmedel som trängselskatt, prissättning och reglering för parkering, miljözoner och bilfria innerstadszoner" (Miljö- och klimatprogram 2021-2030) "Strategin kan genomföras genom att vi planerar så att behovet av transporter minskar, till exempel genom att bostäder, verksamhets- och handelsområden, arbetsplatser, skolor och	kombination av en modern bilpark och ett bilfritt boende. Malmös framtida biltrafik ska utgöras av miljöfordon som drivs av förnyelse" (Trafik och mobilitetsplan 2016)		effektiviseras. Det gäller särskilt innerstaden, där konkurrensen om gaturummet är som störst. Ny bebyggelse bör framför allt komma till i lägen nära kollektivtrafik. Det ökar möjligheten för människor att använda kollektivtrafik, cykel och att förflytta sig till fots. Det underlättar även för dem som är mer eller mindre hänvisade till bilen som transportmedel, därför att det saknas	till minskade utsläpp av växthusgaser bl a genom hållbar trafikplanering." (Översiktsplan, 2010) "Parkering utgör en viktig del av stadsplaneringen och parkeringsförutsät tningarna påverkar tydligt trafikanters val av färdmedel. Om parkeringstillgånge n är god inbjuder det till ökad biltrafik, på samma sätt som fler och större vägar leder till mer trafik. Verktygen i parkeringsplanerin ge är t ex. utbud, parkeringsavgifter och tidsreglering.

		under jord." (Miljöarbete i Stockholm 2017) " Kollektivtrafiken är väl utbyggd och beslut om utbyggnad är fattade som innefattar nya tunnelbanelinjer och citybanan för pendeltågstrafiken ." (Strategi fossilbränslefritt Stockholm, 2040, 2016) " För att Stockholms trafiksystem ska fungera effektivt måste staden arbeta med att minska det totala trafikarbetet, framför allt för personbilar." (Översiktsplan, 2018)	anläggningar för fritidsaktiviteter lokaliseras till blandstads*- och/eller kollektivtrafiknära lägen. Närhet till god kollektivtrafik och kvaliteter såsom grönområden, handel och annan service gynnar gående och cyklister." (Klimatstrategiskt program för Göteborg, 2014) "Strategin kan genomföras genom att vi väljer utsläppssnåla och energieffektiva fordon. Vi ska använda färdmedel så som elcyklar och liknande alternativ när så är möjligt.		konkurrenskrafti ga alternativ. Bostäder och verksamheter i sin tur ska stärka underlaget för kollektivtrafiken , service och annat som behövs i vardagen. I staden innebär kraven på effektivitet att kollektivtrafiken behöver prioriteras tydligare än idag när det blir trångt i gaturummet." (Översiktsplan 2016) "En god framkomlighet via trafiklederna är viktig för att kunna	

| | | | Idag är grundkravet att de fordon som köps in eller hyrs ska vara de mest miljöanpassade modellerna på marknaden. Genom att fortsätta att skärpa kraven vid upphandling kan vi påskynda utvecklingen av ny, miljöanpassad teknik. Även krav på drivmedel är viktigt att ställa och vi ska stödja förnybara drivmedel och energieffektiva hybrid- och elfordon." (Klimatstrategiskt program för Göteborg, 2014) | | | möjliggöra prioritering av kollektivtrafik längs andra gator i staden. Längs trafikleder prioriteras bilens framkomlighet. Skillnaden mellan dem är att längs kollektivtrafikgator prioriteras kollektivtrafik, längs huvudgator prioriteras biltrafik" (Översiktsplan 2016) "Tidigt i perioden förväntas kommunen och landstinget fatta ett vägvalsbeslut om ett | |

					kapacitetsstarkt kollektivtrafiksystem i staden: busstrafiksystemet BRT (Bus Rapid Transit) eller stadsspårväg." (Översiktsplan 2016)	