A systems perspective on sustainability measures aimed to reduce greenhouse gas emissions in three Swedish municipalities

By: Malin Redmo

Supervisor: Monica Hammer
Södertörn University
Master’s dissertation 30 credits
Master’s program in Environmental science | spring semester 2021

SÖDERTÖRN UNIVERSITY | STOCKHOLM
sh.se

Abstract

2019 was the year with the highest measured amount of GHG emissions in history, indicating that our existing way of living is unsustainable and demands substantial changes. New ways of governing environmental issues are therefore being called upon in which the local level has great potential to create change. Sustainability measures involving integrated social dimensions which questions the motive for performing or engaging in emission demanding activities are found leading to a more long-lasting change. In Sweden, the decentralized decision model makes municipalities have a large responsibility for creating change in crucial emission demanding areas. Recognizing these concerns, this study applies a multi-dimensional system perspective with a broad range of cultural, habitual and technological aspects by Jensen et al. (2019) on three front-running municipalities (Tyresö, Växjö and Lund) working to reduce emission levels. The study focuses on distinguishing between different drivers for change among sustainability measures regarding energy and mobility functions, with a specific focus on the account of incorporated social dimensions. The results indicate that there is a lack of integrated social dimensions among the selected municipalities, in which only 26% of the grand total of 220 analyzed measures involve integrated social elements which enables a system-wide change. Technical and individual behavioural changes are far more prioritized than changes which are linked to collective lifestyle aspects and involve a mixture of technology, norms, cultures and organizations within the society, which are aspects proven more likely to lead to a system-wide change. The study provides knowledge on the capability of local decision making to enforce a systemic change toward sustainability if the current measures are carried out, in which the results indicate that the change among the three selected municipalities will be limited.

Keywords: system perspective, social dimensions, sustainable transition, local governance, GHG reduction.

Popular science summary

Greenhouse gas emissions are the biggest challenge to cope with in order to tackle the challenges with climate change. Human impact is the main cause of emissions, which indicates that the way we are currently living must change in order to minimize the emission levels. To create an effectful change, new sustainability norms, cultures, and routines integrated into people's everyday life situations, in addition to new technological innovations and knowledge, needs to evolve. Political decision making therefore needs to include sustainability efforts which enables a collective change to more sustainable living. In Sweden, the 290 municipalities have a large responsibility for creating change among some of the areas causing the largest amounts of emission (traffic and energy). This study therefore examines how local decision making in Sweden includes efforts which aims to create more sustainable ways of living which are integrated in people's lifestyles among the local citizens. This is done by testing out a framework with four categories based on different assumptions of how to create change, by Jensen et al. (2019), onto sustainability measures among three front-running municipalities working to reduce emission levels (Tyresö, Växjö, Lund). The four categories are A) change in technology, B) change in individuals behaviour, C) change in everyday life situations, and D) change in complex interactions. The four categories can be divided into two sub-categories in which category A and B do not involve any social elements, and category C and D involves social dimensions which invokes a change for how citizens are living by creating new sustainability norms, habits and cultures in daily life situations. The results show that most of the sustainability measures among the chosen municipalities are aimed to create change among technological aspects or knowledge enhancements about sustainability behaviours among the citizens. Which is found to lead to a limited change as it does not involve any social dimensions which aims to create new sustainability norms and habits. Only 26% of the grand total of 220 analyzed measures are formulated to create a change among more integrated social behaviours among the citizens, framed to build more sustainable behaviours integrated in the core of individuals way of going about life. The framework used in the study provide a good tool in order to understand the level of social change a measure is formulated to create, and is found to be suitable to apply on to more contexts. The results from this study sheds light on the discussion regarding the capacity for local decision making to enable a social change towards sustainability and the importance of involving social dimensions in sustainability measures in order to enable a more large-scale change to sustainability to occur.

Acknowledgements

I’d like to express my gratitudes towards IVL Swedish Environmental Institute for giving me the opportunity to execute this master thesis with the support and guidance of them. A special thanks is given to my supervisor Åsa Nyblom at IVL for a great support throughout the process and for all insightful discussions. Furthermore, I’d like to thank Monica Hammer at Södertörn University for being my supervisor and helping me detangle issues during the writing process and for being involved in my work. Lastly, I’d like to thank my friends and family for supporting me during these hectic months and for being there for me whenever I’ve wanted to brainstorm ideas during the writing process. This study wouldn’t be possible without your support.

Malin Redmo

Table of contents

1.Introduction

The world is facing a great challenge with the ongoing alarming climate change, indicating that all people on Earth cannot continue by a "business as usual" approach in the way we are currently living. A shift to more sustainable patterns of how we live and go about life is a must. Therefore, the importance of implementing not only new ways of living for individuals, but also a systemic change involving technology, behavioural, cultural and habitual aspects into political decision-making is of great importance (Jensen et al. 2019).

The most critical issue to tackle in order to cope with climate change is the great emissions of greenhouse gases (GHG's), which stands for the most dominant cause of global warming. 2019 was the year with the largest measured amount of GHG emissions in history, which indicates that the way we are currently living is not sustainable and requires fundamental changes (Klimatpolitiska rådet, 2020). Human impact is the main cause of global warming, and the observed negative impacts on the environment is continuously growing. The effect GHGs have on the globe is crucial for future life on Earth and with less than ten years until the targets of Agenda 2030 should be reached, there is an urgent need for upscaling the efforts to reduce the levels of emissions globally. The longer the actions for change are taking, the more we will have to suffer, and the greater will the technological, economic, social and institutional challenges be onwards (IPCC, 2014).

In 2019, the European Environmental Agency (EEA) published the report, The European Environment - state and outlook 2020: knowledge for transition to a sustainable Europe (SOER) which strongly emphasizes how social, environmental and sustainability challenges are linked to lifestyle activities and in particular to societal systems regarding energy and mobility. In order to achieve the far-reaching change which is needed for the environmental and sustainability objectives, new alternative ways of living which are integrated in people's lifestyles, can affect the sustainability outcomes positively. This understanding of systemic change has many implications for policy and governance, in which the governance system has the role as an enabler of society-wide innovation and transformation in which the power of citizens and communities are important actors within this sustainability transformation. It is therefore recognized that a broader policy mix that takes a systemic view of sustainability issues to ensure structural change can produce beneficial outcomes (EEA, 2019).

The potential for local policy and behavioural changes to make an impact on GHG emissions on a larger scale is visible. In Sweden, the responsibility for local planning and decision making is decentralized to the 290 municipalities which enables municipalities having large responsibilities regarding crucial areas for change. Emissions from energy and traffic are produced in urban contexts which are some of the most dominant causes for GHG emissions, and are areas of concern for the local decision making in Sweden. The local level therefore has a large responsibility and ability to build infrastructure and policies which enable climate resilience (Collier & Löfstedt, 1997; Sippel & Jenssen, 2009).

In order to achieve the necessary sustainability goals and to reach a long-lasting change without a rebound effect, more social dimensions and human-related aspects need to be adapted into the policy making. Culture-specific views, the role of routines, and practices related to people's everyday life need to be recognized and adopted into policy measures and governmental decisions, as they shape individual and collective choices of taking action and respond to practices (EnergiseA, n.d.; Bavaresco et. al 2020). Most measures for reducing emissions have been identified to be aimed to create technical or individual change. However improvements in technology will not solve the issue of reducing emissions, and targeting individual behavior will bring about limited change in sustainable patterns. Thus, norms and more integrated behavioural changes which target why a specific practice or action is being made, is vital for enabling a long-term change without risking a rebound-effect (Genus et al, 2018; Jensen et al, 2019).

The need for more knowledge on the capacity and capability of municipalities to enact systemic change makes the local context an interesting research subject (Isaksson & Hagbert, 2020). There are challenges with understanding if current measures are targeted across a larger system scale, such as whether measures aimed to reduce GHG emissions will cause a positive impact on a long-term basis. Applying a larger system perspective on climate measures would therefore be beneficial of a framework which is able to pinpoint what the current system actually looks like, such as comprehend the core of what is currently being done (Jensen et al. 2019; Genus et al, 2018;EnergiseA)

1.1. Problem definition

GHG emissions are declining too slowly, thus more policy instruments which combine innovative technology, integrated social dimensions and involvement of the whole society for reaching the goals are needed (Naturvårdsverket, 2020a). Social dimensions which question cultural and behavioural practices, such as challenging people's everyday choices, have been found to often be neglected in environmental policy (Genus et al, 2018). The study will therefore explore if there is a lack of integrated social dimensions in measures aimed to reduce GHG emissions among three selected front running Swedish municipalities. This will be conducted by applying a system-wide framework on the sustainability measures (regarding traffic and energy) which will distinguish between different drivers for change. With a specific focus on how social dimensions are integrated across the selected municipalities, the study will examine how three selected Swedish municipalities are working on reducing emissions within its municipal borders,

1.2. Aim

The core of the study is to understand to what extent integrated social dimensions are included in local sustainability measures aimed to reduce GHG emissions in energy and mobility functions.
The aim of the study is twofold.

Firstly, to provide knowledge on to what extent integrated social dimensions are incorporated in local energy and traffic measures by analyzing how three selected Swedish municipalities are distinguishing between different drivers of change.

Secondly, the study aims to test if a framework by Jensen et al (2019) is useful to distinguish the level of social dimensions integrated into local environmental decision making. Thus, the results will provide knowledge on how the framework can be used in other contexts than the developers of the framework applied it onto.

1.3. Research questions

The core of the study lies in answering the hypothesis; if there is a lack of integrated social dimensions in measures aimed to reduce GHG emissions and will be explored by addressing the following research questions:

- How has social dimensions been conceptualized among the local measures aimed to reduce greenhouse gas emissions?
- Which area(s) are centrally involved in creating change into a local transition to a fossil free future among the selected municipalities?
- How is the framework useful to understand the core of GHG reducing measures in a local context?

2. Background

2.1. Greenhouse gas emissions in Sweden

Sweden has the goal of becoming the world's first fossil fuel free country (Prop. 2019/20:65). Since 2017, a climate policy framework has been implemented, stating that zero emissions should be reached by the year 2045 in order to thereafter achieve negative emissions, in which the emissions coming from activities within the Swedish territorium shall be 85% less or more in comparison to the base year 1990 (Miljödepartementet, 2017). However, based on current policy instruments, the Swedish Environmental Protection Agency demonstrates that the emissions in 2045 will only be about 34-37% less than in 1990, which validates the need for harder policy instruments, innovative technology and involving the whole society for reaching the goals (Naturvårdsverket, 2020a).

The levels of GHGs are declining too slowly within the Swedish borders, such as on a global level (Ibid). In 2019, evidence showed that the emissions in Sweden had only reduced with 29%, which is a significantly smaller number than expected in order to reach the fossil free goal. This further indicates that more than a 50% reduction is needed before 2045 in order to reach the target (Naturvårdsverket, 2020b).

The largest reductions of emissions since 1990 took place between 2003 and 2014 with an average annual reduction rate of just over two percent. In the last four years (up to and including 2018), the declining rate has been slower and emissions have decreased by an average of less than one percent per year, which is far too slow (Klimatpolitiska rådet, 2020).

Sweden's territorial emissions of GHG emissions in 2019 was measured to consist of 50.9 million tonnes of carbon dioxide equivalents. Industry and domestic transports are dominating as the largest sources with 32% of the grand total emissions coming from the two sectors respectively. Within domestic transports, road traffic accounts for the largest share, in which emissions from cars and heavy vehicles dominate. Following comes agriculture with 14% of the grand total emissions, and thereafter electricity and district heating with 9% of the grand total. Emissions coming from waste have experienced a large decline in the past 20 years, and corresponds to two percent of the grand total emissions as for today. The Swedish Environmental Protection Agency emphasizes that effective policy instruments have largely affected the reduction of emissions in the waste sector (Naturvårdsverket 2020b). The dispersion of emission among different sectors are illustrated in the graph below.

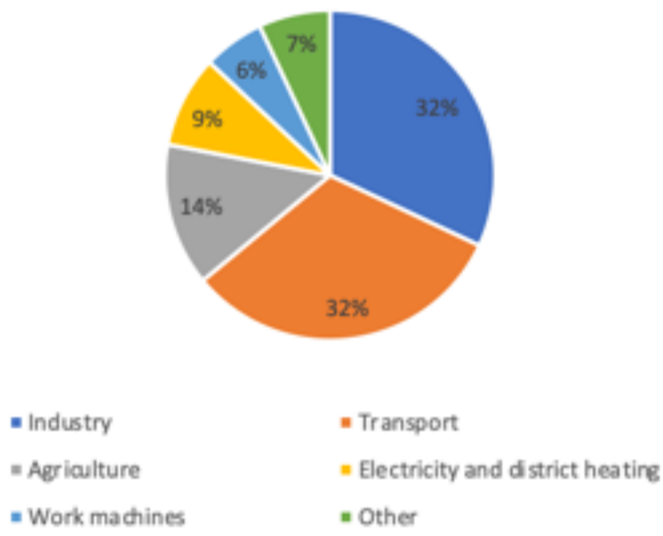

Figure 1. *The most dominant sources of emissions in Sweden in 2019 ((Naturvårdsverket 2020b).*

The Swedish government acknowledges that more powerful measures are needed in order to succeed in converting to a fossil free future. It is recognized that politics needs to achieve a long-term and controlled system change where different conditions that exist in our country with, for example, different income groups and other individual conditions, are being taken into account (Prop. 2019/20:65).

2.2. Municipalities decision model and orientation

Sweden has a decentralized decision model in which regions and municipalities are responsible for a large part of the society's service, in which among the most important tasks include school services such as preschool, social services and elderly care (Prop. 2019/20:188; SKR, 2020). The municipality has the main responsibility to make sure that there are health services, environmental protection and an overall clean environment within the municipal borders, for example, by ensuring there are places where people can throw away their trash. Hence, services such as water, traffic, sewage and waste are the municipalities responsibility to a large extent. Together with the regions, the municipality handles the public transport and the maintenance of roads within its borders, which allows the municipality to, for example, plan and build infrastructure which enables change within the municipal borders (SKR, 2019, Boverket, 2019).

Sweden consists of 290 municipalities, distributed in 21 regions, in which the decision makers in each municipality consist of politicians elected by the citizens. This means that the citizens have a large opportunity to influence and control the local decision making (SKR, 2020). The municipal self-government enables local and regional adaptation based on different needs and conditions (Prop. 2019/20:188). This implies that Sweden's municipalities are an important local arena with responsibilities involving important services for climate action, such as for implementing incentives for long-term transitions into sustainable development.

Municipalities are large energy users and thus largely responsible for a great amount of GHG emissions, in which many of the largest emission sources (e.g. traffic, availability of public transport, road maintenance, energy usage, waste services) lie on the responsibility of local decision-making. The most prioritized challenges to transform for municipalities, based on the decision making from the Swedish association of local authorities and regions (SKR), are making the public traffic rely on fossil free fuel, phase out fossil fuels in energy production and usage, such as meet the challenges of energy usage coming from transport, data centers, industry and community buildings in a climate-smart and energy-efficient manner (SKRa, n.d.). This goes in line with reducing the most pressing and dominant emission sources which are made up of transport and industry, such as energy as the fourth largest source of emissions (Naturvårdsverket, 2020a). However, due to the decentralized decision model of municipalities, measures targeted to create more sustainable patterns differ amongst the municipalities, along with different prioritizations and ways of implementing actions due to the political governance. Yet, the municipality has the power to steer the inhabitants in different directions which directly or indirectly affects the GHG emission levels.

It is important to emphasize that municipalities have a lot of responsibility for many services and areas within the municipal borders, nonetheless it does not have responsibility for all areas and is dependent on the political orientation within the municipality which is decided by the citizens through elections. GHG emissions occur globally and are caused by human action, therefore efforts coming from not a political willingness but also through a public interest and public participation is essential for creating a successful change. If public interest is low although powerful measures have been implemented, the transmission of climate policies into concrete climate action may fail (Sippel & Jenssen; 2009).

3. Theoretical framework

3.1. Framework development

The framework with four typology models used in this study, by Jensen et. al (2019), serves as the base in the EU-funded project Energise, part of Horizon2020. The Energise project overarching goal is to achieve a greater scientific understanding of social and cultural influences on energy consumption. The basis of the framework thus lies in establishing a structure which moves beyond existing research on reduction of energy usage and aims to integrate new insights which emphasise social practices, the role of routines, different reduction initiatives, and energy culture approaches into energy reducing practices (EnergiseB, n.d.). The practice of integrating a broader perspective of reaching sustainability is not only essential in energy consumption research, but also needed in other sectors aimed to promote sustainability as well as all functions of the society, in order to accomplish a sustainable transition (see for example Geels et al 2016;.Isaksson & Hagbert 2020).

The framework is based on an integrated multi-dimensional system perspective which involves socio-economic, cultural, gender, political and technological aspects within sustainability transitions. In the study by Jensen et al (2019) the framework with the four typology categories used in this study (found in part 3.3.) was applied on sustainable energy consumption initiatives across 30 European countries. In the study, most sustainable initiatives were found to be positioned in category A and B (change in technology and change in individual behaviour) which are aspects argued to lead to limited outcomes as it does not address interactions between technology, business, culture, everyday life situations and routines and are aspects that more likely will lead to long-term transformation (Jensen et al. 2019).

3.2. Social dimension perspectives in sustainable transitions

Research on transition to sustainability perspectives and the importance of adding social dimensions to environmental governance has been vastly covered (see for example Genus, et al 2018; Isaksson & Hagbert 2019; Malmeaus et al,. 2021).

Drawing on a study by Genus et al., (2018) which cites that many scholars claim that social dimensions are frequently neglected when it comes to energy academics while material and technical questions are getting more attention. There is a need for bridging more approaches in academia and opening up for insights from larger perspectives such as socio-technical, practice based actions and integrated assessment models in order to understand how to create an effective change. A multi-faced transition and change in, for example, the energy sector, requires combining more levels, sectors and approaches into the governing system (Geels et al, 2016).

Various stakeholders across levels are involved with energy reducing initiatives (owners, municipality, policymakers etc), which may result in confusion about who is responsible for the reducing related activities. However, involving more actors related to energy usage can bridge the gap between actual and human-centred policies. Rich and more knowledge on the responsibilities is therefore needed for making the actual humans involved with energy demanding activities aware of the extent their practices impact energy use (Bavaresco, 2020).

What has been found is that adding more social dimensions improves the outcome of sustainable transition and emission reducing initiatives (Bavaresco, 2020; Isaksson & Hagbert, 2019). Isaksson & Hagbert (2019) who analysed radical perspectives (which include change in social power relations, norms, vision of future etc.) of sustainable development in two Swedish municipalities found that in order to become more effective in relation to a long-term sustainability transition, a wider system context is needed for accomplishing a societal transformation in the political agenda. Yet, there is a pressing need for more knowledge regarding what is required in order to integrate behavioural change and to integrate new ideas and visions for the future into the political arena. Roseenblom (2020) draws upon a study by Genus (2018), which states that transitions are not a singular disruptive process with new technologies as a driving force, and continues by emphasising how transformations go well beyond socio-technical systems. Resenbloom acknowledges that transitions are not isolated to single systems, but involve a wide span of multiple systems across system borders, an argument shared by Geels (2011) who addresses multi-level perspectives on sustainability transitions, and recognizes how changes in environmental problems are in need of deep-structural changes by creating deep socio-technical transitions. He discusses the complexibility of sustainability transitions as they do not offer a direct user-benefit as sustainability is viewed as a ‘common good’. Hence transitioning to more sustainability practices implies more interactions between technology, policy/power/politics, economics/business/market and culture/discourse/public opinion. This implies that there is a need for more integrated approaches which address multi-dimensional and dynamical structural changes for complex sustainability transitions in order to achieve a more long-term and sustainable transition.

The European Environment Agency's (EEA) latest State of the Environment report (SOER) calls for new approaches of what we need to do as well as how we do it in order to handle the alarming environmental challenges. There is an urgency of engaging citizens and engaging actors across society in order to enable systemic change. Societal systems of production and consumption (food, energy and mobility) must therefore be transformed to achieve a low carbon future (EEA, 2019). Furthermore, Sweden's Climate Policy Council acknowledges a pressing need for achieving a radical societal change in order to reach the environmental targets globally, and stresses that the current environmental policies are not enough in order to accomplish the change which is needed. Radical innovations and societal changes at system level are crucial in order to succeed with the ambitious policy goals (Klimatpolitiska rådet, 2020).

A recent study by IVL Swedish Environmental Institute brings up how policy measures with a larger system perspective can result in avoiding or minimizing recoil effects by changing the design or formulation of a measure. A recoil effect is described as when a measure "hits back", meaning that the measure results in secondary effects which counteracts the measures initial goal. An example is given as when engines are made more fuel efficient in order to make it cheaper to drive a car which often leads to an increase in car usage and levels of emissions from cars (recoil effect). It is therefore important that measures which are designed to increase levels of emissions, does not implicate that the risk of a recoil effect is made possible. It was found that in order to avoid recoil-effects, larger system perspectives should be applied to measures and that cross-sectoral measures could cause a more effective outcome with minimized recoil-effect (Malmeus et al,. 2021).

The gains by involving more local contexts in sustainable development policies are of great importance. The potential for local decision making to influence the environment both at a local and global level is large. What has been found is however that radical measures involving more social dimensions often are absent in local decision making, even though the local decision making plays an important role in creating effective climate protection measures and strategies (Collier & Löfstedt, 1997; Sippel & Jenssen, 2009). Municipalities are therefore an important arena for developing and implementing initiatives for transitioning to long-term sustainable development which requires involving more dimensions. Thus, the emphasis on having more studies focusing on radical perspectives in local decision making in regards to sustainable transitions is necessary in order to grasp the capacity and capability of municipalities to enact systemic change (Isaksson & Hagbert, 2020).

3.3. Analytical framework

The analytical framework in this study by Jensen et al., 2019, draws upon four typology categories which display an assembled "type" or approach attached to each group which provide each group with a systematic classification. These groups are based on problem framing assumptions highlighting important aspects of different types of problem framings, and consist of interrelated social, technical, and economic aspects and highlight the prominent change-agent for enabling change.

a) *Changes in technology*

This typology category assumes that change or improvements in technology will create change. Trust in that technology, new innovative solutions or optimizing the technology of everyday household products/items will lead to a smaller level of emission is the core of the category. Social changes in people's behavior is a matter of technological optimization and adaptation to these changes. Hence, technology is the ‘change agent’ and main driver for creating change. Changes in habits, norms or everyday practices as a consequence of new technology are seen as unintended consequences. What is essential is that the technological aspect is the main driver and enabler for change to happen.

b) *Changes in individuals behaviour*

This category assumes that change will come about when people change their individual behaviour in certain situations. The category includes measures in which the main driver for change is targeting the way people make sustainable choices. Actively choosing sustainable products and adopting more sustainable behaviours is assumed to open up for change to happen and to be long lasting. External factors are seen to be a motivation for change to happen for individuals, and knowledge is an important factor which reflects on people's behaviour. Nudging or social marketing are mechanisms that may encourage individuals to adopt more sustainable behaviours. Thus, giving people methods, tools and information to enable change are seen as drivers for change.

Compared to the previous category which assumes that technology is the main driver, this category means that if people do not actively choose to use products with lower emission levels due to more knowledge enhancement, change will not happen.

c) *Changes in everyday life situations*

The targeted component is everyday life situations, in which this category aims to create new habits or practices. The question of *why* one is using a specific item which produces greenhouse gas emissions is therefore more important than how one is using it. Sufficiency rather than efficiency is being emphasised as a question of importance for this typology. Thus, habitual aspects of integrated practices regarding technology, infrastructures and social norms or practices are involved in order to create change. Meaning that how a normal everyday practice is being done is targeted. The core action which is being targeted by this category is the underlying action for choosing to act in a specific situation.

d) *Changes in complex interactions*

This category is based on broader social assumptions of the source of *why* energy or ther emission heavy actions are being used. The category targets several systems, interactions, and feedback loops integrated in activities and situations in people's lives. The responsibility for creating a change ranges across several sectors and actors, as they create an assumption of a 'social organization' in which actions creating emissions happen due to practices which are interconnected. The change-agent can therefore be seen as dynamic and part of an umbrella of initiatives shared by multiple actors coming from different domains of society.

These categorizations are summarized in the table on the following page, which will help to guide the analysis. The categories will from here on be referred to as category A, B, C and D.

Table 1. *Core components of problem framing categories and their operationalization (Jensen, et al,. 2019).*

CATEGORY/ TYPOLOGY	INQUIRIES
A. Changes in technology:	Optimizing or improving technology is the main driver for change
B. Changes in individuals behaviour:	Giving people methods and information about making active behavioural choices indicates that individuals decisions and attitudes is the main change-enabler
C. Changes in everyday life situations:	Focus lies on changing specific material components, images/ norms, routines and habits related to areas in one's daily settings in order to target the underlying action for choosing to act in a specific situation
D. Changes in complex interactions:	Change will occur due to organization of interactions across several areas and levels within society, creating an umbrella of initiatives towards the same goal. 'Social organization' is the key change-agent

3.4. The importance of problem framing

The essence of problem framing is to understand the core of an issue/problem. If a problem cannot be expressed or understood clearly, then others will have a problem with finding a solution which solves the core of the issue. Thus, an unclear definition of a problem results in non-helpful solutions as the problem in itself hasn't been clearly defined. Narrowing down the key problem to the root will therefore lead to problem solving within the narrowest definition of the problem (Euchner, 2019).

Jensen et.al (2019) cites Dewey (1938), stating that ‘without a problem, there is blind groping in the dark. The way in which a problem is perceived decides which specific suggestions are entertained ... ’ (p. 112).Which, in a philosophical way, indicates that problem framing can be viewed as creating a frame for a defined problem. When gaining a deeper understanding of a problem it becomes possible to see it in new ways, and can add specific concepts to describe the problem can be adapted which in turn, can help with finding patterns of reasoning and new ways of mapping knowledge associated with this new and more in depth way of observing the problem and its solution (Pee et al, 2015).

The importance of understanding how the problem has been framed results in enabling us to find the core of the measures and can clarify how measures have been phrased or formulated in order for the policy measures to achieve real transformation. How problems are formulated provides an indication on the assumption and solutions for the type of change that is possible. Understanding the core of how problems have been phrased can therefore help us understand how specific policy measures are organized in order to reach transformation. The problem formulation on what has to change, is based on the wanted solutions, and therefore enables us to understand the framework for what type of change is possible (Malmeaus et al,. 2021).

3.5. Defining emission reduction measures

This study draws upon finding the core issue of measures aimed to reduce greenhouse gas emissions among two of the greatest emission sources in the Swedish context, traffic and energy, which are areas municipalities to a large extent have control over. Measures can range from reducing consumption levels of e.g. energy usage by substituting fossil fuels with renewable energy sources (Jensen, et al. 2019), target the request for energy demanding sources by nuding for more environmentally friendly mobility usage or by promoting substituting supplies or products to more sustainable ones.

Emission reducing measures can be complex. However, they should include some aspects making it possible to identify the core initiator, so that (embedded) expectations from the key actors can be explored in order to acknowledge how the specific measure will imply reduced emissions (Jansen, et al, 2019). In conclusion, these measures or implementation are actions-based, targeted on either a small scale or large scale with the core intention to reduce the level of greenhouse gas emission.

4. Material and methods

4.1. Method

The study is based on a qualitative study method by conducting three case studies concerning selected municipalities, more specifically by using a thematic analysis method. Three semi-structured interviews have been conducted with representatives from each municipality used in this study, in order to get a deeper understanding of the municipal point of view of how measures can involve the whole society, such as the opportunities and difficulties it results in. The research is guided by a theoretical framework which informs the meaning of the addressed problem and helps to distinguish between different change enablers, such as provides a guideline for recognizing and organizing patterns or themes within the data set.

The qualitative method is useful for exploring and understanding the context of the mechanisms behind the problem and to address gaps in particular understandings, which is helpful for the problem framing assessment process of the study (Creswell & Poth, 2018; p.81,85). The method for analyzing the information is based on a thematic analysis which identifies, analyzes and reports patterns of meaning and themes in the qualitative data (Clarke & Braun, 2016). The thematic analysis is used as a tool for coding and finding relevant themes for the research question within the data set. These patterns are used as building blocks for organizing and presenting the observations made from the data and literature used in the study, and based on underlying, theory-driven or explicit meaning within the data set. The aim is to identify, interpret and detect patterns guided by the research question. The approach of finding these patterns is made by a deductive and top-down approach in which the theoretical concepts are used as a base for interpreting the data. The thematic analysis is based on three functions, 1) getting familiarized with the data and its content; 2) creating codes by generating meaningful labels attached to specific segments of the dataset relevant for the research question (typology A,B C and D found in table 1); 3) arrange and categorize the codes into the themes corresponding to the typology categories (Clarke & Braun, 2016; Willig & Stainton Rogers, 2017). This is further illustrated in the figure below.

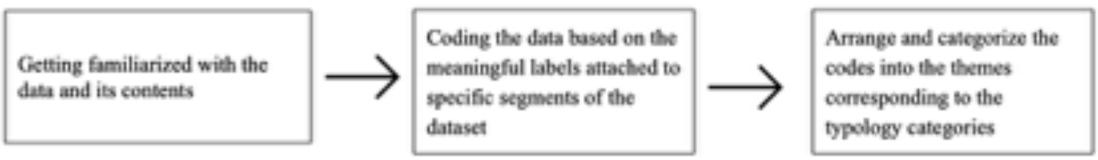

Figure 2. *Illustrated process of how to analyse data by applying a thematic analysis method.*

The process of collecting the data used in the study is guided by a purposive sampling design. Meaning that the collected data is strategically sampled for its relevance for the research and contains criteria which will allow the research question to be answered (Bryman 2012; p. 408).This indicates that the data has been chosen for its content which allows the research questions to be answered.

In order to get an insight into the municipality point of view of organizing effective sustainable measures and to understand how different issues give certain solutions, three semi-structured interviews with representatives from each municipality have been carried out. The semi-structured interview form is suitable as the interview method is flexible and opens up for the researcher being able to ask the interviewees follow up questions dependent on how the interviewee answers specific questions, such as being able to change the sequence of the questions depending on the answers given by the respondents. The questions being asked are open ended which opens up for more developed answers than just “yes/no” answers, which results in a more fluid conversation and a richer understanding of the studied topic (Kallio et. al, 2016; Bryman 2012; p. 696).

The interview guide is based on previous knowledge (performed in step 1 in the thematic analysis model) which has been gained throughout the study period, and structured in a way which allows the interviewee to answer questions which are of importance for the study. The interview guide can be found in the appendix.

The reliability and validity level for the study is strengthened by the thorough account for why measures are suitable for the specific typology category. Measures which are arguably vague and consist of some aspect making it difficult to understand why it is suitable for a specific category is being presented and discussed in the result part in order to acknowledge the difficulty of categorizing the measure and giving arguments for why it is being categorized into that specific category.

4.2. Choice of municipalities

The selection of municipalities is justified by their membership in Klimat Kommunerna (Climate Municipalities), a non-profit association consisting of 40 frontrunning municipalities in the transition towards a fossil free future aiming to speed up climate transition. The association is financed through member fees and external project funds. Municipalities are eligible to become members if they have political decisions aimed to a) continuously inventory GHG emissions; b) set targets for emissions; c) have an action plan and implement measures to reduce emissions; d) to continuously inform about the efforts to the association (Klimatkommunerna, 2013). The members of Klimat kommunerna have different marks based on twelve climate marks, in which each one represents a leading area of climate work for that specific municipality. These marks range from, for example, Engaged schools, Carfree rides, Green obligations to Emission reduction. The number of marks each municipality has is thus dependent on the number of areas they do specific actions in line with that specific climate action target (www.klimatkommunerna.se). The most relevant category for this study is Emission reduction, thus the municipalities used in this study are marked as frontrunning municipalities actively working to reduce emissions in their municipality.

The three municipalities chosen for this study are Tyresö, Växjö and Lund municipality. The municipalities range in their different levels of total GHG, illustrated in table 2 by visualizing how the municipalities differ in comparison to each other regarding the size of the municipality and its population. 2018 is used as a base year. The visualization of GHG levels only serve as a basis of understanding the different implications each municipality has to work with. It is important to acknowledge that each municipality ranges in their dispersion of population/ cities/ countryside/ green areas etc. which makes a comparison between them insignificant.

Figure 3. *The geographical location of the three municipalities used in the study (marked with red pointers). Tyresö is found at the top, Växjö in the middle and Lund at the bottom. (GoogleMaps©)*

The dispersion of the three municipalities are mainly focused on the middle to southern part of the country, as visualized in the figure above. Both Lund and Växjö are medium-sized municipalities with rural areas and approximately 40 000 inhabitants in the largest urban area, while Tyresö is classified as a commuting municipality close to Stockholm. Meaning that more than 40% of the working population commute to work in Stockholm city (SKR, 2017).. The number of citizens in relation to its size differs for all municipalities which are illustrated below in table 2, indicating that the municipalities have some differences which affect their level of emissions and their choice of measures.

In order to achieve a dispersion of municipalities covering the whole country, adding a municipality located more northerly could be argued being necessary. The differences with longer distances and for example, longer winters, compared to the more southern municipalities can contribute to affect how measures are being shaped and prioritized. However, with the basis of the purposive sampling method, municipalities with a fitted action plan together with a membership in Klimat kommunerna were not found in the northern part of Sweden. Hence, the dispersion cannot be perfect, the importance is the quality.

Table 2. *Summarized total tonnes of CO2 emissions, size and population per municipality.*

MUNICIPALITY	AMOUNT OF GREENHOUSE GAS EMISSIONS, TOTAL, TONNES OF CO2 EQUATIONS , 2018	AREA, KM2	POPULATION
Tyresö	28 653	100	48 678
Växjö	263 961	1 914	94 274
Lund	223 521	439,9	125 941

Tyresö: (Kolada1); (Tyresö kommun, 2021). Växjö: (Kolada2,) Växjö kommun, 2020); Lund: (Kolada3),(SCB, nd).

4.3. Material

The material used in this study consists of policy and control documents containing each municipality's measures aimed to reduce greenhouse gas emissions for energy and transport. Traffic and energy are chosen since they constitute major emission sources in Sweden in areas which municipalities have a certain control over. The documents have been collected from the different municipalities official websites.

Interviews with representatives from each municipality provides an additional dimension for understanding the core intention behind the measures and purpose for the solutions to the problems within each municipality. The interviewees all have positions within the environmental function in their municipality, and work as either environmental strategist or environmental coordinator and were selected due to their relevance for the study based on their job title and tasks. The interviews were conducted online through Microsoft Teams, except for one interview which were made through telephone due to technical issues. All interviews were conducted in the middle of April 2021 (9th, 14th and 19th) and took approximately 30 minutes. The interviews provided important information regarding if the documents used in the study are the actual, and relevant documents that cover GHG reducing initiatives for energy and traffic, in order to not miss any important documents.

The material was systematically collected by searching for municipalities' action plans for emission reduction. Thus a search on a search engine was made with words containing “*name* *of municipality* + environmental/energy/traffic action plan/ emissions" was made for each municipality with the mark "emission reduction" in Klimat kommunerna. If an action plan was found, they were skimmed through in order to get familiarized with the content (step 1 in the thematic analysis method) in order to find if the energy measures included *how* they were going to be utilized in practice. Meaning, if they included some aspects making it possible to identify the core initiator and the change-agent for each measure. Not all municipalities had relevant documents used for analysis, thus they were rejected as a study object.

The documents used to study energy and mobility measures aimed to reduce GHG emissions within each municipality are summarized in table 3.

Table 3. *Summarized material per municipality used in the analysis.*

MUNICIPALITY	DOCUMENTS
Tyresö	Collective action document for energy plan, energy efficiency and climate strategy, 2010-2020 (revised in 2016) (Täby Kommun. 2016b).
Växjö	Energy plan for Växjö municipality 2016-n.d.; Transport plan for Växjö municipality 2014-2020. (Växjö kommun. 2016; Växjö kommun, 2014a)
Lund	Energy plan för Lunds municipality 2019-2026 (Lunds kommun. 2020).

The number of documents, year span and scope of the documents which covers emission reducing measures differs for all chosen municipalities. Tyresö and Lund municipality has one overarching action plan with measures targeting both energy, and traffic, while Växjö municipality has different documents for each function within the municipality.

The interviewees[1] highlighted documents within the municipality containing strategies of involving more functions within the municipality and to engage more citizens in the transition to sustainability. However, due to the lack of concrete measures declaring how to turn those strategies into actions, those strategies cannot be categorized and used in this study.

5. Results

This chapter is divided into three parts for each municipality used in the study and covers the results. Firstly, a short background is given for each municipality with a brief review of the goals and vision for the environmental plan to accomplish. It continues with a review of the

[1] For example, Interview, Lund municipality. 19-04-21

measures within each category, together with a more in-depth description of why the measure fits into the category it has been coded into. Lastly, each municipal section ends with illustrating the dispersion of measures into each category in a graph. The complete coding scheme with all measures can be found in the appendix.

5.1. Tyresö

Tyresö municipality, located in the Stockholm region, has one overarching action plan for climate measures which provides an umbrella document for the municipality's various energy and climate-related plans and strategies that together help to fulfill the municipality's vision for climate and energy goals. The overarching goal is to reduce the greenhouse gas emissions by 20 percent in 2020 compared to the base year 1990, and to achieve a fossil free vehicle fleet by the same time.

A total number of 77 measures was found and include efforts regarding (mostly) energy, traffic and waste. 12 measures were excluded for this study as they did not include any element connected to reducing GHG emissions. These were measures aimed, for example, to improve the water quality and how to enhance nature areas around schools. Furthermore, five measures were originally adopted in the action plan, but disregarded by the municipality afterwards, hence they have not been categorized in this study as no actions were taken for these measures. This results in the analysis of a total of 60 measures.

The action plan was adopted in 2010 and stretches to 2020 but was revised in 2016. A new updated plan for 2021 and the years following is in progress but has not been published yet.

The measures in the action plan are described to be organized to catch the "big elephants and the low-hanging fruit". Meaning that they should be simple but give fast results. (Tyresö kommun, 2016a).

The results are based on the Collective action document for energy plan, energy efficiency and climate strategy, 2010-2020 (revised in 2016) (Täby Kommun. 2016b).

5.1.1. Changes in technology

The majority of the measures analyzed in Tyresö’s energy plan (34 out of 60) have been categorized into category A with technology as the main change enabler. Four specific themes can be found.

A total of 11 measures indicate a focus on improving technological aspects within the municipal organization's buildings, which can be found, for example in the measure *Install solar panels on municipal buildings*, and *Sensors and other energy-efficient technology will be introduced on the municipality's properties*. The underlying intentions behind the measures is to improve technology, and not having any connection to social dimensions. Hence, improving the current technology enables change and leads to reduced levels of emissions, in accordance with category A.

Changing the source of energy in buildings, or optimizing energy efficiency can be found as the main intention for the second theme within category A, which suits the category's aim to improve and enhance technological aspects in order to reduce emissions. Examples of measures which suits into this theme are:
When expanding Dalskolan's sports hall, the sports hall and the school's energy source should be converted from direct electricity to district heating, and *Develop a plan to energy-efficient existing municipal buildings that, for example, invest in better climate shells in connection with maintenance.*
What can be found, is that the underlying issue, which is being solved by implementing the measure, is to ensure more buildings with clean energy and improving aspects of buildings so heat won't disappear.

The change in technology category does not focus on how often or why something, for example energy, is being used. Yet, the category aims to create technological improvements which will eventually lead to change. Thus, simply changing or improving one product into another fits into category A, in which typical example for this is found in the measures, *Municipal employees lease green cars (a total of 35 cars)*, and *In 2015, the municipality's park of passenger cars will 85% consist of green cars.* The underlying goals of these measures do not indicate how to make people drive more seldom, but the focus lies on altering the current vehicle fleet.

Lastly, a theme aimed at improving infrastructure within the municipality can be found in examples such as:
Install more charging posts for electric vehicles, and *Streamline street and park lighting.*
In which the problem formulation on what has to change to ensure a reduction of GHGs is expressed as solely focusing on technological aspects for both of the examples.

5.1.2. Changes in individuals behaviour

The category of changing individual behavior in which the individual is targeted as the change-agent in order to reduce levels of emissions can be found in 23 out of 60 measures.

Providing knowledge to individuals in order to give them tools to make more sustainable choices is a core of this category, and is one of the most prominent themes found in the energy plan, with examples such as:

Providing energy and climate advice; *Training in EcoDriving for employees who drive a car*, and:
Arrange a workshop on how the municipality can work more actively with sustainability issues throughout the procurement process. That is, both before, during and after the procurement, from needs analysis to follow-up.
These educational measures give individuals tools, methods and knowledge to make more sustainable energy choices. The responsibility for change therefore lies with the individual, hence individuals should be given the tools to make 'right' and responsible choices. The underlying solution to the problem which can be found in these measures is to give information to individuals which will give them the responsibility to make active choices for using more sustainable options. External factors are seen to be a motivation for change to happen for individuals, and knowledge is an important factor which reflects on people's behaviour. Yet, what is interesting for these last two examples, is that they are only targeting individuals within the municipal organization. Which is another team found in the action plan.

Targeting individuals within the municipality can, in addition to the two above, be found in examples such as:
A survey of the municipality's business trips must be carried out and a policy for these trips must be drawn up.
What is interesting is that none of the measures indicate an undertone of having an intention to reach a larger target group or influence other people to make sustainable choices. The core goal is understood as influencing a small group of individuals by conducting these measures, instead of reaching a larger system.

Six measures have been categorized in both category A and B, which is justified for its two folded elements of integrated change enablers. These are summarized below:

- *The municipality shall work for separate measurement of operational electricity and property electricity*
- *Effective follow-up and accounting systems for energy use must be introduced*
- *When procuring travel and transport services, requirements must be set for low emissions of carbon dioxide per kilometer and annual reporting of carbon dioxide emissions.*
- *Introduce coordinated goods transport in collaboration with other Södertörn municipalities.*
- *In collaboration with energy consultants: contact with major players (companies and organizations) through energy consultancy and environmental certification*
- *Increased supervision of energy declarations to ensure that they are implemented*

Although elements of technology can be spotted (e.g. accounting systems for energy use), by reviewing the underlying incentive for the measure, one can also find underlying connections aimed at changing how individuals behave. Such as the opposite as well. For example, by installing separate measurements of electricity, the improved technology will in turn lead to individuals getting knowledge on how much energy they are using, which might lead to them making active behavioural choices to reduce their energy use. Thus, we can find that the core of the problem is twofold, aiming to improve technology and to influence individuals behaviour. It can furthermore be found, for example, in the third measure from the top, that the underlying problem solving element does not rely on changing integrated social dimensions (as in category C and D), but does not fit in solely one category (A or B) on its own. It can therefore be more suitable to categorize the measure in both A and B, and therefore reject it for having any integrated social elements in it.

5.1.3. Changes in everyday life situations

The category in which measures are aimed to create change in everyday life situations consist of a total of 9 out of 60 measures.

A clear theme found within these measures is that through physical planning encourages, nudges and makes it easier for individuals to choose more sustainable traveling options. Examples are found as:
Continued expansion of pedestrian and bicycle networks and *Encourage public transport and, if necessary, work for an expansion of entrance car parks, in which new bicycle entrance car parks are built every year in locations close to public transport at bus stops.* The core intention and change-enabler for these measures is found in the notion of providing conditions for changing how people behave in everyday situations (by changing physical environments). Indicating that new habits and practices are, or can be, created by these measures, which is found to be a more integrated social intention and part of the core in people's everyday routines.

Two measures are found to have elements of both category B and C and are summarized below.

- *Adopt and implement a meeting and travel policy*
- *Introduce systems for collecting food waste and producing biogas from food waste*
-

The argument for fitting in both categories lies in the underlying core of the measure such as the solution the measures will contribute with. For example, as in the first example, the intention of the measure indicates that a travel policy will change individuals behaviour (B), but while also having it as a policy, it aims to be integrated into the way of behaving within the municipality, thus becoming a habitual or integrated ritual in the organisation (C).

5.1.4. Changes in complex interactions

No measures which can be categorized into category D in the measures aimed to reduce greenhouse gas emissions for Tyresö municipality. Meaning that no measures are aimed to create a change across several sectors and actors, interconnecting due to practices.

The dispersion of measures within each category is presented in figure 4 below.

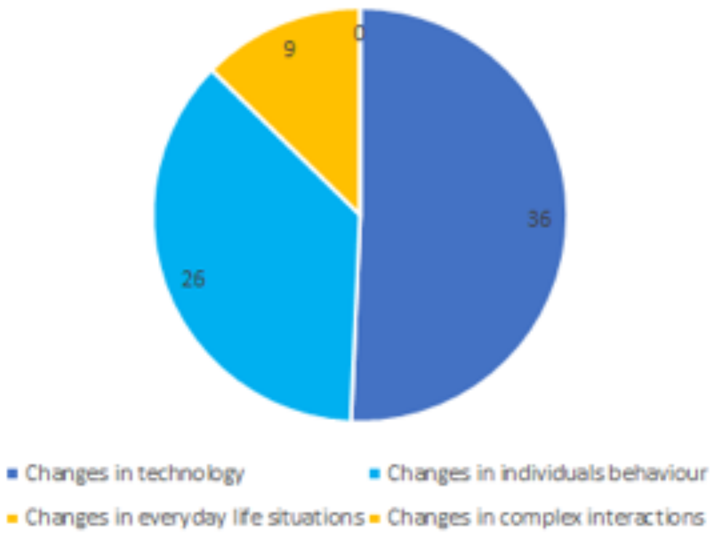

Figure 4. *A pie chart displaying the dispersion of measures within each typology category.*

The dispersion of measures illustrates that measures aimed to create technological change in order to reduce greenhouse gases are the most common measures in Tyresö municipality with a total of 36 (51%) measures, which adds up to . Thereafter comes change in individuals behaviour with 26 (37%) measures.. Change in everyday life situations has a total of 9 (13%) measures, while change in complex interactions has zero measures (0%).

5.2. Växjö

Växjö municipality, with the slogan "The greenest city in Europe", is located in Småland in the southern part of Sweden. In 2010, the municipality set the goal that the municipality as an organization should become fossil fuel-free by 2020 and as a geographical area by 2030 (Växjö kommun, 2016).

The action plans with measures aimed to reduce greenhouse gas emissions are divided into different targeted areas. The two action plans relevant for this study is:

- ➢ Energy plan (adopted in 2016)
- ➢ Transport plan (adopted in 2014)

These plans stretch to 2020, however, new updated plans are being processed but have not been published yet.

The energy plan describes the goal of having the energy used in homes, business and transports not having an affect on the climate due to emissions of carbon dioxide. The action plan consists of four strategic areas 1) renewable energy, 2) efficient energy use 3) renewable fuels for transports and energy efficient vehicles, and 4) security of supply (Växjö kommun, 2016).

A large number of measures (56) are aimed to make efforts to improve the transport sector into becoming more sustainable. The municipality aims to develop a city where walking, cycling and public transport meet most of the transport needs for citizens, and vehicles are environmentally friendly. The strategic areas for the transport plan are 1) sustainable vehicles and traffic, 2) biking areas, 3) walking areas, 4) developed public transport, and 5) mobility management.

A total of three measures from the traffic plan have been disregarded for this study, as it has no element of referring to reduction of greenhouse gases.These are for example measures which target the noise level coming from vehicles, and forming station councils.

It is acknowledged that reaching the environmental goals requires participation from citizens, organisations, businesses, agencies and associations, such as emphasized that challenges regarding sustainable transports and energy efficiency are targeted as areas in need for transformation (Växjö kommun, 2014b).

The results are based on the Energy plan for Växjö municipality 2016-n.d. and the Transport plan for Växjö municipality 2014-2020 (Växjö kommun. 2016; Växjö kommun, 2014a).

5.2.1. Changes in technology

Within the transport plan almost all measures are contained in category A, with a total of 27 out of 33 measures. While the transport plan consists of 11 measures out of a total of 53 categorized into category A.

The energy plan consists of two prominent themes. One of the themes in the energy plan is found to enhance the number of electric vehicles, as for example electric bicycles and cars, within the municipal borders. Examples which are representative for the theme can be found in measures such as:
In the case of new construction of municipal premises and homes, charging for electric vehicles must always be installed;
Demonstration projects are carried out in order to investigate the possibilities for the use of renewable fuels or electricity in the municipality's service vehicles and work machines as well as public transport, and:
Coordination between the municipal actors outside the city of Växjö to improve the infrastructure for renewable fuels and electricity.This suits into the technological category as the identified change enabler is technological improvement, implying on the notion that social practices will come as a consequence of the new technology as an unintended consequence.

The second them within the energy plan focuses on renewable energy and effective energy usage, which can be found in examples such as:
The technical committee and the municipal real estate companies will become more self-sufficient in renewable electricity, Within the framework of its business development work, Växjö Municipality shall both support and drive investments in renewable energy production, and:
Växjö municipality contributes to the development of the biogas market in the region by collaborating with different actors and participating in different projects.
The core intentions for the measures can be understood as solely improving technical aspects and not having any social or behavioural element within it. For example, by developing the biogas market in the region, more biogas electrical vehicles can be used, which in turn will increase the number of vehicles.

Within the traffic plan, a theme of efforts aimed at enhancing electric vehicles are found, in which the solving mechanism to the issue of GHG is identified as merly improving technical aspects which will reduce emission levels. These aspects can be found in measures such as:
Identifying strategically important charging points for electric cars (car parks, workplaces) and work for charging posts to be established there. Collaboration with private actors may be necessary, and:
Investigate the possibilities of introducing electric / hybrid-powered buses in public transport.

A few measures are directed at the municipal organisation only, such as:
Lead by example and increase the proportion of electric vehicles, electric bicycles, electric mopeds, etc. in the municipal vehicle fleet.
These measures share the same objective, with the core focus on only improving technology and indicating that the technical aspect within itself will lead to social aspects (meaning that more people will choose electric vehicles) as a result of the technical improvement. Thus, the core change enablers are seen as technology.

5.2.2. Changes in individuals behaviour

5 out of 33 measures can be found in the energy plan which fits into category B, while one measure fits into both A and B. Within the traffic plan, 13 measures fit into category B, while two measures fit in both A and B.

The theme for the measures within the energy plan is mainly to provide knowledge and tools to individuals in order to encourage them to make more sustainable energy choices. Some of these informative measures are described as:
Växjö municipality has active energy and climate advice where municipal residents, companies, property owners, organizations and associations get access to advice and support in their energy efficiency work;
Within the framework of its customer focus, Växjö Energi AB will work to have an active

dialogue with customers about their energy consumption and offer services that contribute to reduced energy use, and:
Where possible, individual measurement of electricity and water in homes shall be applied and visualized. Charging must be linked to actual consumption.
The first two examples have the underlying intention and goal of wanting individuals to make more sustainable choices by providing them with knowledge about how to make it possible, while the last example has the underlying intention of wanting individuals to reduce its energy usage by providing individuals with information of their own energy usage. If the bill is high, or if individuals visually can see how much energy they are using, the hope is to make them change their behaviours into more sustainable actions.

One measure from the energy plan is categorized into category A and B with the notion of not having characteristics applicable to solely either A or B, but having no characteristics of category C or D. However, what can be understood is that the core intention of the measure does not indicate nor imply any integrated social dimensions. Thus, by excluding C and D, it is categorized into A and B. The measure is presented below.

- *When making investment decisions for new and redevelopment, Växjö's municipal real estate company must include reporting of life cycle costs, in order to reduce energy use.*

The main theme for measures within the traffic plan fitted into category B, are to a large extent aimed to be informative and give individuals tools and knowledge about making more sustainable mobility choices. Examples that are typical for this indication are:
Act for active counseling so that more people within the municipal organization use the IT tools' various opportunities to replace physical travel and:
Conducts annual campaigns aimed at inspiring more cycling, electric cycling, public transport and walking. It can e.g. involve trying out electric bikes, cargo bikes and public transport.

One measure is organized to promote the option of working from home and thereby result in less usage of emission demanding transportation options (this measure was created years before the Corona pandemic, which made everyone have to work from home), by giving them knowledge about how. This measure is presented as:
Work to offer companies and organizations advice to increase knowledge of the IT tools' various opportunities to replace physical travel.
The core intention is to reduce individuals car usage and therefore minimize the emission levels.

In the traffic plan, two measures are categorized into both category A and B, with the basis of not having any tendencies of category C and D, meaning that the category lacks any integrated elements of social dimensions, which makes it more applicable to A and B. The measure can be found below.

- *Businesses with heavy, wide or long transports should be located where the street network can handle it.*

5.2.3. Changes in everyday life situations

Within the energy plan, none of the measures are found to be categorized into category C. However, the transport plan consists of 38 measures categorized into category C, and one measure categorized into both A, B and C.

The dominant theme of the measures categorized into category C are organized to affect the infrastructure in ways that enable more people to choose alternative ways of traveling (bike, walk etc). The underlying element of these measures is identified as making roads and infrastructure for e.g. bikes more accessible and safe, resulting in more people choosing the more environmentally friendly traveling option in their everyday life, thus making it a habit or an integrated practice in one's life. Examples are found as:
Inventory of cycle path networks in Växjö and other urban areas to find out what needs to be remedied to make it faster, easier, more convenient and safer for all types of bicycles; Develop a maintenance plan for the bicycle infrastructure so that it is of good quality, has good accessibility and is traffic-safe and:
Make an inventory of the most important footpaths in Växjö to find out what needs to be remedied in order for them to be accessible, traffic-safe and perceived as safe.
By inventorying the possible improvements, and by maintaining the roads, the chances are larger that people might use bicycle and footpaths more often as their everyday traveling option.

One measure within the traffic plan is categorized into both category A, B and C. This is due to its complex, yet vague definition, which results in different core problem definitions.

- *Develop a traffic plan for the city of Växjö. The traffic plan shall, among other things, define where different types of traffic are allowed and prioritized and what applies to different types of roads and streets with regard to speed, passability, traffic solutions, emergency vehicles and more.*

The vagueness of the measure indicates that the measure might both involve more car improvements or increase in for example fossil-free cars ("...different types of traffic" category A), the plan might also involve changing how individuals act in traffic (B), but to some extent also show elements of C as the plan may indicate a change in mobility across the municipality, which may lead to more sustainable traffic movements for people's everyday commute (C).

5.2.4. Changes in complex interactions

A total of two measures from the energy plan are categorized into category D, while two measures from the traffic plan are found in both category C and D.

The first measure within category D from the energy plan is organized with the core intention to contribute to a system change in the way energy is produced. The measure is phrased as:
In the dialogue with builders, the municipality encourages investments in small-scale energy

production.
Having both the municipality, builders/companies and citizens collaborating to enhance small-scale energy production with the intention of leading to a large upscaling of local micro production of energy. Which in turn involve social organisations within the society together aiming for a joint goal by mixing technology, collaboration, knowledge enhancement and a long-lasting change of energy production.

The second measure within category D in the energy plan reads as:
Prior to new construction projects and major renovations / conversions, an analysis is made of possible flexible solutions such as joint use of different activities in the same premises. By analyzing the core intention with the implemented measure, one finds information that the intention is to create co-space for different types of activities. By also having it as a goal in the construction phase, it indicates that the intentions of building spaces are not tied to specific activities, thus enabling the space being used for more than one thing. This creates the potential for an umbrella of activities made possible by joint use of spaces. Which in turn minimizes the need for more spaces being built, or having a space being empty, as it is now used for several purposes. This covers a complex composition of many actors and new ways of living in harmony with others.

Lastly, the two measures contain elements from both category C and D with an underlying core which targets a system change are presented below:

- *Influence the location of public and commercial activities. Växjö municipality takes an active role as an investigator or dialogue partner in locations and tries to find locations that are easy to get to with walking, cycling and public transport for employees and visitors. This is especially important for visitor-intensive activities such as trade, healthcare, preschools, schools and offices. Correspondingly, businesses with heavy, wide or long transports should be located where the street network can handle it.*
- *Stimulate and market car sharing systems and the use of car pools, preferably with electric cars, for companies and private individuals. Provide parking spaces in good locations for carpools when needed, inform carpool organizations about the possibility of gaining access to attractive parking spaces.*

For the first example, elements of C can be found as the change-enabler is influencing the location of infrastructure and buildings with the intention to reduce travel needs, in turn leading to people's routines changing onto choosing more sustainable traveling options (C). However, some elements of D can also be found as the core of the measures lies in taking one or two steps further with the location of public activities and infrastructure. Meaning that an active role is taken by relocation and controlling the structure of society, thus influencing the broader system into changing e.g. traveling patterns and influence interactions among several areas within society (D). The second example has mostly elements of C within it as it aims to create new habits and routines for mobilizing (C), but yet again, shows tendencies towards D.

A sharing system of vehicles indicates a core of involving a larger system within the society, and understanding the power of a sharing-system instead of privately owned vehicles. The measure furthermore targets social organizations within the society by offering the responsibility to create a change across a range of several sectors and actors (D), and by that influence habits of people's daily lives.

The dispersion of measures can be found in figure 5 below.

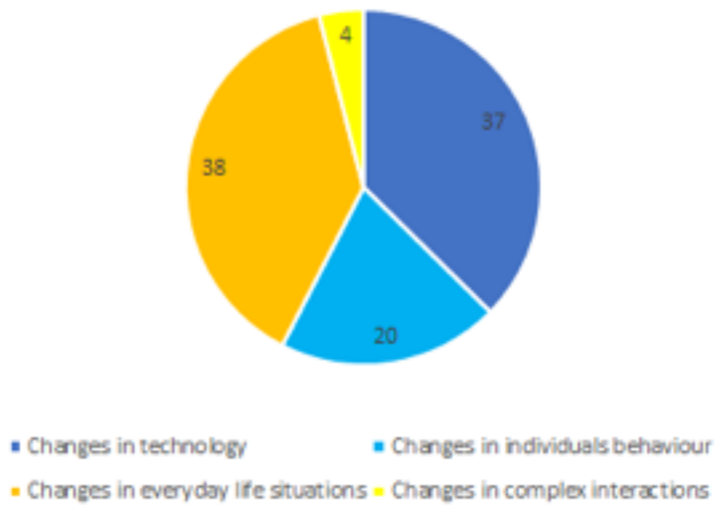

Figure 5. *A pie chart displaying the dispersion of measures in Växjö municipality.*

The graph illustrates that a total of 37 (37%) measures are categorized in the category change in technology, while 20 (20%) measures are found in the category change in individuals behaviour. Change in everyday life situations consists of 38 measures (38%) , and lastly, four (4%) measures are found in the category change in complex interactions.

5.3. Lund

Lund municipality is located in the most southern region in Sweden. It is emphasized that in order to achieve the overall energy and climate goals, the municipality must primarily reduce the societies need for energy which includes everything from designing the city so that the need for transport is reduced, to building well-insulated houses. The municipality strives for having environmental thoughts being incorporated in all work and everyday life for all citizens (Lunds kommun, 2020).

The energy plan highlights that greenhouse gas emissions must be reduced by at least 50 percent by 2020 (compared to the base year 1990) and be close to zero by 2050. (Lunds kommun. 2020.) The measures in the energy plan is divided into four sub-areas: 1) energy efficient transports and renewable fuels; 2) engaging more people in the energy transition; 3) energy efficient properties and contracts; and lastly, 4) increased self-sufficiency of renewable energy with circular flows (Lunds kommun, 2020). The energy plan has a timespan between 2019-2026 and combines energy usage regarding housing, traffic and engaging more people in a renewable energy transition.

The results are based on the energy plan för Lunds municipality 2019-2026 (Lunds kommun. 2020).

5.3.1. Changes in technology

A large proportion of the efforts, 31 out of 43, are categorized into category A and contain elements of category A to solve emission problems without have any essence of implying integrated social dimensions. There are three themes which can be found within the policy document. 1) enhance sustainable transports, 2) improve the energy system in buildings, and 3) enhance renewable energy solutions.

One of the themes regarding traffic is the notion of pushing the growth of sustainable transports (electric busses, cars) by enhancing infrastructure for fossil-free vehicles. Examples within this theme can be found in measures such as:
Through the Service Board, Lund Municipality's administrations procure vehicles so that fossil fuel freedom, energy efficiency and improved air quality are achieved. This means that electricity and biogas are prioritized over other fuels when purchasing light motor vehicles. The companies procure light vehicles according to the same principles; *Street lighting, electricity supply to trams and electric buses as well as other infrastructure that supports sustainable transport are designed in an energy-efficient way*, and:
More filling stations for biogas are being established in Lund municipality, mainly in the villages. If the financial calculation for the filling station has not been good enough, other forms of ownership than Kraftringen have been identified. Examples of such ownership can be the municipality together with local actors. The conditions for establishing a filling station for liquid biogas are being tested.
The core change-enabler within these categories, and the solution to the emission issue can be found as solely improving and enhancing technical aspects. For example, more filling stations with biogas indicate a wanted growth in green cars. Which, as category A implies, technical change will lead to the wanted goal of reducing emissions.

The second theme implies improving energy systems in buildings and can be found in measures as:
The municipality of Lund continues to work with energy efficiency improvements in the renovation, maintenance and operation of the municipality's properties, and develops cutting-edge projects to identify successful solutions that can be used in a larger part of the portfolio and:
When renovating and remodeling, consideration is always given to whether buildings are suitable for solar cells, so that new solar cells are put into use annually.

These measures indicate a goal of demanding more technical solutions by improving the energy sources in buildings by either building to create energy efficiency or by switching energy sources. It is not implied how often or why energy should be used, which goes in line with the core of category A, which indicates that social change will come about as the technical solutions are in place.

Increasing renewable energy production, or providing tools to enhance renewables within the municipal borders are found as the last theme within category A. Examples which are typical for this theme are measures such as:
The municipality and its companies create the conditions for a completely fossil fuel-free energy system in the geographical area of Lund municipality, and:
*Sustainable and smart energy systems are based on the interconnection of different actors and different energy sources. Digitization is a tool to achieve this. Smart and sustainable energy systems are developed so that they contribute to the goals of increased energy efficiency, reduced primary energy use and power shortages, as well as increased circular flow*s.
Technical solutions are shown to be the core in order to create a sustainable transition. It can be argued that improving technological aspects may result in more people choosing the more sustainable option, although these efforts presented below do not involve any aspect of changing social dimension, which therefore suits in category A, implying that social change may occur as an unintended consequence by improving technology, which makes the technological part the foundation for creating change.

5.3.2. Changes in individuals behaviour

A total of 13 measures fits into category B, in which five measures are found to have elements from both category A and B, and one consist of a mixture of B and C (presented in the following sections).

One prominent theme for the measures within category B is enhancing knowledge for individuals. The policy document includes an episode aimed to engage more people in the energy transition, in which a number of efforts are being found with elements belonging to category B. The efforts mainly involve educating and giving individuals knowledge to make sustainable choices and can be expressed in measures such as:
The municipality of Lund carries out knowledge-raising activities in the area of energy-efficient properties aimed at various actors such as builders, tenant-owner associations and the general public. The municipality for dialogue and collaborates with developers to optimize energy systems based on the environment, economy and social aspects and:
The exchange of experience between landlord and user continues to develop. It is about e.g. about receiving comments and grievances while informing tenants and users about energy-smart behavior. Incentive models are also developed in order for tenants to get involved in their energy use.
The second example is portraying a crystal clear example of category B, as it refers to the

goal of involving tenants with their energy usage by providing them with information about more sustainable behaviours. Thus, the message which is taken from these two examples is that change will come about when people are giving knowledge about making more sustainable choices and therefore change their individual behaviour in specific situations.

Another example is the me*asure:*
The municipality of Lund conducts continuous work to ensure that the occupancy rate of the municipality's vehicles is good and that these are not used unnecessarily
which highlights the goal of wanting individuals not to use cars when they don't have to.Which indicate external pressure making individuals choose to not travel by car. If the underlying goal would have been expressed differently, and for example indicating a reduction of municipal cars and therefore having people choose other traveling options, the measure might have been categorized differently. However, the measure does not indicate how many cars a "good" occupancy rate is, and by that, does not nudge individuals into choosing other mobility options and thus belongs to category B.

Five measures can be categorized into both category A and B, and are presented below.

- *In the procurement of transport contracts, the municipality of Lund demands that environmentally adapted and energy-efficient vehicles be used instead of conventional fossil fuel-powered ones. Requirements for route optimization, economical driving and the like are set where relevant.*
- *The municipality of Lund is investigating whether geographical expansion of the existing environmental zone or the introduction of new, tougher environmental zones in the city center or other districts can contribute to improved air quality, energy efficiency, reduced noise and reduced climate impact in an effective way.*
- *The municipality of Lund promotes collaboration and innovations in the energy and climate area. Coordinating and motivating local actors, seeking external funding and making use of experiences from completed projects are key tasks. Within the mayoral agreement collaboration, the municipality concludes agreements with individual companies and organizations on measures.*
- *The municipality of Lund reduces the total energy use in new and existing buildings by using areas efficiently. Before building technical solutions are chosen, the need for cooling and heating through green roofs, lip plantations, shading trees, sun protection, etc. must be reduced. have been considered. Dialogue is conducted with actors outside the municipal organization to promote a similar approach throughout the geographical area.*
- *New production of the municipality's premises and homes meets at least the requirements for heat output requirements for FEBY (forum for energy efficient building), or Miljöbyggnad level silver. The building and surrounding green structure are designed if possible to reduce energy use for cooling and heating. Certification of the properties is positive but not a requirement.*

The reason for having a mix of categories lies in not having elements of both categories, such as not having any elements which indicate more integrated social dimensions. The first example indicates a clear mixture of A and B as the core intention for the measure both aims to promote energy efficient vehicles, which in turn may lead to an increase of such vehicles (A), such as aims to nudge how cars are being driven (economical driving - B). The last example is rather vague as it does not indicate that technology alone will solve the problem, or nudge individuals to change their behaviour in some way. Yet, what can be understood is that the measure in itself will not lead to a system-wide change, which makes it possible to reject the measure to fit into category C or D.

5.3.3. Changes in everyday life situations

A total of four measures can be found in category C, in which one is a mix of B and C, and two is a mix of C and D, and will be discussed in part 4.2.4. below.

The measure fitted exclusively in category C deals with the problem of changing material components and habits related to the mobility areas in one's daily lives, by targeting why and how specific activities affecting greenhouse gas emissions are being used in everyday life situations. The measure is expressed as:
Mobility houses are being built with an offer of a car pool, electric bicycles and charging options for different types of vehicles. In the villages, mobility hubs are being developed for commuters.
The solution to the problem is framed as involving infrastructure to make people question the old ways of using mobilisation vehicles, and by that create new habits by finding that the problem can be solved by mobility hubs.

One measure is found to have a mixture of elements in category B and C and is presented below.

- *The municipality of Lund carries out activities aimed at residents and companies with the aim of promoting sustainable transport and increasing the proportion of energy-efficient electric and gas vehicles among these target groups. When locating workplaces and homes, a reduced need for transport is sought. Work on LundaMaT's focus areas and measures continues.*

The argument for having the measure containing elements from both categories lies in the notion of firstly, containing elements which aims to improve knowledge among residents and companies (B), and secondly, by having a core which aims to reduce transport by target the localisation in ways that is reducing the needs of using emission demanding vehicles, and thus affects people's everyday traveling habits (C).

5.3.4. Changes in complex interactions

The measures found in category D contain a mixture of C and D, meaning that it has integrated social dimensions as the core enabler for change within the measures, however the solution to the problem can be understood in two ways. The two measures are presented below.

- *The municipality of Lund carries out knowledge-raising activities about small-scale renewable energy and makes it easier for property owners to store and sell electricity from small-scale electricity production, e.g. from solar cells and wind power. The solar map is developed and used as a basis. Kraftringen develops services in the area, including utilization of small-scale surplus heat.*

- *Lund Municipality works across administrative and company planning in community planning in order to stimulate small-scale renewable electricity production and utilization of surplus heat during urban renewal and when new districts are designed.*

Both measures have not quite fully reached the D category with a wide spectrum of involvement of system-wide aspects, however, elements and intentions within the category can be found. The first measure is viewed as interacting across several sectors within society, and involves both residents, property owners and businesses acting with interconnected practices. Hence, the measure involves an umbrella of activities stretching over several sections by involving technical dimensions, giving individuals knowledge by providing them with the solar map, but also has a goal to, by a joint concentration, reach the goal of better energy solutions which affects the society into changing their energy culture. The second measure is categorized based on the same premises, but also contains elements of affecting the community planning by finding locations which might enhance micro production of renewable energy. Thus, the measure is aimed more large-scale by affecting the design of districts in order to suit a more sustainable energy production.

The dispersion of measures in Lund municipality can be found in figure 6 below.

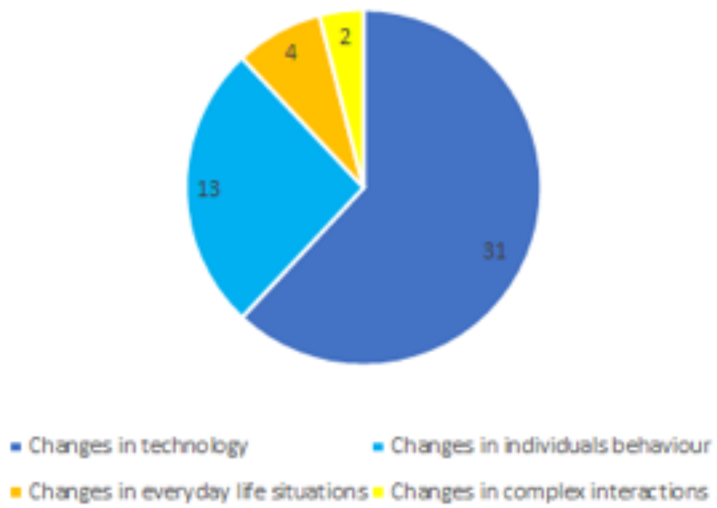

Figure 6. *A pie chart displaying the dispersion of measures within Lund's municipality.*

The graph displays how change in technology is the most common category for all measures with a total of 31 (62%) measures, thereafter follows change in individuals behaviour with 13 (26%) measures. Change in everyday life situations has a total of four (8%) measures, while change in complex interaction contains two (4%) measures.

6. Analysis

As illustrated in figure 4, 5 and 6, one can find an over representation of measures aimed to create technological and behavioural change in order to reduce GHG emissions in all municipalities. Summarized in figure 7 below, the results indicate that 74% of a total of 220 analyzed measures are found in category A and B which implies not achieving a wide system change linked to lifestyle activities and in particular to societal systems (EEA, 2019).

A total of five themes consisting of different change-enablers are found across all policy documents among the three selected municipalities. These can be summarized as:

- enhancing the number of electric vehicles, such as electric bicycles and cars (A),
- enhancing knowledge for individuals (B),
- influence how infrastructure is built in order to nudge people to make more sustainable mobility choices (C),
- improve energy systems and increase renewable energy production (A), and
- interacting across several sectors within society (D).

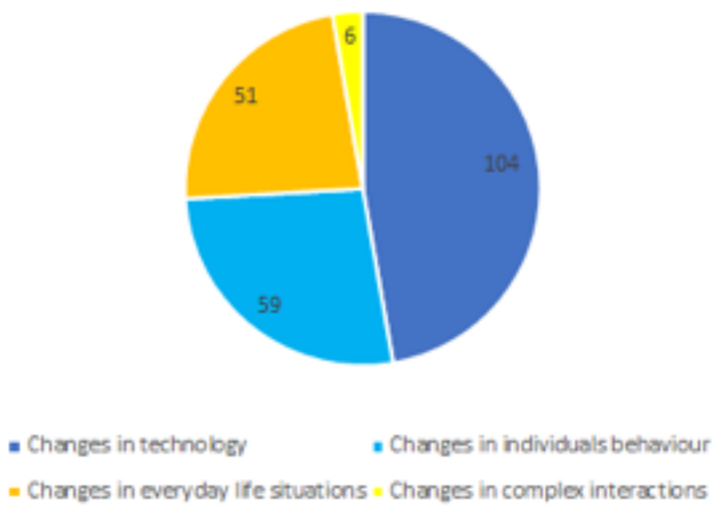

Figure 7. *A pie chart displaying all the number of measures fitted into each category for Tyresö, Växjö and Lund municipality summarized.*

Similar to the results from the Energise project (Jensen et al., 2019), the result from the local efforts researched in this study, illustrated in figure 7, displays how the majority of the measures, about ¾ of the grand total, have been categorized into category A and B. This is argued to have limited outcomes as it does not address a wide-stretched mixture of interactions between technology, business, culture and everyday life situations and routines which is found more likely leading to a long-term sustainable transformation (Jensen et al. 2019). By not including social dimensions to a large extent with a wide range of combined elements on several levels, the chance of a recoil-effect to occur is furthermore increased (Malmaeus et al., 2021). The outcome of implementing these measures might result in becoming not as effectfull as needed, or as it was intended to become (Jensen et al,. 2019). Overall, the lack of integrated social dimensions which challenges norms, everyday life dynamics or larger systemic changes among the local measures within the three selected front-running municipalities are found to be limited with the scale of creating a sustainable and disrupting change.

Many measures are found to have elements of two or more categories and have therefore been categorized into a mixture of categories. For some measures, the reasoning for categorizing the measure into more than one category has been that the measure has some elements which could be argued to invoke a system change (for example when measures have been categorized into B and C), but cannot be argued to do so fully. For other measures, the basis for categorizing into more than one category has been to exclude that the measures have any aspect which involve integrated social dimensions or aims to enable a system-change and has therefore been categorized into a mixture of A and B. This might, to some extent, problematize the results as it may indicate that there is a large focus on for example technological efforts, while instead, the results should be understood as a lack of integrated social dimensions for the majority of the measures. The results should therefore be interpreted as follows: by the number of measures which do not involve social dimensions and do not invoke a system change, versus measures which do involve social dimensions and do invoke a system change. This is illustrated in the figure below, which identifies that the majority of the measures do not involve elements with integrated social dimensions or involve actors working across functions within the society.

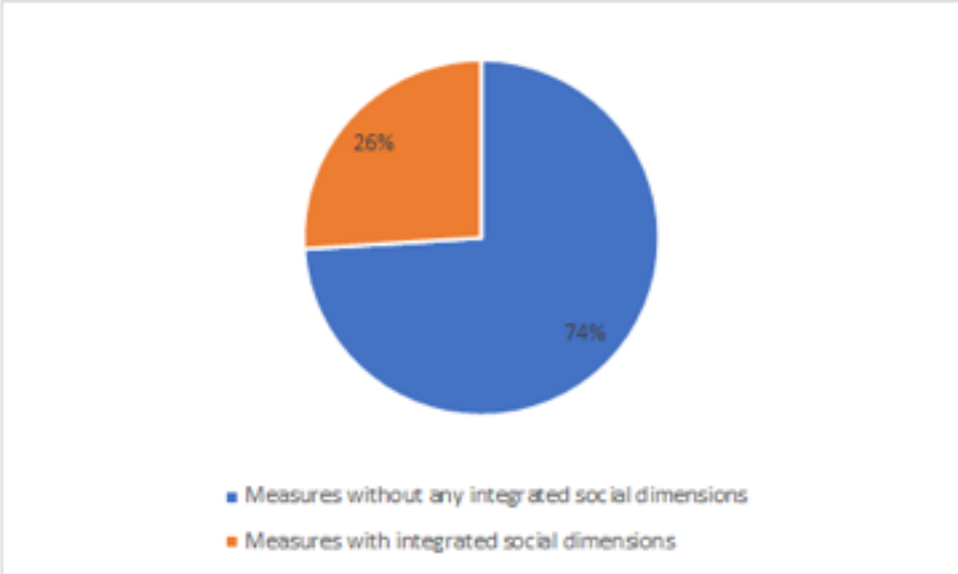

Figure 8. *Dispersion of measures displaying the percentage of measures which do and do not include social dimensions.*

Within category A, a mix of measures aimed to improve the number of electric vehicles, energy efficiency effort and renewable energy enhancements are found as one the most prominent themes. Technical improvements are important in the transition to sustainability, as for example, switching to renewable energy sources, which results in reducing the level of GHGs when energy is being used. However, energy practice cultures need to change as well, thus dimensions related to the motive behind using energy is required (Genus et al. 2018). Isolating the focus by relying on technological enhancements alone might cause recoil-effects of, for example, increased consumerism. As in the long term, investing in more green technologies does not reduce the amount of emissions in the atmosphere on its own. On the contrary, increased consumerism will contribute to a continuation of emissions as the production of the "solution" in itself contributes to emissions. What is therefore important to highlight is that if new products are bought, new ways of behaving towards these products needs to come about. New practices and cultures of using energy need to be integrated together with the new technologies in order to create an effective and long lasting change.

Within category B, the most prominent theme is found to provide citizens with knowledge on how to make more sustainable choices. Having policy measures which are aimed to involve actors related to, for example, energy usage or mobility patterns can result in more rich and important knowledge for individuals and is needed for making the actual humans involved with energy demanding activities aware of the extent their practices impact the environment (Bavaresco, 2020). Yet, the knowledge aspect is rather complex. For example, offering energy advising, as all municipalities do, does not mean that all citizens know that the offer is given and is provided for free. It furthermore solely help the people that actually reach out for help[2]. Yet, those people might not be the ones that actually need the help. Thus, having knowledge enhancing measures aimed at citizens on how to make sustainable choices are to some extent dependent on how the offer is communicated out to the citizens. As one interviewee stated, sometimes the chance of reaching out to people might be dependent on how many instagram followers the municipality holds, which makes informative efforts more difficult[3]. This further indicates how efforts which are not nudging, or in some way, forcing people (for example by building infrastructure) to make sustainable choices, has a reduced chance of reaching out with information to the majority of the citizens. In turn, this might indicate that individuals are not confronted with the option to choose the more sustainable option when encountered with two alternatives (a sustainable, and a non-sustainable) as category B suggests, as a result of not getting informed of the pros and cons of the two options in the first place. Furthermore, having the knowledge on making a sustainable choice may not lead to individuals actually choosing the sustainable option, as the non sustainable option might be a part of a habitual aspect of going about ones lives. Which further indicates that deep structural change is needed. The interviewees expressed difficulties with reaching out to the large population within its municipality[4], which proves that new ways of organizing sustainable measures linked to lifestyle activities and in particular, to societal systems needs to arise, as the current ways of reaching people and trying to make a change might not work or become part of how people are going about their lives (EEA, 2020). Knowledge enhancing efforts is however important for having some sort of breakthrough, but is involved with the challenge of reaching out to people and should therefore, for the best result, involve a deeper level and mixture of functions within the municipality such as involve elements which questions why energy demanding actions are being performed in the first place in order to invoke a larger system change.

The majority of the measures within Växjö municipality's traffic plan can be found in category C, with a focus on building infrastructure with the goal of creating new mobility behaviours among the citizens. These are elements which can also be found for Tyresö and Lund, although on a much smaller scale. What all measures within category C have in common is a joint goal of nudging citizens to make more sustainable choices becoming a part of their everyday routines and habits. Meaning that the sustainable choice is aimed to not be thought of as “sustainable”, but become an integrated part of people's daily lives and routines. The representative from Växjö municipality expressed that the underlying motive for these measures to evolve lies in what they as a municipality have resources for doing in order to change mobility cultures. The municipalities, together with regions, have the responsibility to handle the design and the maintenance of roads within its municipal borders, which implies a

[2] Interview, Lund municipality. 19-04-21

[3] Interview, Tyresö municipality. 08-04-21

[4] Interview, Tyresö municipality. 08-04-21

lot of responsibility for building change within the municipal borders (SKR, 2019, Boverket, 2019). Building with the motive of ensuring that the conditions for living sustainably are there was therefore the core aspect for the formation of the measures together with making it more difficult to not live climate-smart, with the hope of making the sustainable choice become the default[5]. Not having individuals contemplating over if the choices are sustainable or not, but having the sustainable choice be the first hand choice integrating into one's way of going about life, is the main goal with category C (and D), which can be achieved by making it easier to travel by other ways than by car.

A small number of measures can be found within category D in which the majority of the measures have a mixture of other categories as well, and therefore expressed as not fully evolved to become part of category D. There are a total of 6 measures which are formulated to invoke a full system-wide transformation in which the general theme for these measures are to invoke a collective interaction across several sectors within society. Yet the small number of measures (6 out of 220 measures) categorized into category D indicates that there is a lack of umbrella initiatives which involve functions across several levels in the society towards a joint goal. Having larger societal functions working with the same mission enables a more effectful chance, than making point efforts to create change. Norms and more integrated behavioural changes linked to lifestyle activities and cultures, involving all functions across the society is vital for enabling a long-term change without risking a rebound-effect. Yet the results present a lack of initiatives which involve such change among the three selected municipalities (Genus et al, 2018; Jensen et al, 2019).

Overall, Växjö municipality is the only one out of the three selected municipalities that displays some evidences of organizing measures which aims to create a system-change. Yet, this is only visible within the traffic plan, as the energy plan mainly consist of elements categorized into category A. Tyresö and Lund provide fairly similar results with the amounts of measures placed into the categories which claims to enact a more system-wide change.

A large focus can be found, in for example Tyresö municipality, on changing the behaviour of the municipal workers or changing other aspects within the municipal organization by, for example, increasing the amount of fossil free cars in the municipal vehicle fleet. A smaller focus is therefore directed on changing the behaviour of the local citizens' within the municipal territory, which may result in limited outcomes. It can however be argued that focusing on having the municipal organization and the workers within doing "what's right" promotes good examples to the citizens in order to "walk the talk" when sending out messages to the larger population to change their way of living. Although the lack of involving the citizens is in the long term problematic, as the scope of citizens stretches out to a larger population than the municipal workers. Thus, having a small group change their

[5] Interview, Växjö municipality. 14-04-21

behaviour will in the long term not be as effective as having a larger population making changes. Moreover, having frontrunning municipalities not involving the whole society to a large extent sends out an alarming result and goes well in line with the statement by the Swedish Climate Policy Agency which stresses that the organization of the current environmental policies are not enough in order to accomplish the change which is needed (Klimatpolitiska rådet, 2020).

Lund municipality emphasizes the need of engaging more people in their environmental plan, and strives for having environmental thoughts being incorporated in all work and everyday lives for all citizens (Lunds kommun, 2020). An episode in the energy plan therefore consists of measures aimed to involve and engage more people in the transition, in which the interviewed representative from Lund highlighted that the core idea of the measures was to involve more people through cooperation by providing support and create an engagement among the citizens[6]. Yet, by analyzing the core intentions of the measures by understanding how the problem formulation is based on the wanted solutions, the efforts are found to strive for enhancing knowledge about sustainability and increase micro production of renewable energy. By that, the majority of the efforts within the episode belong in category B and does not engage people to the core (Malmeaus et al,. 2021). The execution and outcome of the measures is therefore not as effective as the motive for them. Providing individuals with knowledge does not imply people will use the knowledge and apply it in various situations in their lives and therefore do not invoke a change in energy practice cultures. The importance of formulating political efforts which aims to engage citizens to their core is crucial in order to achieve a successful change. Otherwise, turning policies into long lived actions may fail (Sippel & Jenssen; 2009).

6.1 Discussion

This paper explores how sustainability measures among three selected municipalities account for different drivers for change, with a specific focus on the degree of social dimensions incorporated in the sustainability measures. In addition, it investigates the potential for applying the framework by Jensen et al. (2019) on sustainability measures on a local level, in which a system-wide perspective is applied and used to categorize the measures with the basis of establishing the core change-agent and inclusion of social dimensions. Based on the categorization guided by the framework and conducted by a thematic analysis, the results indicate a limited change which does not invoke a system-wide transformation among the selected municipalities. These results indicate that three of the front-running municipalities working to create a fossil free future in Sweden do not enable a change which affects sustainability practices regarding energy and transport cultures among their citizens. Meaning that lifestyle activities are centrally not involved in the sustainability measures.

---

[6] Interview, Lund municipality. 19-04-21.

What can be found in the categorization, is that measures aimed to improve opportunities for alternative ways for mobilization have been organized and formulated similarly but categorized differently. Meaning that the measures aimed to enhance the use of fossil-free cars and biking opportunities differ in the way they are seen to enable a societal transformation. The basis for the differentiation between the categorical differences lies in the notion that the use of cars needs to be minimized rapidly in order to create a sustainable change and can therefore not be seen as creating a positive system-wide outcome as category C and D implies. It is important to not create measures which build us into a system which hinders the chance of reducing the car traffic, which Malmaeus et al., (2021) agrees on by arguing that environmentally friendly cars should only be promoted in a way which does not lock us into today's car-based society. Car use must be reduced in the long term in order to achieve sustainability goals, therefore, increasing the number of cars is not part of the change we need, and therefore such measures have been categorized accordingly.

The results from this study indicated that the social dimensions which are formulated to facilitate a system-wide change among the three selected municipalities sustainability measures are mainly focused on building infrastructure which enable new mobility patterns. Umbrella initiatives which involve actors and functions across the society are found to be limited. Overall, the solution to the problem of GHGs emissions is mainly found as giving individuals tools and knowledge to individually enforce a transition to sustainability. Policy measures has to a large extent not been framed to ensure that a collective transformation in which cultures regarding mobility and energy practices are being shaped into new sustainable ways. The necessary changes for a long-term sustainable transition requires more offensive measures which challenges the motives behind emission demanding practices. Relying on behavioural changes and the supply side of products will not ensure the deep cuts in emissions which are required (Jensen et al., 2019). In general, the results indicate that sustainability measures among the three selected municipalities have been conceptualized to enact small-scale changes in which the social dimensions are limited and dependent on individual willingness to make minor changes in their current way of living. Overall, the lack of a large number of efforts which enables a social transformation to the root of its problem among the three selected front-running municipalities provides some concerning results. Statements from the EEA stresses that governance systems have a role as an enabler for system-wide change, and the Swedish government has acknowledged that more powerful measures are needed which take different conditions into account (EEA, 2019; Prop. 2019/20:65). Yet, the results indicate that the lack of social elements which are proven to enable a system-wide change is obvious among the selected municipalities. The findings from the study indicate that the way a large majority of the measures have been conceptualized do not make citizens question the core of the issue related to the worldwide noticeable unsustainable way of going about life. Thus. the problem formulations among the sustainability measures requires to be evaluated in relation to the changes they intend to achieve, and be reconsidered according to if the goal is to improve the current situation or if a system-wide change which reshapes norms, habits and everyday practices related to sustainability cultures is intended (Malmeaus et al, 2021).

There are challenges with creating a deep-structural change as the transitions do not offer a direct user-benefit for individuals. This further implies the need for more integrated approaches in policy which addresses multi-dimensional and dynamical structural changes for complex sustainability transitions by engaging citizens to make sustainable choices become part of the default mode within everyday life situations (Geels, 2011). In turn, this creates obstacles and opportunities for local governance as the transition process is complex and requires an engagement of many functions within and across the municipality. Policies need to be formulated to have a wider system perspective which results in enabling individuals not contemplating over sustainable choices, but having sustainable choices being the easiest and the default mode of going about life. Deep-structural changes are therefore required, in which the local arena is an important arena for developing and implementing initiatives for transitioning to long-term sustainable development (Isaksson & Hagbert, 2020; Geels, 2011).

In addition, the political willingness within the municipality needs to be in line with the necessary sustainability goals. Although municipalities do not have resourcefulness to invoke change for all functions within the society, the municipality do have the power to steer the inhabitants in different directions which directly or indirectly affects the GHG emission levels (Sippel & Jenssen; 2009). Thus, monetary terms and political orientation within the three selected municipalities can disclose why policy measures have not invoked more focus on a system-wide change which nudges citizens to choose more sustainable options in everyday life decisions by, for example, building infrastructure to adopt more sustainable behaviours. However, the argument cannot be considered as accurate.

The insights made with the basis of the framework by Jensen et al., (2019) show evidence of supporting the hypothesis. Meaning, that integrated social dimensions have been found to be lacking within their measures aimed to reduce GHG emissions among the three selected municipalities. The framework has been useful in order to detect the solution to the problem which the measures have been framed to resolve. The four different typologies together with the problem framing approach has furthermore been helpful to detect the level of integrated social dimensions the measures contain. Such as providing knowledge on whether or not a measure is likely to make an impact on people's everyday life activities. Detecting how the problems have been formulated enables a more in-depth understanding of the core solution a specific measure aims to achieve, which gives an indication to what extent the measures will enact a transformation. The four typology categories which provide an assembled “type” attached to each group are therefore shown to be useful to apply in more contexts than what the framework originally was intended to. Yet, minor challenges regarding the framework have arisen along the categorization period which has sparked questions whether or not the framework is useful to apply to all measures, as some measures do not involve elements which are part of the assembled typology. However, problem framing the measures has made it possible to detect the core intention of the measure, which furthermore has made it possible to distinguish if the measure contains elements with the motive of changing social aspects. Additionally, as the research question aims to understand to what extent social dimensions has been included in sustainability measures among the three selected municipalities, the four typology categories can be merged into two subcategorized: measures which do not involve social dimensions nor are understood as invoking a system change (A and B), versus measures which do involve social dimensions and are understood to invoke a system change (C and D). Thus, measures which were rather vague but contained elements which made it possible to detect the level of social dimensions, were possible to categorize into one of the two merged subcategories which illustrates the level of integration of social dimensions. The framework has therefore been useful in order to understand the problem formulation which identifies the expected solution to the problem. Which in addition, makes the framework possible to apply onto more context and policy subjects, with the basis of enabling four categories being divided into two merged subcategories to detect elements of social dimensions.

By the basis of the results found by analysing local efforts guided by the framework by Jensen et al. (2019), the results are indicating that the majority of the analyzed measures among the three selected frontrunning municipalities does not include integrated social elements which enables a strong and long-lasting transformation which invokes on people's lifestyle activities or enables sustainable umbrella initiatives to arise. Altering the policy process by establishing systems thinking is important and cannot be postponed. The emission rates are alarmingly high, and the way we are going about life now is currently not solving the core of the problem in the rate which is needed (Naturvårdsverket, 2020b). However, there are great opportunities to change behaviours through policy actions, and the results from this study indicate that more effectful policy efforts which challenge citizens' way of living into becoming more sustainable is required.

6.2. Conclusion

Motivated by understanding if integrated social dimensions has been developed with the intention of leading to a large-scale system change in local sustainability policy measures across energy and mobility practices, the study has identified that most initiatives across the three selected front running municipalities consist of measures which mostly rely on changing technological aspects or improving individuals knowledge about specific sustainability choices. The findings indicate that dimensions which bridge more approaches and link social and environmental challenges into lifestyle activities are to a large extent lacking. 74% of the 220 reviewed measures involve elements which do not invoke changing energy and mobility cultures among the citizens. The results are concerning as they imply that the responsibility for reducing emission levels among the selected municipalities is allocated to improve the current situation, rather than produce a systemic-change which challenges energy and transport norms. Umbrella initiatives enabling a collective transformative change in which motives for performing emission demanding actions are questioned has been claimed to create far more impact than initiatives which are dependent on investing in new technological aspects and whether or not individuals absorb new knowledge about implementing sustainable behaviours.

Applying the framework by Jensen et al. (2019) on local environmental decision making provides an interesting dimension which sparks discussions regarding the level of social dimensions that are integrated in local efforts. There is a difficulty in dividing measures into four categories, as environmental issues and political-decision making is complex, and four assembled typology categories might not reflect how the world functions. However, by using the framework to determine whether or not measures incorporate features that will have a profound impact on people's energy and mobility norms and cultures, the framework has been found applicable to a wider range of contexts.

The insights made through this study indicate that policy measures developed with the motive of making a larger system-change are lacking among the selected municipalities. The responsibility of creating change integrated into everyday life activities has to be enforced on a political level among all levels in order to make sustainable lifestyles more accessible. New local commitments may strengthen the capabilities of enabling a local system-wide transformation to sustainability which is crucial for future challenges regarding climate change.

6.3. Further research

More research on how local decision making regarding sustainable transitions can be organized to have a larger potential of reaching a sustainable transition which involves a wide-system perspective would be useful, as the need for scaling up the sustainability transition is vital. Applying the framework to other decision-making functions may be helpful in order to understand the potential for measures to reach a more system-wide transition. The framework has been found to be useful to apply onto different aspects across the decision-making floor, and may be useful in more contexts. Additionally, more research on social dimensions in sustainable transformations might drive the discussion further about the role social dimensions integrated in peoples way of going about life has on sustainability transformations.

References

Bavaresco, Mateus V. D'Oca, Simona. Ghisi, Enedir. Lamberts, Roberto. 2020. Methods used in social sciences that suit energy research: A literature review on qualitative methods to assess the human dimension of energy use in buildings. Energy and Buildings. Volume 209, 15 February 2020, 109702

Boverket. 2019. Roller och ansvar. Kunskapsbanken. Accessed: 2021-04-06. Link: https://www.boverket.se/sv/PBL-kunskapsbanken/planering/detaljplan/roller-och-ansvar/

Clarke, Victoria & Braun, Virginia. 2016. Thematic analysis. The journal of positive psychology. Volume 12, 2017 - Issue 3

Collier, Ute. & Löfstedt, Ragnar. E. 1997. Think globally, act locally?: Local climate change and energy policies in Sweden and the UK. Global environmental change, 7(1), 25-40.

Creswell, John W. Poth, Cheryl N. 2018. Qualitative inquiry & research design. Choosing among five approaches. Sage publication. Fourth edition.

Dewey, J., 1938. Experience & Education. Kappa Delta Pi, New York, NY0-684-83828-1.

EnergiseA. n.d. Project description. http://energise-project.eu/about-ENERGISE Accesses: 2021-02-02

EnergiseB.n.d. European Network for Research, Good Practice and Innovation for Sustainable Energy. ENERGISE. European Commission. Link: https://ec.europa.eu/inea/en/horizon-2020/projects/h2020-energy/social-sciences-and-humanities/energise Accessed: 2020-02-16.

Euchner, Jim. 2019. Problem framing. Research-Technology Management, 62:2, 11-13

European Environmental Agency (EEA). 2019. The European environment — state and outlook 2020. Knowledge for transitioning to a sustainable Europe. Published: 04-12-19. ISBN: 978-92-9480-090-9

Geels, Frank W. 2011. The multi-level perspective on sustainability transitions: responses to seven criticisms. Environmental Innovation and Societal Transitions 1 (2011) 24–40

Geels, Frank W. Berkhout, Frans. van Vuuren, Detlef P. 2016. Bridging analytical approaches for low-carbon transitions. Nature Climate Change, vol 6, June 2016.

Genus Audley. Fahy Frances., Goggins Gary., Iskandarova Marfuga., Laakso Senja. 2018. Imaginaries and Practices: Learning from 'ENERGISE' About the Integration of Social Sciences with the EU Energy Union. In: Foulds C., Robison R. (eds) Advancing Energy Policy. Palgrave Pivot, Cham. https://doi.org/10.1007/978-3-319-99097-2_9

GoogleMaps©. https://maps.google.se/

IPCC, 2014: Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, R.K. Pachauri and L.A. Meyer (eds.)]. IPCC, Geneva, Switzerland, 151 pp.

Isaksson, Karolina. Hagbert, Pernilla. 2019. Institutional capacity to integrate 'radical' perspectives on sustainability in small municipalities: experiences from Sweden. Environmental Innovation and Societal Transitions 36 (2020) 83–93

Jensen, Charlotte, L. Goggins, Gary. Røpke, Inge. Fahy, Frances. 2019. Achieving sustainability transitions in residential energy use across Europe: The importance of problem framing. Energy Policy 133 (2019) 110927

Kallio, Hanna., Pietilä, Anna-Maija., Johnson, Martin, & Kangasniemi, Mari. 2016. Systematic methodological review: developing a framework for a qualitative semi−structured interview guide. Journal of advanced nursing, 72(12), 2954-2965.

Klimatkommunerna. www.klimatkommunerna.se

Klimatkommunerna. 2013. Stadgar för Klimatkommunerna. Last updated on: 2013-05-02

Klimatpolitiska rådet (2020). Årsrapport. Klimatpolitiska rådet. https://www.klimatpolitiskaradet.se/wp-content/uploads/2020/05/klimatpolitiskaradetrapport2020.pdf

Kolada 1. Jämföraren. Tyresö. AGENDA 2030 - Globala målen för hållbar utveckling. Accessed: 2021-02-25. Link: https://www.kolada.se/verktyg/jamforaren/

Kolada 2. Jämföraren. Växjö. AGENDA 2030 - Globala målen för hållbar utveckling. Accessed: 2021-02-25 Link:https://www.kolada.se/verktyg/jamforaren/?_p=jamforelse&focus=16610&tab_id=130255

Kolada 3. Jämföraren. Lund . AGENDA 2030 - Globala målen för hållbar utveckling. Accessed 2021-04-15. Link: https://www.kolada.se/verktyg/jamforaren/?_p=jamforelse&focus=16652&tab_id=130255

Lunds kommun. 2020. Energiplan för Lunds kommun 2019–2026. Latest update:14-10-20. Accessed: 15-04-21 Link: https://www.lund.se/bygga-bo--miljo/hallbara_lund/ekologisk_hallbarhet/mal-minsta-mojliga-klimatpaverkan/energiplan-for-lunds-kommun/

Malmaeus, Mikael. Nyblom, Åsa. Melin, Anna. Åkerman, Jonas. 2021. Rekyleffekter och utformning av styrmedel. IVL Svenska Miljöinstitutet. ISBN 978-91-7883-255-2

Miljödepartementet. 2017. Ett klimatpolitiskt ramverk för Sverige. M2017/00229/R. Stockholm 2017-02-02

Naturvårdsverket. 2020a. Handlingsplan för att nå Sveriges klimatmål. Accessed: 2021-02-16

Naturvårdsverket. 2020b. Territoriella utsläpp och och upptag av växthusgaser. Sveriges officiella statistik. Accessed: 2021-02-18

Pee, S. H., Dorst, C. H., & van der Bijl-Brouwer, M. (2015). Understanding problem framing through research into metaphors. In V. Popovic, A. Blackler, D-B. Luh, N. Nimkulrat, B. Kraal, & Y. Nagai (Eds.), IASDR 2015 Interplay : 2-5 November 2015, Brisbane, Australia (pp. 1656-1671)

Regeringens Proposition. 2019/20:188. Sveriges genomförande av Agenda 2030

Regeringens Proposition. 2019/20:65. En samlad politik för klimatet – klimatpolitisk handlingsplan

Rosenbloom, Daniel. 2020. Engaging with multi-system interactions in sustainability transitions: A comment on the transition research agenda. Environmental Innovation and Societal Transitions. Volume 34, March 2020, Pages 336-340.

SCB. n.d. Kommuner i siffror. Lund. Accessed: 22-04-21

Sippel, Maike. & Jenssen, Till. 2009. What about local climate governance? A review of promise and problems. November 27, 2009.

Sveriges kommuner och landsting (SKR). 2019. Vad gör kommunerna? Accessed: 2021-04-05

Sveriges kommuner och landsting (SKR). 2020. Fakta om kommuner och regioner. Accessed: 2021-01-22

Sveriges kommuner och regioner (SKR). 2017. Kommungruppsindelning. Översiktstabell och lista på indelning 2017.

Tyresö kommun. 2016a. Klimat- och energistrategi för Tyresö kommun 2010-2020. Reviderad 2016. Antagen av kommunfullmäktige 2016-09-08

Tyresö. 2016b. Samlat åtgärdsdokument för energiplan, energieffektiviseringsstrategi och klimatstrategi. Tyresö. 2016-09-08.

Tyresö kommun. 2021. Tyresöfakta. Accessed: 2021-03-25. Link: https://www.tyreso.se/organisation--styrning/fakta-och-statistik/tyresofakta.html

Växjö. kommun. 2014a. Transportplan för Växjö kommun. Link: https://vaxjo.se/download/18.313cf36515d1bde9ee3214a9/1602754073638/Transportplan_Vaxjo_kommun_webb.pdf Accessed: 2021-02-11

Växjö kommun. 2014b. Miljöprogram för Växjö kommun. Antaget av Växjö kommunfullmäktige 2014-06.17. Link: https://vaxjo.se/download/18.7b0b9141162a514f1b113114/1523263364005/140617%20Miljoprogram_webb.pdf

Växjö kommun. 2016. Energiplan för Växjö kommun. Hållbarhetsgruppen. Link:https://vaxjo.se/download/18.7b0b9141162a514f1b113066/1523263186286/Energiplan%202016_webb.pdf

Växjö kommun. 2020. Fakta Växjö kommun. Accessed: 2021-02-25. Link: https://www.vaxjo.se/sidor/politik-och-demokrati/om-vaxjo/fakta-vaxjo-kommun.html

Växjö. 2021. Kommunens hållbarhetsarbete. Växjö Kommun. 22-03-21. Accessed: 04-04-21. Link: https://vaxjo.se/sidor/hallbar-utveckling/kommunens-hallbarhetsarbete.html

Willig, Carla & Stainton Rogers, Wendy. 2017. Thematic Analysis. Chapter from: The SAGE handbook of qualitative research in psychology. 2nd edition. 55 City Road: SAGE Publications Ltd.

Interviews

Lund municipality, Environmental strategist. Personal interview April 19, 2021. Stockholm

Tyresö municipality, Sustainability strategist.Personal interview April 9, 2021. Stockholm

Växjö municipality, Environmental coordinator. Personal interview April 14, 2021. Stockholm

Appendix.

Interview guide

Question	Suggestions on follow up questions/ what the question is supposed to cover
1. Describe your role within the municipality and how you work/ are organized within the municipality to work with measures which contribute to a reduction of greenhouse gas emissions.	*Ask about different functions within the municipality (energy, waste, traffic).* *Interact with different functions within the municipality?*
2. Which areas /specific problems are considered to be the municipality's biggest challenges that need solutions (to reduce greenhouse gas emissions)?	*Get an understanding of what the municipality considers being their biggest problem.* *How do these problems give rise to different types of solutions?* *How are the problems identified?*
3. Within the municipality's action plan "n*ame of the action plan"*, there are a number of measures aimed at improving technical aspects to achieve the various sub-goals. Why do the municipality find it important to invest in technical improvements?	*Give examples of doing e.g. change energy sources*, *invest in green cars etc* *How will the technical solutions lead to more people actually using e.g. the cars?* *What is the value of creating/doing technical solutions? Is something missed by having a strong focus on technology? - What?* *Will technical solutions result in more gains? "Small changes that capture large elephants" etc*
4. How do you work to include functions from the whole of society in climate work? How do you change the behavior of the inhabitants to act more environmentally friendly as the climate strategy aims at? Give examples.	*How important is it to reach everyone?* *If they struggle to understand, give examples of e.g. waste - do you provide the opportunity for closer waste stations - how do you know that residents will use them?.* *What are the biggest difficulties in changing individuals' behaviors?*
5. How do you/your function within the municipality work to create norm-breaking or cultural changes to how the inhabitants relate to the environment in the municipality ?	*That is, changing people's norms for how they act towards the environment in regards to actions that contributes to a reduction in greenhouse gases. Ex. norm: taking the bike for short distances instead of the car.* *How do you know that norm changes are taking place?* *What are the difficulties of making norm-breaking changes?*

Coding scheme

a) Tyresö

Measure	Change in technology	Change in individuals behaviour	Change in everyday situations	Change in complex interactions
All the municipality's properties must be energy declared	X			
A strategy with goals for energy efficiency must be developed as a result of the completed energy declaration	X			
Sensors and other energy-efficient technology will be introduced on the municipality's properties	X			
The municipality's street lighting stock shall only consist of energy-efficient lighting fixtures	X			
Effective control and regulation equipment must be installed for property systems	X			
The municipality shall work for separate measurement of operational electricity and property electricity	X	X		
Effective follow-up and accounting systems for energy use must be introduced	X	X		
The municipality must continuously work with energy strategic commitments in its planning	X			
The municipality shall, in consultation with energy distributors, work to ensure that existing and planned areas with dense development can be connected to the district heating network.	X			
Bollmoravallen, Förrådet, Kringlan, the library in Trollbäcken and other premises with municipal operations that are currently supplied with their own oil facilities or electric heating are converted to district heating	X			
When expanding Dalskolan's sports hall, this and Dalskolan should be converted from direct electricity to district heating	X			
The municipality shall investigate and analyze various technical possibilities for converting properties outside the district heating area that are heated with direct-acting electricity	X			
The municipality shall, in consultation with Svenska Kraftnät, analyze the consequences for the municipality of the 220kV power line proposed in the investigation "Stockholm Ström" from Nacka to the existing station in Solberga in Haninge municipality	X			
In 2015, the municipality's vehicle fleet will consist of 85% green cars	X			

A survey of the municipality's business trips must be carried out and a policy for these trips must be drawn up		X		
Training in Eco-driving for all municipal employees who frequently drive a car in the service, and technical aids in addition		X		
Continued expansion of pedestrian and bicycle networks			X	
The municipality shall, in consultation with SL, work for good and efficient local traffic within the entire Tyresö municipality's built-up areas		X		
Through physical planning, create conditions for sustainable development through efficient and sustainable systems			X	
Investigate alternative modes of transport and means of transport both within the municipality and also for transports to places outside the municipality's geographical area		X		
Encourage public transport and, if necessary, work for an expansion of entrance car parks			X	
The municipality must continuously work with energy strategic commitments in its planning	X			
When preparing detailed plans for apartment buildings in development agreements, the municipality shall work to ensure that the buildings are heated with renewable or alternative energy sources and with low energy consumption.	X			
Continued planning for expansion of pedestrian and bicycle networks			X	
Green car pool, 12 pcs.			X	
Green cars for staff, 35 pcs	X			
Ecodriving		X		
Electric bicycles and electric mopeds	X			
Charging posts for electric vehicles	X			
Pumping station for bicycles			X	
Conversion to district heating	X			
Solarpanels on municipal buildings	X			
Stricter energy saving requirements for land allocation	X			
Continued purchase of fossil-free energy	X			
Energy and climate advising		X		
Conduct environmental conferences for the municipalities on Södertörn		X		

Boat bottom washing		X		
Develop a plan to make energy efficient existing municipal buildings, such as investing in better climate shells in connection with maintenance	X			
Develop requirements for the highest energy use in the case of conversion and energy use in the case of conversion and new construction of municipal residential buildings and premises that are lower than BBR	X			
Make an inventory of all the municipality's preschools to check the conditions for starting to measure the electricity within the building	X			
Arrange a workshop on how the municipality can work more actively with sustainability issues throughout the procurement process. That is, both before, during and after the procurement, from needs analysis to follow-up.		X		
Extend the procurement unit's training of the municipality's customers to also include which goods and services are most sustainable from an LCC perspective in existing agreements		X		
Set up a plan to replace the municipality's older and "redundant" business cars as the vehicle pool expands	X			
Start leasing electric cars	X			
Buy electric cars that can be charged at your own office and in the municipality's charging posts	X			
Training in EcoDriving for employees who drive a car		X		
Adopt and implement a meeting and travel policy		X	X	
Work to reduce the environmental impact of employees' travel to and from work		X		
Streamline street and park lighting	X			
Implement an information campaign in schools and preschools about energy saving and their own energy usage		X		
When procuring travel and transport services, requirements must be set for low emissions of carbon dioxide per kilometer and an annual report of carbon dioxide emissions.	X	X		
Develop guidelines for which environmental / energy requirements are to be set in development agreements for new construction	X			
Introduce coordinated goods transport in collaboration with other Södertörn municipalities.	X	X		
Install more charging posts for electric vehicles	X			

Organize an energy day, Eco-pilots, for relevant actors		X		
In collaboration with energy consultants: connect with major players (companies and organizations) through energy consultancy and environmental certification	X	X		
Introduce systems for collecting food waste and producing biogas from food waste		X	X	
Increased supervision of energy declarations to ensure that they are implemented	X	X		
Make it easier to find the municipality's energy advice from the website		X		
Install electricity meters in Krusboda, and to eventually let the tenants pay their own electricity consumption		X		
Total 60	36	26	8	0

b) Växjö

Measure	Changes in technology	Changes in individuals behaviour	Changes in everyday life situations	Changes in complex interaction s
Energy plan				
Real estate companies will allocate 0.2% of total net annual sales to investments in renewable energy production, with priority given to small-scale local production.	X			
Upgrades and environmental adaptations to hydropower plants owned by Växjö Municipality will continue to be made in order to maintain overall production capacity in the long term.	X			
The Technical Services Committee and the municipal real estate companies will become more self-sufficient in terms of renewable electricity.	X			
Växjö Energi AB will play a leading role in relation to renewable energy in the municipality and will prepare a forward strategy and an action plan.This strategy is based on a holistic approach and a system perspective which includes sustainable development, competitiveness and resource efficiency enhancement. Renewable energy means solar power, wind power, small-scale hydropower and biomass.	X			
As part of the dialogue it conducts with developers, Växjö Municipality will encourage investment in small-scale energy production.	X			
Växjö Municipality and Växjö Energi will conduct a solar energy campaign directed at the private and corporate markets, with support for applications for subsidies, purchases and installation.	X			
Within the framework of its business development activities, Växjö Municipality will support and drive forward initiatives for renewable energy production.	X			
Växjö Municipality will work to supply as many areas and customers as possible with district heating. It will also conduct a dialogue to this effect with private district heating companies and local district heating companies.	X			
The district cooling network will be extended to serve more customers.	X			
Environmental and Public Health Services will exercise day-to-day supervision to replace fossil oil with bio-oil or other fossil fuel-free energy.	X			
Växjö Municipality will conduct an active dialogue with companies and local community associa- tions to invest in large-scale wind power generation in accordance with the Wind Power Plan.	X			

When Växjö's municipal real estate companies build new-buildings, the energy demand must not ex- ceed the following: Residential premises: 55 kWh/m2 per annum. 1) 2) For residential premises with electric heating: 30 kWh/m2. Business premises: 50 kWh/m2 3) per annum. For business premises with electric heating: 30 kWh/m2. These limits may be achieved through the use of max. 5 kWh/m2 of so-called "free-flowing energy sources" (sun, wind, hydropower, etc.), harvested either on site or locally.	X			
Växjö's municipal real estate companies should endeavour to achieve the levels shown below in con-junction with all major renovations. In cases where these levels cannot be achieved, the reasons for this must be stated for each renovation project in connection with the annual follow-up of the Energy Plan. Residential premises: 75 kWh/m2 per annum. For residential premises with electric heating: 40 kWh/ m2.Business Premises:70kWh/m24) per annum.For business premises with electric heating:40kWh/ m2. These limits may be achieved through the use of max. 5 kWh/m2 of so-called "free-flowing energy sources" (sun, wind, free flowing water, etc.), harvested either on site or locally.	X			
Växjö Municipality offers active energy and climate advice. Residents, companies, building owners, orga-nisations and associations have access to advice and support in connection with their work to improve energy efficiency.		X		
When making investment decisions about new construction and renovation projects, Växjö's municipal real estate companies must include life-cycle costs in order to reduce energy use.	X	X		
Prior to new construction projects and major renovations/refurbishments, an analysis is to be made of possible flexible solutions such as shared use of the same premises for different activities.				X
Building in compliance with passive house standards must always be considered as a possible option for new construction projects.	X			
Wherever possible, functions are to be installed in each individual home to measure and clearly show the household's use of electricity and water. Electricity and water charges are to be linked to actual consumption.		X		
Wherever possible, energy use in premises is linked to the respective user within the municipal organisation. Financial incentive models will be developed to support energy efficiency enhancement activities.		X		
Växjö Municipality will regularly conduct new energy-saving campaigns based on positive experience from previous energy-saving projects.		X		

Växjö Municipality will investigate the possibilities of implementing development projects to supply even highly energy-efficient buildings with district heating.This may involve household appliances powered by district heating.	X			
We will strive to optimise the conditions for energy supply (including small-scale production) in one of our development areas through the use of smart networks.	X			
Within the framework of its customer focus,Växjö Energi will maintain an active dialogue with custo- mers about their energy consumption and will offer services that contribute to a reduction in energy use		X		
Environmental and Public Health Services will develop its supervision activities (for example checklists, projects,etc.).The purpose of this is to enhance the efficiency of energy use in activities and operations that are within the supervision of the municipality.	X			
A thorough investigation will be made to determine whether it is possible to supplement the Sandvik CHP plant with a biomass gasification plant to significantly improve electrical efficiency and increase the production of electricity from renewable sources. This electricity has the potential to make a substantial contribution towards achieving Växjö's goal of a fossil-free municipality, a genui- nely neutral energy balance and the use and production of genuine renewable energy. It also paves the way to creating the right conditions for a functioning infrastructure for the efficient production of renewable fuel in the form of electricity available through a local network of charging stations, plus locally produced hydrogen gas for fuel cells in an adjacent integrated production plant.	X			
Växjö Municipality will contribute to the development of the regional biogas market by working with different stakeholders and through municipal involvement in a range of projects.	X			
Växjö Municipality will work to further improve the infrastructure for renewable fuels and charging facilities for electric vehicles. All municipal workplaces will offer charging facilities.	X			
Charging facilities for electric vehicles will always be installed where new municipal premises and residential premises are built.	X			
There will be coordination between municipal players outside Växjö to improve the infrastructure for renewable fuel and electricity.	X			
Demonstration projects will be implemented in order to investigate the potential for using renewa- ble fuels or electricity in the municipality's service vehicles, machines and plant, as well as in public transport.	X			

When negotiating procurement contracts for vehicles, we will aim to buy energy-efficient, climate-friendly vehicles. A green vehicle strategy/policy will be prepared.	X			
A strategy will be prepared to safeguard the delivery of district heating, electricity and district coo- ling at levels sufficient to meet customer needs, and to ensure that supplies of heating, cooling and electricity from renewable energy are sufficient to meet customer needs.	X			
Measures specified in the risk and vulnerability analyses compiled by the municipality and muni- cipal companies will be implemented with the aim of ensuring an adequate supply of electricity, heating, cooling and fibre optic provision in both urban and rural areas.	X			
Transport Plan				
Produce a document on accessibility with pedestrians, bicycles and public transport to use as support for prioritizing of development areas.			X	
Prioritize investigation, planning, land purchase and investments for development areas that have good accessibility for pedestrians, bicycles and public transport and has low dependence on cars.			X	
Influence the location of public and commercial activities. Växjö municipality takes an active role as an investigator or dialogue partner in locations and tries to find locations that are easy to get to with walking, cycling and public transport for employees and visitors. This is especially important for visitor-intensive activities such as trade, healthcare, preschools, schools and offices.			X	
Businesses with heavy, wide or long transports should be located where the street network can handle it.	X	X		
Develop a traffic plan for the city of Växjö. The traffic plan must, among other things, define where different types of traffic are allowed and prioritized and what applies to different types of roads and streets with regard to speed, passability, traffic solutions, emergency vehicles and more.	X	X	X	
Develop a parking strategy that takes a holistic approach to the issue of parking for car, bicycle and commuter parking and highlights the availability of disabled parking. The concrete measures in the parking strategy are designed so that sustainable modes of transport benefit.		X	X	
Further develop the work with road safety to reduce the number of injured by e.g. speed-safe important pedestrian and bicycle passages, painting and signage etc.			X	
Produce a document on accessibility with pedestrian, bicycle and public transport to support the prioritization of development areas.			X	

Prioritize investigation, planning, land purchase and investments for development areas that have good accessibility with pedestrian, bicycle and public transport and that have a low dependence on cars.			X	
Influence the location of public and commercial activities. Växjö municipality takes an active role as an investigator or dialogue partner in locations and tries to find locations that are easy to get to with walking, cycling and public transport for employees and visitors. This is especially important for visitor-intensive activities such as trade, healthcare, preschools, schools and offices. Correspondingly, businesses with heavy, wide or long transports should be located where the street network can handle it.			X	x
Increase the basis for service by concentrating new development areas in the vicinity of existing service, densifying existing areas and by pointing out the needs in the detailed planning. Furthermore, the conditions for new establishments of local service can be improved through densification.			X	
Identify strategically important charging points for electric cars (car parks, the workplace) and work for charging posts to be established there. Collaboration with private actors may be necessary	X			
Lead by example and increase the proportion of electric vehicles, electric bicycles, electric mopeds, etc. in your own vehicle fleet.	X			
Initiate campaigns and collaborations with various actors to raise interest in all types of electric vehicles, electric car pools, electric bicycles, etc. among companies and the general public.		X		
Investigate the possibilities of introducing electric / hybrid-powered buses in public transport.	X			
Let the municipality's goal of a fossil fuel-free municipal group by 2020 also include contracted transport services. When procuring transport services, the municipal group must set requirements that steer towards more efficient vehicles and increased use of renewable fuels.	X			
Develop a regulatory system for goods deliveries to the city center that benefits fossil fuel-free vehicles. This may, for example, mean that the load zones closest to the city center may only be used by fossil fuel-free vehicles.	X			
Inventory of cycle path networks in Växjö and other urban areas to find out what needs to be remedied to make it faster, easier, more convenient and safer for all types of bicycles.			X	
Implement the measures from the inventory list for bicycles to make it faster, easier, more comfortable and safer according to priority: cycle paths where most cyclists travel or where conversions are planned. Try using bike lane principles on one of the main bike lanes.			X	

Develop solutions for what the bicycle infrastructure should look like (intersections, roundabouts and for sections by cycle paths / cycle lanes, parking, etc.) that also follow the principles for road safety. These principles are included in the revision of the cycle path plan.			X	
Develop a long-term strategic plan for Växjö's cycle path network that includes and connects the city's new development areas and other new construction plans with the existing cycle paths. Also include other local and rural needs for cycle path networks in the plan. Define which ones belong to the main cycle network and other cycle paths as well as leisure and recreational cycle paths and develop the cycle path signage. These measures are included in the revision of the cycle path plan.			X	
Develop a current investment list of prioritized new cycle paths that are cost-calculated. The list is included in the revision of the cycle path plan			X	
Investigate bicycle lanes and bicycle parking in the city center and station area.			X	
Develop operating routines to ensure a high level of maneuverability and good quality of the bicycle infrastructure so that accidents are minimized throughout the year. Develop a prioritization of the operation of snow removal, sweeping, etc. of cycle paths in the city and other urban areas in the municipality. Also develop a working method to ensure good safety and passability during road works on the cycle paths. These measures are included in the revision of the cycle path plan.			X	
Develop a maintenance plan for the bicycle infrastructure so that it is of good quality, has good accessibility and is traffic safe. This measure is included in the revision of the cycle path plan.			X	
Develop a routine to simplify reporting of faults on the cycling infrastructure in the municipality, including feedback, in order to maintain a good standard of the infrastructure together with the cyclists.			X	
Work with campaigns for more students to walk and cycle safely to and from school. Also work with active counseling so that more students gain knowledge about road safety. Collaborate with schools, parents' associations, the Police, the Police Academy, Traffic		X		
Collaborate with cycling associations and other actors to create a well-developed cycling culture in the municipality so that more groups can use cycling more, longer and more often. Create a cycling reference group with cycling associations and cycling stakeholders who meet regularly to capture views that can improve conditions for cycling and develop the cycling culture in the municipality.		X	X	

Develop data for what cycling looks like in the municipality and how it develops over the years through bicycle bills, travel habits surveys, etc. Report it in a bicycle report together with other improvements linked to cycling.			X	
Make an inventory of the most important footpaths in Växjö to find out what needs to be remedied in order for them to be accessible, traffic-safe and perceived as safe.			X	
Implement the measures from the inventory list so that the most important footpaths in Växjö are accessible, traffic-safe and perceived as safe.			X	
Develop a pedestrian plan for Växjö that also provides principles or solutions for the needs of the elderly, children's needs, security for e.g. women at night and accessibility for people with disabilities.			X	
Develop operating routines for streets, squares and pedestrian crossings so that accessibility increases from the pedestrians' perspective and accidents are minimized throughout the year. Develop the principles for winter maintenance and sand sweeping of walkways in the city and other urban areas in the municipality. Also develop a working method to ensure good safety and accessibility during road works on the sidewalks.			X	
Develop a maintenance plan for the walkways so that they are of good quality, have good accessibility and are traffic safe. Include continued work with safety in tunnels, lighting and shrubbery.			X	
Develop a routine to simplify reporting of faults on the walkways in the municipality, including feedback, in order to maintain a good standard of infrastructure together with pedestrians.			X	
Further develop regional train traffic. In the short term, work to: - More Öresund train departures are extended to Kalmar. - The number of departures in the newly started Krösatåg traffic has increased. - Train traffic to Gothenburg is ensured. - Changes and waiting times are improved in Alvesta and Emmaboda.	X			
Make investigations to develop the strongest regional routes for both train and bus. Initiate a feasibility study on the double track Växjö – Alvesta and support the development of the main line in Skåne and Småland. Measures for increased punctuality, shorter travel time to Värnamo and future train stops on I11 can probably also contribute to regional development. Also go through the regionally important bus routes to investigate which measures can give the greatest increase in travel. The following routes should be investigated: Växjö – Alvesta – Ljungby, Växjö – Ingelstad – Tingsryd – Ronneby, Växjö – Rottne – Braås – Åseda and Åryd / Furuby– Hovmantorp – Lessebo.	X		X	

Plan for an attractive long-term line network in the city. The interchanges and bus lanes are investigated to clarify land use, investments and to integrate them with the environment and service. In several places, choices also need to be made between different line options. In the short term, line network investigations need to be carried out for Bredvik / Bäckaslöv and the regional lines' bus stops in the city.			X	
Traffic new development areas from the start with public transport. In the short term, this means further development of traffic to Vikaholm, traffic arrangements for Bredvik and Bäckaslöv and the expansion of a regional bus stop at Bredvik			X	
Implement accessibility measures for the buses. Public transport is prioritized in traffic signals. Long-term measures are being developed to increase the relative passability of buses along Sandgärdsgatan – Storgatan – Smedjegatan, Linnégatan – Sandsbrovägen, Fagrabäcksvägen and Liedbergsgatan. The number of bus stops is reduced through centrally located stops and boarding is made more efficient. Bumps, sharp turns and materials with a short service life are avoided during conversions. Increased foresight and coordination around road works and events reduces worries and delays for bus passengers			X	
Develop a priority action list for stops for which the municipality is the road operator. Inventory shortcomings in usability, safety and traffic safety on pedestrian and cycle paths and intersections with car traffic adjacent to stops. Clarify the responsibility for the operation and maintenance of stops along state roads and ensure that the operating budget is set aside. Ensure good operation and maintenance of all stops. Also expand winter operation on municipal pedestrian and bicycle paths to stops.			X	
Invest in weather protection, platforms, guideways, bicycle parking, parking spaces, good lighting, seating, etc. at the main stops.			X	
Encourage contractors to implement measures for a smoother driving style for drivers.		X		
Set stricter energy and noise requirements for future procurement. A reduced use of internal combustion engines in the buses can contribute both to reduced noise nuisance in attractive locations and to increased energy efficiency. It should be considered to try some type of electric hybrid bus in the event of an increase in the number of city buses before the next procurement.	X			
Act for active counseling so that more people within the municipal organization use the IT tools' various opportunities to replace physical travel.		X	X	
Work to offer companies and organizations advice to increase knowledge of the IT tools' various opportunities to replace physical travel.		X	X	

Offer moving-in packages to new municipal residents with information and offers for walking, cycling, electric cycling and public transport. Also offer moving-in packages and advice to companies that are moving to or within the municipality.		X	X	
Offer advice to larger companies and organizations for business and business travel with information, campaigns linked to travel habits surveys, action plans, follow-up.		X		
Conducts annual campaigns aimed at inspiring more cycling, electric cycling, public transport and walking. It can e.g. is about trying out electric bikes, cargo bikes and public transport.		X		
Work to increase traffic safety in traffic through campaigns on helmet use, visibility in traffic, etc. Use established concepts such as. eye contact		X		
Create conditions for more journeys on foot, by bicycle and by public transport (green travel plans) for new establishments and extensions of existing areas, in collaboration with the developer.			X	
Stimulate and market car sharing systems and the use of car pools, preferably with electric cars, for companies and private individuals. Provide parking spaces in good locations for carpools when needed, inform carpool organizations about the possibility of gaining access to attractive parking spaces.			X	X
Introducing bus passes for the municipality's business trips in southern Sweden.		X		
Total	37	20	38	4

c) Lund

Measure	Change in technology	Change in individuals behaviour	Change in everyday situations	Change in complex interactions
The municipality of Lund conducts continuous work to ensure that the occupancy rate of the municipality's vehicles is good and that these are not used unnecessarily.		X		
In the procurement of transport contracts, the municipality of Lund demands that environmentally adapted and energy-efficient vehicles be used instead of conventional fossil fuel-powered ones. Requirements for route optimization, economical driving and the like are set where relevant.	X	X		
Through the Service Board, Lund Municipality's administrations procure vehicles so that fossil fuel freedom, energy efficiency and improved air quality are achieved. This means that electricity and biogas are prioritized over other fuels when purchasing light motor vehicles. The companies procure light vehicles according to the same principles.	X			
The municipality of Lund procures and buys environmentally adapted and energy-efficient work machines and heavy vehicles, so that the municipality can achieve the goal of fossil fuel freedom. Knowledge exchange between administrations and companies takes place regularly. Collaboration takes place with other municipalities and organizations to strengthen the market offer.	X			
The municipality of Lund carries out activities aimed at residents and companies with the aim of promoting sustainable transport and increasing the proportion of energy-efficient electric and gas vehicles among these target groups. When locating workplaces and homes, a reduced need for transport is sought. Work on LundaMaT's focus areas and measures continues.		X	X	
The municipality of Lund investigates whether a geographical expansion of the existing environmental zone or the introduction of new, tougher environmental zones in the city center or other districts can contribute to improved air quality, energy efficiency, reduced noise and reduced climate impact in an effective way.	X	X		
Mobility houses are being built with an offer of a car pool, electric bicycles and charging options for different types of vehicles. In the villages, mobility hubs are being developed for commuters.			X	

Street lighting, electricity supply to trams and electric buses as well as other infrastructure that supports sustainable transport are designed in an energy-efficient way.	X			
The municipality of Lund works continuously to increase standardization, simplification, common payment methods, refueling systems, etc. regarding renewable fuels and electricity. The aim is to simplify for producers and consumers.	X			
The municipality of Lund invests in infrastructure for charging large and small electric vehicles to cover the needs of its own operations and to meet the needs of municipal tourist destinations. LKF offers charging options for its tenants and their visitors. LKP and Kraftringen offer public charging options.	X			
The municipality of Lund promotes innovative solutions for electrification of the transport system. For example, charging roads, public transport, cycling and hydrogen / fuel cells, etc. tested in pilot projects or large scale.	X			
More filling stations for biogas are being established in Lund municipality, mainly in the villages. If the financial calculation for the filling station has not been good enough, other forms of ownership than Kraftringen have been identified. Examples of such ownership can be the municipality together with local actors. The conditions for establishing a filling station for liquid biogas are being tested.	X			
The municipality of Lund works for energy-efficient freight transport with a low climate impact, both on short and long distances. Improved coordination and transfer from road to rail is sought. The service committee has the main responsibility for the work with freight transport to and within the municipal organization.	X			
Internal energy training with a focus on action competence is carried out aimed at decision-makers and other relevant target groups (eg technical staff, educators, economists).		X		
Lund Municipality offers independent energy advice and coaching to individuals and companies. Builders and operators are encouraged to engage in energy-smart behavior when in contact with the municipality's authority functions. Kraftringen also offers energy services to both corporate and private customers.		X		

Energy campaigns are carried out aimed at the municipality's residents, schoolchildren and companies. It is about meeting the interest of the target groups and helping them to take active action themselves while they can contribute to the goals of the energy plan.		X		
The municipality of Lund promotes collaboration and innovations in the energy and climate area. Coordinating and motivating local actors, seeking external funding and making use of experiences from completed projects are key tasks. Within the mayoral agreement collaboration, the municipality concludes agreements with individual companies and organizations on measures.	X	X		
The municipality of Lund develops and provides digital tools that promote sustainable energy use. The tools are for both internal and external use.	X			
The municipality of Lund actively utilizes knowledge resources at Lund University by involving researchers and students in the municipality's development work in the field of energy.		X		
The municipality of Lund reduces the total energy use in new and existing buildings by using areas efficiently. Before building technical solutions are chosen, the need for cooling and heating through green roofs, lip plantations, shading trees, sun protection, etc. must be reduced. have been considered. Dialogue is conducted with actors outside the municipal organization to promote a similar approach throughout the geographical area.	X	X		
The municipality of Lund continues to work with energy efficiency improvements in the renovation, maintenance and operation of the municipality's properties, and develops cutting-edge projects to identify successful solutions that can be used in a larger part of the portfolio.	X			
The municipality of Lund installs efficient and robust energy solutions for new production and renovation of the municipality's own homes and premises.	X			
When renovating and remodeling, consideration is always given to whether buildings are suitable for solar cells, so that new solar cells are put into use annually.	X			

The municipality of Lund carries out knowledge-raising activities in the area of energy-efficient properties aimed at various actors such as builders, tenant-owner associations and the general public. The municipality for dialogue and collaborates with developers to optimize energy systems based on the environment, economy and social aspects		X		
The exchange of experience between landlord and user continues to develop. It is about e.g. about receiving comments and grievances while informing tenants and users about energy-smart behavior. Incentive models are also developed in order for tenants to get involved in their energy use.		X		
When choosing an energy source for heating the municipality's properties, the starting point is a primary energy perspective, which means that the environmental impact is assessed from the entire life cycle of the energy used. With regard to the climate impact from building materials and the construction process, the first step is to build up knowledge by carrying out calculations in accordance with proposed legal requirements on climate declaration (A1-A5). By 2021, some projects have been calculated with at least half of the data from environmental product declarations (EPD). Whenever possible, alternatives are chosen that reduce the climate impact during the life cycle of buildings.	X			
New production of the municipality's premises and homes meets at least the heat output requirements for FEBY, or Miljöbyggnad level silver. The building and surrounding green structure are designed if possible to reduce energy use for cooling and heating. Certification of the properties is positive but not a requirement.	X	X		
In the procurement of contracts, the municipality of Lund encourages environmentally adapted and energy-efficient vehicles and machines are used instead of conventional fossil fuel-powered vehicles. Requirements for route optimization, short transport of masses and environmentally adapted working methods in areas other than transport are set where relevant. The municipality carries out random checks so that the requirements are complied with.	X			

The municipality of Lund is testing new circular solutions to utilize more of the residual products in the municipality for biogas production and second-generation biofuels.3 Collaboration takes place widely with business and research actors. By testing new solutions in Lund, the municipality also supports new companies. At least one new pilot project has been started before 2022.	X			
The municipality of Lund is working to stimulate the establishment of more biogas production facilities. This takes place in broad collaboration with various actors, including VA SYD.	X			
The municipality of Lund conducts knowledge-raising activities regarding small-scale renewable energy and makes it easier for property owners to store and sell electricity from small-scale electricity production, e.g. from solar cells and wind power. The solar map is developed and used as a basis. Kraftringen develops services in the area, including utilization of small-scale surplus heat.			X	X
The municipality of Lund works across administrative and company planning in community planning in order to stimulate small-scale renewable electricity production and utilization of surplus heat during urban renewal and when new districts are designed.			X	X
The municipality of Lund works for increased electricity production from wind power, among other things by stimulating upgrading to a higher power in places where there are already wind turbines. A mapping of development opportunities can provide a basis for the work.	X			
The municipality and its companies create the conditions for a completely fossil fuel-free energy system in the geographical area of Lund municipality.	X			
The municipality of Lund works strategically to promote the expansion of and connection to renewable district heating in additional locations and development areas. This also applies to land that is not owned by the municipality. Densification is prioritized for district heating areas, and new connection is promoted within the existing network.	X			

Administrations and companies collaborate widely, including with VA SYD, for increased utilization of residual heat within Lund municipality, among other things through investments in the world's largest low-temperature district heating network.	X			
A survey is made in dialogue with property owners to investigate what the need for district cooling looks like in the municipality, taking into account expected climate change and increased frequency of heat waves. Opportunities to reduce the need for cooling through sun protection, tree planting and more are being considered. The district cooling network is then expanded to cover the needs where it is an economically acceptable solution.	X			
Lund Municipality is a pilot municipality for new technology and digitalisation where clear connections are made between a good and attractive living environment and growth in the economy. Brunnshög and Västerbro are good examples here.	X			
Sustainable and smart energy systems are based on the interconnection of different actors and different energy sources. Digitization is a tool to achieve this. Smart and sustainable energy systems are developed so that they contribute to the goals of increased energy efficiency, reduced primary energy use and power shortages, as well as increased circular flows.	X			
The municipality invests in energy storage on a large and small scale, both for electricity and heat, in order to even out peaks in energy use both around the clock and between seasons. The focus is on profitable measures, but pilot projects with careful evaluation can be tested if financial sustainability is uncertain.	X			
The municipality of Lund is working to ensure that the transmission network operator Svenska Kraftnät and the regional network operator E.ON are able to deliver sufficient power capacity to increase electrification in the transport system at the same time as new businesses can establish themselves in the municipality. One method for this is to support the development of a functioning power market and a regulatory framework that facilitates flexibility in demand.	X			

Systematic work is carried out to optimize the distribution of electricity and district heating, among other things through equipment for smart grids, efficient reinvestments and operation. For district heating, residual heat is utilized through the expansion of low-temperature systems.	X			
Total	31	13	4	2