MANAGING THE PATHWAY TOWARDS CO_2-NEUTRALITY

EXAMINING THE TRANSITION IN SIX AMBITIOUS DANISH AND DUTCH MUNICIPALITIES

MASTER THESIS

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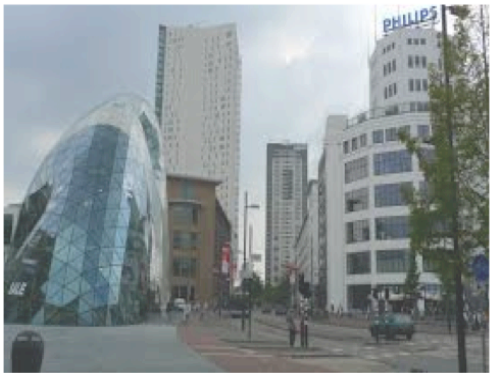


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Abstract:

The pathway to become CO_2-neutral at the municipal level is unknown and there are no clear guidelines. Therefore, it is of interest to study the management process of the most ambitious municipalities with a CO_2-neutral target in the progressive nations of Denmark and the Netherlands. In this research study three Danish (Aarhus, Copenhagen, Sønderborg) and three Dutch (Eindhoven, The Hague, Zoetermeer) municipalities have been examined, with inputs from four external experts in this field, into the management processes used on the pathway towards CO_2-neutrality. The data was gathered through a comprehensive literature review of studies, policy documents and through 10 interviews. The data was analysed through the theoretical perspective of transition management as the main input. The findings of this study is that municipalities play a key role in facilitating the transition to become CO_2-neutral. This facilitating role involves collaborating internally and externally between the civil society and other municipalities as a way to strategically navigate the long-term transition. Also, to facilitate their own municipality as an institution to reduce CO_2 emissions, while facilitating action from actors in the geographical boundaries of the municipality. It is concluded that there are a number of procedures for the facilitating process from focusing on specific areas of interest to concrete actions plans. It is further concluded that the transition management perspective can be beneficial for the municipalities entering the uncertain future of moving towards CO_2-neutrality.

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CHAPTER 1

INTRODUCTION

Scientific evidence overwhelmingly supports the knowledge that human activities, especially fossil fuel consumption, are threating human society, as we know it. As scientific knowledge on climate change continues to develop the need for action now is becoming more accepted globally.

1 INTRODUCTION

Since the start of the industrial revolution in the late 18th century the consumption of fossil fuels has contributed to increased wealth and global development, whilst also contributing the rapid rise of greenhouse gases (GHG) (Lui et al., 2013). Scientific evidence overwhelmingly supports the knowledge that human activities, especially fossil fuel consumption, are threating human society, as we know it. As the scientific knowledge on climate change continues to develop the need for action now is becoming more accepted globally. Certain countries and non-governmental organisations (NGOs) are pushing forward for an international agreement at the Conference of the Parties (COP) meetings that will obligate countries to meet certain climate targets (Richardson et al., 2009). However, achieving GHG reductions to reduce the effects of climate change will require action now from all actors within society. This includes the global and national scale, but also local authorities. More than 70 % of global production based GHG emissions are from urban areas in the developed world, and an even higher share when considering the consumption. However, urban areas are increasingly being seen as the centres of progressive innovations and climate policies (Nevens & Rooda 2014).

1.1 PROBLEM AREA

1.1.1 Shift from Global to Local

Despite continuously developments in the international arena to create concrete global agreements on mitigating CO_2 emissions, as well as adapting to future changes in the climate, progress has been slow (Bolin, 2007). The field of climate change has prominently been focused from the top down perspective on an international and national level (Kates & Torrie, 2010). However, following the disillusion of the failed attempts to create ambitious global mitigation agreements at the COP15, COP16 and COP17, developments in the academic and the political communities has shifted to recognise the need for climate protection at a local level (Hoff & Strobel, 2013; Bulkeley and Kern, 2006). Municipalities are a link between governments and citizens, and have the opportunity to create direct action towards national climate targets (Betsill & Bulkeley, 2007). Now some nations and local governments in Europe are starting to include substantial policies that are targeting GHG emissions as a core part of their local climate programs, some more ambitious than international targets (Argyriou, Fleming & Wright, 2012).

1.1.2 Ambitious National and Local Targets

Governments in Denmark and the Netherlands are among the most progressive and front-running nations in climate policy, and both have ambitious 2050 targets compared to other nations in Europe; Denmark aims to be 100 % renewable by 2050, whilst the Netherlands aim to have a 100 % sustainable energy system in the same time period (Bosman, 2013). Denmark and the Netherlands also share similar locational characteristics of being lowland nations that are vulnerable to the effects

of climate change. While the Danish and Dutch governments have developed ambitious targets, an increasing number of municipalities are developing climate strategies including both mitigation and adaptation measures. In 2011 a Danish study discovered that 72 % of the Danish municipalities have some kind of climate change action plan (Hoff & Strobel, 2013). A similar Dutch study between 1998 and 2013 discovers that 95 % of the Dutch municipalities have formulated climate policies (Hoppe et al. 2014). Some of these municipalities are even more ambitious than the EU and national targets with aims of being CO_2-neutral by as early as 2025 in Copenhagen (Denmark) and 2030 in Zoetermeer (Netherlands) (Municipality of Copenhagen, 2012; Municipality of Zoetermeer, 2007). These ambitions of progressive nations and municipalities are a positive step towards creating global agreements to deal with climate change.

1.1.3 Challenges with Climate Strategies

Research into climate action at a local level has argued that the national governments need a certain level of involvement in terms of long-term strategies and clear guidelines (Sperling, Hvelplund & Mathiesen, 2011). However, producing climate strategies at the municipal level is not mandatory thereby there are variations in what and how municipalities will reach CO_2-neutrality. Climate change issues are complex and cut across many established sectors in a municipality from the environment, transport, housing, and finance departments, among others. Thereby, the creation and implementation of these climate strategies is a difficult process for institutions that are not necessarily knowledgeable enough to comprehend the difficulty. Also, financial constraints in the current economic environment makes the traditional methods of hiring more staff and investing in renewable technologies much more difficult (Hoff & Strobel, 2013). In Denmark half of the municipalities in the greater Copenhagen area are struggling with achieving their annual 2 % reduction of CO_2 emissions (Hoff & Strobel, 2013). While a national survey in the Netherlands reveals that half of the municipalities will not achieve their climate targets (Hoppe et al., 2014).

1.2 RESEARCH QUESTION

As there are a number of Danish and Dutch municipalities taking the lead in aiming to becoming CO_2-neutral before the national and EU targets even without clear guidelines in how to implement local climate polices, opens up the question about how Danish and Dutch municipalities will achieve reaching these ambitious climate targets? How can municipalities manage complex cross-sectorial issues of climate change in order to achieve CO2-neutrality? Therefore, the following research question is proposed for this research study:

How do ambitious Danish and Dutch municipalities manage the long-term transition towards CO_2-neutrality?

As stated in the problem area, the path to become CO_2-neutral at the municipal level is unknown and there are no clear guidelines. Therefore, it is of interest to study the management process of the most ambitious municipalities in Denmark and the Netherlands with the target to become CO_2-neutral. Studies in this field have mostly focused on the development of and role of local authorities in climate polices (Bulkeley & Kern, 2006; Coenen & Menkveld, 2002; Granberg & Elander, 2007; Van der Berg & Coenen, 2012); technological advancements to the transition (Rohracher, 2001; Seyfang & Smith, 2007; Shove & Walker, 2007). While other researchers focus on the mitigation measures and municipal climate networks (Bulkeley & Schroeder, 2008; Ivner & Gustafsson, 2011; Giest & Howlett, 2013). However, there is little already developed knowledge on how ambitious municipalities are managing the transition towards becoming CO_2-neutral. Therefore, this study is of highest relevance since it will examine the patterns and differences within these leading municipalities, and cover parts of the surface on how to manage the long-term transition within a municipal context. This research has an explorative approach to identify how ambitious municipalities are working with this target, which could be useful for other municipalities that set a target to become CO_2-neutral in the future. However, this study will not focus on specific areas of the transition but instead gain in-depth knowledge of the management process.

CHAPTER 2

KNOWLEDGE BACKGROUND

Local governments have shifted from the traditional hierarchical organisation government to network based governance and increased civil participation. This is a shift away from statue law to more flexible regulations and the enabling of collaborative action (Mayntz, 2003)

2 KNOWLEDGE BACKGROUND

The following chapter outlines some of the literature and studies that are of relevance to understand the complexity in managing the long-term transition. This includes the role of municipalities, issues with municipal climate strategies, and literature on navigating targets. Furthermore, studies examining how municipalities anchor climate policies and tools for developing strategies are also discussed. This chapter provides background knowledge that enhances the understanding of the climate change issues in relation to municipal climate strategies and the management processes required, which contributes to the *Analysis* and *Discussion*.

2.1 MUNICIPALITIES - A SHIFT TO 'ENABLING'

A number of studies identifies that with the liberalisation of the global markets non-state actors are now predominantly part of the direct consumption and production of GHG. As such, the governance role of municipalities has changed as the role of non-state actors in climate governance has become even more important. (Bulkeley and Kern, 2006; Bulkeley and Newell, 2010).

Bulkeley (2010) argues that the role of local scale governments have shifted from government to governance, and thereby have become the facilitators of public-private-partnerships in order to bring structure to the fragmented discourse of climate change action. This is partly down to the limited resources available in the public sector since the economic crisis of and the liberalising of European markets. The key role for municipalities is now to *govern through enabling* by cooperating, encouraging and facilitating action from non-state actors such businesses and citizens (Bulkeley, 2010; Alber & Kern, 2008). Local governments have shifted from the traditional hierarchical organisation government to network based governance and increased civil participation. This is a shift away from statue law to more flexible regulations and the enabling of collaborative action (Mayntz, 2003). Thereby, as climate related projects are usually outside the 'normal' administrative functions of municipalities the role of local government "*is to steer evolving, partly external, partly internal, participatory governance institutions*." (Engberg & Larsen, 2010: 551). Although, Bulkeley & Kern (2006) and Kern & Alber (2008) still argue for the importance of other governance modes in relation to climate change; *Self-governing; Governing through enabling; Governing through provision; and Governing through authority*. Yet, as this study is focusing on ambitious municipalities in the transition to become CO_2-neutral, the clear roles are unknown.

2.2 Municipal Transition Barriers

The complex nature of issues relating to climate change makes the municipal transition towards CO_2-neutrality a cross-sectorial and fragmented process. Bulkeley and Newell (2010) have emphasised that there are three overriding factors that bring complexity to climate governance:

> "*…the multiple scales of political decision-making involved; the fragmented and blurred roles of state and non-state actors; and the deeply embedded nature of many of the process that lead to emissions of GHG in everyday processes of production and consumption."* (Bulkeley and Newell, 2010: 2)

Therefore, it is important to have knowledge on some of the barriers within municipalities that can impact the implementation of climate strategies and policies. The *Problem Area* in the *Introduction* presented that in Denmark half of the municipalities in the greater Copenhagen area are struggling with achieving their annual 2 % reduction of CO_2 emissions whilst in the Netherlands half of the municipalities would not attain their climate targets (Hoff & Strobel, 2013; Hoppe et al., 2014). It is therefore relevant to raise the question of why municipalities struggle with attaining their CO_2 targets? Through the next sections Burch (2010), among others, contributes with knowledge on barriers for mitigating climate changes to comprehend what barriers the municipalities are struggling with, which can be used to reflect on the findings identified through this research study.

2.2.1 Cultural and Behavioural Barriers

The first category of barriers identified by Burch (2010) is of a cultural and behavioural origin, which includes the *"the relationships between individuals in various critical positions within the municipality, their personalities, and the collective ethos and customs at play within the organization"* (Burch, 2010: 7580). Burch (2010) identifies 12 different cultural and behavioural barriers including a lack of desire from the politicians due to the need to focus on getting re-elected, which leads to a less transformative agenda from these politicians. This specific barrier is more relevant for municipalities lacking a climate agenda, however it can also occur for municipalities with ambitious targets. Burch (2010) further discovers that the structure of certain organisations limits the possibilities of implementing new solutions, since it requires that new solutions will have shown themselves as being successful elsewhere.

Additionally, the potential lack of alignment between planners and the council can become a barrier. Burch's (2010) study also discovers that planners are sceptical for new initiatives or targets from the municipal council, since these new targets are not followed with additional funding. The operational staff highlight the lack of daily interactions between them, the planners, and politicians as a barrier (Burch, 2010). An Irish study reveals that other priorities in the local authorities are a significant barrier along with a lack of funding (McGloughlin & Sweeny, 2011).

2.2.2 Structural and Organisational Barriers

Secondly, Burch (2010) identifies 18 barriers as structural and organizational, which includes the *"features of the organization's structures and procedures that influence day-to-day activities and long-*

term policy direction" (Burch, 2010: 7579). One of these is the lack of "*incentives built into the budgetary system that stimulate innovation"* (Burch, 2010: 7579). Also that the current hierarchical structural system within the municipalities can lead to less flexibility and innovation. Burch (2010) finds that the budgetary systems within the municipalities favours short-term planning and does not foresee long-term planning, therefore it is easier to allocate funding for smaller projects that shows immediately results.

A Dutch study on local authorities' climate strategies and the challenges they are facing, formulate the reason for why municipalities struggles with attaining their targets: *"In part these problems are related to the complex institutional organization of climate mitigation policy in the Netherlands."* (Hoppe et al. 2014: 8). The study further emphasises that barriers of an institutional context are affected by *"lack of alignment with sectorial policies and the department responsible for their implementation"* (Hoppe et al. 2014: 8).

Engberg & Larsen (2010) identifies these issues within the Municipality of Copenhagen in dealing with sustainable urban regeneration. Here the size of the municipality and the frameworks of the seven administrations had little cross-departmental collaboration and few, if any, practitioners who had knowledge of political aims in all sectors. Many climate initiatives within municipalities are taking the form of bottom-up approaches that are outside the norms of the administrative procedures. In the Municipality of Copenhagen, clashes were noted when bottom-up, inter-departmental initiatives demanded resources and funds from pre-agreed plans and budgets of the administrations. The study noted that these clashes resulted in a reduction of commitments and resources in such cross-sector projects (Engberg & Larsen, 2010).

2.2.3 Regulatory and Legislative Barriers

Lastly, Burch (2010) identifies 15 barriers of the regulatory and legislative category, which covers *"the nature of the policy tools that the municipality has at its disposal and the interactions between multiple levels of government."* (Burch, 2010: 7580). A potential barrier is a lack of a coherent sustainability strategy that allows different departments and employees to understand the targets and approaches more coherently. This closely interlinks with the lack of a 'green' policy that forces the municipal workers to include sustainability in projects, and therefore it is up to the individual worker if he or she will include this (Burch, 2010). Despite this, Betsil & Bulkeley (2007) also argue that there have been attempts from national governments and international climate networks to join-up governance across different organisations, however, climate policy on a local scale still remains fragmented.

The municipal planners in Canada also mention that sustainability lacks a common definition within the municipalities (Burch, 2010). Furthermore, a lack of detailed plans for the actual implementation of sustainable initiatives and a lack of monitoring and evaluation procedures within the municipalities are also identified as barriers (Burch, 2010). External forces are also playing a role on the way municipalities can work with sustainability. For example, how the building codes can become a challenge since *"municipal building bylaws conflict with provincial building codes"* (Burch, 2010: 7580).

2.3 Navigating the Transition

As the academic and political communities have recognised the need for climate protection on a local level, and the role of local governments is shifting towards an enabling governance mode. Also, that there are many barriers to implementing climate strategies, brings out many questions of how can local municipal planners enable action towards CO_2 mitigation despite some of the barriers previously mentioned? (Bulkeley & Kern, 2006).

2.3.1 Political Support

As climate change is a multi-scale and multi-level issue, several studies identify the importance of the political arena on progressive actions and strategies. Studies by Bulkeley (2010), and Bulkeley and Schroeder (2008) state the importance of a political agenda towards climate change and how individual politicians at the top of the local hierarchy can determine the path taken by that municipality. Bulkeley (2010) highlights the crucial role of the mayor in both London and Los Angeles played in determining the path towards a sustainable profile and aligning the municipality. In these cases the strong political support created the framework that unified the climate initiatives within the administration. Bulkeley & Schroeder (2008; 10) emphasise this in the case of London;

> *"This has meant that those working to produce and deliver climate change strategy have had the crucial ingredient of political support and have, in turn, led to the formulation of ambitious targets for emissions reductions for London and to the widespread recognition of climate change as a policy issue across the GLA (Greater London Authority).*"

Thereby, this has given governance power to the London Boroughs within local climate policies. This is important for implementations of projects on a smaller scale. For example, a study into strategic niche management by Quitzau, Hoffmann & Elle (2012) in the municipality of Egedal, Denmark, identify that a new sustainable political alliance due to a new Mayor created an opportunity for sustainable action. Without the political support the municipal planner would not be able to push forward a transformative and progressive development project.

2.3.2 Increased use of Networks

As the role of municipalities moves towards an enabling position and to facilitate or coordinate climate action and innovation, networks have become a key aspect of knowledge gaining and learning on how to create local action (Bond, 2009).

Transitional Municipal Networks (TMNs) are a growing interest in the academic and practical fields in Europe. Municipalities have become a guiding force and a place for knowledge sharing on climate change issues that has continued to develop since the early 2000s with the expansion of networks such as the *Energie-cities*, *Climate Alliance,* and *Covenant of Mayors*, among others in Europe (Kern & Bulkeley, 2009; Bulkeley, 2010). This is not just between municipalities as networks can engage communities and other actors where municipalities are *"supporting not steering and learning not teaching"* (Bond, 2009: 220). Importantly, these TMNs can provide funds that are available to member municipals and thereby by-passing the traditional hierarchical political structures by working in a horizontal perspective (Bulkeley 2010).

The use of networks is evident in a study of Swedish municipalities where of the 184 responding municipalities: *"(…) 72 % stated that they cooperate with other actors in networks dedicated specifically to climate issues or where climate was included as one issue among others."* (Grandberg and Elander, 2007: 542). Also this Swedish study identifies that urban municipalities are more likely to engage in networking activities relating to climate change as 65 % of the networks that engaged other actors were urban municipalities (Grandberg and Elander, 2007).

Engberg and Larsen (2010) notes that this way of working for municipalities creates an adaptable and flexible arena which can create knowledge of local to international problems and potentials. Also, networks can create dialogue and channel conflicts that can provide answers to multi-layered situations and when applied to climate change can mobilise progressive action.

2.3.3 Working Strategically

The aforementioned study by Quitzau, Hoffmann & Elle (2011) identifies how planners in Egedal municipality took advantage of a window of opportunity from a new political alliance in order to create a sustainable housing development. Rather than a radical ideology about sustainability, the planners present the idea built upon the need for housing in the future which could incorporate the sustainability aspects to bridge the gap between some of the organisation barriers mentioned earlier in *Structural and Organisational Barriers*. Despite barriers that stopped the enforcement of more sustainable buildings the municipal planners used the civil law on the property that allows the right to incorporate legally binding requirements for developers on the building once the municipality

purchased the land. Quitzau, Hoffmann & Elle (2011: 1053) argue that in this case the planners realised the need for working in an *"ad-hoc and network-based planning approach with strategic reflections about how to implement new energy-efficiency technology"*.

This example shows the importance of a more transformative approach to planning where the planners take the role of local niche managers and *"identify ways to make the sustainable policy objectives operational in the planning process and to mobilise the stakeholders involved in the project innovate"* (Quitzau, Hoffmann & Elle, 2011: 1054). Furthermore, as Alber & Kern (2008) also discuss, this shows the importance of the enabling role of municipalities in the future innovation within energy and climate policies and project implementation.

2.4 Anchoring Climate Policies

Exter, Lenhart and Kern (2014) argue for the importance to integrate the municipal climate policy into other departments and strategies to overcome or prevent some of the barriers identified in the *Municipal Transition Barriers*. Anchoring refers to how well the climate targets and strategies are integrated into other departments working procedures and strategies. The following section will present some of the findings from the Dutch study *'Governing climate change in Dutch cities: anchoring local climate strategies in organisation, policy and practical implementation'* by Exter, Lenhart and Kern (2014).

2.4.1 Organisation

The study identifies various types of organisational structures of climate policy spreading from a programme office to a hybrid organisation. Several municipalities within the study highlight the importance of being located (physically) near relevant departments and planners, which will affect the anchoring in a positive way. The municipalities value the importance of having a manager in a high position in the administration differently. One could assume that formal power could benefit the climate agenda being anchored, however some felt that *"formal power is not always utilised, for example, when power to steer is not common in a municipality's culture."* (Exter et al. 2014: 10).

The municipalities perceive having a climate officer in different departments such as housing, economy and transport to be an advantage for integrating the policy into other department. While other municipalities state that the climate policy is a general issue that should be integrated into other departments but without any formal responsibilities. However, there is a consensus that it is a real challenge for the municipality to achieve this anchoring, and the expert interviews in the study also highlight that this integration is inadequate.

2.4.2 Policy

The study identify that the four perceived front-running municipalities recognise the importance of anchoring the climate policy into other policies to a higher degree than the other municipalities, and this can potentially be the reason for why these municipalities are forerunners. Furthermore, this study also identifies that more than two-thirds of the municipalities did not have the long-term target translated into actions and short-term targets, which would allow them to measure their progress and *"better anchor responsibilities within the whole administration, making climate strategies less voluntary."* (Exter et al. 2014: 12). Also, the study discovers that more than one-third of the municipalities find it important to anchor the climate policy into other projects, policies or strategies, however through expert interviews it is exposed that the actual anchoring may not be sufficient.

2.4.3 Practical Implementation

The last subject in the Dutch study is more of a practical value. In most municipalities there is a high degree of internal support on mitigation including both political and management support, which is important for the anchoring process. Additionally, most municipalities acknowledge the importance of anchoring the climate policy by external support and cooperation to achieve the actual implementation. A very interesting finding is that most municipalities believe that the capacity for climate strategies will be reduced in the future due to *"national and local budget cuts for local climate strategies, especially affecting smaller cities."* (Exter et al. 2014: 13). This implies that certain municipalities will become less ambitious and redefine their target to follow the national obligation. A last point highlights a difference in how municipalities monitor, however it is a necessity to monitor since it can *"improve organisational anchoring and actions"* (Exter et al. 2014: 13).

2.5 Tools

As stated throughout the *Knowledge Background* long-term targets to become CO_2-neutral is highly complex and involves many different sectors and actors and requires long-term thinking. Therefore it is important to know about the new methods of working with long-term transitions.

2.5.1 Roadmaps

Energy policies in the European Union has progressively moved towards long-term strategies, especially with the heightened knowledge of climate change and the liberalisation of the energy market. Since the Lisbon Treaty in 2009, energy in Europe has become a shared responsibility, which is opening the door for a common energy policy (Carvalho, 2012). In order to reach GHG emission reduction goals of between 80-95 % by 2050, the EU Commission in 2011 constructed the *'Roadmap for moving to a competitive low carbon economy in 2050'*. The EU Commission expects all member states to develop low carbon roadmaps. In technological terms the traditional method to move from the present state to the future is roadmapping (Dunderstadt, 2007). This normally consists of experts

constructing a map of current resources and what the gap is to what is needed in the future, and then creates pathways to reach this goal. Here the future is described only in terms of the actions and targets rather than elaborating on broader future visions. Roadmaps have the strength of identifying barriers and solutions whilst creating shared targets. Furthermore, the gap between the present and the needed future is divided into short-, mid-, and long-term goals. Roadmaps are a key tool that can be used by municipalities to understand the pathway towards CO_2-neutrality, as well as guiding short-term actions.

2.5.2 Backcasting

Participatory backcasting has grown into an approach to creating sustainable transitions in understanding system innovations. Quist and Vergragt (2011: 883) simply describe backcasting as *"looking back from the future"* using desirable, alternative futures rather than regular forecasting which *"looks to the future from the present"* which can be limited. They also argue that this method is particularly useful when dealing with highly complex problems, like becoming CO_2-neutral, which is an alternative to the dominant global trends. Kajikawa et al., (2008) argues that these two approaches are not contradictory but compatible that create visions but also feasibility studies of these visions. According to Quist and Vergragt (2011), backcasting has increasingly been applied as a tool for identifying alternative futures when dealing with climate change. The backcasting approach is normally included in roadmapping strategies to create future vision to present status along which the roadmap pathways are then constructed. In recent years the participatory backcasting method has been tested and used in the Netherlands, Canada and Sweden.

CHAPTER 3

METHODOLOGY

It is of the highest relevance to conduct studies on the transition management towards CO_2-neutrality within the municipalities, and thereby generate new knowledge to an extremely important topic

3 METHODOLOGY

The following chapter outlines the methodological thoughts, limitations and decisions that were chosen for this research study. Within the first section it is argued for the choice of doing a *Qualitative Study*, followed by a section that presents the use of the *Multiple-Case Study* as a research design to support the examination of the research question. The third section *Reviewing Existing Literature* argues the importance of doing a literature review and what this is used for. In the last section *Interview* the decisions made for the interview will be discussed including the choice of the *Semi-Structured Interview* and the *Selection of Interviewees*, while arguments for developing the *Interview Guide* are presented in the next subsection, followed by a last presentation of how this study was *Gathering and Processing* the data.

3.1 QUALITATIVE STUDY

With the recent focus on the shift from national to local governance in the mitigation of CO_2 emissions as identified in the *Introduction*, there is still an insufficient amount of in-depth studies on the strategic pathway towards the CO_2-neutral target. Therefore it is of the highest relevance to conduct studies on the transition management towards CO_2-neutrality within the municipalities, and thereby generate new knowledge to an extremely important topic. To produce this in-depth knowledge it was chosen to do a qualitative study instead of the quantitative approach since it provides concepts that benefit the research. As there is limited knowledge on this research study an explorative approach is the most beneficial to understand the management process of municipalities.

Bryman (200) describes the qualitative research approach as generating rich and deep data, and instead of taking the *"point of view of researcher"* it takes *"points of view of participants"* (Bryman, 2008: 393). Since it was discovered within the *Introduction* that the knowledge on how municipalities manage the transition towards CO_2-neutrality was inadequate, it is relevant to take the point of view of the participants that work with this transition inside the municipalities.

A major critique point of the qualitative research is that it can often become subjective from the author and the points gained from the interviewee. Also, quantitative researchers often claim that it is difficult to replicate a qualitative study due to the unstructured approach, which links back to the subjectivity and the researcher's ingenuity (Bryman, 2008). Another critique that is often aimed at the qualitative research is the lack of generalizable results due to the small 'sample size'. A last note highlighted by Bryman (2008) is the lack of transparency within the qualitative research on how the researcher arrived to the conclusion.

It is difficult to remove the subjectivity within a qualitative study as it is a very unstructured process and *"begins in a relatively open-ended way and entails a gradual narrowing down of research questions"* (Bryman, 2008: 391). Furthermore, what has been observed through this research and what was selected to focus on was dependant on the authors, and therefore it will always be very difficult to replicate qualitative studies, however, by arguing for the different methodological choices will support the degree of replication, and further also enhance the transparency throughout the study (Bryman, 2008). Regarding the generalizability of the results, Bryman (2009: 391) argues: "*Instead, the findings of qualitative research are to generalize to theory rather than to populations"*. Furthermore, Williams (2000) argues for how qualitative studies are able to produce generalizable results to specific groups, and further states qualitative researchers often tend to make their results generalizable when the compare them to existing findings and theories.

Yet, under the circumstances and the lack of existing knowledge, it is not desired to create generalizable results within this study but instead gain in-depth knowledge on the management of the transition and potentially identify findings that reveal parts of the surface on this relatively unexplored subject. However, there are limitations to both of the qualitative and quantitative research, and therefore it is about being aware of these limitations and select the one most suited for the research question, which for this study is the qualitative research also further elaborated in the section *Multiple-Case Study*.

3.2 MULTIPLE-CASE STUDY

This study seeks to gain and understanding on how the ambitious Danish and Dutch municipalities manage the long-term transition towards reaching their target of becoming CO_2-neutral. It is decided to conduct a study with a comparative approach to the research question, however since it was chosen to do a qualitative research, Bryman (2008: 60) highlights that this*"(...) takes the form of a multiple-case study"*. Therefore, this research is designed as a multiple-case study design, which Bryman also highlights as common research design for organisational studies:

> "In recent years, a number of writers have argued for a greater use of case study research that entails the investigation of more than one case. Indeed, in certain social science fields, like organization studies, this has become a common research design in its own right." (Bryman, 2008: 60)

This type of design allows studying two or more cases through identical methods. Through this design it is possible to observe several municipalities at the same time, and thereby examine similarities and differences on the research question from different municipal perspectives. This will allow a cross-

national and cross-municipal comparison. Using this design enhances the understanding of the problem since it is compared *"in relation to two or more meaningfully contrasting cases or situations."*(Bryman, 2008: 58). However, the multiple-case study design is also exposed to critique, since it potentially can remove part of the 'case-study' degree. This is emphasised by Dyer and Wilkins:

> *"Dyer and Wilkins (1991), for example, argue that a multiple-case study approach tends to mean that researcher pays less attention to the specific context and more to the ways in which the cases can be contrasted. "* (Bryman, 2008: 61)

Instead of focusing on the actual problem the critique underlines how the comparativeness is often forced into the study, and it often replace the 'case study' focus. Yet, Bryman counterattacks the critique received from researchers that are more pro case-study design in the following:

> *"It is important to appreciate that case study researchers do not delude themselves that it is possible to identify typical cases that can be used to represent a certain class of objects (...). In other words, they do not think that a case study is a sample of one."* (Bryman, 2008: 55)

This research study will focus on the actual problem itself and add the comparativeness perspective to this, instead of focusing fully on the comparative part of the research, which the comparative design could entail. Furthermore, the multiple-case study design will also entail the replication of the study, and the results from the study can potentially become more generalizable compared to results gained through case-study design (Lewis-Beck et al., 2003).

As this research study has an exploratory approach searching for interesting points to the management of the transition, this limits the in-depth knowledge to a broad context rather than specific points of the management process. The study contributes to specific points that would require further research to understand the transition process in greater detail.

3.2.1 External Experts

As a feature to the multiple-case study it is chosen to add a follow-up interview that will allow this study to gain knowledge from other external actors including: *consultant from the Dutch ministry*, *Danish consultant*, Dutch *environmental organisation*, and a Danish *external planner*. These external experts provide reflections on the results gain from the six municipalities, which contributes with new and more critical perspective to the *Discussion*. Having external experts provides the critical perspective to the findings of the six municipalities and thereby enhances the validity of the conclusions.

3.3 REVIEWING EXISTING LITERATURE

Throughout the entire research period of this study, existing literature was reviewed to enhance the comprehension of the municipalities' role in the transition towards CO_2-neutrality. An extensive review of the existing literature has strengthened the quality of the research since it has placed the study in the context of already developed knowledge. In the following it will shortly be described how existing literature played a role in the development of certain of the chapter within this research study. To systematically highlight this contribution the review of the literature is divided into two different themes: *Academic*, and *Strategies and Policy's*.

3.3.1 Academic

Within the first phase of the research it was necessary to create knowledge on local governance of climate mitigation to comprehend what the municipalities are doing. It was therefore important to be very explorative through this initial phase of our research since the review of academic literature helped frame the research study. Therefore it was important to ask questions throughout the process of reviewing the existing literature, such as: *"What is already known about this area? What concepts and theories are relevant to this area? Are there any significant controversies?"* (Bryman, 2008: 81).

The process of reviewing existing literature helped scoping the *Problem Area* within the *Introduction* and thereby developing and justifying the relevance of the *Research Question* within an early stage of the research, which of course has changed through time due to a continuous review of literature. The most meaningful and relevant studies involving the local governance of climate mitigation are presented and discussed within the Knowledge *Background* chapter which functions as a literature review that contributes to the *Analysis* and *Discussion.* A last chapter involved the review of existing academic literature that could support the development of the *Theoretical Perspective*, which built the perspective, and to an extent, decided what to focus and how to understand the findings in the *Analysis* and further frame the *Discussion* and *Conclusion*. This shows the importance of the review of existing academic literature and how it have framed the research study.

3.3.2 Strategies and Policy's

The review of academic literature supported how to frame the research, while the examination of the national policies and the municipalities' climate strategies of becoming CO_2-neutral had a more practical approach. In the start of the research phase numerous Danish and Dutch climate strategies targeting CO_2-neutrality was reviewed to understand how municipalities generally works with the climate issues, and also to start identifying the municipalities that would be the main focus of this research. Later, when the six focus municipalities for this research study were identified, the review of the strategies was scooped down to become more specific and led to the development of the *Strategy*

*Framewor*k found in appendix 1.1. This framework presented an overview of the six municipalities' targets and how they will achieve and manage this transition, and further allowed the exploration of patterns and differences. The *Strategy Framework* was a major contribution to develop the *Interview Guide* for the municipalities presented later within the *Interview* section and further created a profile of the six municipalities including a summary of the their main strategy, which are presented later in the *Municipal Cases* chapter.

Furthermore, different national policies were reviewed to understand the differences between the structures in Denmark and the Netherlands, which also includes a review of relevant EU legislations. This review led to the development of the *National Context* chapter, which present the energy systems, climate and energy policies, and local climate policies within Denmark and the Netherlands. This chapter was developed to enhance the knowledge of how the national and EU policies affects the municipalities, and further contribute to understand parts of the *Analysis* and *Discussion.*

3.4 INTERVIEW

3.4.1 Semi-Structured Interview

To accurately examine the research question the literature review was sufficient to provide data for certain parts, however, it was necessary to conduct interviews to create more knowledge on how Dutch and Danish municipalities manage the transition towards CO_2-neutrality. All of the interviews in this study were conducted as a qualitative interview. It could be argued that a study with a comparative perspective would be more suited for the structured interview, however since this research also have a explorative approach the quantitative interview was desired: *"In qualitative interviewing, there is much greater interest in the interviewee's point of view; in quantitative research, the interview reflects the researcher's concert"* (Bryman, 2008: 437).

Bryman (2008) argues for two types of qualitative interviews: *Unstructured and Semi-structured*. Even though it was decided to have an explorative approach it is also about balancing this with the comparative perspective that was desired to understand the management of the transition. In the comparative part of this research a number of topics are required to compare where the municipalities are similar or vary in the approach to the managing the transition. However, it was also important to have the explorative approach that provides flexibility for the interviewee to elaborate their point of view and allowing the interviewer to ask further into certain parts. The semi-structured interview allowed these criteria's to be fulfilled:

> *"A semi-structured interview. The researcher has a list of questions or fairly specific topics to be covered, often referred to as an interview guide, but the interviewee has a great deal of leeway in how to reply."* (Bryman, 2008: 438)

With the semi-structured interview it is possible to have an interview guide consisting of different topics that need to be covered by the different municipalities, and thereby contribute to the comparativeness of this study. This is emphasised by Bryman: *"If you are doing multiple-case study research, you are likely to find that you will need some structure in order to ensure cross-case comparability"* (Bryman, 2008: 440). Yet, this structure still allows the interviewer to ask follow-up questions to elaborate certain parts and give space for the interviewees to explain interesting points from their point of view.

As mentioned in the *Qualitative Study* it is also necessary to show awareness that conducting qualitative interviews as the main data includes quite a degree of subjectivity into the research since it provides more freedom for the interviewees and interviewer, and this will decrease the reliability and validity of the study.

3.4.2 Selection of Interviewees

It has been argued for why this study focuses on Danish and Dutch municipalities earlier in this *Introduction*, however it is necessary to explain the reasons for selecting the municipalities that are examined in this research study. Before the municipalities were chosen a number of criteria was developed to ensure that the sample for this study would be relevant to examine the research question.

The first criteria for selecting the municipalities were having an equal amount of Danish and Dutch municipalities with a target of becoming CO_2-neutral. Yet, even though Denmark and the Netherlands are two progressive countries on the climate agenda, there are still not a large proportion of municipalities targeting CO_2-neutrality. Still it was decided to select three of the most ambitious municipalities for each country since it would provide a significant amount of qualitative data for the research, which also supports the generalizability of this study's findings.

Due to a limited sample size of CO_2-neutral municipalities in Denmark and the Netherlands the criteria for how to select the municipalities could not be to comprehensive. Therefore, it was decided to contact most of the municipalities in Denmark (4 in total) and the Netherlands (15 in total) that had developed a CO_2-neutral target, thereby it was possible to identify the amount of municipalities that

was interested in participating in this study. If more than six municipalities replied it would be possible to develop different criteria, and if not, the research question does not specifically ask for a selected sample size:

> *"(…) if the research questions do not suggest that particular categories of people (…) should be sampled, there may be a case for sampling randomly."* (Bryman, 2008: 375)

Out of the four Danish municipalities all of them were interested in participating in this study, while six out of the fifteen Dutch municipalities replied. Therefore it was possible to select between different municipalities. Since all of the municipalities had developed a CO_2-neutral target they had one thing in common, and therefore it was decided to look at the demographics data to find a variable that would allow selecting between the 10 municipalities. On behalf of the population sizes and density the following six municipalities was chosen:

- **Denmark**: Aarhus, Copenhagen, Sønderborg
- **The Netherlands**: Eindhoven, The Hague, Zoetermeer

In chapter *Municipal Cases* table 3 the demographics are shown for these six municipalities. Copenhagen and The Hague are quite similar regarding the population size and density, while there is more variation between the other four municipalities, especially on the density of the municipalities. Yet, the sample size represents municipalities with a population of approximately: 500-600,000, 200-300,000, and 75-125,000 inhabitants.

Furthermore, in the selection process of the practitioners from the municipalities it was chosen to focus on planners, coordinators and managers (Will be referred to as Practitioners) instead of politicians or other actors. Choosing this type of practitioner allows this study to explore the management of the transition towards CO_2-neutrality within the municipalities, since these practitioners manage this transition on a daily basis. Information on the practitioners and the interviews can be seen in table 1.

Municipality	Interviewees Job Position	Time of Interview	Transcription
Aarhus (DK)	Special consultant	56:56	Appendix 3.1
Copenhagen (DK)	Project Manager	01:17:56	Appendix 3.2
The Hague (NL)	Policy Advisor Sustainability	01:25:02	Appendix 3.3
Eindhoven (NL	Sustainable Energy Advisor	01:22:15	Appendix 3.4
Sønderborg (DK)	Climate Coordinator	47:08	Appendix 3.5
Zoetermeer (NL)	Manager of Sustainable Zoetermeer	59.07	Appendix 3.6

Table 1: Interview information on the different practitioners from the municipalities.

The choice of focusing on municipal practitioners limits this research study to a one dimensional perspective. Furthermore, there is the possibility that the municipal practitioners are optimistic about their place of employment, especially from a political perspective. Although, this study is focusing on the management processes of what is happening in the municipalities rather than opinions on the municipality itself.

Furthermore, follow-up interviews were conducted with external actors as mentioned in *Expert Reflections.* As aforementioned this will provide new perspectives for the discussion on results gained from the interviews with the municipalities. These actors include an environmental organisation, an employee form the Dutch ministry, a consultancy, and another municipality (See table 2). Thereby, the external actors represent different interest group and equally represent Denmark and the Netherlands.

External interviewee	Interviewees Job Position	Time of Interview	Transcription
Danish Consultant	Director	44:35	Appendix 4.1
Danish External Planner	Environmental Coordinator	01:13:33	Appendix 4.2
Dutch Environmental organisation	Climate Change Advocate	53:08	Appendix 4.3
Consultant in Dutch Ministry	Senior Consultant on Local Climate Policy's	01:28:20	Appendix 4.4

Table 2: Interview information on the different external actors.

The limitation of time within this research study has limited the number of interviews conducted with practitioners and external experts. Whilst some general conclusions can be made from the six municipalities, the outcomes may be context specific. The knowledge gained from this study can provide the basis of further research into other municipalities working to become CO_2-neutral.

3.4.3 Interview Guide

Previously it was argued for the choice of the semi-structured interview since it allows the inclusion of an interview guide that enhances the comparativeness of this study. In the following section it is

argued for how this guide was developed and further what was the reflections through this process. First of all, the interview guide is linked closely together with the municipalities' strategies found in *Municipal Cases* and also the *Theoretical Perspective*. However, most importantly for the development of the interview guide is to have in mind the research question: *"(…) 'What do I need to know in order to answer each of the research questions I'm interested in?'"* (Bryman, 2008: 442)

Through the literature review a lot of interesting points were discovered and a lot of information gaps were identified on how the six municipalities manage the long-term transition towards becoming CO_2-neutral. Therefore eight different topics were developed to identify the similarities and differences in the management of the transition within the municipalities: (1) *Municipal strategies,* (2) *Long-term planning procedure,* (3) *Short-term planning procedure,* (4) *What have changed within the municipality,* (5) *Important actors,* (6) *Best practices,* (7) *Reflexive learning procedure,* and (8) *Others*. Each of these eight topics included two to four questions that allow the exploration of these topics and contribute to understanding the research question. The interview guide can be found in appendix 2.1.

Since the interview guide was developed on behalf of overall knowledge gained on the six municipalities, it was only within specific questions that individual knowledge from the municipalities was included. For an example, in the question below it was necessary to insert individual numbers and sectors since these were already discovered throughout the literature review.

> "Your municipality have a target of becoming CO2 neutral by 20##. What is the reason for including/excluding the sectors you have done in your climate target?" (Question from Appendix 2.1)

Under the questions within the interview guide different follow-up questions were developed as guidance to understand what potentially could become interesting within the question and maintain the comparability and coherency in the interviews. Also, in the development of the interview guide it was carefully ensured that the questions would not be leading due to the explorative approach of gaining knowledge through the practitioners' point of view. It was also desired to create reasonable flow through the interview guide but still keep the flexibility. Furthermore it was desired to go through all of the main questions in each interview and approximately use the same time.

The procedures for developing the interview guide for the different external actors are identical to the municipalities guide and will therefore not be further elaborated. The interview guide for the different external actors can be found in appendix 2 (2.2, 2.3, 2.4, 2.5. See transcriptions in appendix 4).

3.4.4 Gathering and Processing

Until now the study has reflected on the type of interview, the selection of interviewees', and the development of the interview guide, however it is equally important to reflect on how to conduct the actual interview and the data gathering, and further how to correctly process the data. To improve the actual conduction of the interviews more than one author participated in the interviews to ensure that all questions were covered through the interview. Furthermore it was decided to record all of the interviews on an audio file to enhance the actual concentration on the interview by the interviewers. If instead the interviewer had to take notes then this could potentially mean that interesting points from the interviewee would not be asked a follow-up question when needed (Bryman, 2008).

After the interviews were conducted each of the audio files of the interviews were listened through and transcribed, which also can be found in appendix 3. However, it is not a 100 % precise transcription of the interview due to time constraints and that some of the interviews were in other languages than English, yet it is still a very detailed. Transcribing the interview will both benefit the authors of the research and the readers who examine the study to fully understand the results from the analysis (Bryman, 2008). Having all of the data from the qualitative interview benefitted in gaining an overview of the actual overall content on how the municipalities manage the transition towards CO_2-neutrality.

To gain an overview of the data and thereby enhance the *Analysis* an *Interview Framework* (See Appendix 1.2) was created under content of the *Interview Guide* (Appendix 2.1 interview guide). Within the *Interview Framework* different statements from the practitioners was summarized under the relevant question, including the time of when the practitioners said these statements in the interview. Therefore, it was possible to track the actual quote from the transcription if the statement was interesting for the different analysis points. However, one could argue that it becomes subjective what is included within this *Interview Framework* since the whole transcription could not be included. Yet this have been taken into account and efforts have been focused on minimising the subjectivity as described in the *Qualitative Study*.

CHAPTER 4

THEORETICAL PERSPECTIVE

The large technological, institutional, and cultural practices have co-evolved in a path-dependent process to indirectly exploit and strengthen the carbon lock-in due to increasing returns of scale and the need to continue economic growth within these nations.

4 THEORETICAL PERSPECTIVE

This chapter will present the theoretical perspective of this research study to develop a framework that will enhance the understanding of the research question and the complexities that will be dealt with. The overriding context of this study is within the notion of transforming the current society towards CO_2-neutrality in a municipal perspective. However, a change within society of this degree is a challenge of high complexity and there is a need for managing the transitional process through time.

The theoretical framework contains different perspectives with a transformative focus. First presented is the carbon lock-in that helps setting the scene for the institutional complexity in creating a transition (Unruh, 2000 & 2002). Therefore, it is necessary to understand what an institution is and how to change one through Alexander's (2005) research on institutional design. Next the multi-level perspective (MLP) is introduced to identify the different levels of socio-technological context: *niche*, *regime*, and *landscape*. This leads on to Loorbach's (2007), among others, contribution on transition management, which introduce a guideline for how to manage a long-term transition in society. Sørensen and Tofting (2011) present a theoretical contribution on how collaboration can enhance innovation in the public sector. The last section presents how these different theoretical contributions will form the *Theoretical Framework* that will allow this research study to answer the research question.

4.1 SOCIETAL CARBON LOCK-IN

Unruh (2000) states that industrial economies have become locked-in to fossil fuel based systems that have grown to dominant the energy infrastructure, which inhibits efforts to introduce alternative technologies despite the need for change. The large technological, institutional, and cultural practices have co-evolved in a path-dependent process to indirectly exploit and strengthen the carbon lock-in due to increasing returns of scale and the need to continue economic growth within these nations. Unruh (2000: 818) terms this as the techno-Institutional Complex (TIC) that *"develop though a path-dependent, co-evolutionary process involving positive feedbacks among the technological infrastructure"* of which are assisted and deployed by institutions and organisations.

As techno-institutional infrastructure tends to create their own stability from the users and managers of the systems, it is easy to imagine that a change comes from outside rather than inside (Unruh, 2002). However, those who seek changes to the carbon lock-in often have contradicting agendas such as governments whose policies promote economic growth and investments in the fossil industry whilst seeking to reduce GHG emissions and increasing renewable technologies. This can be described as a 'wicked problem', as the need for sustainability within society as well as continue economic growth can be contradictory and difficult to solve, especially politically (Ekins, 2002).

4.2 Institutionalisation

Unpicking the 'lock-in' requires a political, societal, as well as technological shift in the management of our societies (Unruh, 2000). By understanding the lock-in of the carbon infrastructure in society, and the dependency of the resulting technologies makes societal sustainable transitions all the more complex. Government and governance play an import role as these can provide the opening but also the barriers to the future energy infrastructure as well as the social, economic and environmental costs (Verbong and Geels, 2007).

On a municipal level current institutions are creating a path-dependency that is difficult to change, however, municipal planners can contribute to changes through strategies followed by actions of an incremental or radical transformative character (Alexander, 2005). Therefore, it is of highest relevance to fully understand the concept of institutions, in order to comprehend the challenges planners in Denmark and the Netherlands face managing climate strategies. In the following section it is discussed; *what is an institution? How can these be changed through institutional design? How is this applied to this research project?* These questions are discussed through scientific evidence provided by Alexander (2005) and Raadschelders (1998).

4.2.1 Institutional Structures

The term institution normally covers social structures or mechanism that frame the acts of individuals: "*(…) human interaction is constrained and coordinated by the institutions within which they operate and that they themselves have created"* (Raadschelders, 1998: 567). Raadschelders further adds to the concept of an institution by defining it in the following: *"(...) the development of norms, rules, values"* (Raadschelders, 1998: 569). Comprehending these two statements illustrate how an institution is a product of the norms, rules and values of the relevant individuals, which form a social structure or mechanism that frame how individuals can act.

Alexander highlights the importance of seeing an institution as 'living mechanism' that goes through different stages (2005). Therefore, an institution is constantly developing, which means the norms, rules and values will change through time, and thereby the social structure changes. This is further emphasised: *"A 'living' institution, then, is a collection of practices and rules, defining exemplary or appropriate behaviour for groups of actors in specific situations."* (Olsen in Raadschelders, 1998: 569). This provides evidence that it is important to understand the institution, in this study as a living mechanism that changes through time.

4.2.2 Institutional Design

If an institution develops through time, then it must be possible to change the norms, rules and values within the institution. Alexander stresses the necessity of institutional involvement from planners: *"If*

planning is the translation of ideas into action, and the planner's goal is the transformation of society (…), then institutional transformation must be a critical aspect of planning" (Alexander, 2005: 210). Therefore, it is highly relevant for planners to understand the concept of institutions and, more relevant, their own institutional context (Alexander, 2005).

So how do you create changes in society? According to Alexander it is only possible to achieve lasting societal changes by *"changing the people who make up society. And there are only two ways of changing people: changing individuals, and changing institutions"* (2005:210). Alexander argues that a change can occur through institutional design, which is essential to change current norms, rules and values within an institution:

> *"Institutional design means designing institutions: the devising and realization of rules, procedures, and organizational structures that will enable and constrain behavior and action so as to accord with held values, achieve desired objectives, or execute given tasks"* (Alexander, 2005: 213).

Institutional design is a theoretical term that covers interventions in the current structure of an institution, and thereby deliberately/inadvertently changes the institutional practices. Institutional design is relevant when the current institution is inadequate for achieving its 'purpose'. This often occurs when new strategies or policies are developed and the current organisation is insufficient, then there is a need of institutional design to accommodate this (Alexander, 2005). This is where the construction of climate visions and strategies can open the door to the processes needed to tackle the lock-in, whilst providing the guidance from the overall transition required to become CO2-neutral.

According to Alexander (2005) there are two different ways of approaching institutional design in regards to the agent that creates changes. If an agent successfully changes the norms, rules and values outside the agent's institutional context, this approach is defined as 'objective' institutional design. Instead, if the agent changes the institutional structure within their own context, Alexander defines it is 'subjective dialogue' institutional design.

4.3 Multi-Level Perspective

Since the early 2000s, the *Multi-Level Perspective* (MLP) by Frank W. Geels (2002) has been used academically to understand technological transitions using the three level approach; Landscapes, Regimes, and Niches. Technological transitions are defined as *"major technological transformations in the way society functions such as transportation, communication, housing, feeding, are fulfilled."* (Geels, 2002: 1257). This defines that technology itself does not have power and only in connection with

human agency does technology fulfil a required function. It needs to be emphasised this theory only focuses on technologies, however, provides knowledge to the transitional process of technologies.

In principle, technological transitions consist of a change from one socio-technical configuration to another, which involves a substitution of technology, as well as changes in other organisational and institutional changes that participate, directly or indirectly, with the technology. As mentioned in the context of carbon lock-in, such reconfiguration processes are complex due to interconnections that are socio-technically linked (Unruh, 2000). Thus, radically new technologies "*have a hard time to break through, because regulations, infrastructure, user practices, maintenance networks are aligned to the existing technology."*(Geels, 2002: 1258)

4.3.1 Co-evolving Process

The MLP perspective on technological transitions combines the evolution process of variation, selection and retention of technology with the evolution of unfolding and reconfiguration within society. The MLP model presented by Geels (2002) is an analytical perspective that the transitional process takes place as the technology moves up the hierarchical ladder from the niche to impact the dominant regime. A configuration then takes place in this process, and thereby creates new regimes. Pressure or 'shocks' within the landscape from changes in the cultural, societal or behavioural viewpoints within this level can also impact these shifts in the technological transitional process, creating openings for technological change (Geels, 2002).

4.3.1.1 Niche Level

This level is the area at which radical innovation and experimentations take place outside, but maybe involving, the regime. This protected space will be impacted less by market and regulation conditions and can help interactions of various actors that are relevant to the technological innovation. Niches are crucial for technological transitions as this is the level that can create the *"seeds for change"* (Geels, 2002: 1261). However, the success of new innovations is not only decided by the activities in the niche level, it is also impacted by developments in the existing regime and landscape.

4.3.1.2 Patchwork of Regimes

These are groups of actors that are involved in the overall socio-technical regimes. For example: the electricity production regime, heating production regime, energy suppliers, energy consumers, financial institutes etc. Geels (2002: 1260) refers to these regimes as being *"the semi-coherent set of rules carried by different social groups"* and that these provide *"orientation and co-ordination to the activities of relevant actor groups"*. Thereby, to create socio-technical changes it is necessary for niche technologies to integrate and reconfigure the dominant regimes. However, the socio-technical regimes of the different sectors can function as a mechanism of selection and retention of niche technologies

that without guidance may never become successful despite their overall transitional importance (Geels, 2002).

4.3.1.3 Landscape

However, it is important to remember that socio-technical changes can occur through shocks in the landscape, or referring back to Alexander, this is where the institutional design can occur more or less deliberately. The landscape represents deep societal and structural trends such as energy infrastructure as well as other factors, for example, economic growth, fossil fuel prices, political coalitions, and cultural values. These represent the context of which the actors of the regimes interact. This level refers to a larger set of technology-external factors and in principle is harder to change (Geels, 2002). However once established, socio-technical regimes can influence these factors in the landscape level.

4.3.2 Limitations of MLP

Genus & Coles (2008) criticise the application of MLP in Geels work in terms of case studies. They argue that Geels focuses on historical technology artefacts, which neglect knowledge about unsuccessful technologies by focusing on the winners. Also the different cultural and social aspects that have influenced the transitions are neglected. Even Geels (2002:1262) states that the MLP *"still leaves unclear the process of breaking out of radical innovations from niche- to regime-level".*

Furthermore, Shrove & Walker (2007) are critical on transition studies and the MLP model which have failed to identify the transition manager of the transition management process. Genus & Coles (2008) suggest that a focus on technologies, which are in the process of development, would be a more useful application of the MLP and transition theories. This is where Loorbach (2007) & Kemp, Loorbach & Rotmans (2007) have constructed the transition management approach which builds upon the ideas behind MLP model.

4.4 Transition Management

Transitions are described as complex processes working within multiple levels, arenas and networks, which have a considerable amount of uncertainty and lack of control. Therefore managing transitions can be seen as a contradicting term. However, despite the uncertain and conflicting aspects of transitions, transition management attempts to bring guidance to the process (Loorbach, 2007). The basic elements formulated for transition management are;

- *"Systems-thinking in terms of more than one domain (multi-domain), different phases (system states) and different scale levels (multi-level);*
- *Long-term, flexible visions (at least 25 years) as a framework for shaping short-term agendas and action;*

- *A selective multi-actor (participatory) approach to involve relevant societal perspectives and beliefs;*
- *Back- and forecasting: the setting of short-term and mid-term goals based on long-term sustainability;*
- *A focus on learning and the use of a special learning philosophy of learning-by-doing and doing-by-learning;*
- *An orientation towards transition, system innovation and innovation;*
- *Creation and active management of societal niches and protected environments (for both actors and innovations)"* (Loorbach, 2007: 81).

Rotmans, Kemp, and Van Asselt (2001) describe transition management as not so much the realisation of a specific transition but a process of change that initiates a transition. This involves the goals as well as the tools and policies needed for change to be regularly re-evaluated and altered when necessary. From this perspective, *"the transition objective is in fact a basket of objectives informed by the visions of those participating" (Rotmans, Kemp, & Van Asselt, 2001; 22)*. Thereby the final vision and the objectives determined by the transition are determined not just by technical and scientific knowledge, but also socially and by the locational characteristics.

4.4.1 Transition Management Cycle

The activities within the transition management cycle are very similar to many policy-process in identifying problems, creating strategies, implementing actions, and evaluating. However, the policy sciences have these phases in a *"sequential ordering of these activities"* which has been criticised in other academic fields (Loorbach, 2007: 115). Transition management cycle has the same phases but has reformulated these as a governance cycle on a societal scale. The four phases are now: *(1)* problem structuring, and establishment of the transition arena and vision, *(2)* Developing coalitions and transition agendas to create a window of opportunity for an alternative strategy and vision, *(3)* the mobilising of actors and executing projects and solutions that can take place at the level of institutions and the wider society, *(4)* the stabilisation of transition projects and monitoring, evaluating and learning to formulate new goals and strategies that maintain the focus to the overall transition vision (Loorbach, 2007). Loorbach (2007: 125) proposes that the *"evaluation preludes a new cycle in which the same activity clusters are gone through but then more detailed and adapted, and perhaps in changed proportions".* After each evaluation the transition is accelerated and expanded into a wider discourse whilst maintaining specific context and activities that can enhance the transitional strategies. These phases can coincide and take place at different levels from the MLP model and from an iterative cycle process that is shown in figure 1

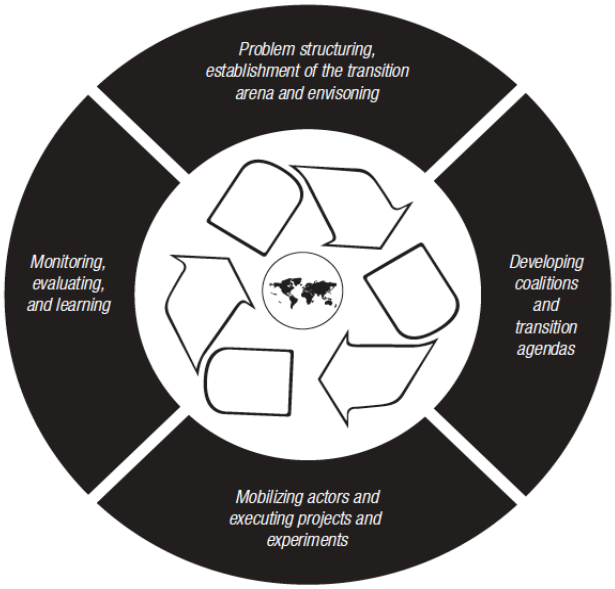


Figure 1: Transition management cycle. (Source: Loorbach, 2007: 115).

4.4.1.1 Phase 1 – Strategic: problem formulating and vision generating

The first phase is the strategic level that focuses around the processes of vision development, strategic discussions, long-term goal formulation, collective goal and norm setting. This is a participatory process where a shared problem formulation is developed, in which key actors can be brought together to try and create a long-term vision. According to Loorbach (2007: 104), such a form of "*strategic influencing of long-term processes relies on coincidence, informal networks, intellectual capacities and creativity*". This process is not normality for the domain of policy making that usual within short- to mid-term political cycles. This level is about the long-term visions and influencing the overall societal systems. Loorbach (2007) argues that the influence at the strategic level comes from innovative individuals rather than institutions, although many may be working within the institution, and need they need to develop a transition arena in which innovative ways of working can be enhanced.

4.4.1.2 Phase 2 – Tactical: bridging the gap between the long- and short-term

The second phase is the tactical level of the transition management cycle where steering activities based on the transition vision are identified and related to the dominant structure or regime of a societal system in question. This involves creating target images and agendas in line with the overall vision and creates actions to support these, such as financial support, negotiations with regime actors, rules and regulations, using networks, changing practices and structures. This phase can be seen as a practical approach to ideas of Alexander's (2005) institutional design perspective and the need to change institutions to allow transitional processes to have a window of opportunity. These processes can work within different levels, sectors, and systems and are defined as *'system innovations'*, which are not concrete but flexible and can change over-time. Actors at this level focus on their activities and

not specifically the overall transition context, as such are working within different sectors or 'arena's of arena's which will be described later in the *Transition Arena*. At a municipal level, this could include institutional fragmentation of departments, officers, and other policies that sometime are not compatible or willing to contribute to system innovations. Loorbach (2007) argues that the transition agendas here need to be tactically beneficial to the individual activities yet also relate to the overall transition vision, which may set institutional changes in motion.

4.4.1.3 Phase 3 – Operational: experimentation and mobilising actors

The third phase of the transition management cycle involves the operational level that includes the short-term actions and experiments that have innovative potential. At this level practices within the institution are altered and actors explore new solutions such as technologies, rules, institutional design, and support networks, of which some will fail but some may influence and alter the dominant regime. Again, Loorbach (2007) argues that action in this phase is often initiated by individual ambitions and entrepreneurial skills that include societal, technological, institutional, and behavioural activities. Many studies within the socio-technological context study the management of innovation, yet transition management provides more attention to the developing of innovative practices and facilitating change. Although, Loorbach (2007) argues that the repetition of processes between strategic, tactical and operational levels of transition management means that the operational level not only focus on up-scaling of innovations, but also bring down of the new visions and agendas that have been formulated in other phases. Thus, the operational level consists of experiments with niche markets with the primary goal of acquiring knowledge and learning how to contribute to the overall transition.

4.4.1.4 Phase 4 - Monitoring, evaluating and learning

The fourth phase of monitoring, evaluating and learning is an important and symbolic phase, which is continuously acted upon throughout the other phases. The ability to evaluate and learn during the transitional process is one of the most important aspects of transition management: *"Evaluation of progress made is a 'natural' phase in any development process when actors involved re-evaluate their own action in the context of their own progress"* (Loorbach, 2007:123). Therefore, this phase evaluates activities and their effect in the different phases and the interaction between the phases to provide learning process on their own actions and progress and identifying successful as well as unsuccessful changes. Also, Kemp, Loorbach & Rotmans (2007) argue that during the evaluating and learning phases it is important to create and maintain public support through participatory decision-making, which helps to create support for policies. Evaluation and the ability to learn from the experiences must be applied throughout the long-term strategy with the ability to readjust when required. This is based on the notion of social learning by interacting with different actors and reflections on the

cooperation internally and externally to the specific activities arenas and reframing perspectives based on experiences: learning-by-doing and doing-by-learning (Loorbach, 2007).

Overall, transition management is based on long-term visions and goals, which work as a framework for formulating short-term objectives and evaluating existing policy within a four phase iterative cycle that are repeated throughout the long-term period. As these processes include many parts of society, it is therefore important to understand and develop the context between the involved actors, which takes place in the *transition arena* (Loorbach, 2007).

4.4.2 Transition Arena

The transition arena, as part of the transition management process, is a multi-actor governance instrument that stimulates and coordinates innovation through a shared problem and long-term transition. As such, the transition arena (in an ideal world) is a symbolic space of an open network where different perspectives, different agendas, and different processes are discussed and aligned where possible (Loorbach, 2007). The transition arena is built upon the need to protect and promote the innovative processes in the niche layer of the MLP model presented by Geels (2002). However, the transition arena is a space in which to spread knowledge of the overall long-term vision into other arenas or 'arena's of arena's', where the transition vision is placed within themes or regimes that can assist in putting the transition goals on their specific agenda.

The transition arena is initially an instrument at the first phase and strategic level of transition management cycle where the arena is created and a shared problem definition and long-term vision are developed. The transition arena moves into the tactical and operational levels of phase 2 and 3 where coalitions are developed and actors mobilised to create a transition agenda in multiple arena's or arena's of arena's. It is out of these arena's of arena's is where experimental projects and the operational activities of the transition management are conducted from specific perspectives and sectors. These are influenced by the overall vision in the transition arena and vice versa with knowledge gained from experiments in the arena's of arena's influencing changes in the overall vision and guiding principles if necessary.

Loorbach (2007) argues that from Geels (2002) MLP model of transitions, the transition arena, despite not being a technology itself, can be seen as a niche. During the continued development and expanding of the transition arena it can become increasingly connected to the regime. At this point the transfer of ideas and agendas takes place between the transition arena and regular policies in which the short-term actions are accepted. After evaluating the success or unsuccessful integration of the transition

agenda or ideas the transition arena diverges again to start the process again from a wider perspective. Thereby, the transition arena is the instrument that can enable a "*self-organizing and self-steering participatory process, which leads to a guiding and inspiring long-term orientation and short-term experiments that support it.*" (Loorbach, 2007: 134).

4.5 Collaborative Innovation in the Public Sector

Borins (2001) highlights a dilemma in society since an innovative public sector is desired yet society does not want the public sector to become as innovative as the private sector. In the context of the transition towards a CO_2-neutral society there is a need for new sustainable solutions that can outcompete the existing regimes and thereby support the transition. Certain solutions already exist such as wind turbines, which one could argue have developed from a niche into becoming a part of the energy regime and compete with the current technological infrastructure. However, to facilitate this transition there is a significant need for innovation in both the public and private sector. Furthermore, Sørensen and Tofting (2011) argue innovation is not only including the development of new technological solutions it also covers different methods of collaborating that can assistance and accelerate the transition.

4.5.1 The Innovation Cycle

According to Sørensen and Tofting's (2011) innovation is not only about creating new ideas but also about adopting already existing ideas into individual institutional contexts. Furthermore, innovation is often a reaction towards a need for a change in society and is often based on planned behavior, however it is difficult to define if certain ideas are intended or unintended behavior since a number of different circumstances affect this. Innovation is often seen as a positive change, however, this depends on the individual perspective of the change. These guidelines are also assembled in the following statement:

> *"An intentional and proactive process that involves the generation and practical adoption and spread of new and creative ideas, which aim to produce a qualitative change in a specific context."* (Sørensen & Tofting, 2011: 849)

To further enlighten the understanding of innovation Sørensen and Tofting (2011) use the model shown in figure 2 to present the different steps throughout an innovative process, also referred to as an innovation cycle. However, an innovative process is a *"complex, nonlinear, and iterative process."* (Sørensen and Tofting, 2011: 851). Therefore it is important to emphasise that these different steps in figure 2 are not always in chronological order.

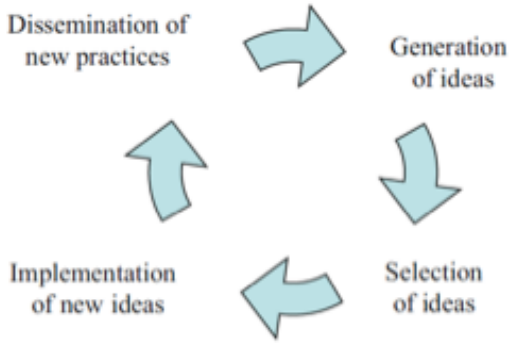


Figure 2: Innovation cycle. (Source: Sørensen & Tofting, 2011: 851)

These four steps are key components in the process of innovation and will often interact and integrate with each other. Feedback loops will occur throughout the innovation cycle e.g. moving back and forward from generation of ideas and the selection of ideas (Sørensen & Tofting, 2011). As aforementioned, the transition arena is built upon the need to protect and promote innovative processes, and it is about creating the arena and selecting the actors within (Loorbach, 2007). Linking the innovation cycle and transition arena indicates a need for collaboration to enhance innovation.

4.5.2 Enhancing Innovation

The innovation cycle in figure 2 is used by Sørensen and Tofting (2011) to support their argument on why collaboration can enhance innovation in the public sector: *"the innovation cycle can be strengthened through collaboration between relevant and affected actors from the public and private sector."* (2011: 852). Sørensen and Tofting (2011) presents four different methods of strengthening the innovation cycle: *(1)* In the phase of *generating ideas* it is possible strengthen the innovation process by sharing experiences and ideas with different actors, which will then provide feedback. *(2)* An improved selection of ideas will also enhance the innovation. This selection can be improved by using different actors to assess the idea, especially if the actors have a variation in perspective and forms of knowledge. *(3)* The implementation phase can be strengthened through collaboration that will create a joint ownership of the idea and thereby reduce the resistance towards implementing this. Furthermore, this *"also helps to mobilize resources, ensure flexible adjustments, and compensate eventual losers."* (Sørensen & Tofting, 2011: 852). *(4)* Creating social or professional networks can enhance the actual dissemination of the innovative practices.

According to Sørensen and Tofting (2011) there are numerous studies demonstrating the existence of how collaboration can enhance innovation, yet it is necessary to be aware of the limitations and challenges in creating this collaboration: *"social and political actors will not always collaborate, collaboration will not always produce public innovation."* (2011: 853). One challenge is that certain

long-term networks will develop a mutual worldview, which will lead to less creativity within the network and thereby diminish the collaborative innovation. Another challenge is that this can affect the trust and effectiveness within a network and thereby the innovation when a network tries to *"implement innovations because of the heightened level of uncertainty and the incomplete institutionalization"* (Sørensen & Tofting, 2011: 853).

4.5.3 Supporting Collaborative Innovation in the Public Sector

Through a set of more or less deliberate actions it is possible for the public administration to enhance collaborative innovation in public sector (Sørensen & Tofting, 2011). Under an appropriate institutional context collaborative innovation can be enhanced, however as aforementioned, Unruh (2000) states that certain institutions could become locked-in. According to Alexander (2005) these institutional lock-in's can be changed through institutional design, which possibly can enhance collaborative innovation in the public sector *"(...) with the right kind of institutional design and management, collaboration can be a crucial source of innovation in the public sector"* (Sørensen & Tofting, 2011: 853).

Five different collaboration strategies are highlighted as a method of supporting and enhancing collaborative innovation in the public sector (Sørensen & Tofting, 2011). The first method is focusing on facilitating collaboration internally in the public administration and this is called the *(1)* cultivation strategy, it aims to create an environment where ideas are shared, developed and tested by different public actors. The *(2)* replication strategy focus on *"foster collaborative relationships with other public"* actors, and thereby foster an environment with focus on the most successful innovations through different steps *"identify, translate, adapt, and implement"* (Sørensen & Tofting, 2011: 853). The *(3)* partnership strategy can enhance the innovation through public-private-partnership (PPP) by facilitating innovation. The *(4)* network strategy is prompting the public administration role as a network facilitator. This strategy focuses on engaging actors with different perspectives or expertises, and fosters an environment with knowledge sharing and feedback. The last collaboration strategy is the *(5)* open-source strategy and it focuses on inviting different actors to help solving the problem and this is a less formal collaboration between the different actors.

4.6 THEORETICAL FRAMEWORK

Until now this chapter has outlined different theoretical concepts: *Carbon Lock-in, Institutional Design, Multi-level Perspective, Transitional Management*, and *Innovation in the Public Sector*. All of these concepts contribute to the development of the overall theoretical framework for this research study. However, each of the theories contributes differently: setting the scene, introducing concepts, descriptive theories, and practical theories. This section will emphasise how the different theories fit

within the theoretical framework by asking how these are applied to the research and how they support the study in examining the research question:

How do ambitious Danish and Dutch municipalities manage the long-term transition towards CO_2-neutrality?

The *'Carbon Lock-in'* perspective gives an introduction to the context of this study by presenting the institutionalisation of society and how this constructs techno-institutional complexes within different sectors. Comprehending the concepts behind these institutional complexities generate an understanding of the challenges municipalities are facing throughout the transition towards becoming CO_2-neutral within a society that is still path-dependent.

4.6.1 Institutional Changes within the Municipalities

Using the theories of institutionalisation and institutional design allow this study to explore the institutional changes within the six municipalities. How was their CO_2-neutral targets developed and how has the introduction of this target within the municipality changed the institution? It is known that political decision-makers are an important actor on the meso-level towards changing the institutions, however it is the planners that manage the strategies and actions. Using the concepts of institutional design can reveal variations in the different planning methods inside municipalities, and how this effects the current institutions. Also an institution is not a constant thing and will constantly change throughout the transition towards CO_2-neutrality, which Alexander (2005) also highlights by referring to an institution as a 'living mechanism'. Therefore it is only possible to give examples of institutional changes occurring after specific incidents.

4.6.2 Municipal Support to Niche-Technologies

Long-term climate strategies or policies of the Dutch and Danish municipalities are in place to push forward the overall energy transition required to become CO_2-neutral. These strategies can act as guides in the process of supporting the niche level of innovative technologies and try to realign the dominant regimes. The procedure of using the MLP in this study is not to be compared to other case studies such as Geels (2002 and 2012). In Geel's studies MLP is the main theoretical perspective and is fully focusing on certain technologies and regimes, which is not the case of this research study.

This study argues that the processes in the niche level are vitally important for climate strategies to lift up innovations that create the required transition to a CO_2-neutral society. Using the concepts in MLP generates a method to understand what municipalities are doing to support new sustainable technologies entering the broad society, and thereby contributing towards the transition to a CO_2-

neutral society. Furthermore, the concepts from MLP can support the examination of why certain projects become successful or unsuccessful?

4.6.3 Collaborative Innovation

Borins (2001) highlights that it is important to find a degree of satisfaction for how innovative the public sector can become. Yet, this research study argues that the public sector has an important role in both creating innovative solutions themselves, but also facilitating the innovation in the private sector that can support the transition.

The theory of transition management identifies the transition arena as instrument that stimulates and coordinates innovation through shared and long-term transition. Here it is the vision is used to bring together relevant actors and experts within the specific arenas. Using the model for innovation cycle from Sørensen and Tofting (2011) provides a theoretical tool to observe the actions taken intentionally or unintentionally in the different municipalities towards creating innovation. Furthermore, Sørensen and Tofting (2011) add four methods of enhancing the different steps within the innovation cycle through collaboration.

Essentially, the theoretical perspectives of the transition arena and the innovation cycle will support the analysis with questions such as: What are the municipalities doing to enhance the innovation both in the public and private sector? How are the municipality collaborating with different actors? Can collaboration enhance innovation and how? This examination is supported by the different strategic approaches to enhance collaboration: cultivation, replication, partnership, network, and open-source.

Also, Sørensen and Tofting (2011) highlight that institutional design can support the collaborative innovation. Therefore, it is important to understand institutional changes within the municipalities to examine if the collaboration towards sustainability is improving, and if sustainability concepts are getting anchored within other departments and actors.

4.6.4 Transition Management Approach

In this research study transition management provides the overall understanding of how municipalities manage their CO_2-neutral strategies, of which the other theoretical perspectives of Alexander's (2005) institutional design and Sørensen and Tofting's (2011) collaborative innovation in the public sector provide in-depth knowledge of parts of the four phases in the transition management cycle. Therefore, transition management guides the management processes analysed with the questions of: what planning procedures are assisting the development towards becoming CO_2-neutral? How are policies being integrated? How is collaboration initiated? What process is there for moving

between current short-term actions and the next short-term actions and how are things reflected upon?

Loorbach (2007) argues for a management model that promotes arena building, experimenting, and learning-by-doing and doing-by-learning. The strategic, tactical, and operational layers of actions provide identifiable actions that can be used in the analysis of the six municipalities' management of their long-term goals. For example: how was the climate strategies developed? What procedures are the planners using? How are short-term actions being developed? Therefore, the concepts of transition management provides the processes and substances that can guide the understanding of the working of the municipalities in question of what they are actually doing to achieve the transition to become CO_2-neutral.

The phase of monitoring, evaluating, and learning is of importance to this study in order to understand how the management of the long-term climate strategies and policies are developing. This will support the analysis with questions such as: how are the projects and targets monitored? How is the process of learning of experiences and how new knowledge can be used and shared? These questions can also provide knowledge on how the institutional design of the municipalities may have changed and the role of and success or unsuccessful use of collaborative innovation. Furthermore, by identifying the practices within front-runner municipalities will contribute towards creating recommendations for other municipalities.

This understanding gives a practical approach to the movement of technologies from the niche to the regime levels as well as assisting in anchoring the long-term vision in the main political arena and within society (Loorbach, 2007). The knowledge from transition management, as well as collaboration innovation, will hopefully provide findings on the role of these six ambitious municipalities in the management of the overall energy transition.

CHAPTER 5

NATIONAL CONTEXT

The goals of ETS are to reduce GHG emissions, to promote low-carbon technology at the lowest cost to society (European Commission, 2015b). Furthermore, legislations in the EU will raise the share of renewable production to 20 % and increase energy efficiency to 20 %, and reduce GHG emissions by 20 % by 2020

5 NATIONAL CONTEXT

This chapter will present the development of energy and climate policies in the EU, Denmark, the Netherlands, and at the local government levels. The energy system context and the climate policy targets are also presented to give an understanding of the context the current municipalities' climate strategies are working within, which can cause enabling but also constraining factors towards the municipal transition to CO_2-neutrality.

5.1 European Union

The first EU level energy policy was triggered by the oil crises in 1973/74 when the 1974 *'Council Resolution concerning a new energy policy strategy for the Community'* was passed in which a new energy policy strategy for the EU and goals for 1985 were agreed (Langsdorf, 2011). This included the promotion of nuclear energy, hydrocarbon and solid fuels in the member states, and to use the energy more rationally. The focus remained on economic objects and as such there was no common energy policy agreement, which could include environmental aspects. Including environmental aspects is important as energy and the environment are intimately linked from fuel extraction through to emissions. As such, important energy regulation like the *Renewables Directives (2001; 2003; 2009)* and the introduction of the EU emission-trading scheme (EU ETS) in 2005 were based on environmental regulation (European Commission, 2009; Langsdorf, 2011).

The 1992 "Earth Summit" in Rio and the Kyoto Protocol in 1997 brought climate change and the issues surrounding energy to the global agenda (Langsdorf, 2011). Policy makers concluded that energy and climate issues and challenges were at such a large scale that solutions were not suitable for nation state levels, thereby creating a common goal for the European Union to lead the fight against climate change. However, it was not until 2007 the first EU energy action plan was agreed that still forms the current common energy policy. The three key aspects of this agreement are: sustainability, security of supply, and competitiveness. Liberalisation of the energy market began in the late 90s which have been strengthened with the EU directives in 2004 and 2007 that is still the dominant political agenda in order to reduce the power of energy production monopolies and enable more competition in the internal markets (EurActiv, n.d.). However, it has proved difficult to liberalise the grid-connected energies (gas and electricity) as some Member States are reluctant to open their markets whilst the nature of grids create 'natural monopolies' with complex regulation in place to organise the right to use the grid (European Commission, 2015a).

These key aspects can be seen as important as the EU is still heavy dependent on fossil fuels. The statistics of the EU 28 where gross energy consumption in 2013 was 1.666 million tonnes of oil equivalent and fossil fuels represented in fuel sources below (See figure 3)(Eurostat, 2015a):

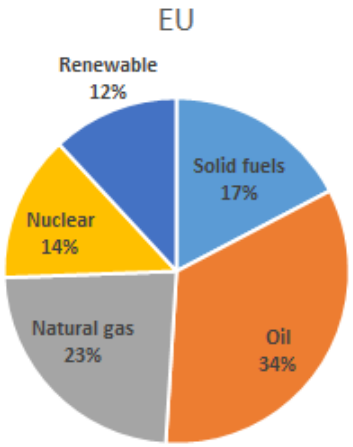


Figure 3: *Percentage EU energy consumption by fuel type (Source: Own production based on Eurostat (2015a))*

Also, the EU still has a very high import dependency with more than half of the energy imported, which varies drastically between member states. For 2011, the Netherlands imported approximately 30.4 % of their energy needs, whilst Denmark is a net exporter of 8.5 % of their energy production (European Commission, 2013; Langsdorf, 2011).

5.1.1 Climate and Energy Policies in the EU

The European Commission has set targets for the overall European area, in which member states under the Kyoto Protocol have agreed to take action. EU leaders have endorsed the 2050 objective to reduce GHG emissions by between 80-95 % compared to 1990 levels, published in the 2011 *'Roadmap for moving to a competitive low carbon economy in 2050'* (European Commission, 2011).

On the path towards 2050 the EU commission has also set out some intermitted targets for 2020 and 2030. A 20 % reduction in GHG emissions by 2020 below 1990 levels is one of the main goals under the *'Europe 2020 growth strategy'* and the '*EU Climate and Energy Package*', which the EU will increase to 30 % if greater commitment to emission reductions is agreed in other developed and developing nations. Under the *'Climate and energy policy framework for 2030'*, the EU Commission has proposed the 2030 emission reduction target of 40 % below 1990 levels (European Commission, 2015a).

The EU Emission Trading System (ETS) will initiate these targets and frameworks. The ETS was launched in 2005 that sets a cap on emissions on large industry and energy producers, which is expanding to include the transport sector, in order to create a price on carbon that will incentivise

changes. The goals of ETS are to reduce GHG emissions, to promote low-carbon technology at the lowest cost to society (European Commission, 2015b). Furthermore, legislations in the EU will raise the share of renewable production to 20 % and increase energy efficiency to 20 %, and reduce GHG emissions by 20 % by 2020. These have become known as the *'20/20/20'* targets. The EU has been a driving force for international negotiations on climate change. However, member states have the freedom in which to actively work with the targets (European Commission, 2015a).

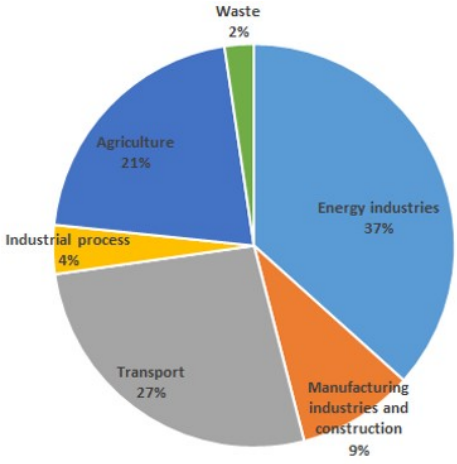
5.1.2 Local Initiatives from the EU

On a local level the EU commission along with public-private-partnerships provide support and finance for climate and energy policies and implementation, as well as knowledge gaining, on a local scale. These networks are not just European but also global in the work they do. For example, *Energie-Cities, Climate Alliance,* and *Covenant of Mayors* are working on a municipal level in order to share knowledge and to create innovation in the energy and climate policy arena. Since the early 2000s Transitional Municipal Networks (TMNs) have continued expanding with many of the leading cities and urban areas joining agreements and targets in order to receive funds and support (Kern & Bulkeley, 2009; Bulkeley, 2010).

The EU commission launched the Covenant of Mayors after the adoption of the EU Climate and Energy Package in order to endorse and support the efforts of local governments in implementing sustainable energy policies as the commission has identified the important role of local authorities in mitigating the effects of climate change. This network is to assist towards reaching the 20/20/20 targets for the EU member states (Covenant of Mayors, 2015). The Climate Alliance was established in 1990 and has more than 1,700 cities, municipalities and districts as members that have the aim to reduce GHG emissions and implement sustainable policies in the energy and transport sectors. This includes collaboration with NGOs and other organisations that provide knowledge and expertise as well as funds for actions (Climate Alliance, 2015).

5.2 DENMARK

The 2012 emissions per capita in Denmark was 9.25 tonnes CO_2, which is 0.27 tonnes higher than the EU (28 countries) average (Eurostat, 2015b). Below are the emissions per sector for Denmark (See figure 4).



Emissions per sector	1000tonnes CO_2e
Energy industries	16,758
Manufacturing industries & construction	4,281
Transport	12,245
Industrial process	1,791
Agriculture	9,599
Waste	1,080

Figure 4: Denmark emissions per sector in 1000 tonnes CO_2 in 2012 (Source: Own production based on Eurostat (2015b))

5.2.1 Danish Energy System

Denmark is a leader in terms of renewable energy, energy efficiency and climate change policies and since 1990 has reduced GHG emission, and has succeeded in increasing economic growth whilst reducing energy consumption (Sperling et al., 2011). The Danish energy system up to the 1970s was completely based on central fossil fuel dependent structures. The oil crisis during 1973/74 impacted the Danish energy supplies and had an impact the way the current energy system is looking. The open and flexible political process in Denmark resulted in long-term energy plans that emphasised the importance of being independent of other countries fossil fuels. This lead to programmes that supported district heating, wind power, combined heat and power (CHP) plants, and biogas. The dominance of the centralised energy production has shifted towards the addition of local CHP and district heating and wind power, which has reduced the dependency on oil in the heat and electricity sectors (Sperling et al., 2011). The increase in local production was also helped by the tradition of cooperative based organisations and business models in Denmark that has originated from Danish cooperative farmer movements in the 19th Century (Chloupkova et al., 2003). This has had a positive impact in the implementation of new energy policies and technologies locally, especially in the case of on- and offshore wind turbines.

Since 1999, there have been a series of agreements on energy reforms that have had a broad political support of the parties in the Danish Parliament. The Danish government has maintained its commitments to fulfilling its international environmental commitments and has followed the trend in Europe of liberalisation the energy (The Danish Government, 2002). Denmark has many governmental ministries and agencies that are involved in the energy and climate policy arena including *The Danish Ministry of Climate, Energy and Building* as a part of the government's increased efforts to promote a more sustainable society and is responsible for national and international efforts

to mitigate climate change and *The Danish Energy Agency (DEA)* responsible for all tasks related to the production, transmission and utilisation of energy, and its impact on climate change (Ministry of Climate, Energy and Building, 2012). This has been assisted by a high level of political and defined responsibilities and consensus towards clear long-term goals that have been beneficially to the renewable sources. The *Danish Energy Policy 2012-2020* or the *Energy Agreement 2012* was agreed between the parties of the Danish Government in 2012 that sets out the aims for the coming years for energy sources and emission reductions. The current gross energy consumption by fuel type 2013 is shown below in comparison to the EU (See figure 5)(Eurostat, 2015a):

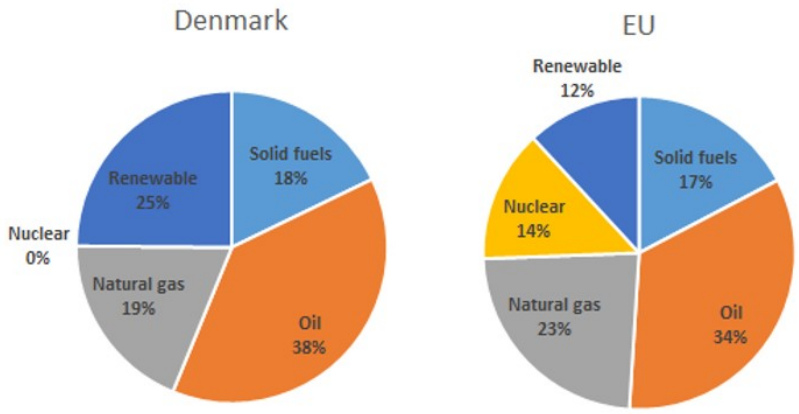


Figure 5: Denmark and EU percentage of fuel type for gross energy consumption in 2013 (Source: Own production based on Eurostat (2015a))

5.2.2 Climate and Energy Policies on a National Level

In March 2012 the new *Energy Agreement* was reached that contains ambitious initiatives to bring Denmark to become 100 % renewable in the energy and transport sector by 2050. The agreement includes concrete goals of having 50 % electricity consumption supplied from wind power and that 35 % of the final energy consumption from renewable sources by 2020. Also that there is a 7.6 % reduction in gross energy consumption compared to 2010 levels, and a 34 % reduction in GHG emission compared to 1990 levels. The Energy Agreement 2012 will increase wind power production by 1.5 GW of offshore turbines. Also, the agreement will stop installations of oil-fired and gas-fired boilers in new buildings from 2013 and in existing buildings in areas with district heating or natural gas from 2016. Also, conversion from coal to biomass at large-scale plants will be made more attractive from funds and subsidies as well as analysis of its role in the energy system will be conducted. The energy agreement also has energy-saving obligations of energy companies themselves of 2.6 % in 2013-2014 and 3 % from 2015 to 2020 in order to be key players in energy-saving efforts in the future (The Danish Ministry of Climate, Energy and Building, 2012).

The Danish Government has put forward the *'The Danish Climate Policy Plan – Towards a low carbon society'* (2013) in which the visions for Denmark as a whole in reducing GHG emissions and tackling the effects of climate change. The Ministry of Climate, Energy, and Building are responsible for the national climate policy amongst other things. The main national climate policy goals are:

- 80-95 % reduction of GHG emissions by 2050, in line with the EU target.
- 40 % reduction of GHG emissions by 2020 (20 % higher than the EU target).
- All sectors, including non-emission trading system sectors, to contribute with concrete and documented reductions up to 2020 and beyond. As part of the EU target, Denmark is obliged to during the period of 2013-2020 to reduce non-ETS emissions by 20 % of 2005 levels.
- The whole of Denmark's energy supply, including transport energy consumption, shall be based on renewable energy by 2050. This includes phasing out oil for heating purposes and coal by 2030, and electricity and heating supply is to be 100 % covered by renewable energy by 2035.

5.2.3 Local Climate Policies

In Denmark, like many other nations, municipalities are seen as *"central actors within the green transition in the Danish society"* (The Danish Ministry of Climate, Energy, and Building, 2015 – own translation). However, climate change mitigation and adaptation at the municipal level is considered a voluntary task. It is argued that this is down to the 'DUT-principle', where any regulations or actions passed by the national government to municipalities requires grants and funds to compensate for these actions, which is not favourable under tight national budgets. However, as stated in the *Introduction* chapter, 72 % of Danish municipalities have some form of climate action and policies (Hoff & Strobel, 2013).

The Danish government is trying to motivate and support the municipalities through different initiatives. For example a national climate guide for the municipality was published in 2013 to document a number of successful projects from different municipalities, and thereby provide best practise knowledge on different sectors to all municipalities (The Danish Ministry Of Climate, Energy, and Building, 2013).

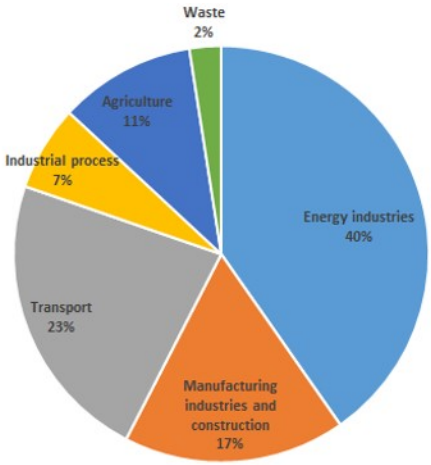
The Local Government Denmark (Kommunernes Landsforening) acts as a political medium between national and local governments. They also provide the knowledge sharing and financial support to municipalities in relation to climate and energy policies. To support the municipalities climate work the Danish Energy Agency partnered together with Local Government Denmark on a project to

support the transition of energy in the municipalities. This agreement is established to accommodate the overall target for Denmark to become fossil free by 2050 (Danish Energy Agency, n.d.). Furthermore, The Danish energy agency developed a CO_2 calculator for the municipalities in 2009 to support the mapping and planning of future climate initiatives. Additional funding was given to improve the CO_2 calculator in 2012 after the national energy agreement (Danish Energy Agency, n.d.).

Another initiative to engage the municipalities is facilitated by The Danish Society for Nature Conservation (Danmarks Naturfredningsforening). This is a voluntary programme that commits the municipalities to a five year contract that engage them to achieve a 2 % reduction of CO_2 every year. By the first of January 2015, 77 of the 98 municipalities of Denmark participated in this programme (The Danish Society for Nature Conservation, n.d.). 8.98

5.3 THE NETHERLANDS

The 2012 emissions per capita in the Netherlands was 11.48 tonnes CO_2, which is 2.50 tonnes higher than the EU (28 countries) average (Eurostat, 2015b). Below are the emissions per sector for the Netherlands (See figure 6).



Emissions per sector	1000tonnes CO_2e
Energy industries	60,307
Manufacturing industries & construction	25,893
Transport	33,985
Industrial process	9,921
Agriculture	15,903
Waste	3,688

Figure 6: The Netherlands emissions per sector in 1000 tonnes CO_2 in 2012 (Source: Own production based on Eurostat (2015b))

5.3.1 The Netherlands Energy System

In 1953, a large natural gas field was discovered in the north of the country in Slochteren, which would lead to natural gas dominating the Dutch energy mix. This was assisted by on-going tensions in the oil fields of the Middle East during the 1970s. From the 1980s the Dutch energy system stabilised with incremental developments to the use of natural gas and oil (Loorbach et al., 2008).

During the 1980s there was a decoupling of economic growth and energy use. The dominant regime experienced confrontation from increased environmental awareness, slower economic growth, and

neo-liberalism push for privatisation and liberalisation throughout the Netherlands and Europe. During the 1990s, the gas and electricity markets were separated from production and distribution and transportation with many becoming a European rather than a national system. The liberalisation of the energy systems was completed by 2004 in the Netherlands, and has changed the role of the national government in the energy agenda (Loorbach et al., 2008).

Now, natural gas is generally used for heating for households and energy provision, whilst imported oil is used for mobility and industry. Coal is also used for energy provision and industry, whilst in 2005 approximately only 2.4 % of the total energy consumption was considered sustainable. The high proportion of gas is due to the natural gas fields in the North of the Netherlands, which has created a cheap fuel source that has dominated the energy market. Energy policies are now increasingly decided at the European level, although the national government still have an influence on the market and the emission reductions through other policies. Historically, population, economic growth and technological developments have driven the energy transition (Loorbach, 2007). The current gross energy consumption by fuel type in 2013 is shown below in comparison to the EU (See figure 7)(Eurostat, 2015a):

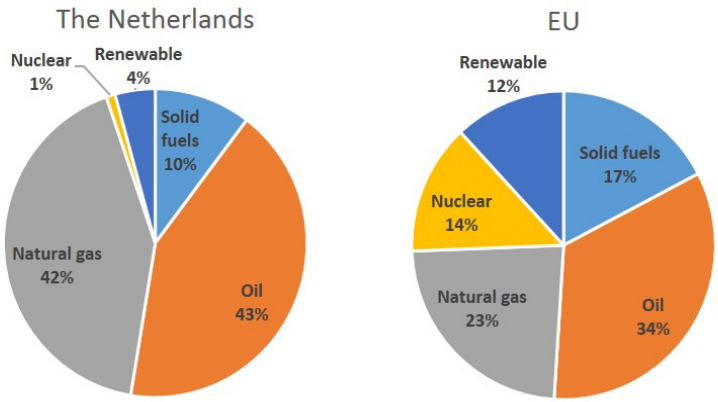


Figure 7: The Netherlands and EU percentage of fuel type for gross energy consumption in 2013 (Source: Own production based on Eurostat (2015a))

5.3.2 Climate and Energy Policies on a National Level

The first national climate change policy in the Netherlands was in 1989 and overall awareness of climate change is high due to the national characteristics of the country and its vulnerability to rising sea levels for its arable land. The Dutch have been active in mitigation and adaptation policies, such as the *Deltaprogramma* for flood protection. However, with the dominance of Dutch natural gas supplies and the vulnerability to flooding has led to more progress in adaptation than mitigation (Wevers, 2014). The long-term Dutch energy policy is to transition to sustainable and low carbon energy supplies by 2050.

The implementation of climate plans falls under the Ministry of Economic Affairs, with the administration by the NL Agency. Here the *'New energy for climate policy: The Clean and Efficient programme'* (2010) presents the following targets:

- A 30 % decrease in the emission of greenhouse gasses by 2020 compared to 1990;
- 2 % annual energy savings;
- An increase in the share of renewable energy sources to 20 % by 2020.

In 2011 the government published a sustainability agenda which identified the main priority areas for future policies, such as resources and product cycle, sustainable water and land use, food production, climate and energy, and mobility (Dutch Government, 2013). Then in 2013 the *'Energy Agreement for Sustainable Growth'* was created by the Social and Economic Council of the Netherlands (SER) which has brought forward agreements between actors of national, regional and local government, unions, employers and other private actors and organisations for long-term action and short- to mid-term targets. Here the agreement has reformulated the targets to the following (SER, 2013):

- A saving in final energy consumption averaging 1.5 % annually;
- An increase in the proportion of energy generated from renewable sources from 4.4 % currently to 14 % in 2020;
- A further increase in that proportion to 16 % in 2023;
- At least 15,000 full-time jobs, a large proportion of which will be created in the next few years.

Also In 2013, the Ministry of Infrastructure and the Environment, created the '*Climate Agenda: Resilient, Prosperous, and Green'* outlining the Netherlands vision for a climate agreement. Here the Dutch climate targets are a 40 % reduction of CO2 emissions by 2030 compared to 1990 levels. The Dutch national policies therefore follow EU recommendations on CO_2 reductions and are actively engaged in the EU ETS (Wever, 2014)

5.3.3 Local Climate Policies

In the Netherlands, municipalities are seen as a key driver to push climate action in the country and to contribute to the national targets. In 2007 the *'Climate agreement municipalities and Dutch Government 2007-2011: working together on a climate-proof and sustainable Netherlands'* was put into action. The main targets of this agreement are; 75 % sustainable procurement by municipalities in 2010 and 100 % in 2015; the national government and municipalities to increase the share of sustainable energy to 20 % in 2020; and new housing developments to be climate-neutral by 2020 (NL Agency, 2010).

In order to implement the Climate Agreement, municipalities receive support from the NL Agency, which works under the Ministry of Housing, Spatial Planning, and the Environment. The NL Agency works with the Local and Regional Climate Initiatives program for the municipalities and provinces in the Netherlands with the aim of increasing local and regional climate policy and participation in multiple relevant networks, such as the G4 and G32[1]. The implementation works under five themes; sustainable government; sustainable energy production; clean and energy-efficient mobility; energy-efficient built environment; sustainable businesses. Participating municipalities receive support from the Ministry for Housing, Spatial Planning, and the Environment (VROM), NL Agency and the Association of the Netherlands (VNG) in order for municipalities to carry out innovative projects that can be shared between the municipalities in the Netherlands (NL Agency, 2010).

[1] The G4 is a network between the four largest cities in the Netherlands. The G32 is a network between 37 of the 100,000+ size

CHAPTER 6

MUNICIPAL CASES

These targets are more ambitious than the national Danish and Dutch climate target, and therefore these municipalities will lead the way nationally and globally

6 MUNICIPAL CASES

In a comparative study it is necessary to understand what 'objects' you are comparing, and how these are deviate from each other. Therefore, the following chapter presents the key data on the municipalities studied: Aarhus, Copenhagen and Sønderborg in Denmark; Eindhoven, The Hague and Zoetermeer in the Netherlands. Lastly, an individual section for each of the municipalities will outline the key points of their strategies and plans.

The demographic data for the six chosen municipalities as the main data source are shown in table 3. It is important to understand the size and density of the different municipalities, since other studies identify an interaction between CO_2 emissions, climate change and the density of cities (Dodman, 2009; Rosenzweig et al., 2010). Aarhus and Sønderborg in comparison to the other municipalities are larger in area size. However, this is explained by the Netherlands being smaller than Denmark in area and having four times the amount of municipalities, and the greater area of Copenhagen is divided into multiple municipalities. Furthermore the density is higher in Copenhagen and the Dutch municipalities due to the same explanation from above. The six municipalities are some of the leading municipalities in both Denmark and the Netherlands, as well as globally. Information about the six municipalities strategies is presented in table 3.

Most of the municipalities have a target of becoming 100 % CO_2-neutral before or in 2030. The Hague's target is to become climate-neutral by 2040, which mean: *"a city whose direct energy supplies are wholly sustainable generated – in other words, a city which has significantly reduced (mitigated) its carbon dioxide emissions"* (Municipality of The Hague, 2011: 8). Also, Eindhoven's long-term target is to become energy-neutral which they define as that energy demand must be limited as far as possible, and the energy needs within the city's boundaries must be met directly with sustainably energy (LightHouse, 2014). These targets are more ambitious than the national Danish and Dutch climate target, and therefore these municipalities will lead the way nationally and globally. It needs to be mentioned that there are different ways of accounting CO_2 emissions, which can explain some of the variation. For this study when talking generally about the municipalities they will be referred to as 'CO_2-neutral', whilst in the discussion on individual municipal targets will be described as what the municipality state. In the following section each case municipality is presented based on their long-term climate strategy which outlines the main targets, objectives and initiatives in becoming 100 % CO_2-neutral, climate-neutral, and energy-neutral.

Municipality	Aarhus	Copenhagen	Sønderborg	Eindhoven	The Hague	Zoetermeer
Population [2[	326,246	580,184,	74,937	221,402	515,880	123,784
Area size (km^2)[3]	469.56	86.20	496.57	87.72	98.12	37.05
Density (per km^2)	689.8	6,731	152	2,524	6,240	3,583
Document	Århus CO_2 neutral i 2030	Copenhagen 2025 – Climate Plan	ProjectZero Masterplan 2029	Vision and Roadmap Eindhoven Energy Neutral 2045	The Hague – Climate Plan	Programma 'Duurzaam Zoetermeer 2030
Time period of the target	-Start year: 2007 -End year: 2030	-Start year: 2012 -End year: 2025	-Start year: 2010 -End year: 2029	-Start year: 2014 -End year: 2045	-Start year: 2011 -End year 2040	-Start year: 2007 -End year: 2030
Long-term goal	CO_2-neutral	CO_2-neutral	CO_2-neutral	Energy neutral	Climate neutral	CO_2-neutral
CO_2 emissions (tonnes)[4]	2,032,540 (2011)	2,029,665 (2013)	674,000 (2007)	Unknown	2,994,000 (2014)	Unknown
CO_2 emission (tonnes) per inhabitant	6.27	3.60	8.8	Unknown	5.80	Unknown
Sectors included	☑ Buildings ☑ Industry ☑ Transport ☑ Electricity ☑ Heat	☑ Buildings ☑ Industry ☑ Transport ☑ Electricity ☑ Heat	☑ Buildings ☑ Industry ☑ Transport ☑ Electricity ☑ Heat ☑ Agriculture	☑ Buildings ☑ Industry ☑ Transport ☑ Electricity ☑ Heat	☑ Buildings ☑ Industry ☑ Transport ☑ Electricity ☑ Heat	☑ Buildings ☑ Industry ☒ Transport ☒ Electricity ☑ Heat
Milestone	Unknown	20 % CO_2 reduction in 2015 compared to 2005	25 % CO_2 reduction in 2015 compared to 2007	Unknown	30 % CO_2 reduction in 2020 compared to 1990	-8 % CO_2 reduction in 2010 & 30 % CO_2 reduction in 2018 compared to 2007

Table 3: Municipal key informations

[2] Statistics Denmark (2015a) and Statistics Netherlands (2015)
[3] Statistics Denmark (2015b) and Statistics Netherlands (2014)
[4] Municipality of Copenhagen (2014b), ProjectZero (2009a), Municipality of Aarhus (2012b) and The Hague through E-mail.

6.1 Aarhus

The city of Aarhus is the 2nd largest city in Denmark with a population of 326,246 and is located on the east coast of the Jutland. The vision *Århus CO_2 neutral i 2030 – Klimaindsats i Energiby Århus* (Aarhus CO_2 neutral in 2030 – Climate initiative in Energy city Århus) is used as the main overview what Aarhus municipality will do to become CO_2-neutral in 2030. The focus of the vision is defined by three principles: Long-term perspective, holistic approach, and synergy between actors. Furthermore, the *Klimaplan 2012-2015 – Det intelligente energisamfund* (Climate plan 2012-2015 – The intelligent energy society) has been studied to gain an overview that is presented.

6.1.1 Targets

In 2007 the council of Aarhus municipality agreed on becoming CO_2-neutral in 2030. This emphasises that Aarhus municipality is an ambitious climate municipality by being of the leading municipalities in Denmark. Aarhus municipality further states that they will be able to influence the national legislations through this target. The target of CO_2-neutrality includes all of the different sectors, and in 2011 the total CO_2 emissions for Aarhus municipality was 2,032,540 tons CO_2/year.

6.1.2 Objectives

Aarhus has developed three objectives in the vision that will support them towards becoming CO_2-neutral: *Collective solutions, public participation, collaboration with businesses and educational institutions*. Under each of these objectives a set of focus themes are highlighted. However, the vision is an overall guiding document and is not proposing any concrete measures. Instead, Aarhus develops, like most Danish municipalities, a climate plan that works as a short-term action plan and provide the guidance for achieving the overall objectives.

Since 2007, Aarhus has developed three different climate plans: 2008/09, 2010/11 and the current 2012/15. Aarhus's pathway towards CO_2-neutrality is therefore directed through a number of different climate plans that ensures that actual progress are accomplished, evaluating and learning, and readjusting future strategies to the overall long-term target.

6.1.3 Initiatives

Within the climate plan Aarhus identifies four focus points: *CO_2 emissions, security of energy supply, growth, and climate adaption.* These four focus point unfold into nine different focus areas including energy supply, transport etc. It is within these nine focus areas the actual measures are implemented from the climate plan. However, Aarhus municipality have identified five main streams, which will guide the different focus areas:

1. Fossil free energy
2. Energy efficiency in buildings and residence

3. Energy efficient transport
4. Intelligent energy system
5. Export – Catalyst

Under each of these main streams different projects are presented with a description of the actual projects, the expected results and which actors that are participating. Therefore the climate plan is providing a short-term overview over of what Aarhus municipality will implement to actually move towards their target. Furthermore, the *Klimaplan 2012-2015* includes a short evaluation of the climate plan from 2010/11 and what was learned from this. As a last note, Aarhus is currently in the process of evaluating the current climate plan and develops the future plan from 2016.

6.2 Copenhagen

The Municipality of Copenhagen is the capital and largest city in Denmark with a population of 580,184. The main document that is used in this study is the *Copenhagen 2025 –Climate Plan* which has been produced and published by the municipality of Copenhagen in 2012 and has been studied to gain an overview that is presented. This climate document is a holistic plan that works with initiatives and goals within four areas; energy consumption, energy production, green mobility, and the city administration. The context of the climate plan is to create a better quality of life, innovation, job creation, and investments in green technologies, which not only reduces emissions but also benefits everyone in Copenhagen.

6.2.1 Targets

The main goal for Copenhagen is to become the first capital city in the world to be CO_2-neutral by 2025 and has targets within the four specific areas just mentioned. The document states that the goals for 2025:

- *Energy consumption*: 20 % reduction in heat consumption, 20 % reduction of electricity consumption for commercial buildings and 10 % reduction in households all compared to 2010 levels.
- *Energy production*: To have a carbon-neutral district heating system and with the separation of plastic from waste. Also that electricity production is based on wind and biomass.
- G*reen mobility*: 75 % of all trips in Copenhagen are by foot, bicycle, or public transport. That 20-30 % of light vehicles and 30-40 % of heavy vehicles run on new fuels.
- Ci*ty administration*: for 2025 are to reduce energy consumption in municipal buildings by 40 % compared to 2010.

6.2.2 Objectives

The *Climate plan 2025* is building upon the former strategy *København Klimaplan* (Copenhagen Climate plan) from 2009. Within the *Climate plan 2025* Copenhagen developed a Roadmap for 2013-2016, under this period different initiatives from the four main areas are included. This is a detailed time schedule for different initiatives towards becoming CO_2-neutral. The pathway towards 2025 is divided into three different periods: 2013-2016, 2017-2020, and 2021-2025. In the end of the first two implementation periods a detailed evaluation will be conducted to ensure that Copenhagen are moving towards 2025, and allow them to readjust the strategy. A final evaluation will be conducted in 2025-2026 to ensure that the target and objects are fulfilled.

6.2.3 Initiatives

The climate plan sets out a number of initiatives in order to reach the goals for the four specific areas and thereby reach the 2025 target of becoming CO_2-neutral. For energy consumption the plan sets out to improve buildings and to create guidelines and funds for retrofitting to create more energy efficient buildings. In terms of energy production, 100 wind turbines will be constructed before 2025; citizens of Copenhagen will be given the opportunity to buy shares in. Also to find suitable areas in other municipalities to place wind turbines. The power stations at Amager and Avedøre will be converted into biomass whilst new biomass-fired CHP plants will be built.

For green mobility, conditions for cyclist will continue to be improved, whilst the municipality will demonstrate projects for new fuel vehicles and construct electric and hydrogen filling stations, and will increase the number of public transport vehicles using electricity and biofuels. The municipality plans to use new traffic management technology to create behaviour change in citizens, which will include collaborations between businesses, local groups, and citizens. The initiatives for the City Administration will include monitoring its own buildings as well as placing 60,000sq/m of solar panels. Also by using the size of the municipality as a company to create a higher demand for sustainable products through green procurement across the organisation. Finally, over 30,000 street lamps will be replaced. Many of the on-going projects are presented in the project catalogue *Copenhagen Climate Projects* from 2014, which demonstrates the variety of initiatives undertaken.

6.3 Sønderborg

The Municipality of Sønderborg is in the Region of Southern Denmark and has the population of 74,937. The main document used for this study is the *ProjectZero Masterplan 2029 – for a CO_2-neutral Sønderborg region* which was produced by ProjectZero and published in 2009 (ProjectZero, 2009a). The municipality in cooperation with ProjectZero set the target of becoming CO_2-neutral. ProjectZero is organisation that was established in 2008 with financial support from Sønderborg municipality,

Bitten & Mads Clausen's Fund, SYD ENERGI, DONG Energy and the Nordea Fund. Project Zero develops, manages and implements the master plan.

6.3.1 Targets

Sønderborg wants to become one of the first municipalities that are 100 % CO_2-neutral by 2029. This will be a gain for the inhabitants and enterprises that will benefit from the better environment, new expertise and new green jobs. There are three key areas of focus to achieve the 2029 target; substantial energy efficiency measures; conversion of the energy supply to renewable energy; and the transformation to a dynamic energy system. The target for 2015 is a 25 % reduction in CO_2 emissions based on 2007 levels. In terms of energy consumption the municipality will consume 1,434 GWh, which is 45 % lower than in 2007.

6.3.2 Objectives

The master plan is an overall long-term strategy that will establish the guidelines for achieving the overall goal. Whilst the actual implementations are divided into different action plans starting with the *Roadmap 2010-2015* that is almost finished and leading into the new action plan *Roadmap 2020*. There are seven different time periods in which actions will take place, the first two from 2010-2012 and 2013-2015. However, after 2015 there will be 5 more time periods up to 2029. All the measures identified will be used in the time period that fits them, for an example some of the technologies are not fully ready to be implemented.

Within the three key areas there are a number of strategies that will be implemented. In *energy efficiency* measures will be implemented when there is a need for refurbishment. Also the municipality will act as a role model to the citizens in this topic and will ensure not just 'easy' but 'difficult' savings will be achieved. In *conversion of the energy supply to renewable energy* the district heating will be based on renewable energy from waste, geothermic, biogas, biomass, solar heat, and heat pumps. Also, smaller settlements in the municipality will be based on heat pumps or biomass furnaces. All electricity production will be from renewable sources whilst the transport sector in the future will be based on biogas or bioethanol. The strategies for a *dynamic energy system* will include; exploring the possibility of real-time price signals; increasing energy storage capacity and movable consumption; and to provide show rooms of new technologies.

6.3.3 Initiatives

There are a number of constant initiatives through 2010-2029. These are: lower energy demands of buildings in which they are one or two classes above the rest of the building classification in the rest of Denmark; demonstration of package solutions for energy renovation of buildings; energy management

and optimisation under the communication platform ZEROcompany; and tests with energy saving charges that can increase the incentive to realise energy efficiencies.

The measures for 2010-2015 are: the expansion of the district heating grid; introduction of geothermal, solar, and biofuels in the district heating grid; changing oil furnaces, natural gas furnaces, and electric heating to district heating in urban areas and to heat pumps, biomass, and solar heat in the rural areas. Also the establishment of new on-shore wind turbines and biogas application in central plants. As mentioned before the Roadmap 2010-2015 is almost finished, and in the new Roadmap 2020 it is stated that the target for 2015 are almost realised (ProjectZero, 2015).

The assumed measures for 2016-2021 are; conversion of part of the consumption of fossil fuels and introduction of biogas in transport and manufacturing processes; establishment of central and decentralised PV plants; establishment of off-shore wind turbines; and new products and technologies. The assumed measures for 2022-2029 are; conversion of part of the consumption of fossil fuels in district heating production, transport, and manufacturing processes to bioethanol due to an increased production of non-food crops; a continuation of the establishment of central and decentralised PV plants; continuation of the establishment of off-shore wind turbines' and new products and technologies.

6.4 THE HAGUE

The city of The Hague is the 'political' capital of the Netherlands where the Dutch Government is based and with the population of 518,880 is the third largest city. The main document that is used in this study is the *The Hague Climate Plan 2011* which has been produced by the municipality and is based on the framework memo *Towards a Sustainable The Hague*, which was approved be the City Council in 2009. The Klimaat Fonds Haaglanden and Covenant of Mayors also supported the Climate Plan. The Climate Plan is one of thirteen project execution plans that are under the *Towards a Sustainable The Hague*, which aims to integrate all incentives and policies into one sustainable approach. However, the Climate Plan is discussed within all other plans in relation to climate initiatives.

6.4.1 Targets

The Hague has the long-term target to make the city climate-neutral and climate-proof by the year 2040. In this context climate-neutral is the same as CO_2-neutral and climate-proof means adapting to the consequences of climate change. This study focuses on the goal to be CO_2-neutral by 2040 and the way the municipality will manage the processes to reach this vision. The short-term goal for 2012 was to understand the context of this long-term target, identify barriers to achieving this, and develop tools for the desired future CO_2 reductions. The mid-term goal is in 2020, where the municipality is aiming

for a 30 % reduction in CO_2, a 20 % reduction in energy consumption, and for 20 % of the city's energy to be generated through sustainable means. The baseline is 1990 levels which was 3,000,000 tonnes CO_2, however, the 2009 levels that are the start point of this climate plan are 2,700,000 tonnes CO_2. This means that the 2020 target of a 30 % reduction is actually a 20 % reduction of CO_2 when compared to 2009 levels.

6.4.2 Objectives

The Climate Plan outlines four strategic choices in which to underpin the climate policy within the municipality:

1) Opening the dialogue: creating shared responsibility and making "shareholders" rather than "stakeholders".
2) Target-group-specific approaches: Differentiate between target groups within the three categories; household electricity usage, commercial electricity usage, and transport.
3) Using various types of policy instruments: Legal tools, communication / network tools, and economic tools.
4) Multi-stage approach: Initial small projects with local partners as pilots to lower key barriers to reducing CO2 emissions. Then to expand pilot projects to the public at large.

6.4.3 Initiatives

It is stated that The Hague's long-term targets require technology that is not economically or technologically available. The focus will be on energy-efficiency of households and commercial buildings, as well as switching to renewable production. They predict little gains within the transport sector due to the already high level of cycling in the Netherlands as a whole. The main initiatives in *Climate Action Programme* 2011-2012 have a budget of 10,088,000 EUR.

The main initiatives for energy conservation are; 5 million EUR for schemes designed to encourage owner-occupied to install renewable energy equipment; Scheme for loft and floor insulation and budgeted 1.95 million EUR that has been extended for 2012-2014.; 650,000 EUR for double glazing; 5.85 million EUR for municipal buildings to be made more energy-efficient (2008 action plan).

Other initiatives stated in the Climate Plan are to conduct a study in 2011 for the potential of aquifer thermal energy storage for districts; 2 Million EUR for solar energy for residents and commercial properties for 2011-2014; feasibility studies for private temporary wind turbines along the motorway east of the city; feasibility study for the potential to expand the geothermal heating that has been successful in the Zuidwest neighbourhood; expand and more-efficient heating grids; a feasibility study

on a regional biomass fermentation plant; and look into creating a central climate centre or many smaller neighbourhood climate centres.

6.5 EINDHOVEN

The city of Eindhoven is the 5th largest city in the Netherland and the largest in the province of North Brabant with a population of 221,402. The main document that is used in this study is the *Vision and Roadmap Eindhoven Energy-Neutral* 2045, which has been produced by LightHouse (Intelligent Lighting Institute of the Eindhoven University of Technology) in 2014. The vision and roadmap focuses on the built environment and will be used to create a framework for increasing knowledge and future decisions in the Municipality. Clear action plans are currently under development. The municipality of Eindhoven itself works under the principle *The Natural Step* where every decision within the municipality is checked for its contribution to sustainability.

6.5.1 Targets

The main document in Eindhoven is a vision and roadmap, thereby concrete CO_2 or other energy targets have yet to be clearly developed. Therefore the stated short-, mid-, and long-term goals are more vague. The short-term target is to create conscious energy savings and for own green energy generation. The mid-term target is to create Eindhoven's own energy management capabilities within the municipality. Finally, the long-term is to become energy-neutral in 2045 in the built environment (2035 without mobility). Eindhoven define this as that the energy demand must be limited as far as possible, and that the energy needs within the city's boundaries must be met sustainably.

6.5.2 Objectives

This *Vision and Roadmap Eindhoven Energy-Neutral 2045* has a four phase objectives approach:

1) Ambition: Analysis of current situation and define the scope of the content and partners.
2) Vision: Identify the most important value drivers.
3) Roadmap: Identify initiatives already in progress and future developments possible.
4) Programme: Roadmap forms the basis for programmes with the maximum effort on energy-neutrality (cost, time, creativity, and management attention).

6.5.3 Initiatives

Eindhoven's vision of becoming energy neutral is based on five key strategy elements that have been formed from workshops with councillors, housing cooperatives, and expert researchers. Firstly, the vision emphasise on a *value system* that all parties and citizens are to become sustainably aware in all aspects (energy, behaviour, products) and creating "real value". Secondly, *just doing it* by being proactive (history of proactivity in Eindhoven (Philips etc.)) and developing models against resistance – not just technical but social implementation. Thirdly, *innovation and learning* and the emphasis that it is not a linear route and requires collaborative approaches with all parties, with pilot projects and

smart choices. Fourthly, the *decisions* that consider all of the relevant factors and to create synergies and cross-boundary decision in the final processes. Finally, *responsibility* that to reach the 2045 targets there is a need to work with the national and EU level for legislations and support.

In the general understanding of the vision and roadmap the first step of the energy transition is to change social behaviour and increase social cohesion, increase insulation and the use of solar energy. The second step is to create sustainable heating and cooling systems throughout the city. Finally, thinking ahead in the infrastructural choices so that sustainable technologies become viable for electricity and heating.

6.6 ZOETERMEER

The city of Zoetermeer is the 3rd largest urban area in the South Holland region of the Netherland and has expanded rapidly from a village of 6,392 inhabitants' in 1950 to the current population of 123,328. The main document that is used in this study is the *Programma 'Duurzaam Zoetermeer 2030' (Sustainable programme Zoetermeer 2030)* which has been produced and published by the municipality of Zoetermeer in 2007. In 2013, the backcasting study *'Zoetermeer: van 2030 tot nu'* was developed and published for the municipality by CE Delft, an independent research and consultancy organisation specialised in developing innovative solutions to environmental problems. These have been studied to gain an overview that is presented.

6.6.1 Targets

Zoetermeer has the long-term target of becoming CO_2-neutral by 2030 and to be in the top ten most sustainable municipalities in the Netherlands. In the shot-term, the target is an 8 % CO_2 reduction (16,000 tonnes CO_2) by 2010 compared with the baseline 2007 levels and 50 % sustainable procurement in the municipality itself. The mid-term targets in 2018 are a 30 % CO_2 reduction (70,000 tonnes CO_2) compared to 2007 levels, 100 % sustainable procurement by the municipality, and to incorporate at least one sustainable project annually. However, Zoetermeer defines CO_2-neutrality as all the energy used in the municipality for heat, hot water and cooling is from renewable sources. They do not include electricity and transport as they state difficulties for the municipality to affect these sectors.

6.6.2 Objectives

The main strategy has set out five objectives that are key for the municipality to become sustainable:

1) Healthy environment: To focus on quiet neighbourhoods and that the air quality is 20 % better than current EU standards.
2) Climate neutral Zoetermeer: That all energy for heating and cooling are CO_2-neutral by 2030.
3) A Natural Zoetermeer: To maintain green spaces for both wildlife and leisure facilitates.

4) Sustainable purchases: That all municipal purchases meet the 100 % sustainability criteria.
5) An Innovative Zoetermeer: The need to encourage innovation that can benefit a sustainable development.

6.6.3 Initiatives

The long horizon of the sustainable programme in Zoetermeer means that there are less concrete measures and the strategy is set out as a guide to the 2030 targets. However, it is stated that it is important for the programme to be visible with projects implemented that are seen by many and also that the progress of reductions are visibly measurable. It is important that it is not only the Urban Development Department of the municipality that is working with the climate policies but also that other departments and external parties (including individuals and entrepreneurs) have ownership of the overall programme. Also, there is a focus on important agreements and process that work on improving relationships and creating social cohesion. The goals of the sustainable Zoetermeer programme must be translated into other policy documents such as; *The City Vision; Energy Vision; Vision Public Space and the Chance Card recreation; Sustainable Procurement Policy; Sustainable Building; and Noise Policy and Air Quality.*

The main tools for the actions in the sustainable programme are using a communication campaign for energy saving for residents and municipal staff; creating alliances with major corporations such as Rabobank, Siemens etc.; enabling strategic environmental assessments for businesses and entrepreneurs; integrating sustainability into all relevant municipal decisions and projects; subsides from EU and national level for residents; and engaging in the G32 platform for municipalities of 100,000+ inhabitants for joint actions and knowledge gaining and lobbying powers.

CHAPTER 7

ANALYSIS

"The key point will be to accelerate pace that measures will be taken by parties in the city and this are our inhabitants and also our companies, and other organizations. (…). As a municipality we are seeking ways to support and facilitate these parties in the city to accelerate the implementation rate of the measures." (Practitioner of The Hague)

7 ANALYSIS

The following chapter brings together the data collected from the *Knowledge Background, National Context, Municipal Cases* and the practitioner interviews from the six municipalities in an explorative and comparative presentation relating the research question, as shown in figure 8.

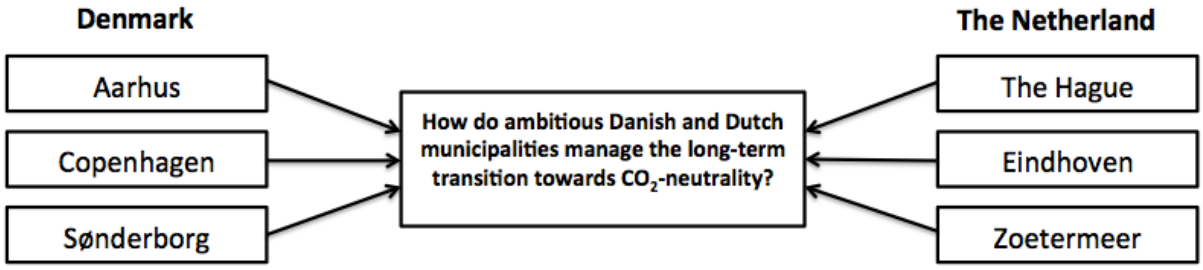


Figure 8: Analysis overview

This chapter is divided into four main sections. Firstly, *The Development of the CO_2-Neutral Targets* is presented to understand the circumstances of the six municipalities. Secondly, *The Role of the Municipality in the Transition* provide knowledge on how these six ambitious municipalities are working with the transition towards becoming CO_2-neutral. Thirdly, the *Anchoring the Climate Policy* is examined within the municipalities to understand the procedures, formal and informal, of supporting the CO_2-neutral target. Finally, *Navigating the Transition* examines the management approaches the six municipalities are taking towards becoming CO_2-neutral. The four main sections of the *Analysis* chapter are summed-up at the end of each section in which questions are proposed from the examined data and further discussed in the *Discussion* chapter.

7.1 THE DEVELOPMENT OF THE CO_2-NEUTRAL TARGETS

Throughout the following part of the analysis the development of the six Danish and Dutch municipalities CO_2 neutral strategies are presented. In the *Introduction* it was identified that an increasing amount of municipalities are developing climate strategies, yet it is only a minority that engage themselves to the CO_2 neutral target, therefore it is interesting to understand why exactly these six municipalities choice to develop their CO_2 neutral strategies. This section explores

- the circumstances for the development of the municipalities CO_2-neutral strategy
- political support on the climate agenda
- the relationship between party politic and the climate target
- the institutional changes within the municipalities
- the concept of Transition Arena

These parts are summed up in a last subsection highlighting the outcomes in regards to the development of the CO_2 neutral strategies and proposing questions to the *Discussion*.

Section Findings

- **Different circumstances lead to the development of the municipalities' CO_2-neutral targets including political, financial and reputational influences through internal and exogenous levels**
- **All municipalities strive to stimulate local growth through their CO_2-neutral target.**
- **The introduction of the CO_2-neutral target within the municipalities has created institutional changes in the norms, rules, values and structures to accommodate the climate agenda.**
- **Political support of the CO_2-neutral target within the municipalities has created institutional changes in the norms, rules and values, which have empowered the climate agenda.**
- **All of the municipalities state they have broad political support on the CO_2-neutral target, which is important for a long-term transition.**

7.1.1 Circumstances for the Development of the CO_2-Neutral Targets

As discussed within the *Municipal Cases* and shown in table 3, the six municipalities have different targets varying from *CO_2-neutral*, *Climate-neutral* and *Energy-neutral*, while their end year of the targets differs from the first one in Copenhagen by 2025 to Eindhoven in 2045. In the following section a descriptive presentation of the circumstances for the development of the six municipalities climate targets are outlined to provide insights into the institutional changes this potentially have created. The following section presents: *Danish Circumstances; Dutch Circumstances*.

7.1.1.1 Danish Circumstances

The practitioner from Aarhus states that CO_2-neutral target was developed due to reputational influence: *"In 2007 the city council in Aarhus developed the ambitious target: Aarhus CO_2-neutral in 2030. This emphasizes that Aarhus want to be one of the leading Danish climate cities"* (Municipality of Aarhus, n.d: 3). The practitioner from Aarhus further states that it is not only about the CO_2-neutral target but also the potential to create local growth within the municipal borders. In particular the point that combining the target with innovation and growth is recognised by all of the Danish and Dutch municipalities as a key asset to the development of their CO_2-neutral targets.

In 2010 The Municipality of Sønderborg developed their target of becoming CO_2-neutral in 2029. Compared to the other five municipalities Sønderborg is quite unique in being a rural area and therefore encounter other challenges than some of the more dense and larger municipalities in this study. One of the challenges is that urbanisation is causing a decrease in population in rural areas such as Sønderborg municipality and the same trend occurs with the employment market. Instead of passively ignoring the trend the municipality decided to actively try and prevent this:

> *"We had to get some growth in our area, and one had to identify what was special about us. Therefore we choose to bet on the green (…). We have many engineers here, and we have many enterprises that have their focus area on developing green technologies (…). So therefore a PPP (Public Private Partnership) was established in 2007 that was called ProjectZero (…). To say it gently, if you do not do anything down here then you become a part of what you call peripheral Denmark, and that we do not want."* (Practitioner of Sønderborg – Own translation)

Sønderborg did not want to become part of a peripheral Denmark and instead developed a vision for how the municipality could become CO_2-neutral and thereby create growth and at the same time remain attractive for both enterprises and citizens, which is very much a financial based reason. This vision was closely connected with the existing knowledge institutions within the municipality and the practitioner highlights private support as a key to the development of the vision. Furthermore, it was decided to restructure the municipal institution by establishing ProjectZero, which supported the

transition by developing and managing the *Masterplan* and *Roadmap's*. Being a rural municipality creates other challenges for Sønderborg in comparison to the other five more dense municipalities. The practitioner from Sønderborg emphasises several of these challenges in the interview and indicates a great awareness of the locational limitations that have been taken into consideration in phase one of the *Transition Management Cycle*:

> *"Sønderborg is an agriculture area and this is needed to include (…). There is a huge different between municipalities e.g. the municipalities in the Copenhagen area have another type of transport compared to Sønderborg"* (Practitioner in Sønderborg – Own translation)

Sønderborg has other challenges to deal with than the other municipalities and here the practitioner especially compares Sønderborg to Copenhagen referring to the limited number of people cycling and the use of public transport: *"(…) it can be normal to own two cars"* (Practitioner in Sønderborg – Own translation). The circumstances for the development of the CO_2-neutral target in Copenhagen is rather political in nature when compared to Sønderborg. The Copenhagen Climate Plan was developed in 2009 in the period leading up to the COP15 as part of the Danish Government's desire to demonstrate what was possible and how the local-level has a major role in mitigating climate changes. Also, Copenhagen was the host city of the COP15 meeting and therefore it was keen to illustrate a showcase on what a capital city could achieve. With the climate target, Copenhagen is set to become the first CO_2-neutral capital in the world, and this maintains their reputation as being an international front-runner on sustainability.

Even though Copenhagen and Sønderborg highlight different circumstances for the development of the CO_2-neutral targets, it is still two examples of institutional design according to the theories of Alexander (2005). Especially the case of Sønderborg can be seen in the perspectives of institutional design as the new climate policy initiated a restructuring of the current institution with the establishment of ProjectZero. This lead to a change in the norms and rules since ProjectZero now handles several of the municipal procedures. This can be seen as designing the existing institution to accommodate the new desired objectives as the *"existing planning systems and institution are flawed or perceived as inadequate for their purposes"* of becoming CO_2-neutral (Alexander, 2005: 210). Furthermore, the values of the municipal institution in Copenhagen were changed due to a desire from the Danish government to demonstrate what was possible at a local level. These are examples of institutional changes as a result of the introduction of new targets and strategies to accommodate the climate agenda.

7.1.1.2 Dutch Circumstances

The Hague's *Climate Plan* mentions both the climate impact and the decreasing amount of fossil resources as two examples for the development of the climate-neutral target. It also states that The Hague has the innovation and leadership within the municipality and therefore: *"keenly feels the urgency of the situation and wishes to join forces with local leaders in the field of energy conservation."* (Municipality of The Hague, 2011: 5). The practitioner from The Hague further states that The Hague has a reputation as a climate leading municipality and they want to maintain this in the future.

The practitioner from Eindhoven highlights the need to combine the target with innovation and growth as an important factor for the development of the energy-neutral target: *If we can combine the economical strength and the research strength with our ambitions of energy-neutrality then we are doing a good job"*. The Municipality of Eindhoven is known historically as being an area for development of technical knowledge and the practitioner refers to it as being the *'Brainport'* of the Netherlands with a large number of technological enterprises and institutions. Another important circumstance for the development of the target was a national scheme that seeks to motivate Dutch municipalities to set climate targets through funding for specific projects from the Dutch government. This scheme from the national government can be seen as an exogenous force that lead to the development of the target in Eindhoven. The practitioner in Eindhoven states:

> *"There was this discussion point with our Alderman (Elected politician) whether we should say CO2-neutral or energy-neutral and he chose to have this term energy-neutral for the reason (…) that is mainly political and that the content is virtually the same as CO2-neutral in my view."* (Practitioner of Eindhoven)

According to the practitioner in Eindhoven energy-neutral was chosen as it is seen as being less controversial within the broader society. Not everyone believes in climate change, whilst everyone understands the need for energy and that the amount of fossil fuels is decreasing year-on-year. This should be seen as a deliberate method of strategically navigating the target and thereby getting the vision accepted into the broader society of the Municipality of Eindhoven. This is working strategically to create a mutual problem definition in phase one of the *Transition Management Cycle* that can be accepted by as many stakeholders as possible, bringing strength to the long-term vision, which can be seen as approach to preparing the transition arena.

Zoetermeer is more of a residential municipality, and therefore has limited industry compared to the other municipalities. Instead the development of Zoetermeer's target was affected by reputational

circumstance. According to the practitioner in the Municipality of Zoetermeer, exogenous circumstances lead to the development of the CO_2 neutral target:

> *"We (the municipality) got a prize from a regional environmental organisation (…) for the worst program on this subject in the region. That was a very big wake-up call for the politics (sic. Politian's) here; they felt a lot challenged at that moment. So the target couldn't be big enough, actions was needed, and at that moment the, was also budget was quite okay for the municipalities (…) so everything fell in its place."* (Practitioner of Zoetermeer)

Here exogenous forces triggered the development of the CO_2-neutral target in 2007 and the plan *Programma 'Duurzaam Zoetermeer 2030'*, and instead of being in the lower level bracket of municipalities with a climate agenda Zoetermeer are now having a target more ambitious than most other municipalities: *"The Municipality of Zoetermeer has high ambitions and is among the 10 most sustainable municipalities belong in the Netherlands"* (Municipality of Zoetermeer, 2007: 2). This illustrates how exogenous forces can affect the politicians within a municipality and create a need for institutional design to change the political values within the institution to focus more on the climate target and thereby enhance the reputation of the municipality. With Alexander's (2005) proposals on different approaches to institutional design the example in Zoetermeer could be perceived as '*objective*' institutional design, since exogenous forces outside the institution triggered the change of values within the municipality.

7.1.2 Political Support

Introducing an ambitious target of becoming CO_2-neutral will change different procedures within the municipalities to accommodate this new target. This sector will examine how political support and party politics influences the climate targets and strategies. The following section presents: *How has Political Support Changed the Institution?; How does Party Politics Influence the Climate Agenda?*

7.1.2.1 How has Political Support Changed the Institution?

In Aarhus and Copenhagen the municipal council chose the climate target as a main focus in the municipality. Questioning the practitioner on whether it is easier to implement a sustainable project within their municipality today, the practitioners replied that the climate agenda has been empowered in a positive direction within the institution of these two municipalities: *"the city council they have for 6 month ago decided five targets that are the main targets for Aarhus municipality, and one of these targets was the CO2 emissions."* (Practitioner of Aarhus) and *"the agenda is powerful in Copenhagen, and you know, when you can see climate mitigation and adaptation is one out of three of the focus areas in the city"* (Practitioner of Copenhagen). Having such a strong political support behind them gives power

to the practitioners, and even though it is not formal power it has changed the values and norms of the institutions of Aarhus and Copenhagen.

The focus on becoming CO_2-neutral is also having a significant political impact within the municipality of Zoetermeer. Here the practitioner highlights how the municipal council is pushing to accelerate the climate agenda *"The municipality is focusing on this target. They want achievements of up to 100 %. This is pushing the work so the pressure is coming from the council (board/political)"* (Practitioner in Zoetermeer). In Sønderborg the politicians are often getting involved since certain projects or schemes that require their approval. The practitioner also emphasises that with the green profile that Sønderborg has, it is often easier to push through with the climate agenda. While Eindhoven succeeded in pushing through their target of becoming energy neutral by 2045, the practitioner states that *"if it was 5 years before I do not think I could have this before because political people were not interested in this subject"* (Practitioner in Eindhoven).

With the different examples of the practitioners from Aarhus, Copenhagen, Eindhoven, Sønderborg and Zoetermeer it indicates that the CO_2-neutral targets have become an important agenda within the institutions and changed the values and norms. This change in the institutions are specifically shown in the example of Eindhoven, where the practitioner mentions that five years ago this could not have happened due to political values and rules within the institution. The practitioners from Aarhus and Copenhagen state that this political support has made it easier to work on the climate agenda and therefore the institutional rules has changed to accommodate the CO_2-neutral target. This shows that the political level within the transition arena is an important aspect for the strength of the long-term strategy.

A practitioner from The Hague directly translates power into economy, and emphasise that without a significant budget it is difficult to have any power within the institution of the municipalities: *"No we don't have a lot of power since we hardly have any budget"* (Practitioner in The Hague). Burch (2010) identifies this as being a cultural and behavioural barrier, when politicians propose new targets or initiatives without supporting this with additional funding. Instead the practitioner in The Hague continues on how the practitioner instead needs to enter the other department's regime: *"So we have to be there at the right time and take part in the discussions of the other departments"* to achieve changes (Practitioner in The Hague). The same circumstance is identified within Aarhus municipality: *"Not for the climate secretary, we don't have more power, but we have mandate to make these questions on climate"* (Practitioner in Aarhus).

The practitioners within The Hague and Aarhus do not feel they have gained more formal power, however both of them mention that it is now about using their new mandate to get through sustainable projects within the institution. In the perspective of institutional design this is an example of how the rules have changed within the municipalities, since the practitioners are now able to use their mandate to affect other practitioners within the municipality.

These examples from the municipalities indicate that the CO_2-neutral target is politically supported and how this has changed the institutional norms, rules and values within the municipalities, which have empowered the climate agenda. However, the practitioner from Copenhagen highlights that it is important to have continuous support throughout the transition:

> *"If our own city council will support what is needed in the coming years, and I think the next four years will be extremely important, because some of the initiatives is really where you have to work constantly every year, and you can just do them from 2023. And that is first of all buildings, but in fact also supporting the introduction of new fuels."* (Practitioner in Copenhagen)

Therefore the practitioner from Copenhagen highlights that the city council needs to maintain focus on this target and support it politically as there is a need to target some of the more challenging sectors constantly throughout the coming years. Furthermore, the practitioner in Eindhoven stressed the need for continuous political support since the budget system within the municipality is not accommodating the long-term transition.

> "(...) *this measurement that you take will have a payback time which is shorter than the technical lifetime of the measure then you have to implement this measure...if a department says we do not have the money to implement that measure then we can go to our politician then you have to do it as there is a decision that if the payback time is shorter than the lifetime your just have to do it"* (Practitioner in Eindhoven)

The current budget system is geared towards short-term projects and investments, as it easier to allocate funds to smaller projects that meet the demands of politicians who are looking for immediate results or a quick payback time. A new budgetary system should instead accommodate long-term investment with a shorter payback time than the actual technical lifetime of the measure. If this new decision structure was introduced within the municipality it would support managing the long-term transition.

7.1.2.2 How does Party Politics Influence the Climate Agenda?

Sønderborg has broad political support within the municipal council and even though there have been elections with a change of politicians the target is still supported, which includes parties from both political sides. The practitioner highlights political support as being crucial for reaching the CO_2-neutral target. This is further supported by the practitioner from Copenhagen who states: *"when we looked at the budget negotiations and the budget agreement and he had brought it support, so in fact it is also the radical left and the Danish National party (Dansk Folkeparti) is also a part of that agreement".* Aarhus specifically states that party politics is not influencing the climate strategy and the practitioner highlights this in the following quote *"During the last years we have had one Vice-Mayor from Venstre and one from the Social Democrats and I think that both have been very interested"* (Practitioner of Aarhus).

The practitioners highlights this broad support as a significant advantage for the development of the climate target, and even with an election that changed the structure within the institution, the municipalities still have support from the left- and right-wing council members on the climate agenda. This indicates that the values of the three Danish municipalities are anchored within the institution to support the CO_2-neutral target.

In The Hague the practitioner states *"all political parties they have more or less climate issues adopted in targets"* while the Eindhoven have a left wing coalition in the municipality. Both The Hague and Eindhoven emphasise that they have in general a broad political support on the climate agenda, and that party politics does not influence their work. However, both mention that this may become a challenge in the future if certain parties become dominant within their council *"When we have another election in a couple years and another coalition then it is politics to decide"* (Practitioner in Eindhoven). Yet both are somewhat optimistic that this will not occur in the next foreseeable future.

These examples from the municipalities give insights as to the importance of having broad political support on an ambitious target such as becoming CO_2-neutral. It appear that there is general consensus that party politics do not specifically influence the six municipalities that are examined in this research study, which indicates that the climate policy in the municipalities is well anchored within the institution. This broad political support is important to continuously maintain the focus of the long-term target, as previously mentioned by the practitioner in Copenhagen.

7.1.3 What are the Findings from the Development of the CO_2-Neutral Targets?

In the section *Circumstances for the Development of the CO_2-Neutral Targets* it was found how Copenhagen was inspired by the national government on developing their target, while a Dutch

national scheme and the local Brainport inspired Eindhoven. Aarhus and The Hague strive to be front-running municipalities on the climate issue, and Sønderborg developed the target to avoid becoming a part of peripheral Denmark. Zoetermeer developed the CO_2 neutral target due to having a negative reputation influenced by exogenous forces due to being awarded the region's worst performing sustainable municipality. This shows how different political, financial or reputational circumstances lead to the development of the municipalities CO_2-neutral targets at an internal or exogenous level. Furthermore, Aarhus and The Hague highlight the potential of creating local growth by developing the CO_2-neutral targets as important factors, which is further recognised by all of the municipalities as being a crucial part of the transition. Therefore, all of the practitioners strive to stimulate local growth through their CO_2-neutral target. Also, several practitioners indicate how the introduction of the CO_2-neutral target within the municipalities has created institutional changes in the norms, rules, values and structures to accommodate the climate agenda. For example, ProjectZero has changed the institutional structure within the municipality of Sønderborg, which changed the norms and rules due to ProjectZero now managing certain procedures that were formerly handled by the municipality. However, different questions are proposed from this section: Why do the municipalities have different targets? Why are the Danish municipalities targets more ambitious than the Dutch ones? How is the balance between the climate agenda and other economic priorities?

Secondly, in the section of *Political Support* the practitioners from Aarhus and The Hague emphasise that they do not feel empowered personally but both indicate that the climate agenda now has a mandate. Furthermore, the climate agenda is a key area within the municipalities of Aarhus and Copenhagen, while the politicians within Eindhoven, Sønderborg and Zoetermeer are actively pushing the transition. These examples highlight how political support has changed the values and norms within the municipality, especially in the case of Eindhoven where the climate agenda would not have been possible five years ago. Several of the practitioners state that they feel that the climate agenda is empowered by this political support. Furthermore, the practitioners all indicate that broad political support is important throughout the long-term transition towards becoming CO_2-neutral. Several of the municipalities have had members in the council or different vice-mayors from a broad variety of political parties who all supported the CO_2-neutral target. With these findings in mind the following question is asked: How can politicians further empower the climate agenda in the long-term transition?

7.2 THE ROLE OF THE MUNICIPALITY IN THE TRANSITION

Throughout the following part of the analysis the role of the six Danish and Dutch municipalities in the transition are examined. The role of municipalities and planners, as argued for in the *Knowledge Background* chapter, has shifted in the context of climate change. Enabling and facilitating has become a key mode of governance municipalities have in creating change. Therefore, it is key to identify the role of these six ambitious municipalities, how these roles differ between them and where they have been successful in collaborating. The following section contains:

- how municipalities work with private actors
- the collaboration between municipalities
- how municipalities influence the market
- innovation theory
- different phases of transition management

These parts are summed up in a last subsection highlighting the outcomes in regards to the role of the municipalities in the transition to become CO_2-neutral and propose questions to the *Discussion*.

Section Findings

- **The municipalities place the facilitator role in the municipality itself as an important part of the transition.**
- **The municipalities desire to facilitate living labs that stimulate innovation through collaboration with private actors.**
- **The municipalities create collaboration with private actors through different strategies that potentially can enhance the innovation.**
- **Dutch municipalities have formal networks that create a platform that can be used as political force.**
- **Danish municipalities have formed a network that creates an innovation platform for local enterprises.**
- **Municipal collaboration through networks encourages knowledge sharing on best practices, which implies that these networks enhance innovation.**
- **The municipalities can influence the market for niche technologies with the use of different measures such as pilot projects and subsidies**

7.2.1 Working with Private Actors

This section examines the role of the six municipalities in bringing private actors together, supporting these created arenas and where there have been successes in this role. The following section presents: *Collaborating Between Actors*; *Creating Living Labs; Examples of Collaboration.*

7.2.1.1 Collaborating Between Actors

Municipalities are responsible for managing the long-term strategies towards becoming CO_2 neutral. This puts a lot of responsibility on these ambitious municipalities, as they do not have the resources, capacities and political power to achieve this transition on their own. The Municipality of Aarhus states the importance of collaboration with outside stakeholders, which are emphasised by the Practitioner of Aarhus since the municipality does not have any formal power on 75 % of the CO_2-emissions (Practitioner of Aarhus).

It is therefore important for the municipalities to establish co-operations with other private and public stakeholders. The importance of broad stakeholder support is also emphasised within the *Masterplan* of Sønderborg (ProjectZero, 2009a). While the practitioner of Copenhagen states *"(…) broad stakeholder support is essential for a good long-term strategy"* and thereby have put an emphasis on how *"The City of Copenhagen will make an effort to establish a dialogue and facilitate partnerships (…)"* (Municipality of Copenhagen, 2014a: 10). Both Copenhagen and Sønderborg highlight how important the role the collaboration between the municipalities and stakeholders are rated.

It is through cooperation and dialogue that local and common strengths and resources are utilised in the best possible way. Facilitating action in the wider society of the municipality is seen as a method of increasing the uptake of technologies that will assist in reaching the target. This is also the case in the Municipality of The Hague, where the long-term climate strategy has specifically mentioned the role of the municipality in facilitating outside projects:

> *"The key point will be to accelerate pace that measures will be taken by parties in the city and this are our inhabitants and also our companies, and other organizations. (…). As a municipality we are seeking ways to support and facilitate these parties in the city to accelerate the implementation rate of the measures."* (Practitioner of The Hague)

The Hague has chosen to support and facilitate different businesses and citizens to accelerate sustainable measures within the municipality. This facilitator role is a way of managing the long-term transition working with external actors. These examples relate to the shift from direct government to governance by facilitating and enabling role of municipalities discussed in the *Background Knowledge* chapter.

7.2.1.2 Creating Living Labs

All of the municipalities have stated in their strategies the need for facilitating collaborations and attracting green companies is seen as a win-win situation for the municipalities in creating innovations and green growth. The six municipalities want to create an environment in which to attract these companies and create a living lab. The practitioner of the Municipality of Eindhoven states: *"We want to be a living lab (…) We can see technical projects, for example soil foil in the technical campus (…)* (Practitioner of Eindhoven). However, the planner of Eindhoven argues that this is not just to create innovations in the local area, it is also due to a lack of resources, especially finances in which to reach the target of becoming energy-neutral: *"What we are trying to achieve is to get other actors to do things because as a municipality we do not have millions of dollars to investment"* (Practitioner of Eindhoven).

In Sønderborg the practitioner highlights how they facilitate platforms for businesses to test their niche-technologies: *"Sønderborg area has a unique platform that can be applied to demonstrate how various energy solutions function in practice" (*Own translation). Thereby, facilitating living labs and cluster is a method to enhance innovation by providing a space for different stakeholders to come together and for niche-technologies to be tested. This platform can be a physical space for example the municipalities own buildings. The practitioner in Aarhus highlights an example of this:

> *"If some of the companies have a good idea, which they would like to test or something, on a building, we may have the possibility to say 'okay we have school or some part of the administrative building you can use for testing' (…).* (Practitioner of Aarhus)

Having this space for testing will enhance innovation and increase the chances of niche-technologies developing in a protected environment, which is separated from some dominant regimes. This also facilitates CO_2 reductions within the municipality as an institution which is important as this is an area municipalities can have more control over. The practitioner from Zoetermeer highlights an extensive living lab project within the municipality:

> *"So what we are doing now is to present our city as a living lab for innovations and especially this innovation ('0 on the energy meter') fits to our city. We have a company who has a proposition for the social housing and the private households to do this renovation and we are making connections with education and research to bring this further in development (…)."* (Practitioner of Zoetermeer)

These cases from Eindhoven, Aarhus, Sønderborg and Zoetermeer are according to Sørensen and Tofting (2011) examples of the partnership strategy that by facilitating collaboration will enhance

innovation. Furthermore, this is an example of the third phase of the transition management cycle that is mobilising relevant actors that can enhance innovation by facilitating projects and experiments on niche-technologies. This way of enhancing innovation through collaboration creates a win-win situation for the municipalities.

7.2.1.3 Examples of Collaboration

The Municipality of Eindhoven's *vision and roadmap for 2045* states *"the vision that is developed must be broad enough to support collaboration with other parties in the metropolitan area and to link them in their focus on sustainability."* (LightHouse, 2014: 7). Furthermore, the practitioner of Zoetermeer stated the importance of the sustainable agenda being accepted in the wider society, which can create a platform between businesses, the municipality and other institutions towards a common vision. The work in creating this acceptance in a broad context falls upon the municipality as arena and coalition building with stakeholders. However, how are the municipalities actually creating collaboration with stakeholders? In the *Climate Plan The Hague* it is stated that:

> *"The Climate Consultation Group, which was established to encourage collaboration, is made up of the following parties: The Hague Development Society, the Staedion and Vestia housing agencies, energy provider Eneco, TNT delivery services, The Hague University of Applied Sciences, the Government Buildings Agency, employers' organisation Uneto, the county government and The Hague Centre for the Environment."* (Municipality of The Hague, 2011: 8)

These different members were included in the development of the long-term vision for the municipality and have been used to create a wide base of support. This is an example of the importance of the first phase in the transition management cycle, bringing together stakeholders in the strategic development of the problem definition and mutual vision that assists in the creation of the transition arena. The Municipality of The Hague also wants to widen the transition arena and get more parties involved in the negotiations regarding the implementation of the *Climate Plan The Hague*. To enhance innovation The Municipality of The Hague used the partnership strategy to create collaboration by establishing its own *Climate Centre* in 2011 for activities and innovation between the municipality, universities, companies and NGOs. This has now been established and used for demonstrations of projects and a place to get information on sustainability for the citizens and companies of Municipality (Practitioner of The Hague).

Also the Municipality of Eindhoven will create a coordination centre for sustainable energy, which will bring partners together and create a space for knowledge to be spread (Lighthouse, 2014). Similarly the *Sharing Copenhagen 2014* initiative has been used to bring international and local businesses,

citizens, and institutions to share knowledge, solutions, resources and ideas (Practitioner of Copenhagen). Again these are examples of how municipalities target innovation through collaboration using the cultivation strategy, which aims to create an environment for shared ideas.

The Municipality of Copenhagen identified initiatives for CO_2 reduction and green growth potential and developed 22 sustainable plans for businesses with the help of 200 people from companies, universities, and organisations, on costs, market trends, new technologies and what stakeholders are needed. According to the Practitioner of Copenhagen this was a new way of working rather than just using consultants and was *"(…) based on the best knowledge in the country so it was difficult for the city council to question the solutions"*. Sørensen and Tofting (2011) would argue that this is an example of the network strategy, since the municipality facilitated these meetings and thereby through the stakeholders' collaboration created the 22 innovative business plans.

The Municipality of Sønderborg facilitate road shows in the rural municipal areas by presenting alternative solutions to substitute oil burners. This indicates that rural municipalities need to think out of the box to accomplish parts of the transition in comparison to the more dense municipalities with district heating. Another successful facilitating process has been in the Municipality of The Hague where 'participation projects' on the environment and how to save energy was initiated in between 30-50 neighbourhoods with a subsidy scheme in which projects like solar panels on schools and urban farms were developed. These projects were about *"participation of the inhabitants in transforming the city to (sic. a) climate-neutral city"* (Practitioner of The Hague). This is about expanding the transition arena for the climate-neutral target by creating facilitating coalitions that can encourage sustainable solutions on a local level.

The practitioner from Copenhagen states *"retrofitting is also an very difficult area since there are different ownership models and a lot of stakeholders"* (Practitioner of Copenhagen). Also, that there are issues of getting people to invest in something that has a long payback time. They have now created a fund for retrofitting in order to take the risk away from the homeowner. However, the Municipality of Zoetermeer has engaged and facilitated the private market to retrofit 1600 houses since 2013 in the *0 on the energy meter* scheme, in which the private companies take the risk by guaranteeing energy savings to the homeowner to cover the cost of the retrofitting of all energy related aspects of a home in a 'one stop shop' (Practitioner of Zoetermeer). The municipality itself has created the connections between homeowners, social housing companies, and as the practitioner said himself the 'ESCO plus' type companies. This is an example of how PPP collaboration can enhance innovation within the borders of the municipality.

The above highlights how the municipalities use strategies to create collaboration between different stakeholders. This then enhances innovation within different stages of the innovation cycle, which can support the municipalities' transition towards becoming CO_2-neutral. This provides evidence on the existence of Sørensen and Tofting's innovation theories, since several of their collaboration strategies were identified. Furthermore, the theories of Sørensen and Tofting links into the transition management as the municipalities seek to expand their transition arenas by creating coalitions and collaboration that benefit of the long-term climate strategies. Even if unaware, the practitioners from these examples are facilitating and building the various arenas that can create significant action in the wider municipality and create innovation through collaboration.

7.2.2 Municipalities Collaboration

The municipalities are not only working on creating collaborations they are also engaging in networks as a way to gain knowledge, enhance innovation and manage the transition to meet their targets of becoming CO_2-neutral. Therefore, it is interesting to see how these six municipalities' are networking between each other nationally and internationally and on what they gain from this networking. The following section presents: *Dutch Municipal Networks; Danish Municipal Networks.*

7.2.2.1 Dutch Municipal Networks

This study has identifies a number of national networks in which municipalities collaborate. In the Netherlands there are different levels of networking depending on the number of inhabitants in municipalities. The Municipality of The Hague, as one of the four biggest cities in the Netherlands is part of the G4 network of municipalities along with Amsterdam, Rotterdam and Utrecht. Here they lobby together to the national level on many objectives, one being sustainability (Practitioner of The Hague). Municipalities in the Netherlands are also subsidised by the Ministry of Environment to initiate regional programs between municipalities, with a current focus on targeting private homeowners and companies to implement energy saving measures. However, the G4 network is not the only municipal network in the Netherlands:

> *"There are a lot of platforms in within the municipalities can meet each other. G4 is sort of an organized platform, but you also got the G32. You got the union of municipalities, which also organize meetings. So there are a lot of meetings where we exchange knowledge"* (Practitioner in The Hague)

The G32 network in the Netherlands consists of the 32 next largest urban areas of 100,000+ inhabitants, which includes both Eindhoven and Zoetermeer. This again includes meetings together on many topics and objectives, one being sustainability. Within the strategy of the Municipality of Zoetermeer it is stated that the G32 creates a network between the 100,000+ municipalities / cities to

knowledge share and project share to push forward successful innovations and initiatives. These networks are designed to enhance collaboration and innovation in which municipalities can then use within their transition management cycle and re-adjust arenas and projects on the new innovations, as well as helping other municipalities. However, the Practitioner of Zoetermeer states this *"…is happening mainly within the ESCO+ innovation ('0 on the energy meter')"* in their case. These networks provides networks for sharing knowledge and best practices, which can be perceived as both being the cultivation and replication strategies towards supporting innovative collaboration between the municipalities.

An example of where these networks can become practical is seen in one of the measures that the practitioner from The Hague proposes is *"legislations on exhausting on car and truck".* Here the G4 network can lobby the national and EU level: *"(…) we as a city do have to make an effort in lobby national government and EU level to make sure that they implement their measures"* (Practitioner in The Hague). In Zoetermeer the practitioner does not mention a specific barrier but remarked that the taxations are sometimes difficult to work with. This is another example where these *'city'* networks (G4 & G32) can create a platform that can be used to lobby for the actual transition within the municipalities.

The Municipality of Eindhoven mentions a network between the 5 largest municipalities in the region, who meets every two months to discuss problems and progress that has been made. The practitioner refer to a meeting at the start of the 2015:

> *"(…) we discussed whether to have a national energy map, the City of Amsterdam has this map. We are discussing with them to get the system of mapping to our cities too with a smaller investment from each city in the region to create these maps."* (Practitioner of Eindhoven).

By sharing ideas and identifying best practices that are tested by other municipalities this network enhanced innovation within the municipalities as in the case of the energy map from Amsterdam. Furthermore, this network has also lead to several agreements within the region with the target of 800,000 energy-neutral houses by 2050, with 11,000 by 2020 within the five cities. This shows how the network has strengthened the transition arena within the Municipality of Eindhoven (Practitioner of Eindhoven).

7.2.2.2 Danish Municipal Networks

In Denmark there are also networks and collaboration between the municipalities. However, this is not on the same organisational level or groups as the Dutch G4 or G32. The Practitioner of Aarhus states:

> *"(…) we have been cooperating with Copenhagen and Sønderborg, and the Danish Energy agency have taken the initiative to have these meetings, and then they invited Copenhagen, Aarhus and Sønderborg to regular meetings to discuss."* (Practitioner of Aarhus)

The three Danish municipalities have joined forces in a network for green growth and attracting investments from China. The Danish Energy Agency has taken the initiative to bring Aarhus, Copenhagen and Sønderborg together in order to export the front-running expertise and green growth deals of these municipalities, and further to share knowledge as leading municipalities:

> *"Aarhus have made a huge effort, and also Copenhagen and Sonderborg they have shown especially interest with China and the green areas, so I think that was the reason why there were chosen."* (Practitioner of Aarhus)

This is about innovation and creating green growth within the municipality with companies spreading knowledge and expertise internationally. This is a different aspect in terms of the transition to a CO_2-neutral municipality as this is about economic growth rather than CO_2 reduction in the municipality. The three Danish municipalities in this study are collaborating together, which is to be expected with front-running municipalities. This can enhance innovation due to collaboration between these ambitious municipalities, and furthermore create an innovation platform for local enterprises in China.

Both Copenhagen and Aarhus participate in regional networks that are established to enhance the knowledge on how to develop strategic energy planning. According to the practitioner from Aarhus there is a good level of cooperation between the municipalities focusing on the future energy systems and initiate investigations on larger heating systems, wind and biomass. The practitioner from Copenhagen believes this kind of specific network will occur more often in the future:

> *"(…) I've been together with a lot of majors from the capital region because that have been projects in the region related to strategic energy planning. I think we will see more cooperation between municipalities, especially in the capital region."*

These kinds of networks create an environment where ideas are shared, developed and tested by different public actors, which are an example of the cultivation strategy to enhance innovation through

collaboration. Furthermore, an example from Copenhagen shows the importance of regional collaboration, since Copenhagen was refused planning permission to place offshore wind turbines next to the Municipality of Hvidovre (Hvidovre Avis, 2015). The practitioner from Sønderborg highlights the importance of sharing knowledge between municipalities such as EV's and biogas, and further emphasises how Sønderborg often invite or visit other municipalities to see what they are doing:

> *"If some municipalities can learn from another they go visit them. E.g. Sønderborg want to go a visit Skive because they are doing a lot of things with gas, and this is a new area for Sønderborg. Also, Køge have just visited Sønderborg to learn something about green transport."* (Practitioner of Sønderborg – Own translation)

From the examples of Aarhus, Copenhagen and Sønderborg it is evident that there is a good knowledge sharing environment between the different municipalities with a focus on successful innovations. This is a very open-minded approach between the municipalities and it is about learning from each other's best practices. Furthermore, Copenhagen is part of the international C40 network: of the world's major cities committed to addressing climate change (C40, 2015). The practitioner of Copenhagen said that the municipality is quite active in the C40 for knowledge sharing as well as learning, also:

> *"We have just created a new network for the climate ambitious cities, and we are now 17 cities that have at least 80 % target by 2050. It is called carbon neutral cities alliances. Try to bring together cities that not only want to do something with climate, but also the ones that are really pushing forward. We get really good support from American funds."*

The front-runner position globally for Copenhagen has a strong influence in the role of the Municipality. Taking the lead and knowledge sharing becomes an important aspect internationally. Formerly, Copenhagen struggled participating in networks since they did not gain valuable knowledge. However, the practitioner is very positive about the C40 network, as the other participating cities are progressive as well. As in the case of Sønderborg, the practitioner in Copenhagen highlights that 'you can't be the best on everything', which in their case is specifically recycling and public transport. This is an example of how collaboration can enhance innovation as Sørensen and Tofting (2011: 852) argue: *"the innovation cycle can be strengthened through collaboration between relevant and affected actors from the public and private sector."*

7.2.3 Influencing the Market

Until now, this section of the analysis has identified how the municipalities facilitate and network their transition towards CO_2-neutrality. However, many of the municipalities also stated the role of influencing the market. The following section presents: *Preparing the Market; Initiating Pilot Projects; Using Subsidies.*

7.2.3.1 Preparing the Market

The *Transition Management Cycle* includes facilitating coalitions, creating arenas of stakeholders and transition agendas that strengthen the overall transition vision of becoming CO_2-neutral. However, some municipalities have stated that preparing the market for more than just demonstration projects is an important part of the role of the municipalities. In the Municipality of Copenhagen the practitioner states:

> *"Copenhagen municipality cannot make the market, but they can prepare for the market. Which means they will plan ahead and make the infrastructure, and thereby the market ready for the citizens and companies."* (Practitioner of Copenhagen)

The practitioner from the Municipality of Copenhagen argues for the importance of seeing the transition and the trends of the future now and assists in making the space for the transition trends to take place. This can be seen in the *CPH 2025 Climate Plan* (2012) of the Municipality of Copenhagen where it is stated: *"Electric charging points and hydrogen filling stations will be set up and the possibilities for a secure infrastructure for biofuels will be explored"* (Municipality of Copenhagen, 2012). Therefore, creating the landscape and infrastructure for the niche-technology of EVs to have an opportunity to impact the regime of the fossil fuel lock-in.

However, the practitioner from Copenhagen emphasises that several national and EU legislations are creating barriers for the transition, especially the transport sector. Copenhagen expected that the congestion zone would be introduced after the last election, yet this did not happen. Furthermore, Copenhagen waits to see if the Danish government will remove the taxation benefits from the electric vehicle, and if they will introduce taxes on biomass fuels. This shows how the EU and national levels also influences the market for sustainable technologies that can support the transition towards a CO_2-neutral society.

7.2.3.2 Initiating Pilot Projects

The Municipalities of Copenhagen and Sønderborg are working with pilot projects in their municipalities, which they see as important to their front-running profile. These internal pilot projects can help influence the market on a broader scale. Copenhagen has been successful in implementing a tendering process on waste handling trucks that run on biogas, and now have 18 trucks in service.

Furthermore, Copenhagen is also testing alternative fuels in the transport sector. The practitioner of Copenhagen "(…) see *pilot projects as being really important and as the municipality's role. To show the solutions and show cases".* This has accumulated with Copenhagen testing the feasibility of biogas in the city´s busses, and if shown successful, potentially increase the use of biogas within the municipality and also in broader society (Practitioner of Copenhagen). This is an example of the phase three of the transition management cycle, which is focusing on bringing new innovations to life and enabling niche-technologies to flourish.

7.2.3.3 Using Subsidies

Most of the municipalities are facilitating subsidy schemes, many from the national level that can influence the market and the regime level by providing a financial benefit for the niche-technologies. The practitioner from Municipality of The Hague described the success they had with a subsidy scheme for solar panels that ran for three years and now The Hague has the most solar panels in the Netherlands (only number, not energy production) (Practitioner of The Hague). Here the target groups were strategically identified and with the facilitating of a subsidy created a financially viable market for the solar panels. The success of the scheme moved the niche-technology into the mainstream market, or the regime. After the three year period the subsidy scheme was stopped as the price of solar panels had become competitive and no longer needed support (Practitioner of The Hague). Eindhoven also wants to implement a significant number of solar panels:

> *"(…) identify target groups like our own buildings, schools, housing cooperatives and individual households. Create a strategy for each target group to persuade them to invest in solar panels and identify what problems they have and how the municipality can help to remove these barriers."* (Practitioner of Eindhoven)

This strategy will be supported by national subsidies schemes on which the municipality will facilitate and coordinate stakeholders to uptake the funds available. The Practitioner of Eindhoven states the importance of facilitating these schemes as they have to target of 100,000 by 2018 and one million by 2045. Whether they will achieve this target is unknown, however, by facilitating such a scheme will influence the market and has the possibility of radically changing the energy production regime in the Eindhoven region. By using financial incentives to support niche-technologies that the facilitating role of the municipalities can destabilise the dominant regimes and maintain the path towards becoming CO_2-neutral.

7.2.4 What are the Findings from the Role of the Municipality in the Transition?

In the first section of *Working with Private Actors* the practitioner in Eindhoven emphasises that the municipalities do not have the finances to achieve this transition. This implies that it is a necessity to collaborate with private actors, which is also acknowledged by all of the practitioners. Therefore, these ambitious municipalities place the facilitator role in the municipality itself as an important part of the transition. Sønderborg wants to facilitate a platform for enterprises to test their niche-technologies on municipal buildings, and this living lab approach is further desired by several of the other municipalities. According to Sørensen and Tofting (2011) these types of collaboration can stimulate innovation. In *Examples of Collaboration* different collaborations between the municipalities and private actors were identified. For example, Copenhagen cooperated with different private actors to create different business plans, while Zoetermeer created the *0 on the energy meter* scheme to enhance energy efficiency. These two examples, among others, highlight how municipalities use different collaboration strategies that potentially can enhance innovation. Yet, these examples propose the questions: How much will these private collaborations help the overall long-term transition? Will municipalities lose control over the transitional process by involving many outside stakeholders? What does this facilitator role actually imply?

The section of *Municipalities Collaboration* shows that the Dutch municipalities are engaged in the G4 and G32 municipal networks. The practitioner in The Hague states that these municipal networks can create collaborations between the municipalities that can give the municipalities a political force, which can be used for lobbying on a national level. In the Danish cases, Aarhus, Copenhagen and Sønderborg were brought together by the Danish Energy Agency to form a network in order to enhance collaboration between local enterprises and target the Chinese market, which is an effort to try and stimulate growth within the municipalities. Also, Copenhagen plays a strong role within international networks, for example the C40, in which knowledge can be shared as well as bringing strength to the transition arena through collaborations between relevant public and private actors. Furthermore, the municipal networks can create an environment in which knowledge of best practices can be shared between the municipalities, and thereby imply that the municipalities can enhance innovation through these municipal networks. Thereby, the municipal networks provide a platform in which to support the transition to become CO_2-neutral. However, this proposes the questions: how proactive are the municipalities within the networks? Are networks actually creating innovation? Whether larger municipalities have a greater role to within the networks between municipalities?

In the last section of *Influencing the Market* different circumstances for how municipalities can influence the market was examined. It was discovered that Copenhagen believes it is important to

prepare the market for future niche-technologies as part of the municipalities' role in the transition. Furthermore, Copenhagen also initiate pilot projects on niche-technologies themselves to see if these can be expanded to a higher degree into society. The Hague created a successful scheme by subsiding solar panel, which changed the former energy market since solar panels today can compete on equal terms with other technologies. These examples show how municipalities can influence niche-technologies into the current market by the use of different measures. However, how prominent is influencing the market in the management process of the transition to CO_2-neutrality? Which other measures can the municipality use to influence the market? How much of a role can the municipalities have in influencing the various markets locally and nationally?

7.3 ANCHORING THE CLIMATE POLICY

Throughout the following part of the analysis it is examined how the Danish and Dutch municipalities anchor their climate policies. As argued in the *Knowledge Background* chapter, anchoring the climate policy is an important part of successfully managing the transition. Therefore, it is of the highest relevance to understand what these six municipalities are doing to anchor their individual climate policy within the organisation, and through this process discover different methods to improve these procedures and what the barriers are for the anchoring. The following section examines:

- strategy frameworks for the climate agenda
- anchoring procedures within different departments
- the institutional changes within the municipalities
- the expansion of the transition arena

These parts are summed up in a last subsection highlighting the outcomes of how municipalities anchor the CO_2-neutral within the institution, and further propose questions to the *Discussion*.

Section Findings

- **In general the role of the climate/sustainable departments is to manage the coordination of the transition towards CO_2-neutrality.**
- **All of the municipalities acknowledge the need of integrating the climate policy into other municipal strategies.**
- **The Danish municipalities all highlighted formal procedures to support anchoring and implementing the CO_2-neutral target.**
- **Municipalities use informal collaboration to implement and create ownership of the CO_2-neutral target.**
- **Several municipalities have reduced the climate/sustainable departments and put the resources into other departments as a tool to anchor the climate agenda within the institution.**

7.3.1 Strategy Frameworks

It is important for the municipalities to be aware of anchoring their climate target into other strategies and departments. If not, the municipalities can potentially lose track of their target and lack a clear guideline for the other departments. The following section presents: *Integration of Strategies*; *Sustainable Framework Document.*

7.3.1.1 Integration of Strategies

Since the development of the target and vision of how Zoetermeer can become CO_2-neutral, the focus is now about getting the vision incorporated into other departments' policies. This includes documents such as the *city vision*, *vision for public spaces, energy vision* etc. Zoetermeer is aware that the success of the sustainability agenda depends on how well the strategy is integrated into other departments and thereby create the necessary ownership:

> *"It is important that all internal target groups are aware of Sustainable Zoetermeer and the impact of the project on their own projects and policy developments. They must know the content of the program Sustainable Zoetermeer, support it, and actually incorporate it into their own plans."* (Municipality of Zoetermeer, 2007: 24 – Own translation)

It clearly states that the *Sustainability Zoetermeer* policy is relevant for all partners within the Municipality of Zoetermeer. The different departments and actors need to integrate this policy into their plans to support the actual implementation of the Sustainable Zoetermeer policy. Also, Copenhagen acknowledges that the success of the climate agenda is not depending only on forming the target and strategy but also integrating this target and strategy within the municipal institution. Copenhagen highlight within the *Climate Plan*:

> *"In addition, the CPH 2025 Climate Plan is linked to local master plans, the Agenda 21 plan, the Action Plan for Green Mobility, the City of Copenhagen Resources and Waste Plan, Cycling Strategy 2025 and the visionary plan, the Eco- Metropolis 2015"* (Municipality of Copenhagen, 2009: 12)

Here a variety of plans stretching from mobility to waste plans are linked together with the overall strategy for how Copenhagen can become CO_2-neutral. Each of the plans mentioned have relevance for reducing the CO_2 emissions within specific sectors in the municipality, and by addressing these plans as a step towards integrating the target.

Furthermore, within the *Climate* Plan in Aarhus and *Masterplan* in Sønderborg both municipalities emphasise the importance of anchoring the strategy into the municipality and broader society, which indicates that most municipalities are aware of the importance in anchoring the climate target throughout the institution. If the plans are linked together successfully, the target can become common within the municipal institution. Thereby, spreading the ownership of the CO_2-neutral target to other departments can create coalitions and mobilise actors within the transition arena, and align the climate agenda in different departments of the institution. By mobilising other departments creates greater collaboration within the institution of the municipality itself, however according to Alexander (2005) this requires institutional changes of norms, rules and values.

7.3.1.2 Sustainable Framework Document

Compared to the other five municipalities, The Hague has developed a specific document that sets the framework for the coordination and inspiration of changes. This document *'Towards a Sustainable The Hague'* is the framework for the development of 13 execution plans of which the *Climate Plan* is one of them:

> *"This policy document offers that strategic framework and provides the cohesion between existing policy and current programmes. At the same time, that framework forms the starting point for all municipal implementation programmes (sustainable and otherwise) that will be set up with and for the city from now on"* (Municipality of The Hague, 2009: 6)

This document aims to integrate all current initiatives into one single sustainable approach, although not specifically linked to the climate-neutral target. The *Climate Plan* focuses mainly on the climate-neutral target, however it is also working as *"(…) the co-ordination of these climate-related initiatives in relation to the other twelve project execution plans"* (Municipality of The Hague, 2009: 6). This means that the climate related initiatives outlined in the *Climate Plan* are discussed within the other 12 execution plans. The purpose of this plan is to anchor sustainability through the whole institution *since "(…) sustainability is not for the department of sustainability it is for the department for housing, it is for the department of mobility"* (Practitioner in The Hague).

Burch (2010) highlight the lack of a general 'green' policy as a barrier for anchoring the climate agenda, therefore The Hague created the *'Towards a Sustainable The Hague'* framework to have an overall policy that states the guidelines for sustainability. This document can potentially align different actors within the transition arena and generate ownership of the climate target, which will change certain planning procedures and norms within the institution of the municipality to accommodate the climate agenda.

7.3.2 Practical Examples of Anchoring

Previously in the *Strategy Frameworks*, the overall municipal frameworks were examined. However, what are the municipalities actually doing to create ownership of their target within the municipalities? The following section presents: *Anchoring Procedures within Different Departments*; *Collaborating with Specific Planners; Spreading the Ownership of the CO_2-Neutral Target.*

7.3.2.1 Anchoring Procedures within Different Departments

Several of the municipalities emphasise how they use the climate departments as the coordinator and then have specific contact 'managers' within other departments as being the mechanism that can support the anchoring. In Aarhus they use the concept of key account management as an approach to ensure that the climate target is integrated within other departments, as well as ensuring that sustainability is actually included in different initiatives:

> *"(…) key account management where you have one contact into a department for an example, so they know more than the rest of their administration about the climate and we are contacting them if there are something we have to discuss or present"* (Practitioner in Aarhus)

Using the key account management approach ensures that within each department in Aarhus there is one contact person who is more knowledgeable on the climate agenda than the rest of the department and this is the contact person the climate department uses. It is working as a network within the institution of the municipality creating a shared ownership on the target of becoming CO_2-neutral, and the practitioner emphasised that this has worked out well.

The example from Aarhus shows how the institution has changed to adapt to the CO_2-neutral target by introducing the concept of key account management, and thereby spreading the ownership of the climate policy within the municipal institution. However, recently Aarhus has gone through a major institutional change since the organisation in technical and environmental departments was restructured six months ago. The practitioner highlights how the restructuring of the organisation has created challenges in anchoring the climate agenda as the former contact persons are situated in new positions. Therefore, the key account management approach is currently not efficiently working in the municipality of Aarhus.

7.3.2.2 Steering Committees

Copenhagen has developed a specific mechanism that will support the anchoring of the CO_2-neutral within the municipal institution, which is a different approach compared to the key account management model from Aarhus. Inside such a large municipality as Copenhagen there are sometimes 40-45 projects in place at the same time spread throughout the institution, which also includes

external partners. Due to the amount of projects there are numerous project leaders within the municipality and therefore a steering committee was established to have an overview of the projects and ensure that the climate agenda is incorporated.

> *"So we have three heads of work streams and they are all placed in the secretary and they are running and also having the dialogue with the project leaders, project development."* (Practitioner in Copenhagen)

The steering committee consists of three 'heads' of the work streams mentioned in the *Municipal Cases chapter*: *Production, Consumption and Mobility*. The purpose of this steering committee is to run a dialogue with all of the different project leaders, both internal project leaders and external project leaders (HOFOR and MOVIA). Sønderborg has used the same approach and appointed a steering committee to ensure that the climate policy is spread throughout the institution of the municipality:

> *"This combination aimed to utilize external expertise and to ensure real anchoring and support behind the identified devices and chosen strategies thus the later implementation was encouraged in the best possible way. Representatives from the ProjectZero Secretariat have taken part in all work groups in order to ensure synergy."* (ProjectZero, 2009a: 24)

The anchoring of the climate agenda is improved by creating a steering committee to have the overview, and create different work groups with internal and external experts on the following subjects: *CO_2 base line (forecast), buildings, manufacturing processes, transport, agriculture, renewable energy, and energy plan.*

In the perspective of transition management the steering committees in Copenhagen and Sønderborg are stimulating and coordinating shared problems within the transition arena. This creates coalitions and mobilises actors within arena's of arena's towards creating ownership of the climate policy in different departments. Furthermore, creating these steering committees can be seen as institutional design, since the structure within the municipality changes towards accommodating the CO_2-neutral, and further contributes to changes the norms and practices within other departments.

7.3.2.3 Collaborating with Specific Planners

The practitioner in Zoetermeer states that different planners within the municipality do not meet that often: *"No, only if there is a development or an action needed. So not in a structural basis as you will get boring meetings".* According to the practitioner they focus more on targeting the appropriate people within different departments to create ownership of the climate agenda and support the actual implementation of sustainable measures:

"(…) *Need to find the people who see the purpose and then you can make achievements. If the economy (department) does not see it then focus on the housing (department) or the another way. But if they both do not want to work with this then you have a problem".* (Practitioner in Zoetermeer)

First of all, the practitioner in Zoetermeer highlights how other departments have other targets, and therefore do not always focus on the climate agenda. Therefore, Zoetermeer use an informal and unstructured approach to anchoring the CO_2-neutral within other departmental projects. Comparing this to the key account management and steering committee approach, this is focusing less on long-term anchoring and more on the actual implementation of sustainable projects. However, this is a common practice in other municipalities, also emphasised by the practitioner in Sønderborg who often works informally with other planners. The practitioner from Sønderborg further stress that different planners have different mentalities, some are greener than other, however a strong climate profile and political support can assist the anchoring of the climate agenda. Therefore, the Municipality of Aarhus involves different planners earlier in the development process of specific projects:

"The people actually involved in these activities they have been part of developing the task, to ensure that they have the ownership (…). It is much more important that the people working with the different subject are involved and have a ownership." (Practitioner in Aarhus)

The practitioner emphasises the importance of engaging specific planners in the development stage since this will increase the ownership feeling of the planner. If instead it is only the climate department that develops these specific projects and pass them to departments that will execute the plan, it can become difficult to create ownership of the CO_2-neutral within other departments.

Within the municipalities there are several different targets that affect the norms and values, in which the planners working. This will create barriers for anchoring the climate agenda within the whole institution, and therefore a more informal approach to other planners can become beneficial. The practitioner from Aarhus also highlights how it is about expanding the transition arena and the involvement of different actors within the municipality earlier in the process since it creates ownership of the target.

7.3.2.4 Spreading the Ownership of the CO_2-Neutral Target

Eindhoven are currently implementing the 'Natural Step framework' to make the whole institution more sustainable. This framework assists the municipality in seeing the bigger picture within the institution itself from current trends and how to strategically create these to become more sustainable

through actions and planning tools (The Natural Step, n.d.) This will support the integration of the climate agenda into other department within the Municipality of Eindhoven. According to the practitioner it is important to train *"(…) all the staff of the municipality to learn these steps and how to integrate these procedures and sustainability into there goals"* (Practitioner in Eindhoven). The practitioner from Eindhoven highlights that it is the plan is to reduce the finance for the department of sustainability over the coming years and instead outsource these resources into other department, and thereby anchor the energy-neutral target throughout the whole municipal institution.

> *"Important for us as a department of sustainability to make ourselves obsolete so our goal is in a few years, maybe 10 years, we will not be necessary as all other organisations (sic. department) implemented themselves the sustainability goals"* (Practitioner in Eindhoven)

Also, at the moment in the Municipality of Aarhus there a trend of minimising the role of the climate secretary and instead spread the resources into other departments of the organisation: *"You may say that also this trend have started to maybe minimize the climate secretary a bit and then putting the resources in the organization"* (Practitioner in Aarhus). Even though it is important to create ownership within other departments of the organisation in Aarhus, the practitioner also highlights that the climate secretary has the role as the coordinator of the climate agenda in the city administration. This also occurs in the Municipality of The Hague who has seen a reduction of employees in the sustainability department, and thereby has taken more of a role as the pushing coordinator.

Within the Municipality of Sønderborg there is only one full time employee working as a climate coordinator (Excluding the employees in ProjectZero). This is a deliberate method to push the climate agenda into other departments so it becomes a part of several employees' daily work and thereby spread the ownership within the institution. Furthermore, the practitioner highlights how the municipality formerly had a few full time employees working with the CO_2-neutral target within the municipality, however this created less ownership of the target within other departments: *"If you want to get sustainable solutions implemented it is important that it is a part of many peoples job"* (Practitioner in Sønderborg – Own translation).

Looking at these examples with the perspective of institutional design shows how the municipalities strive to change the structures of the institution to support anchoring the climate agenda by reducing the climate department, and thereby spread the ownership of the CO_2-neutral target within the organisation. If these structural changes are accomplished, the norms and values within other departments of the municipalities will change such to accommodate the CO_2-neutral targets. This

approach creates coalitions and mobilises actors from different departments within the transition arena. This will further expand the arena's of arena's where sustainable projects can be developed and implemented, for example in the transport or housing departments.

7.3.3 What are the Findings from Anchoring the Climate Policy?

Throughout the *Anchoring the Climate Policy* section it has been identified that an important role of the climate / sustainable departments is to manage the coordination of the transition towards CO_2-neutrality. In the section *Strategy Frameworks,* Copenhagen, The Hague and Eindhoven want to use frameworks that can anchor the sustainability agenda within the institution of the municipality. The Municipality of The Hague has developed a comprehensive overall strategy framework that supports the sustainability and climate agenda within the institution by ensuring that sustainability issues are included within 13 different department execution plans. These examples indicate that the norms and values of the municipality have changed to include the climate agenda. All the municipalities acknowledge the need to integrate the CO_2-neutral target within all the municipal strategies in order to anchor the climate agenda within the institution. This can enhance the collaboration and mobilise actors to support the climate agenda within the arena's of arena's by incorporating the CO_2-neutral target into the other departments within the municipality. Yet, from the *Strategy Frameworks* section several questions are proposed: Are the procedures working? Could the method of The Hague be generalised to other municipalities? Can politicians support the anchoring?

In the section *Anchoring Procedures within Different Departments* it was found how Aarhus use the key account management model to anchor the climate agenda throughout the institution, furthermore Copenhagen and Sønderborg have created steering committees to stimulate coalitions and mobilise actors. Therefore, it is identified that the Danish municipalities have created formal procedures that support the anchoring of the CO_2-neutral target. Also, different departments and planners have different mentalities and focuses; therefore the practitioner in Zoetermeer, among others, collaborates informally with specific planners to incorporate sustainability. Furthermore, Aarhus involves planners earlier in the development phase of specific projects, since this will enhance the ownership of the CO_2-neutral target. This indicates how municipalities also use informal approaches to implement and create ownership of the climate agenda within other departments. The practitioner in Eindhoven, Aarhus, The Hague and Sønderborg believe that reducing the climate/sustainable department can support anchoring the climate target within the institution and support the transition. However, is the climate / sustainability department minimised to support anchoring the climate agenda or due to other priorities?

7.4 NAVIGATING THE TRANSITION

Throughout the following part of the analysis it is examined how the Danish and Dutch municipalities navigate the transition. As argued in the *Knowledge Background* chapter backcasting and roadmaps are an important part of navigating the transition. Furthermore evaluating has been identified as the important within the fourth phase in transition management cycle, and it is an essential part of moving forward a long-term transition. Therefore, it is of the highest relevance to understand what these six municipalities do to navigate towards the CO_2-neutral target. The following section examines:

- the navigation towards the CO_2-neutral target
- the monitoring procedures and what it is used for
- how the municipalities work with short-term plans
- the fourth phase of the transition management cycle

These parts are summed up in a last subsection highlighting the outcomes of how municipalities navigate the transition towards CO_2-neutrality, and further propose questions to the discussion.

Section Findings

- **Several municipalities use roadmaps or backcasting studies to manage the long-term transition towards CO_2-neutrality.**
- **All municipalities acknowledge the need for monitoring procedures within their strategies, however the Danish procedures seem more comprehensive.**
- **Evaluating projects and plans provides the knowledge of where action and support needs to be managed or steered to maintain the progress to becoming CO_2-neutral.**
- **The Danish municipalities have more concrete short-term action plans.**

7.4.1 Navigating the CO_2-Neutral Target

An important part of the municipalities' strategies is being able to navigate and monitor the long-term targets of becoming CO_2-neutral. It is therefore of importance to look at some of the methods and tools they have used to assist the management of the long-term transition. The following section presents: *Navigating the CO_2-Neutral Target; Monitoring the CO_2-Neutral Target; Working with Short-Term Plans.*

7.4.1.1 How is the Municipalities Navigating?

The Municipalities of Copenhagen, The Hague, Eindhoven, Sønderborg and Zoetermeer have included backcasting analysis as part of their climate strategies. This is regarded as phase one of the transition management cycle in which the vision that has been developed is then worked back to see how to feasibly reach this vision. The Municipality of The Hague and Zoetermeer have only developed backcasting studies and have not produced a roadmap from the information gained, which is seen as the method of working identified in the *Knowledge Background* chapter.

However, the Municipalities of Copenhagen, Eindhoven and Sønderborg have further used the backcasting studies to develop roadmaps of pathways and objectives to enable the targets to be reached, whilst Aarhus is planning to develop one in the foreseeable future. Eindhoven's roadmap has more of an overall objective with targets such as in the short-term creating energy savings and in the mid-term having their own energy management (LightHouse, 2014). Whilst, Copenhagen and Sønderborg's roadmaps have more concrete measures in the short-term based on action plans with concrete projects (Municipality of Copenhagen, 2012; ProjectZero, 2009a, 2009b). This is because Copenhagen and Sønderborg develop roadmaps every four or five years within specific objective areas where initiatives are placed, which enables the long-term transition to be flexible and updated.

The Municipalities of Copenhagen and Sønderborg use the backcasting studies to develop four or five year roadmaps. Copenhagen states the importance of being holistic and not just focusing on CO_2 reductions but also to bring a better quality of life and economy to the city which requires guidance of roadmaps and not just what initiatives are feasible or needed (Practitioner of Copenhagen). The roadmaps based on backcasting studies provide long-term guidance, which is also based on short-term feasible solutions that are flexible throughout the transition period. These allow the different phases of the transition management cycle to have some structure, whilst producing or updating the roadmaps every 4 or 5 years bridges the gaps between the long-term to the short-term.

7.4.1.2 Learning Points from Backcasting Studies

The practitioner of The Hague says that *"(…) backcasting is the most important and to look at the municipality and what we can do."* Although, the backcasting study in the Municipality of The Hague has identified or limited the areas of action the vision stated in terms of CO_2 reduction as:

> *"This study shows that about 50 % of our CO_2 emissions is controlled by measures on the level of EU or central government. This mainly concerns the CO_2 emissions of the electricity used in the city. So the other 50 % is CO_2 emissions which takes place on the ground of the municipality, so that is our main area of interest as a municipality interacting in those CO_2 emissions."* (Practitioner of The Hague)

This limitation can be seen both in a positive and negative perspective. On the one hand it brings the reality of what the municipality itself can achieve and on the other it may stop actions taking place in the sectors they regard as not feasible to work with. In the transformative perspective, this is working strategically to identify where real action can take place. However, limiting to certain sectors will not shift the whole transitional process of becoming CO_2-neutral.

The backcasting study within Zoetermeer municipality created a pathway for their climate agenda:

> *"advises that the innovation ('0 on the energy meter') is the best way to achieve the goal. In our city there is not much waste heat so for the short to mid-term central (district) heating is not really an option."* (Practitioner of Zoetermeer)

Through this study important knowledge was identified on which initiatives to focus on within the CO_2-neutral strategy in Zoetermeer. Furthermore, the practitioner in Zoetermeer highlights how they identified limited ability on impacting the transport and electricity sectors, as in the case of The Hague. These examples show how the backcasting study can both contribute towards finding what is and not feasible to achieve the municipal targets.

7.4.2 Monitoring the CO_2-Neutral Target

Monitoring of progress and projects is the fourth phase of the transition management cycle in which the other three phases can be assessed. This phase can provide valuable knowledge and learning points. Therefore, it is important to see if and what the six municipalities want to achieve from the monitoring process.

All the main climate documents from the six municipalities include monitoring procedures to support the transition towards becoming CO_2-neutral. For example, the Municipality of Copenhagen will monitor in terms of the four focus areas: *energy consumption, energy production, green mobility, and the city administration*. They have clear CO_2 emission numbers presented in these four focus areas, present and future, and will conduct a full-scale evaluation in three periods towards 2025. Furthermore, The Municipality of Zoetermeer puts a lot of emphasis on monitoring as part of their

strategy. The strategy states they will monitor the actual CO_2 emissions from implemented projects as well as working with other municipalities on gathering more data on the local energy consumption.

One thing is to state how the municipalities are monitoring in the strategies, while another thing is what they actually do and how this assists the long-term goal of becoming CO_2-neutral. The Municipality of Aarhus is monitoring their emissions every year within the municipality as an organisation, and further they monitor the emissions for the municipality as a geographical area every second or fourth year (Practitioner of Aarhus). Also, ProjectZero monitors emission levels every year for the Municipality of Sønderborg together with an external consultancy company. This procedure monitors the process and progress been made and relate this to their roadmap, which they can use as basis of managing the transition towards becoming CO_2-neutral. It is not only the overall roadmap that the Municipality of Sønderborg evaluates, but also specific projects. For example, Sønderborg invested 86 million DKK into energy retrofitting and did an evaluation of this project to identify learning points for future investment.

These procedures in Aarhus and Sønderborg monitor the actions in order to evaluate and be flexible in the approaches that need to be taken in the short- and long-term. This is directly in line with the concepts of the transition management cycle of the fourth phase of monitoring being used to adapt what is happening in the other three phases in order to maintain the path and expand the vision of becoming CO_2-neutral. This is also important as the society is continually changing and there is a need to be flexible with the approaches you take (Practitioner of Sønderborg).

The Municipality of Copenhagen are monitoring each year and have just received the 2014 figures that have shown an overall 31% reduction form the baseline year 2010 (Practitioner of Copenhagen). Also the practitioner states the importance of evaluating:

> *"We are going to make a full scale evaluation this autumn but we fell necessary to, we had a general election to the municipality or the city council 1.5 years ago, there was a new mayor (...) new organization and new management, so we felt that there was a need to make it clear what was the status and to be real on that. (...). So it was also in fact important to show to them make visible that there was some areas where we were behind schedule"* (Practitioner of Copenhagen)

Whilst in Copenhagen the monitoring process has provided knowledge for the areas, the municipality is falling behind with in the long-term strategy. This progress, or lack of progress in energy consumption and mobility, gives the politicians knowledge on what areas need more support. This allows the practitioners to manage the pathway towards the end-target and readjust if necessary (Practitioner of Copenhagen).

In Zoetermeer, the monitoring identified that they are having challenges in reaching their target for 2013 on becoming CO_2-neutral in 2030, which the practitioner stated is important for the politicians to know (Practitioner of Zoetermeer). Therefore, recent focus in Zoetermeer have changed from monitoring to the actual implementation, which is moving away for the monitoring procedures stated in their strategy:

> *"We started a lot like that but now we focus more on innovation which we think is the most successful and what kind of organisations and people are enthusiastic about this. So we look for where the energy is and work with these people and not plan from the city hall and act as this does not work as the process just goes back and forward so you have to be flexible."* (Practitioner of Zoetermeer)

The practitioner emphasises that they do not follow the monitoring procedures stated within the strategy due to a shift of focus to the actual implementation of projects. This approach is not in line with the transition management, which clearly state the importance of monitoring and evaluating the progress of the projects. The theoretical framework has stated the importance of being flexible, yet knowing the progress of the transition and what steps need to be taken, is the key part of transition management cycle.

7.4.3 Working with Short-Term Plans

For projects and initiatives is important for municipalities to work with short-term plans to maintain the progress throughout the long-term pathways. All of the municipalities in this study have a long-term vision and several of short-term action plans to implement projects and initiatives. However, the process of short-term actions in reference to the long-term vision varies, especially between Denmark and the Netherlands.

The Danish municipalities are working with concrete short-term action plans with defined periods, and have stated that the transition between them has been smooth. For example, the Municipality of Aarhus has created three short-term climate plans from 2008-2009, 2010-2011 and 2012-2015. Aarhus will start to develop a new short-term plan from June 2015 for the period of 2016-2020 and the practitioner emphasises the need to be aware of the good and bad measures from the previous plans. The Municipality of Sønderborg has an action plan for 2010-2015 and assumed measures for 2016-2021 and 2022-2029 that continue the progress made from the previous plans. The measures in the future short-term plans in Sønderborg are not fixed and will be evaluated prior to the start of each period. This can provide the Municipality of Sønderborg with the flexible pathway that acts as a guiding principle.

In the Netherlands, there is less of a focus on the short- to mid-term goals and more on implementing sustainable initiatives and reaching the end-target of becoming CO_2-neutral. Zoetermeer had a climate

plan for 2007-2011, however they have not created any further short-term action plans. The practitioner of the Municipality of Zoetermeer states: "*It is more looking at where the energy and focus should be. We have a long-term strategy and looking for partners where the energy is and make actions*" The Practitioner states that they achieved their short-term targets in 2010 but things are becoming more difficult to realise the transitional process and have reduced the focus on monitoring and moved towards where the 'energy' for action is (Practitioner of Zoetermeer). Also, the practitioner in Eindhoven states: *"we are going from rough to more detailed action plans"* (Practitioner of Eindhoven). This is a new way of working for the municipality by using the backcasting, as mentioned previously:

> *"(…) with energy we do not work like a planned economy where you say we are at point zero, we want to get there, and now we make a strategy and then we start doing it. No, we just started doing it and then we develop slowly some kind of action plans. More of a trial and error process than real strategies from upfront (beginning)"* (Practitioner of Eindhoven).

The Dutch municipalities are focusing on areas where interest in projects has been identified as a way to manage the transition towards becoming CO_2-neutral. However, this is a more unstructured process in implementing short-term actions and projects, which by focusing on one specific transition agendas will limit the bridge and guidance between the long-term vision and the short-term actions required to reach the end target of becoming CO_2-neutral.

7.4.4 What are the Findings for the Navigating the Transition?

Firstly, in the *Navigating the CO_2-Neutral Target* it is identified how several of the municipalities use different tools to manage the long-term transition towards CO_2-neutrality. All of the municipalities', excluding Aarhus, have conducted backcasting studies, while Eindhoven, Copenhagen and Sønderborg have further developed roadmaps to navigate the transition. Furthermore, the backcasting studies of Zoetermeer and The Hague identifies certain limitations of what the municipalities actually can achieve in the transition such as mobility and electricity. Through the analysis of this section several questions are proposed: *How much guidance to these actually give? Are the backcasting studies from Zoetermeer and The Hague removing the responsibility from the municipalities? Does the backcasting look beside the more challenging long-term investments?*

Secondly, in section *Monitoring the CO_2-Neutral Target* it is shown how all municipalities have different monitoring procedures incorporated within the strategies. Yet, it is further identified within the results that Danish municipalities have more comprehensive and incorporated monitoring procedures based on their action plans. Several of the practitioner from the Danish and Dutch municipalities highlighted the importance of evaluating projects and plans, since this provides knowledge and learning points that allows the municipalities to readjust and manage the transition. The practitioner from Zoetermeer states that they have shifted the focus from monitoring the progress

to actually get sustainable measures implemented. The following questions are proposed: *Why do Danish municipalities have more comprehensive monitoring procedures in comparison to the Dutch municipalities? How can these municipalities navigate towards the CO_2-neutral targets without any clear path or mid-term targets?*

Lastly, the section *Working with Short-Term Plans* presents some of the different approaches to creating short-term action plans. The Danish municipalities are very similar here and all of them have multiple action plans through the past, furthermore Sønderborg just published the new plan for 2016-2021, while Aarhus are currently developing a new one. The Danish municipalities are aware of the importance of evaluating between the current and new plan. Both The Hague and Zoetermeer have developed a climate plan formerly, however they have shifted their approach towards implementing sustainable initiatives and only focusing on the end goal, while Eindhoven will roughly develop their first climate plan. From this part of the analysis the following questions are proposed: I*s making short-term actions plans a better transition management approach or if just getting initiatives started is more important? Why is there a difference in the use of short-term plans between Denmark and the Netherlands? Is it possible to focus on implementing sustainable initiatives and the reaching the end-target, without having clear lines of how to get there?*

CHAPTER 8

DISCUSSION

The long-term target requires stimulations and enhancement of innovation in multiple areas and as such the whole transition vision and arena is being pushed forward

8 DISCUSSION

The following chapter will discuss the interesting findings from the *Analysis* that links back to how the municipalities are managing the transition to become CO_2-neutral. The six municipalities from Denmark and the Netherlands are compared and discussed with input from the four external interviews that reflect on the role of municipalities in managing the long-term transition. The key findings from the analysis are discussed as shown in figure 9.

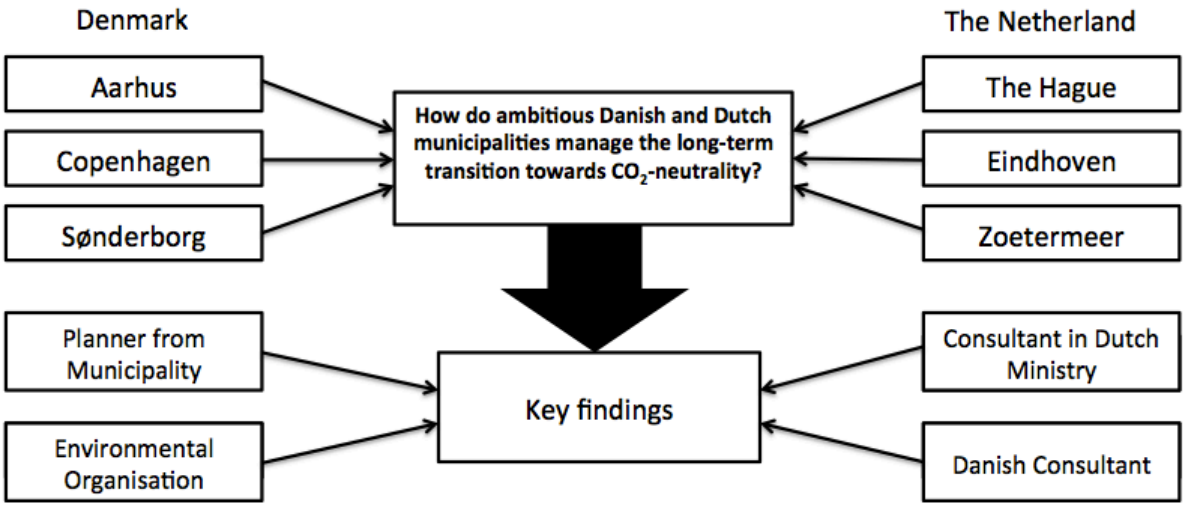


Figure 9: Discussion overview

This chapter is divided into four main sections. Firstly, *The Meaning of the Targets* section compares and discussed the differences in the targets of the six municipalities. Secondly, *Strategically Working* section examines why the six municipalities are using certain methods and what these imply to the managing of the transition towards CO_2-neutrality. Thirdly, *Supporting the Climate Policy* discusses the various methods used to spread the climate agenda throughout the institutions. Fourthly, *A Innovative Municipality* will discuss the role of the municipalities in influencing the market, and what they can do ease the transition. Finally, *Municipalities cannot do the Transition Alone* section discusses the role of municipalities and the collaborations needed to manage the transition towards CO_2-neutrality.

8.1 THE MEANING OF THE TARGETS

The following section of the discussion will not directly contribute to the understanding of the research question. However, by discussing the different meanings of the targets, and why the Danish municipalities have more ambitious targets than the Dutch ones, it will provide explanations that highlight the differences of managing the transition, which are covered in the following sections. The focus will be on some of the questions proposed in *The Development of the CO_2-Neutral Targets.*

8.1.1 Energy-, Climate- or CO_2-Neutral?

Table 3 in the *Municipal Cases* chapter shows the differences between the six municipalities targets, end-years, and which sectors that are included. Here, it is found that Aarhus (2030), Copenhagen (2025), Sønderborg (2029) and Zoetermeer (2030) have used CO_2-neutral as their target, while Eindhoven (2045) use energy-neutral and The Hague (2040) climate-neutral. The definition of the different targets is found in section *Targets* in chapter *Municipal Cases*.

In the analysis section *The Development of the CO_2-Neutral Targets* it is identified that Eindhoven chose this target for political reasons, since it is easier for the broader society to understand that fossil fuels are running low, and according to the practitioner it is less controversial than CO_2-neutral that refers to climate change. However, if the broader society is referring to 'normal' people it can be questioned if an energy-neutral target can be more accepted than climate-neutral or CO_2-neutral? The reason why The Hague chose a climate-neutral target is not discovered in this research study. However, in general, it is more common to use different terms in the Netherlands, while there is coherence in using CO_2-neutral as the target in the Danish municipalities. This is further highlighted in a Dutch study where several front-running municipalities use energy-neutral or climate-neutral, however in general the CO_2-neutral target is still the most used term in the Netherlands (Exter, Lenhart and Kern: 2014). Why the Dutch municipalities each use different targets whilst the Danish municipalities mainly focus on a CO_2-neutral target is an interesting question, which may be due to how the national governments refer to the issues of the climate agenda, where the Danish Government's main climate policy *The Danish Climate Policy Plan -Towards a low carbon society* emphasises CO_2.

What is the difference in the definition of the targets? Climate-neutral and CO_2-neutral are understood to be very similar without any major differences, while it is argued that the energy-neutral target actually limits the Municipality of Eindhoven. For example, those municipalities with a CO_2-neutral target can offset the excess electricity from wind turbines, which then can be subtracted from the energy that is produced by fossil fuels in the CO_2 calculations. The energy-neutral target will not be able to have this approach, as their energy consumption needs to be met directly with sustainable

energy, which limits the possibilities towards achieving their target. Yet, one could argue that energy-neutral is the more 'clean' target since it will remove the possibility of using fossil fuels.

8.1.2 What Sectors are Included?

Relating back to the *Learning Points from Backcasting Studies*, in Zoetermeer and The Hague it is identified that in certain sector changes are out of their control. This is further supported by the *Danish external planner,* who is working in a municipality that is known to be progressive in Denmark and have not developed a CO_2-neutral, as it is unrealistic to change the dependence of fossil fuels in the transport sector with the current national legislation framework. Although, The Hague have included transport and electricity in their target they will require actions from a national and EU level to make it possible to change these sectors, whilst Zoetermeer have instead excluded these sectors. The target of being CO_2-neutral in Zoetermeer only focuses on energy consumption, as this is where they believe they can influence a change and reach their target, as the transport and electricity production is a national and EU issue. The question is how can Zoetermeer claim to become CO_2-neutral in 2030 without including transport, and how can the consumption become CO_2-neutral without doing anything about the electricity?

The *Danish consultant* strongly emphasises how the municipalities *"have no means or tools to get into transport"*. Therefore, if the nations of Europe want to become CO_2-neutral in reality and not just offsetting, there is need for new policies and legislations that can support the municipalities in targeting both electricity, and specifically transport. You could say that such a focused approach, such as The Hague and Zoetermeer, is realistic method of working, however without initiating actions in other areas you are not leading the way for the future transition. However, as mentioned in the *Introduction,* the overall transition and dealing with climate change is a complex issue and thus it is not surprising that some municipalities will focus on areas they can achieve action, which in the perspective of transition management is an key managing process. However, the long-term target requires stimulations and enhancement of innovation in multiple areas and as such the whole transition vision and arena is being pushed forward. Furthermore, this means that the municipalities have an important role in influencing the transition on a national level, as they are more progressive. By targeting these difficult sectors they can support the creation of innovation and shift the political focus onto certain sectors such as transport. Or as the *Danish consultant* further emphasises that in the institution of a municipality: *"(…) you have an important role as a public sector to drive technologies and investment forward"*.

8.1.3 Difference Between Danish and Dutch Targets

Table 3 in the *Municipal Cases* chapter highlights that the Danish municipalities include more sectors in their targets, and the end-years are more ambitious than the Dutch municipalities. For example, Copenhagen aims to be CO_2-neutral 20 years before Eindhoven. This difference in ambitions can potentially be explained by the difference between the energy systems in Denmark and the Netherlands. Figure 5 and figure 7 in chapter *National Context* shows how Denmark and the Netherlands have 25 % and 4 % renewables respectively, and furthermore the 2012 average emissions per capita in Denmark and Netherlands was 9.25 and 11.48 tonnes CO_2 respectively. This indicates that Denmark has started the transition towards changing the energy system before the Netherlands, and therefore the pathway towards CO_2-neutrality is shortened for the Danish municipalities.

The difference in the amount of renewables can be explained as the Netherlands has had a large resource of natural gas in the north of the country that has dominated the energy market and provided large revenues for the nation of the Netherlands. Figure 7 shows that natural gas cover 42 % of the total amount of energy in the Netherlands. Even though Denmark has large resources of gas in the north sea, Denmark is 'only' supplied by 19 % of natural gas as seen in figure 5, which indicates that it has not had the same effect on the energy system as in the Netherlands (explained in chapter *National Context*). The gas market has therefore influenced the development of many other sectors over the decade, which the Dutch environmental organisation has elaborated on *"(…) we are very heavily dependent on gas so we build quite poor houses (…) because gas was so cheap you didn't need all that insulation".* The dominance of natural gas and the larger liberalisation of the energy market in the Netherlands have influenced the CO_2-neutral targets of the Dutch municipalities. The municipalities have little influence on the production of energy in the Netherlands, while in Denmark it is more the practice that the energy market is managed by public-private-partnerships. This joint partnership further leads to the finding that the Dutch municipalities tend to focus more on reducing the consumption, while Danish municipalities focus both on consumption and production. This is further discussed in the *Strategically Working* section. This is where the importance of municipalities to engage not only downward to the citizens but also upwards to the political and private sectors, which will be discussed in the *Municipalities cannot do the Transition Alone* sections.

8.2 Strategically Working

In this section of the *Discussion* the ways of working strategically that were identified in the analysis are discussed. Explanation of why the six municipalities are using certain methods and what these imply to the managing of the transition are further elaborated. This section also focuses on the

questions proposed from the *Navigating the Transition* section of the analysis. Firstly, the more comprehensive monitoring procedures in the Danish municipalities compared to the Dutch municipalities is elaborated on and how these differences can impact the navigational path to becoming CO_2-neutral. Secondly, the differences in the use of short-term action plans between the Danish and Dutch municipalities are further discussed. Finally, whether it is possible to reach the target of becoming CO_2-neutral using these methods.

8.2.1 Differences in Monitoring Procedures

The analysis section *The Development of the CO_2-Neutral Targets* identifies that the long-term roadmaps and backcasting studies have been developed as a tool for the municipalities to manage the overall transition towards becoming CO_2-neutral. Also, it has been identified that the Danish municipalities have more comprehensive monitoring procedures compared to the Dutch municipalities.

The Danish external planner emphasises that the monitoring and learning is a continuous process that should not be divided into short-term phases of four to five years, rather it should be a yearly procedure. By having more formal and regular monitoring procedures on a yearly basis and also between the four to five year action plans, means that the Danish municipalities gain knowledge on the progress on where CO_2 reductions are being made and where things are failing behind. In the Dutch municipalities the unstructured monitoring procedures may not create clear evaluations of the projects or the overall contributions to CO_2 reductions, even though both Eindhoven and The Hague state they understand the importance of evaluation. This will make reaching the target of CO_2-neutral unclear and difficult.

As mentioned in the *National Context,* the Danish Energy Agency has developed a CO_2 calculator for the municipalities to use to monitor and help plan for future initiatives. Thereby, it is not that surprising that the monitoring procedures are more comprehensive in Denmark compared to the Netherlands, who do not have a similar national CO_2 calculator. Furthermore the difference may be due to the Danish municipalities having more ambitious end targets of becoming CO_2-neutral than the Dutch municipalities, and therefore they are under the pressure to show real CO_2 reductions. Furthermore, the Danish municipalities are more proactive than the Dutch in monitoring and evaluating the process, which in the transition management perspective will make the Danish Municipalities more likely to achieve the transition to become CO_2-neutral.

8.2.2 Difference in Short-Term Actions

A clear difference in the use of short-term action plans is identified in the *Navigating the Transition* section of the analysis. Here it is found that Danish municipalities have more concrete action plans, whilst the Dutch municipalities of The Hague and Zoetermeer have formerly used short-term action plans, which however have not been updated since 2011. Furthermore, Eindhoven is working roughly with initiatives of interest at first and will create short-term plans later. Transition management perspective argues for clear yet flexible short-term actions and agendas in managing the long-term vision. So why is there a difference between the Dutch and the Danish Municipalities?

The Dutch municipalities of Eindhoven and Zoetermeer are focusing on where the interest is in the municipality for CO_2 reductions and that short-term targets are not so important. It is about reaching the long-term targets in the end rather than focusing on short-term targets in this process. This approach can be viewed as a strategic way of working as long as concrete implantations can come out of this way of working. The Danish consultant supports the approach of looking for the greatest mitigation potential in the actions and implementations you are taking in the short-term. In Zoetermeer they identified the existing building stock or the residential areas as the focus of their initiatives to become CO_2-neutral, as they could have little influence on the transport, energy production, or industry sectors. The consultant in the Dutch ministry states:

> *"(…) municipalities have looked at their climate policies and they notice about 60 or 70 % of their energy use is in the existing building stock so we will focus on these and see what is done nationally for other areas."*(Consultant in the Dutch ministry)

As such, Zoetermeer is focusing on the '0 on the energy meter' as their main short-term project since Zoetermeer have a high proportion of residential buildings in the municipality (Practitioner of Zoetermeer). However, as mentioned previously, without clear monitoring procedures it is difficult to measure the success of such projects in the amount of CO_2 reduced. As found in *The Meaning of the Targets* The Hague and Zoetermeer are hoping for the National Government to deal with the transport and energy production side of their targets to become CO_2-neutral, which thereby limits the management of the transition within the municipalities.

It is interesting to understand why the Dutch municipalities are focusing more on the energy consumption within the municipalities, whilst the Danish municipalities focus on short-term actions plans covering both the energy consumption and the energy production. One reason links back to the *National Context* of the Netherlands where the energy market has become more liberalised than the Danish system. Therefore, the control of what happens with energy production falls to the EU level.

The Dutch environmental organisation backs up this argument by saying the Netherlands have *"(…) the furthest reaching liberalisation of the energy market I believe in all of Europe"* due to a provision in the Dutch law that requires network companies to sell off their production facilities.

The Dutch environmental organisation argues that the faith in top-down market approaches was in the pre-phase of the COP15, where schemes like the ETS were seen as the method of reducing greenhouse gases. Yet, with governments and municipalities losing the management control of the energy production they are now *"(…) hampering the energy transition because this very liberalised market, the only thing it's really good for is to have lower energy prices"* (Dutch environmental organisation). The higher proportion of privatisation and liberalisation of energy in the Netherlands is part of the explanation as to the reasons why the Dutch municipalities are focusing on the energy consumption. As the Danish municipalities still have a level of power within the utility companies they have an opportunity in influencing the direction they will take in the short- and long-term, and can direct short-term plans of energy production. Thereby, the lower proportion of liberalisation is due to the fact that public-private-partnership is more prominent in Denmark.

8.2.2.1 A Critical Perspective

While all the Danish municipalities use short-term action plans to steer the transition, it is difficult to understand how the Dutch municipalities will manage their long-term transition towards becoming CO_2-neutral without any concrete short-term plans that can steer the transition. The Dutch environmental organisation in the Netherlands questions municipalities with a long-term climate targets without short-term goals and plans as:

> *"(…) some of them have very nice far off targets but their near future implementation is quite poor so it is much better to say 'what will I do in the next four years that will create this movement that makes any target in the long-term future feasible."* (Dutch environmental organisation)

This point from the Dutch environmental organisation is important in relation to managing the long-term transition as without short-term action plans the pathway towards the end-target can become blurred. The Danish consultant argues that focus areas and an understanding of the locational context, as mentioned in the *Development of the CO_2-Neutral Targets* section of the analysis, is vital in order for realistic actions to be initiated, as well as knowing what you want your municipality to look like in the future. Thereby, this requires knowledge and adaptations to the strategies and projects that is produced from the monitoring of short-term action plans that are more prominent in the Danish municipalities. It is important to have concrete points that can lead to real initiatives rather than too weak and unsubstantiated objectives in what you as a municipality want to achieve. Also, by having

the clear actions rather than only looking for where there is interest can create a formal responsibility of the municipality to achieve, which as the Dutch environmental organisation says, they can be held to accountable for.

Therefore, the way the Dutch municipalities are managing the transition to become CO_2-neutral by targeting areas of interest may be a successful and strategic way to get initiatives and projects started. However, without concrete short-term actions on the projects, the level of CO_2 reductions cannot be measured to a sufficient level, and therefore it becomes difficult to manage the transition towards CO_2-neutrality. One could even argue why these Dutch municipalities have developed these long-term targets, and how they expect to arrive at the end-targets without any procedures that can steer the transition?

8.3 SUPPORTING THE CLIMATE POLICY

In the following section it will be discussed how the climate policy can be supported and thereby help anchoring the target within the municipal institution. This section also focuses on the questions proposed in the *Anchoring the Climate Policy* and *The Development of the CO_2-Neutral Targets* sections of the analysis. Firstly a *Critical Perspective on Anchoring Procedures* are presented, followed by a discussion on how *Strong Leaders can Anchor the Climate Agenda.*

8.3.1 Critical Perspective on Anchoring Procedures

One of the key findings in *Anchoring the Climate Policy* found that the municipalities of Aarhus, Eindhoven, The Hague and Sønderborg have all focused on having a small climate department and thereby spread the climate agenda throughout the institution causing institutional changes that will accommodate the CO_2-neutral target. Some of the practitioners stated that this trend occurred due to budget cuts, while some stated it was a deliberate action but they all agree that they believe this is the right way of anchoring the CO_2-neutral target within other departments. However, the consultant in the Dutch ministry is more critical of this approach and mentions a bad example from another municipality:

> *"I think they discovered that the target was set too high but it is also budget cuts. They had a huge environmental department and people who were working within that department are now everywhere in other departments. The excuse they use is that now these people are working in different departments and we have integrated climate change, well that is not the case."* (Consultant in the Dutch ministry)

The case that the consultant in the Dutch ministry highlights is not generalizable, however it indicates that the procedure of spreading the climate agenda to the employees throughout the municipality may not be as beneficial as these four municipalities believe. While some of the actors stated that this was an intentional decision, as the municipalities were enforced to do it due to budget cuts and are maybe involuntarily being optimistic about this approach as being their only choice.

According to the study on anchoring presented within the *Knowledge Background*, it was found to be important to have a climate officer in different departments such as housing, economy and transport, which would support the anchoring of the climate policy, cross-departmentally. Aarhus use the approach of having a small climate department working as the coordinator of the transition process and then use the key account managers through different departments to create ownership of the CO_2-neutral target. The procedure in Sønderborg is similar where they use a steering committee for the different sectors to run dialogues and promote sustainable measures. Both of these municipalities have achieved their short-term target for 2015, and are now moving towards their next target so maybe the combination of spreading the resources into other departments and having a strong coordination of the climate target is an effective approach. It can be argued that they are doing something correctly and a combination of having a minimal climate department to coordinate and spread the resources through the institution may be adequate.

However, larger municipalities with a bigger organisational structure such as Copenhagen are also criticised in the *Knowledge Background of* Engberg and Larsen (2011) who questioned the amount of cross-departmental collaboration within the municipality and found that the practitioners were confused about the political aims within the different departments. Yet, the study is four years old and the practitioner from Copenhagen highlights that the CO_2-neutral agenda within Copenhagen is very strong today and this has empowered the climate agenda, while they have also developed a planning procedure that will allow them to have an overview of the cross-sectional collaboration with other departments, and run dialogues with these practitioners.

Yet the consultant in the Dutch ministry agrees with Engberg and Larsen (2011) and states that anchoring the CO_2-neutral target through larger municipalities can become more difficult *"I think smaller municipalities have set their minds to becoming CO_2-neutral then it is easier to integrate into all the departments as people know each other (…)"*. Due to the more complex structures within the institution of Copenhagen it can become more difficult to anchor the CO_2-neutral target within the municipality, yet this research study perceives the steering committee as the best approach to make the structural complexity more transparent.

8.3.1.1 An Example of a Comprehensive Integration Framework

The Municipality of The Hague has an interesting approach to integrating the climate agenda in a large municipality within other departmental strategies. The development of the framework *Towards a Sustainable The Hague* in 2009 is targeting the barrier identified by Burch (2010) in the *Knowledge Background* chapter that reveals how municipalities lack a coherent climate policy that force other departments to include sustainable measures within their own strategies. The *Climate Plan* in The Hague maps the initiatives needed for the climate-neutral target and worked as an overall document, while the specific initiatives were included in the relevant execution plan in other departments. This is the most comprehensive procedure to anchor the climate agenda within other strategies seen in the six municipalities. The Copenhagen *Climate Plan* is to an extent similar, however it did not go through the same procedure of developing 13 execution plans.

Yet, the *Climate Plan* ended in 2012 and the climate department have yet to develop a new plan, while the framework document goes back to 2009. One could argue that after six years it may be time to update the framework document and go through the same process of developing new execution plans allowing the municipality to readjust their pathway towards becoming climate-neutral by 2040. However, developing 13 executions plans under the same framework while coordinating these plans between each other is expected to be a complex process that demands a lot of the municipality's resources. Furthermore, one could claim if this framework did not exist would the municipality have succeeded in developing more *Climate Plans* and thereby achieved more progress?

Under the right circumstances it is difficult to argue against the approach that The Hague has taken by creating an overall framework for sustainability, as it is a powerful tool to ensure integration of the sustainability agenda throughout the institution. If municipalities have the resources to continuously work through this approach, it is desirable. However if not, this approach can still be a powerful first attempt to anchor the climate policy within municipalities that struggles with this, even though it is only a one time solution.

8.3.2 Strong Leaders can Anchor the Climate Agenda

Even with such frameworks in the municipality to give power to the climate agenda there are still other issues remain, for example the economic burden of climate issues. This requires a strong political leader in order to support the transition towards becoming CO_2-neutral. In *The Development of the CO_2-Neutral Targets* it is apparent that several of the practitioners within the municipalities feel the climate agenda has been empowered by way of political support. This political support is relevant to discuss in relation to how well the different municipalities have anchored the climate agenda

throughout the municipality, since the local politicians are positioned in the top level of the municipalities. However, it is difficult for municipal practitioners to be critical about their politicians, and therefore the following section will instead focus on the external actors perceptions.

8.3.2.1 Political Willingness

The consultant in the Dutch ministry states that a number of Dutch municipalities have developed CO_2-neutral targets, however it is only *"Some who are serious and some who use it as a front or politically motivated"*. This is also supported by the Danish consultant in that the CO_2-neutral target in general is much more about branding yourself than exactly mitigating climate changes: *"(…) I would say CO_2-neutrality is more political branding kind of thing than actual action"* (Danish consultant). If the politicians do not support the climate agenda and only see the climate target as a branding tool, the climate agenda will probably not be anchored throughout the municipal institution, and therefore it will become difficult for the practitioners to manage the transition towards CO_2-neutrality, The Dutch environmental organisation is very critical about the role of the politicians being responsible for framing the transition within the municipalities and highlighted it may not be their priority:

> *"It is not up to the politicians to decide that we will get into this horrible world of climate change. They have an equal obligation to prevent that. The way they go about it that is up to politicians but the question about whether you want to keep this a liveable planet is just not a political one (…)"* (Dutch environmental organization)

Furthermore, the consultant in the Dutch ministry emphasise that the economic factor within the municipalities is much more important than the climate, and therefore it is important to include the economic factor within the climate agenda, otherwise it is difficult to support politically. Several of the external actors doubt if the politicians are willing to allow taking increased economic risk on the long-term investments that are required to move forward the municipalities' targets. However, it is important to remember that municipalities consist of many different agendas, and that the main purpose of the municipal institutions is to serve the citizens. Therefore, the climate agenda is still given a lower priority compared to job creation, education, elderly care etc. Which leads back to one of the main questions, should the politicians' focus on the actual CO_2-neutral transition or on the economic focus:

> *"Yes for the political level it is always a good hook for discussions but it is the concrete action that matters. The targets have to look ambitious but there are no politicians that*

will go for that target if it is too expensive anyway so you have to prove it by the every day action, and cost-effective actions." (Danish consultant)

Therefore, the role of the politicians is about balancing between the CO_2-neutral target and economic priorities to successfully manage the transition. However, this does not mean that the politicians should not be willing to take risk, and here several of the actors highlight the need for a strong leader. This also leads to the importance of the politicians' role in the transition, as they need to balance between this target and the economic priorities in order to create an environment that will allow the practitioners to manage the long-term transition.

8.3.2.2 Need for Strong Leaders in the Transition

However, most municipalities have until now focused on implementing projects with good results and a short payback time (Consultant in the Dutch Ministry & Danish consultant). As the practitioner from Sønderborg states, the municipalities are now entering a crucial phase in the transition since more challenging measures need to be addressed, specifically the Danish municipalities that are nearer the end target date. The practitioner from Copenhagen further elaborates that there is a need for continuous political support throughout the transition since there are measures that need to be worked in the whole period for example transport and retrofitting issues, and these will not produce immediate results for the politicians. Furthermore, the consultant in the Dutch ministry emphasises that the current budget system in the Dutch municipalities does not favour long-term investments, which is due to politicians only being elected for four years and they do not want to be responsible for the extra budget used. This example shows that even with the political support within the six municipalities, there is still a need for strong leader that can support the transition throughout the process.

This is further emphasised by Danish external planner who states the importance of the politicians to get behind the target and demonstrate through the whole institution that there is need to focus on the climate target, and if it costs a bit more and takes more time it is acceptable as it is a prioritised target. A strong leader forcing through the agenda will also benefit anchoring the climate agenda throughout the municipality, which will support the overall transition. Furthermore, the consultant in the Dutch ministry emphasises that it takes a very strong political leader to stop the financial aspects dominating over the sustainable issue. So the municipalities are entering a crucial period of the transition, where there is a need for more political support that can change norms, rules and structures. Therefore, municipalities with a strong leader will affectively have a better political set-up for the future transition since the politicians will be able to take actions needed by the practitioners to achieve the

management of the transition and support anchoring the climate agenda. However, it is also important to be realistic on the economic priorities, and therefore it is important to have close relationship between the climate agenda and the economic priorities. If not, it will not be possible to achieve this transition since the politicians do what society requires.

8.4 A INNOVATIVE MUNICIPALITY

In this section of the *Discussion* the ways ambitious municipalities can influence the market is discussed. This section focuses on the questions proposed from the *Role of Municipalities in the Transition* section of the analysis. Firstly, the prominence of influencing the market in the transition is discussed. Furthermore, the measures used by the municipalities in this research study are also discussed and whether these can influence and prepare the market in the municipalities as well as in a national context.

8.4.1 Influencing the Market

In terms of moving forward and implementing the strategies the municipalities have developed, it is important not to just look to facilitate others to engage and collaborate within the transition. Influencing the market has been identified as a role the municipalities can play, especially in the cases of Copenhagen and The Hague. Why is influencing the market important?

As mentioned in *The Meaning of the Targets* section the Danish consultant states *"(…) you have an important role as a public sector to drive technologies and investments forward"* and in the Danish cases *"(…) you have to realise that if you have ownership you have to be a very active owner and push the agenda forward"* (Danish consultant). This is important in order to support niche-technologies that will ultimately play a key role in municipalities reaching their target of becoming CO_2-neutral. This is what Copenhagen have tried with projects using electric and biogas vehicles in their own fleet, as well as investing in the infrastructure, which the Danish external planner also states has happened within the municipality. Changing the municipal fleet of vehicles to EV's is a general trend in Denmark that has influenced the EV market on a national scale since it has contributed to preparing the infrastructure and thereby also the market for the future. Therefore the municipalities can stimulate the market by supporting certain technologies. One could even say the Danish municipalities are keeping the market 'artificial' alive until the technology is really competitive for the broader society. However, both the Danish external planner and the practitioner from Copenhagen state that the EV market has been difficult to influence with uncertainties in the future of tax support for EVs in Denmark and a reluctance of civil society to make investments. In the Netherlands, The Hague has been successful in supporting solar panels through subsidies and have influenced the market to a level that subsidies are no longer needed for solar panels to compete within the energy market in the

region. This has shown how solar panels can be a good business for the citizens, but also further contributes with additional research focus on this area and lowering the price due to a competitive market.

The Danish external planner highlights another example in the increase of organic food producers in Denmark since the municipalities stimulated them in the 1990s. Several municipalities set a target of increasing the amount of organic food served internally in the municipalities, and thereby the amount of organic food purchase increased and started the growth in this market. This allowed more farmers to focus on organic food since the market became bigger, which further lead to competition and thereby better prices for the consumers. The municipal procurement process can thereby influence the market for solutions and technologies that are needed for municipalities to become CO_2-neutral.

These examples highlight that as well as managing the transition for the municipalities is also about stimulating and preparing the market for new technologies, and to further facilitate the infrastructure in readiness for future technologies that required to enable the transition towards becoming CO_2-neutral. This is important in sectors, such as the transport sector, where there is little formal power to change behaviour in purchasing EVs by the civil society, however investing in infrastructure can support the EV market to contribute to the reductions on CO_2 emissions.

8.4.2 Supporting Innovation

It was identified in the analysis that all of the municipalities want to create living labs, which would enhance innovation and provide a protected space for niche-technologies. This can be seen as a win-win process in phase three of the transition management cycle with areas to support innovation and implementations as well as generating finances for the municipality. Thereby, living labs can be seen as assisting the preparation of the solutions needed now and in the future for the transition to becoming CO_2-neutral. How successful these will be has yet to be seen but in principle the idea of living labs is a progressive initiative by municipalities in the support of innovation. Although, by only facilitating and enabling space for companies to engage in the target, municipalities may lose management control over the transition as the search for green growth takes over. The municipality that the Danish external planner works for states that within their living lab they have actively started their own development projects and thereby have the management control over what they require in relation to their long-term goals.

However, the Danish consultant and Dutch environmental organisation states that to really influence change in the market and to speed up the transitional process, we need to *"(…) create a tax system that*

increases reductions" (Danish consultant). Even though Denmark has a CO_2 tax and feed-in tariffs for renewable technologies, there is still a need for more progressive emission taxes on an EU level, especially with the lack of incentives to change the fossil fuel based industries in the EU ETS. Thereby, he top-down approach of taxes and legislation on a national level are still required to destabilise the dominant regimes that will hopefully support the low-emission technologies. This is a national and international issue that if municipals want to have an influence in then the municipal networks, mentioned in the *Municipalities Cannot do the Transition Alone* section, can create the 'numbers' that can have some real power. Yet with the real support from the national level, creating pilot projects, living labs, and subsidy schemes will help the municipalities in managing the transition to becoming CO_2-neutral by bringing more actors into the transitional arenas and creating an environment in which innovation can be enhanced.

8.4.3 Key Role of the Front-Runner

These six municipalities are arguably front-runners in the terms of having a $C2_2$-neutral target that is ambitious when compared to climate policies in other municipalities. Being a front-runner in this field also implies that you lead the way and push the markets, infrastructure, and society as a whole in the direction of being more sustainable. This is especially important for the larger municipalities who can use their power and influence to initiate changes in the wider society. Thereby, in managing the transition to become CO_2-neutral it is important for the leading municipalities to use their power and influence to prepare and influence markets for the sustainable solutions required in the future. Although, how effective this role can be is unknown and would require further research. One could argue that without facilitating the market for sustainable solutions, the management of the transition to become CO_2-neutral will be more difficult in the long-term as action within the civil society is required to reach the end target.

8.5 Municipalities cannot do the Transition Alone

The *Analysis* chapter has identified the importance of the facilitator role in the transition to become CO_2-neutral. This implies that the municipalities cannot achieve the transition to become CO_2-neutral by themselves and as part of the management process will include using other actors. This section focuses on the questions proposed from the *Role of the Municipality in the Transition* section of the analysis. Firstly, how important is getting the civil society on board the transition and what the facilitator role implies. Secondly, the different use of municipal networks is discussed in terms of how these contribute to enhancing innovation as well as influencing the national and EU level of politics.

8.5.1 Why get the Civil Society on Board?

Throughout the *Analysis* and in the *Knowledge Background* chapters it has been identified that the municipalities play a key facilitating role in managing the transition towards becoming CO_2-neutral.

Therefore, the civil society plays an important role in the success of the long-term transition. The managing of the CO_2-neutral target requires the facilitating of citizens, which all the municipalities in this research study have been proactive in from the 'participation projects' in The Hague to 'Sharing Copenhagen' in Copenhagen. Having the support and acceptance of the civil society will make the possibility of investments in the solutions that are ultimately needed more likely. This was also stated by the Dutch environmental organisation:

> *"I do think municipalities are becoming a lot more active as it brings the issue to the citizens and their doorsteps (…) Municipalities have a very big role in making things concrete, especially in the built environment because they are closest to citizens and can show real and actual results."* (Dutch environmental organisation)

This engagement and facilitating of citizens is not just about the management of the transition in the present day. A transition is over a long period of time so requires a constant engagement with the citizens of the municipalities. The Danish external planner emphasises that it is important to make the civil society aware of the environment at an early age. This makes the integration of the transition vision into other departments of the municipality very important, so knowledge and the transition agenda can be spread to the citizens via education, housing or health plans and policies. Therefore, the facilitation of the civil society in relation to the management of the transition to becoming CO_2-neutral is not just a role for the climate or sustainability departments. However, engaging citizens needs careful management, especially if citizens are required to invest and implement the solutions identified by the municipality. The consultant in the Dutch ministry argues that when being a front-runner or ambitious municipality then communication with the main players is vitally important as:

> *"You can ask too much of your citizens then they do not understand anymore and push back so nothing ends up happening. Make sure that everyone understands what you want and most people agree on what you want and what you are going to do."* (Consultant in the Dutch Ministry)

Thereby, the facilitating role of municipalities is not just about facilitating technologies and solutions but also enabling of civil society to gain knowledge and directly be involved in the transition, which can potentially create a wider acceptance of the climate agenda. A couple of interesting examples of bringing the citizens into the first phase of the transition management cycle in the development of the policies and strategies was obtained from the external interviews with the consultant in the Dutch ministry and the Danish external planner. In both cases citizens were invited to initiate ideas about the future municipal plans, with the one in the City of Utrecht (the Netherlands) being a lottery that lead to 400 participants. This has widened the transition arena from the start of the transitional process and

brought inhabitants directly into contact of what and how the climate policies will be introduced within the municipality in the coming years.

Furthermore, by bringing the broader society into the transition arena will create more space for the politicians to support the climate agenda, which was found to be a dilemma in the discussion section *Strong Leaders can Anchor the Climate Agenda.* If the broader society supports the climate agenda then the politicians will also be more willing to take risks that enhance the climate agenda, for example by changing the budget system to allow long-term investments that will benefit the practitioner in Eindhoven.

Therefore, in the managing of the transition to become CO_2-neutral it is key to directly engage civil society within the transition arenas that the municipality are working in. This process is ongoing through-out the transition period which also emphasises the importance of evaluating the three first phases of the transition management cycle, discussed in the *Strategically Working* section, to ensure the facilitating of actors is successful and whether the arenas need to be widened and spread to other actors within the municipality.

8.5.2 Are Networks and Collaborations Useful in the Transition?

Another key management point identified in the *The Role of the Municipality in the Transition* section in the analysis is that all these leading municipalities are involved in various climate or municipal based networks. Yet how are these useful in the transition?

The networks, especially transnational networks, discussed in the *Knowledge Background* chapter have expanded in the field of sustainability and climate change. Yet, as the size and location of municipalities will affect the types of challenges and solutions required, it is therefore important to engage in knowledge sharing with those networks you can benefit from. For example, not every municipality has the resources to do what Copenhagen or The Hague seeks to achieve. The Danish consultant who previously worked in a small municipality said *"(…) we looked to other places with 45-50,000 people and what are they doing, you have to put it into perspective"*. The Municipality of Sønderborg as a rural municipality is the only municipality to include the agriculture sector. Therefore collaborating with more urban municipalities will not enhance innovation within the agriculture sector. In this perspective the Dutch municipal networks of the G4 and G32 manages to bring municipalities of similar sizes together to collaborate and share knowledge. Coming together with similar sized or locational characteristic municipalities benefits the enhancing of innovation, however, by only sharing knowledge within similar municipalities may limit the possible knowledge gaining

from other progressive municipalities. Therefore it requires a balance between having the same interest and also contributing with different perspectives, to create the best environment for innovation.

The municipalities coming together in these networks can also create a powerful tool in lobbying nationally in relation to climate and energy policies and subsides. The Danish consultant emphasises the need for municipalities to be proactive in areas they have power. These networks therefore need to be used politically proactively and not just as a sharing platform between the members. The analysis section *The Role of Municipalities in the Transition* identifies that the G4 network can and has been used for lobbying whilst Copenhagen has been active internationally within networks and has initiated the *Carbon Neutral Cities Alliances* network of ambitious cities. This implies that larger municipalities can play an important role globally and by collaborating together can create a powerful network on national and international levels that can influence the transition to CO_2-neutrality, among other topics, globally. For example Copenhagen is considerably bigger than other municipalities, and as the Danish consultant states, the government also tend to listen to them. However, if this actually changes something on a national scale is difficult to say since the practitioner in Copenhagen mentioned several barriers created by the national government.

8.5.2.1 The Importance of Regional Networks

The networks and collaborations between neighbouring and regional municipalities are important, as many of the energy related initiatives and solutions require these collaborations. For example, the Municipalities of Copenhagen and The Hague state the need to install wind turbines in the surrounding municipalities. This is also the case with regional collaboration on transport and heating infrastructure according to the practitioners of the Municipalities of Aarhus and Eindhoven. The Danish consultant states that this is a *"(…) critical role in connecting with the other local governments"*. However, the consultant from the Dutch ministry believes, especially in the case of Eindhoven, that collaboration between neighbouring municipalities is not working very well because:

> *"The smaller municipalities may have envy or afraid to be swallowed up by the larger municipalities so it is an emotional thing within local governments whether to follow Eindhoven or not. They take advantage of the economic role Eindhoven plays in the Netherlands and take their own profits but as soon as other areas are involved (climate) the communication is fairly non-existent."* (Consultant from the Dutch ministry)

However, the Danish consultant also stated that an increase in collaboration and networking between municipalities is a positive outcome of the failures of COP15 and that top-down measures cannot solve the climate issues alone. The Danish consultant says that since 2010 there is a *"(…) completely different*

landscape out there in Denmark. Everybody works together on all issues (…)" and that the municipalities themselves realised *"(…) we are too small separately, it is too costly to do it separately so you can work together in ways you learn from each other or go together".* This brings in the discussion that the failures from such international gatherings on climate change like COP15 has possibly galvanised the arenas of local governments to lead the way in the transition to become CO_2-neutral, which is the level that has been identified in the *Knowledge Background* as being the most progressive.

However, do these networks enhance innovation? The municipality the Danish external planner works in actively uses regional networks between municipalities, companies and research and developing organizations to start project developments and innovation. Copenhagen has been successful in expanding cycle superhighways through the surrounding municipalities although, in other sectors they may engage more internationally than nationally as they are so much bigger than other municipalities, which can separate Copenhagen from the other municipalities in Denmark. Whilst Eindhoven has collaborated in setting targets for retrofitting houses in the largest five municipalities in the region. All the municipalities in this research study state the importance of enhancing innovation through collaboration and networking, however, whether this has happened to a sufficient level is debatable. No municipality can be an expert in all areas, thereby learning off each other can be beneficially for all parties involved.

In managing the transition to become CO_2-neutral it can be argued that the collaboration within networks is an important management tool to assist the transition, especially after the 'low hanging fruits' have been addressed and knowledge on unknown technologies and concrete pathways are required. Therefore it is important that all of these best practices around different municipalities are identified and generalised as much as possible to support the national transition.

CHAPTER 9

CONCLUSION

There are number of procedures for the facilitating process from focusing on specific areas of interest to concrete actions plans. In the facilitating role, municipalities have an opportunity to enhance innovation through collaboration with multiple actors.

9 CONCLUSION

This research study brings to life new knowledge on the process of ambitious Danish and Dutch municipalities in their effort to manage the transition to become CO_2-neutral. The comparison between the six municipalities' main strategies, the interviews with the practitioners and the reflective interviews with external actors identifies a number of key findings that answer the research question:

How do ambitious Danish and Dutch municipalities manage the long-term transition towards CO_2-neutrality?

This research study identifies that the Danish municipalities have a more structured approach to managing the transition, especially that the Danish municipalities have more concrete short-term action plans. The Dutch municipalities are working in a more unstructured approach focusing on 'areas of interest' rather than identifying concrete actions to reduce CO_2-emissions. In the transition management perspective it is important to be flexible over the long-term, however there is a need to work structurally with short-term action plans that are monitored for the progress towards becoming CO_2-neutral. All of the municipalities have aspects of the transition management elements within their management process of the transition, although probably unaware of this. Yet, it can be concluded that the Municipalities of Copenhagen and Sønderborg cover the most of these transition management elements of the six municipalities. However, whether the incremental aspects of transition management and not the more strategically navigating of areas of interest is the best way of managing the transition in the long-term is unknown.

The differences in national contexts between Denmark and the Netherlands plays a part in identifying that Danish municipalities are more progressive than Dutch Municipalities. In Denmark the environmental movement started before the Netherlands, which has influenced the Danish political landscape earlier, and thereby on a national level Denmark has a larger proportion on renewable energy sources, while the Netherlands has been hampered by a greater proportion of liberalisation of the energy market. This is part of the reason why the Danish municipalities have more ambitious targets in becoming CO_2-neutral than the Dutch municipalities.

In managing the transition to become CO_2-neutral it is concluded that ambitious municipalities have an important role in stimulating and facilitating new markets of sustainable solutions. This can be by preparing the market with investments in infrastructure or influencing the market through municipal procurement, as well as providing innovative environments for niche-technologies in creating living labs or providing subsides for new technologies. Thereby, in managing the transition to become CO_2-

neutral it is important for the leading municipalities to use their power and influence, to prepare and influence markets for the sustainable solutions required in the future.

Anchoring the CO_2-neutral target in the institution of the municipality is important in order to accommodate the climate agenda. All the municipalities state that they have broad political support, which is needed to manage the transition. The political support of the CO_2-neutral target within the municipalities has created institutional changes in the norms, rules and values, which have empowered the climate agenda. Also a strong political leadership from individuals or management can push through the climate agenda into other municipal departments, such as transport or housing, and thereby change the norms and values of the municipal institution. The anchoring of the CO_2-neutral target within the whole institution of the municipality along with a strong political leader is an important part of enabling the practitioner to manage the transition.

The economic factors in the municipalities is still more important than the climate agenda, therefore, it is key to combine the economic priorities with the climate agenda in managing the transition to become CO_2-neutral. Investments in sustainable solutions tend to have a long payback time which does not fit into the normal political cycles of four to five years, therefore, these solutions requires that municipalities have a budgetary system that supports these investments. Managing the facilitation of collaboration with external actors, as well as their own municipal investments, using living labs can provide the environment to create 'green growth' as well as enhancing innovation in the sustainable solutions required for the transition to become CO_2-neutral. However, whether green growth and becoming CO_2-neutral are compatible is a question for the political decision-makers of the municipalities. Although, by widening the transition arena, more of the society can be part of the transition, which is important in the long-term as municipalities cannot manage the transition alone.

Finally, municipalities play a key role in facilitating the transition to become CO_2-neutral. This facilitating role involves collaborating internally and externally of the municipality as an institution, between the civil society and other municipalities as a way to strategically navigate the long-term transition. Also to facilitate their own municipality as an institution to reduce CO_2 emissions, while facilitating action from actors in the geographical boundaries of the municipality. It is concluded that there are a number of procedures for the facilitating process from focusing on specific areas of interest to concrete actions plans. In the facilitating role, municipalities have an opportunity to enhance innovation through collaboration with multiple actors. Therefore, it is concluded that the key role of municipalities is to manage the facilitation of the long-term transition towards becoming CO_2-neutral.

9.1 PERSPECTIVE

This research study is one of the first to examine how ambitious municipalities manage the transition towards becoming CO_2-neutral. Even though it does not provide in-depth knowledge on a specific part of the transition or create a guideline for how to become CO_2-neutral, it generates knowledge on a, until now, limited research area. Currently, there are few municipalities in Denmark or the Netherlands, and more generally Europe that have developed CO_2-neutral targets. However, it is expected that the number will rise in the future as the focus on climate changes from national and international governments increases. Furthermore, the national targets that have been initiated by the EU in in agreements such as the *2020 climate energy,* described in the *National Context,* will push forward the pressure on municipalities to engage on CO_2 emission reductions. Therefore, this study provides insights into the story of six ambitious municipalities who already set the target of becoming CO_2-neutral. Now as the six municipalities enter different stages of the transition, this research study provides useful knowledge of the first *small steps: "(…) the only way forward is to take small steps and regularly evaluate whether we are coming closer to or drifting away from our ideal destination"* (Loorbach, 2007: 3). Furthermore, this study will contribute to future academic work examining the municipal transition towards CO_2-neutrality. This can both be specific studies that seek to understand certain mechanisms within this transition, or more general studies that will understand the overall transition management.

Although, the focus of the transition management perspective in this research study has guided the conclusion into this way of managing the transition towards CO_2-neutrality. Of course this is not the only or the best process of managing transitions, however, the transition management does provide a clear structure to a complex and unknown process. There are other methods of managing a transitional process and further studies into the management towards CO_2-neutrality in municipalities could be interesting from other perspectives such as strategic planning, the navigating role or more radical working practices in this field.

Also, municipalities that will develop CO_2-neutral target in the future can also look into this study to find stories about how other municipalities work with this transition. For example, what procedures these six municipalities have used to anchor their climate plan, how they monitor and evaluate progress and projects and what they gain from this, and furthermore the role of the municipalities in the transition linking back to the conclusion of facilitating, collaborating and navigating the transition. This research study focus on the management processes of the six municipalities. However, it is important to point out that this is both internally and externally of the municipality as an institution. Both of these roles can be seen as important in contributing to the transition to become CO_2-neutral.

How municipalities can influence the market of certain niche-technologies is one of the findings that is important to perceive in a societal perspective. This is both shown in the examples of EV's in Denmark and solar panels in the Netherlands, and furthermore how Danish municipalities stimulated the ecological food market. Since the municipalities can be a large organisation that has enough resources to experiment with niche-technologies and order larger quantities, it is therefore important that municipalities in Denmark, The Netherlands and other countries acknowledge their role to stimulate niche-technologies.

Furthermore, this research study provides useful contributions for the theories used such as institutional design and how collaboration can enhance innovation in the public sector. In both cases it is shown how these theories contribute towards understanding what the municipalities do in the transition, and how this support them moving forward CO_2-neutrality, which can inspire other researchers to apply these. Furthermore, the keystone in the analysis is the transition management practical perspective, which was found to be a useful tool enhancing the understanding of the different processes and procedures, and allowing a critical perspective of how the municipalities manage the transition. Several of the studied municipalities followed the procedures of the basic elements (See *Theoretical Perspective)* in the transition management, one could propose without knowing, which provides evidence that the transition management perspective can also be used practically. Therefore it is relevant for other municipalities to look into the basic elements of the transition management process to find guidelines for how to manage the complex long-term transition of becoming CO_2-neutral. As mentioned within the discussion, the municipalities are still at the start of the transition, and in front of them is an unknown future with no clear guidelines. Therefore, it is recommended to do a follow-up study on ambitious municipalities who are further into the transition, and learn from the procedures and results they have created. It is also interesting to see if the municipalities that have followed the basic element from the transition management process are doing better than the more unstructured municipalities, to provide further evidence of this approach.

CHAPTER 10

BIBLIOGRAPHY

10 BIBLIOGRAPHY

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CHAPTER 11

11 APPENDICES (SEE APPENDIX REPORT)