The Influence of Polycentric Governance on Co-Creation in the Heating Transition: An Explorative Case of Middelburg

Roland Nguyen
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MIDDELBURG

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The Influence of Polycentric Governance on Co-Creation in the Heating Transition: An Explorative Case Study of Middelburg

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Roland Hung Chuong Nguyen

Student number: 4171632

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Graduation committee

First Supervisor	Dr. T. Hoppe, Organization and Governance
Second Supervisor	Dr. B. Enserink, Multi-Actor Systems
Advisor	Dr. A. Itten, Organization and Governance
External Supervisor	Ir. W. Versol, Municipality of Middelburg

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Executive Summary

In 2019, the Netherlands presented a National Climate Agreement and committed to keep the increase of temperature below 2 °C as compared to pre-industrial levels by 2050. In the agreement, the built environment has been given a big role to reduce its CO_2 emission. From this agreement, each municipality has to formulate its heating transition vision strategy by the end of 2021. In the strategy, each municipality will have to show how it will make its municipality natural gas-free, will specify the technology that will be implemented and will outline the timeline for each of its neighborhoods.

This will be a major challenge for municipalities like Middelburg, which will need public support to accomplish this. The role of citizens is considered essential for the heating transition. Co-creation provides an opportunity for this problem, in which citizens are not only participating in the process, but have also become the initiator and designer of the process. The heating transition is a complex process, which stretches beyond the local level at multiple governance levels. The heating transition setting is very complex and polycentric, where multiple actors and different governments at multiple levels are involved. The polycentric governance perspective will be proposed for this study. Polycentric governance is a system, in which multiple public and private parties interact with each other to decide on a specific geographical location through a system of negotiated rules and norms to solve a problem efficiently with multiple semi-autonomous centers of decision making.

This research will focus on the co-creation and polycentric governance of the heat transition strategy of the municipality of Middelburg. The proposed research question is as follows: ***How can the municipality of Middelburg implement co-creation within the polycentric governance environment to develop an effective heat transition strategy on the local level?***

For this study, a case study is conducted to analyze the polycentric governance and co-creation of the heating transition in Middelburg and the two neighborhoods Dauwendaele and Griffioen. The polycentric governance is analyzed with the use of the Governance Assessment Tool (GAT), which is a comprehensive tool to analyze multiple dimensions of polycentric governance. The co-creation analytical framework is used to analyze the level and quality of the co-creation. With the GAT and co-creation analysis, a design of an improved co-creation process is proposed in this study. The qualitative data is obtained from climate policy documents, academic literature and semi-structured interviews with stakeholders of the heating transition in Middelburg. In total twelve in-depth interviews with stakeholders and ten small interviews with ordinary citizens in Middelburg were conducted for this research.

This study showed that there is a polycentric environment and governance for the heating transition in the municipality of Middelburg. Multiple semi-autonomous decision-making centers have been identified. At the regional level, the RES Zeeland presents the largest decision-making centers, in which five main actors and several relevant stakeholders participate and develop the RES of Zeeland through negotiations at multiple sub tables. At the neighborhood level, there are opportunities for polycentrism with the use of neighborhood representatives who interact with municipalities and their residents in meetings.

The GAT analysis showed that all relevant actors, with the exception of residents, are currently being involved in the process. The residents in Dauwendaele have not been involved yet in the potential heat network. The municipality has decided with Woongoed and the intended industrial heat supplier not to inform the public yet until a final decision has been made regarding the heat network. In addition, the GAT found that there are issues regarding the coherence of the problem perceptions as conflict of interests may occur between the actors in the system. And finally, the GAT found that there is a lack of resources to conduct the heating transition successfully and there is a limited amount of monitoring and enforcement instruments available.

The co-creation analysis showed that there is an infrastructure of neighborhood representatives that can be utilized for the co-creation process. It found that the attitude from the municipality towards co-creation is fairly positive as it had past experiences with public participation and is currently engaging with energy leaders to formulate a heating transition and co-creation strategy. However, the analysis also showed that the reach of the communication channels towards citizens is too low. The attitude of the municipality towards sustainability is perceived as conservative and risk-averse. In addition, the analysis also found that a majority of the citizens did not feel any sense of ownership for the heating transition, felt they could not influence the process and most citizens felt they did not possess sufficient knowledge about the heating transition. Finally, it is also found that the attitude of citizens is risk-averse as they perceive the financial risks of the heating transition as too high to participate and that there is mistrust between the citizens and the municipality.

Based on the polycentric governance and co-creation analysis, a new co-design of the co-creation is proposed. Each neighborhood is different that will require a different co-creation strategy. Neighborhood representatives know the neighborhood and its residents best and they can help to find an alternative that fits the neighborhood best. Next, the reach of the communication channels has to be improved. Furthermore, when the municipality will increase its budget for climate actions again, it is recommended to hire a participation expert to support the co-creation process. In addition, the municipality has to encourage citizens to participate by reducing the knowledge gap between the participants so no asymmetrical information knowledge exists. Moreover, the municipality has to find policies to mitigate the perceived costs of the heating transition. The use of an independent mediator is helpful to increase trust between the citizens and municipality. Finally, it is recommended that the municipality will make use of energy ambassadors, so they share information about the heating transition and their experiences.

Overall, this study has shown that the polycentric governance affects the level and quality of co-creation. A co-creation design has been proposed to enhance the level and quality of co-creation for the heating transition in Middelburg. This research is conducted at the very start of the heating transition, future research is recommended to conduct this research again later in the process of the heating transition at the participation phase. Moreover, future research can focus on whether financial rewards encourage people to co-create for the heating transition and how much is needed. This study will also propose recommendations for the municipality of Middelburg, it encourages the municipality to enhance the quality of its communication channels as it sees communication as a vital tool. Next, it recommends to involve citizens in the process as soon as possible so trust can be built. And finally, the municipality should clearly define the boundary conditions at the start of the co-creation process to give participants the freedom to design alternatives.

Table of Content

Glossary

CIT	Contextual Interaction Theory
GAT	Governance Assessment Tool
RES	Regional Energy Strategy
SHIFFT	Sustainable Heating Implementation of Fossil-Free Technologies
TVW	Heat Transition Strategy
ZMF	Zeeuwse Milieufederatie

1. Introduction

1.1 Problem Statement

In 2015, the United Nations (UN) agreed to a historic and comprehensive agreement to combat climate change known as the Paris Agreement (United Nations, 2015). Under the agreement, all countries committed to keep the increase of temperature below 2 °C as compared to pre-industrial levels globally. Following the agreement, the Dutch government presented a National Climate Agreement in 2019 to commit to the Paris Agreement. The agreement was reached between the government, environmental organizations, trade unions and employers' organizations through the Polder model, a process also known as the Dutch decision-making process based on consensus (Traub, 2019). The goal of the Climate Agreement is to reduce CO_2 emissions by 49% in 2030 and 95% by 2050 (Ministry of Economic Affairs & Climate Policy, 2019).

The heating sector has been given a big role to reduce its CO_2 emission by the national agreement. Currently, the heating sector for buildings accounts for 20% of the total CO_2 emission in the Netherlands (Ministry of Economic Affairs & Climate Policy, 2016). Most residential and non-residential buildings are at present heated by individual gas-fired central heating systems (Tigchelaar & Leidelmeijer, 2013). Natural gas is currently the major source of the Dutch heating system. For a long time, the Groningen gas fields were providing the Netherlands with natural gas. The gas fields in Groningen are the largest in Europe and were discovered in 1959. It has, therefore, become the major energy source and embedded in the Dutch energy system. However, recently the gas production from the Groningen gas fields has been reduced by more than half, while the remaining demand for gas is met via import from Russia and Norway (Chong et al., 2020). This was caused by two main reasons. Firstly, natural gas is seen as an unsustainable energy source resulting in greenhouse gas emissions. Secondly, the extraction of natural gas in Groningen has caused earthquakes in the province of Groningen and has damaged the properties of citizens. The recurring and strengthening earthquakes have initiated wide protests from citizens demanding to stop the extraction of gas in Groningen. In 2018, therefore, the Dutch government has announced to phase-out natural gas in the Netherlands and to completely discontinue gas extraction in Groningen by 2022 (Ministry of Economic Affairs & Climate Policy, 2018).

Therefore, an alternative fossil-free technology for natural gas heating has to be found for the heating sector that can include district heating systems and heat pumps. The national government has given large responsibility to municipalities to come with the so-called heat transition strategy (*in Dutch: Transitievisie Warmte;* translation by the author) to phase-out natural gas by 2021 as part of the Climate Agreement in 2019 (Ministry of Economic Affairs & Climate Policy, 2019). In the heat transition strategy, each municipality has to come up with a transition strategy and explains how they will execute it and make their municipality natural gas-free, specifies which sustainable technology they will implement and what the timeline will look like for each neighborhood.

This will be a major challenge for municipalities that have no or hardly any experience in formulating transition policy as formulating a heat transition strategy will require knowledge in several fields

including society, technology and economy. Marselis & Hisschemöller (2018) conducted 25 interviews with thirty people involved in the heating transition in Amsterdam and found that the knowledge of heating transition is considered low within the municipal organization (Marselis & Hisschemöller, 2018). And research from PBL (Planbureau voor de leefomgeving; *in English: Environmental Assessment Agency;* translation by the author) found that a majority of the municipalities lacks knowledge and authority on energy projects, has insufficient capacity within the organization, has trouble with communicating the heat transition strategy with citizens and other stakeholders and regularly faces resistance from residents about the heat transition (De Vries et al., 2019).

1.2 Co-Creation

In the academic literature, public participation is considered to be key for enhancing public support for local energy projects, empowering the role of citizens and improving the quality of decision-making (Buitelaar & Heeger, 2018; Brandsen et al., 2020; Liu et al., 2020; Wolsink, 2020). In the Regional Energy Strategy (RES), the role of citizens is considered essential for the heating transition and public participation from municipalities is considered necessary for a successful transition (RES Zeeland, 2020). Co-creation can be seen as a step further from public participation, at this stage citizens are not only participating in the process, but they have become the initiator and designer of the process (Itten et al., 2021). Itten et al. (2020) define co-creation as "*Citizens and professionals sharing power and responsibility to work together in equal, reciprocal and caring relationship"* (Itten et al., 2020, p.22). For this study, a distinction is made between public participation and co-creation. Public participation is seen as a more passive form of participation, which lies on the lower level of the participation ladder of Arnstein (Arnstein, 1969). While co-creation is seen as a more active form of participation that lies on the higher level of the participation ladder, where citizens are equal and have equal power to the municipality. In the present study, co-creation for the heating transition will be examined.

1.3 Polycentric Governance

Climate actions such as the heating transition is a complex process where not only the municipality is involved, but stretches beyond the local level (Bulkeley & Betsill, 2005). Most studies only examine environmental policies at one governmental level such as the global, national or local level, which cannot give a full picture of this complex process where multiple authorities at multiple levels are involved. Bulkeley & Betsil (2005), therefore, propose an alternative view, the polycentric governance perspective, which takes multiple tiers of government in the process. Polycentric governance is a system in which multiple governing organizations and private parties interact with each other to decide on a specific geographical location through a system of negotiated rules and norms to solve a problem efficiently with multiple semi-autonomous centers of decision making (Feldman, 2016). The polycentric model can be used upon energy policy such as the heating transition as Lammers & Arentsen (2016) describe that energy policy in a local level setting has become polycentric where multiple actors and different governments at multiple levels are situated. This is the case on the one hand between the municipality and citizens and other local actors and on

the other hand between the municipality and the regional government that develops the Regional Energy Strategy (RES).

1.4 Research Scope

This research will focus on the co-creation and governance of the heat transition strategy of the municipality of Middelburg, the capital city of the province of Zeeland in the Netherlands. Middelburg is part of the Sustainable Heating: Implementation of Fossil-Free Technologies (SHIFFT) project, which is an EU-approved Interreg project running from 2019-2022 (Van der Vyver et al., 2020). It is a project that promotes cross-border cooperation between four European countries including Belgium, The Netherlands, France and the United Kingdom (UK) to stimulate the transition to low-carbon heating technology in existing buildings. Within the SHIFFT project, Middelburg will collaborate with other city partners in developing heat transition strategies with the use of co-creation with the local community. The municipality of Middelburg has designated two neighborhoods for this project: Dauwendaele and Griffioen. In this study, the focus of the case study will be on the heating transition in the municipality of Middelburg and the two neighborhoods will be the focus as embedded case studies.

1.5 Research Objective

Co-creation between governments and citizens is an emerging topic in the domain of energy transition. The governance environment where the energy transition takes place, has become more complex and polycentric. The objective of this research is first to explore the polycentric governance of the heating transition in the municipality of Middelburg and how the multiple authorities and stakeholders at multiple levels are involved and interact with each other. Secondly, the objective of this research is to examine the co-creation process that the municipality is planned to use for the heating transition. Next, the effect of the polycentric governance on the co-creation process will be analyzed. And finally, a co-creation process for the heating transition will be designed for the municipality based on the polycentric governance and co-creation analyses and its interaction. This study will make use of the Governance Assessment Tool (GAT) of Bressers et al. (2016) to analyze the polycentric governance. And the co-creation framework of Voorberg et al. (2015) will be used to analyze the co-creation process.

1.6 Research Questions

The main research question of this research is as follows:

How can the municipality of Middelburg implement co-creation within the polycentric governance environment to develop an effective heat transition strategy on the local level?

Four sub-questions have been formulated to help to answer the main research question. The sub-questions for the research are as follows:

1. *What is polycentric governance and how can it be used to analyze the heating transition in the municipality of Middelburg?*
2. *What is co-creation and how can it be conceptualized to analyze the level and quality of co-creation?*
3. *What are the polycentric governance characteristics of the municipality of Middelburg in the heating transition?*
4. *How do the polycentric governance characteristics affect co-creation in the municipality of Middelburg?*

1.7 CoSEM Relevance

In this thesis, the heating infrastructure system is considered a socio-technical system. It comprises technical components like heating technology, where the transition from one specific technology of energy production towards another technology will have repercussions not only on the technical system, but also on societal changes like public values and governance. The transition of the heating system will be complex and comprises multiple actors each with different objectives. This graduation research will analyze this complexity and is, therefore, relevant for the study *Complex Systems Engineering and Management* with the Energy & Industry specialization.

1.8 Scientific Relevance

Co-creation is a new and emerging concept in the academic literature. Its application to some domains such as education, health care and sustainable energy has been researched, and is present in the literature (Brandsen et al., 2020). However, there is a lack of research on the practice of co-creation about the heating transition (Itten et al., 2021). This thesis will fill that gap and examine co-creation strategies for the heating transition.

In addition, polycentric governance is also a new and fast-developing concept in the academic literature. Hoppe & Miedema (2020) have examined the governance of the regional energy transition of the West-Brabant region in the Netherlands. They have identified a lack of literature on the polycentric governance on the heating transition on the regional and local level and suggest that more regional energy transition governance can be analyzed for other regions to achieve a more representative view. Thus, this research will fill the gap while focusing on polycentric governance aspects of the heating transition.

1.9 Thesis Outline

This section will provide the structure of this thesis. In this chapter, the problem statement of the context of the heating transition for the municipality Middelburg has been presented together with the research objective and research questions. In chapter 2, a literature review on the concepts of polycentric governance and co-creation will be given. Chapter 3 will present the theoretical framework of this research based on the literature review from chapter 2. Chapter 4 will describe

the methodology of this thesis. In this chapter, the research approach and data collection will be described. Chapter 5 will describe the case study and contextual descriptions of the heating transition that is situated in the municipality Middelburg and its two neighborhoods Dauwendaele and Griffioen. Chapter 6 will present the polycentric governance analysis of the heating transition in Middelburg. While in chapter 7 the co-creation process for the heating transition in Middelburg will be shown. Chapter 8 will discuss the findings in chapters 5, 6 and 7 and will integrate the polycentric governance with the co-creation process. Chapter 9, a design of the co-creation process will be composed based on the polycentric governance and co-creation analysis. And finally, chapter 10 will mark the conclusion of this thesis that will answer the research questions and present limitations, policy recommendations and suggestions for future research.

2. Literature Review

In this chapter, a literature review on the polycentric governance and co-creation will presented. This research aims to combine the concepts of polycentric governance and co-creation into one new theoretical framework to strengthen the analysis of co-creation under polycentric governance. First, the concept of polycentric governance will be reviewed and defined.

2.1 Polycentric Governance

Polycentric governance is relevant to the heating transition in the municipality of Middelburg as the transition is operated at multiple governance levels with multiple actors. In the past, the design of policies was often characterized as a hierarchical top-down approach. However, in the second half of the 20th century, that approach has changed to a multi-level governance approach as the balance of power is spread more through multiple levels of governments. The multi-level governance is part of the polycentric governance. The word polycentric is derived from the Greek words *polus (English: many)* and *kentrikos (English: center)* with the literal meaning many centers. According to Elinor Ostrom (2010, *"polycentric systems are characterized by multiple governing authorities at different scales rather than a monocentric unit. Each unit within a polycentric system exercises considerable independence to make norms and rules within a specific domain"* (Ostrom, 2010, p. 552). It means that activities and the decision-making process are spread across multiple government levels such as the local, provincial and national governments, but could also include non-public actors (Ostrom, 2010). In addition, Carlisle & Gruby (2017) give the attributes of multiple, overlapping decision-making centers with some degree of autonomy for polycentric governance. So polycentric governance is a system in which multiple governing organizations and private parties interact with each other to decide on a specific geographical location through a system of negotiated rules and norms to solve a problem efficiently with multiple centers of decision making (Feldman, 2016). The interaction or decision-making process can take place in a competitive and cooperative relationship between the actors (Carlisle & Gruby, 2017)

The concept of polycentric governance was first introduced in 1951 by Michael Polanyi in his book *The Logic of Liberty* (McGinnis, 1999). In his book, Polanyi saw two methods of organization. The first method was the hierarchical top-down approach where there was a superior and a subordinate coordinated through authority, and command & control, whichs also known as the monocentric governance by Ostrom (2010). The second method was as Polanyi described polycentric, where individuals were capable to decide with their interests within a set of rules and constraints without hierarchy. In the 1960s, Elinor and Vincent Ostrom became interested in the concept and applied polycentric governance to the domain of metropolitan areas to describe the governance characteristics of overlapping political units (Ostrom et al., 1961). Later Vincent Ostrom, but also other authors have explored the polycentric governance in other fields like managing common-pool resources (Ostrom, 2010). And in the last decade, the rise of the concept of polycentric governance has spread its application into new domains such as climate change.

However, despite the rise of the concept polycentric, there has been limited development of this concept in the academic literature (Carlisle & Gruby, 2017). There is a need in the literature to establish clarity around the concept of polycentric governance and how it can drive to desired results to help to better understand the natural resource governance (Carlisle & Gruby, 2017). Much of the existing literature focuses on small-scale natural resource governance as the governance is easier to observe (Ostrom, 1990). However, the governance of natural resources is complex and involves actors from multiple levels that are interconnected worldwide.

From the academic literature, several advantages of polycentric governance over monocentric governance have been identified. The advantages are the use of broader support from local entities, the spread of power, more checks and balances, that it enhances trust within the independent decision-making centers between the involved actors, that it offers more flexibility and opportunities for innovation and policy experimentation within the geographical setting, that it makes the system more adaptability to social and environmental changes, that it stimulates the exchange of information and knowledge, and finally that it is better able to fit an alternative within the institutional context (Carlisle & Gruby, 2017; Ostrom, 2010; Morrison, 2017; Lammers & Arentsen, 2016). However, there is also criticism of the use of polycentric governance defined by Ostrom. McGinnis (2011) criticizes the lack of democracy in Ostrom's work and how the balance of power is created and whether the rules are norms are created democratically. In addition, Jordan et al. (2015) found that all forms of governance have certain weaknesses including polycentric governance. For example, Jordan et al. (2015) conclude that the bottom-up approach does not appear to self-organize as easily as Ostrom claims to be. Moreover, polycentric governance can lead to higher transaction costs with coordination and could lead to dispersion of responsibility and accountability (Carlisly, & Gruby, 2017).

2.1.1 Polycentric Characteristics

From the academic literature, the concept of polycentric governance can be derived into three elements: *multiple centers of decision-making*, *overlapping centers of decision-making* and *autonomy* (Aligica & Tarko, 2012; Carlisle & Gruby, 2017; Schröder, 2018). In polycentric governance, multiple centers of decision-making exist. A center of decision-making is an entity where actors collectively have the authority to make decisions. The entities can be public or private organizations. In the literature, it is not clearly defined how many centers are required to be polycentric governance. The answer is typically many (Aligica & Tarko, 2012; Carlisle & Gruby, 2017). Secondly, overlapping centers describe the jurisdictions or share authority over a governance issue by decision-makers. There are two types of overlapping centers: *functional* and *territorial* (Schröder, 2018). Functional overlapping occurs when there is overlap in the sphere of influence between the actors involved. Territorial overlapping occurs when there is overlap in the jurisdictions in geographical space. For overlapping centers, the process of cooperation, competition and conflict resolution between the actors is very important. Finally, autonomy indicates the level of independence of decision-making centers without centralized coordination (Carlisle & Gruby, 2017).

McGinnis (2011) in his work has given four characteristics of actors involved in a polycentric system. The first characteristic is that it is *multi-level* indicating that multiple levels of governments or organizations are involved in the government such as local, provincial, regional, or national bodies or

organizations. Next is that the parties involved have to be *multi-purpose*, which means that different actors within the governance need to have nested territorial jurisdictions and be cross-jurisdictional political units. The third characteristic is that the actors involved need to be *multi-sectoral* meaning that the actors involved belong to multiple sectors such as the public, private, semi-public sectors. And finally, the actors in the polycentric system should be *multi-functional* as well-meaning that the parties involved together possess multiple functions such as roles for the provision, production, financing, coordination, and monitoring of a project.

In addition, Ostrom et al. (1961) suggest that designing the production and provision of public goods or services in a polycentric environment should meet four criteria to be polycentric (McGinnis, 1999; Lammers & Arentsen, 2016). First, there should be *control* meaning that the actors involved have full control and jurisdiction over the geographical area. The area can be small like a neighborhood, but can also be large like a metropolitan region. The second criterion is *efficiency* implying that the production or provision of public goods or services by cooperation should be efficient and seek to maximize the net benefits. Efficiency is often reached when the cooperation between the different actors leads to economies of scale. The next criterion *is political representation*, which implies that all actors that are affected by the production and provision of public goods or services are all represented in the decision-making arrangements. The actors involved can negotiate for their interests in decision-making arrangements. And the final criterion is self-determination, which means that local citizens have a say and are part of the decision-making process of the production and provision of public goods or services. Local citizens can influence the process with self-determination by initiating and establishing a project at the beginning and having an affirmative vote at the end of the process. Self-determination often leads to self-governance, which is the cooperation between citizens, public authorities, and other actors that can be found at the highest level of Arnstein's ladder (Arnstein, 1969).

2.1.2 Polycentric Governance & Climate Change and energy transitions

Polycentric governance can be used for the energy transition. Jordan et al. (2015) found that the landscape of climate governance has become more polycentric. One of the big advantages of the use of polycentrism for climate change is that climate action is likelier to take place within small-scale networks where trust is easier built according to Lee et al. (2014). McGinnis & Ostrom (2008) found that many global problems like climate change are the result of lacking solutions at the local level and that solutions at the local level can have a big effect. They argue that polycentrism is interesting for the governance of climate change as it involves multiple levels of government and organizations and that polycentric governance can easily make progress as multiple and independent decision-making centers can be formed without hierarchy. This is similar to the climate action plans in the Netherlands as the Regional Energy Strategy (RES) is developed for thirty regions in the Netherlands. The RES is a regional partnership, where multiple levels of government such as the municipalities and province work together with (semi) private organizations, Non-Governmental Organizations (NGOs), and citizens to develop an energy strategy for the region. According to Hoppe & Miedema (2017), the energy transition governance has become more polycentric, especially in energy regions of the Netherlands, where the decision-making process is often taking place at the local level and regional level. Polycentrism of the energy transition does not only occur at the regional level, but can also occur at the local or even the neighborhood level (Lammers & Arentsen, 2016). In the last decade, citizens, but also other local actors have the ambition to solve collective problems more

often. Citizens are, therefore, increasingly taking initiative by themselves with the use of decentralized energy production. This eventually leads to a diversity of formal and informal organizations, where a configuration of new institutions and rules are created. (Lammers & Arentsen, 2016). These institutions and rules are created through negotiations, in which the involved actors were able to influence and determine them. In this way, multiple polycentric systems have been created at the local level through citizens' initiatives.

In this section, polycentric governance has been explored with its key characteristics and how polycentric governance can be used for the energy transition. In the next sections, the Contextual Interaction Theory will be explored, from which the Governance Assessment Tool will appear as a tool to analyze the polycentric governance of the heating transition of Middelburg for this research.

2.2 Contextual Interaction Theory

The polycentric governance can be analyzed with the use of the Contextual Interaction Theory (CIT) of Bressers, which focuses on the implementation of policy and explains the dynamic interaction between the actors involved (Bressers 2016; Hoppe, 2021). The CIT is relevant for this study as this theory includes contextual factors that influence the decision-making process for the heating transition. The CIT was developed in the 1990s in the Netherlands to analyze the implementation of policy. According to Bressers (2009), policy processes are mainly driven by social interactions by the actors involved and the human characteristics should, therefore, be examined. The CIT analyzes the characteristics as motivation, cognition, and capacity and power of actors involved. *Figure 1* illustrates the simple interactions with the characteristics between actors. According to Bressers et al. (2007), these characteristics have a large influence on the implementation of policy. Moreover, the CIT does not solely focus on the interaction between the actors involved, but it also focuses on the context and interaction between the environment and the actors involved as the characteristics of the environment also influence the implementation of policy. Hence, the CIT put the characteristics of the actors as the driving force of processes. In addition, Ostrom (1999) also argues that the characteristics of actors are the most important factor of the process (Ostrom, 1999; De Boer & Bressers, 2011). As the CIT is mainly used to evaluate the implementation of policy for which multiple actors at a multi-level are involved. The CIT can be used to analyze "the *multi-actor and multi-level network, institutional and other contexts that are represented in the CIT as factors that influence the motivation, cognitions and resources of the actors involved"* (Bressers, 2009, p13), which are the characteristics of a polycentric environment for this research.

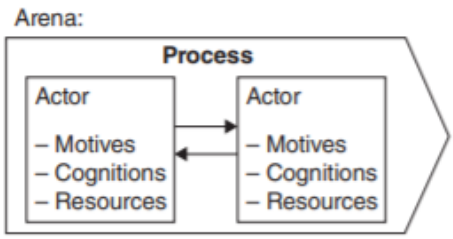

Figure 1: Interaction Model (Bressers, 2007)

2.2.1 Actor Characteristics

As mentioned in the previous section, the three key actor characteristics are *motivation*, cognition, and *capacity and power* that influence the policy implementation process. The motivation of actors is about the objective, goals and values of the actor in the policy implementation process (Bressers, 2007). Motivation drives actors in the process and determines the readiness of actors to participate. Each involved actor in the process has an objective or goal, which he wants to achieve with the implemented policy and is only willing to accept if the policy contributes to his interests, goal and values. This is relevant for the heating transition as the transition involves multiple actors at multiple governance levels, and each of these actors has an objective and goal for the heating transition. The observation of reality by the actors is an important factor to explain the cognition of the actors (Bressers, 2007). The observation of the reality of each actor influences the interpretations of the situation by each actor. The interpretation of the situation can be different for each actor involved, which also applies to the heating transition, in which multiple actors see the transition differently. The cognition of actors influences the motivations and power and resources of the actors involved in the interaction process and has, therefore, a large influence on the formulation of the problem and its potential solutions. The power of the actors involved is depended on the resources and capacity of the actor. Examples of resources are money, knowledge, and hierarchical and (in)formal positions like local governments. The balance of power between the actors involved is determined by the resources of each of the actors involved, which also applies to the heating transition as some actors may have resources and thus exert more power. The more power an actor possesses, the greater the influence he can exert during negotiations of the policy.

So, the actor characteristics such as the motivation, cognition, and capacity and power of the actors involved have a large influence on the implementation of policy and these factors can influence each other. These key characteristics shape the process and keep adjusting and the social interactions during the implementation that can be cooperation, opposition or joint learning (Ostrom, 1999; Bressers, 2004). The decision-making process is, therefore, influenced by these characteristics. The CIT, however, does not account for other external influences, that are acknowledged by Bressers, that also influence the implementation of policy such as culture, norms and other policies, but analyze these factors through the actor characteristics (Bressers, 2009; De Boer & Bressers, 2011). A limit of the CIT regarding the key characteristics is that the interaction between the actors involved does not limit during the process, but could also occur before and after the process (Bressers, 2009). The actors can be influenced by earlier interactions outside the project and can anticipate possible future interactions.

2.2.2 Multiple Layers of Context

The three key characteristics mentioned in the previous sections are not only influenced by the process, but are also influenced by external factors. Bressers (2007) distinguishes three levels of external factors in the CIT from a multi-layered context. These factors are the *specific context*, the *structural context* and the *wider context* and can be found in *Figure 2.* Each of the external factors explains the existing institutions and environment of the policy that will be implemented. The decision and implementation of policy are dependent on the institutions and environment of the location.

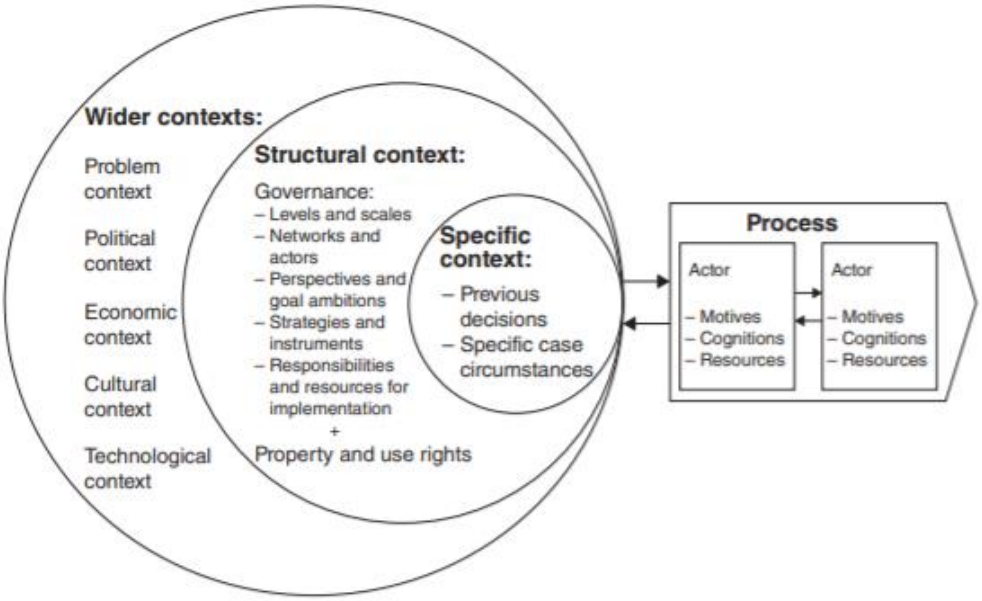

Figure 2: Contextual Interaction Factors (Bressers, 2007)

2.2.3 Specific Context

The specific context focuses on the characteristics of the geographical location where the policy will be implemented (Bressers, 2009). The characteristics of the location should be taken into account for the implementation of policy as each location may require different policy implementation. Secondly, the case history is also an important factor for the specific context. Case history consists of previous policy decisions related to the project. The implementation of policy is not standalone, but is affected and dependent on the decisions made earlier. This is also known as path dependence, in which decisions that are currently made are dependent on earlier decisions in the past and that the institutions are not based on the current conditions, but are rather formed from previous decisions leading to an outcome (Van Dam et al., 2012). Moreover, case history also affects the institutional process which influences the participation of actors (De Boer & Bressers, 2011).

2.2.4 Structural Context

A layer further is the structural context, which consists of the governance and the property & use rights (Bressers 2009). This layer is less dependent on the geographical location of the project and can be applied at more locations, preferably in the same country compared to the specific context. The structural context is not actor specific but can be applied to all the actors involved. Moreover, the multi-level and multi-actor aspects of governance are presented (Bressers, 2009). Bressers (2007, p15) distinguishes five elements of governance that are specified in questions:

The multiple levels and scales, which focus on the levels of governance that are involved in the process. In this process, multiple levels of government are involved. This element focus on which levels of governance dominate the process, which organizations are influential in the process, and how the interaction is between the various level of governance and how its organized. These

questions are important for the heating transition for Middelburg as multiple levels of government are involved in this research like the local, provincial and national governments.

The multiple actors in the policy network, which focus on the multi-actor aspects of the governance. This element focus on how open the process arena is and which actors are involved, and how various governmental and organizations relate to each other. This element is relevant for this research as multiple actors are involved in the heating transitions governmental and non-governmental organizations

The multiplicity of problem definitions and goal ambitions, which examine the various problems and goals of the project. This element focus on what is seen as a problem by the various actors, why do they see it as a problem, for who is it considered a problem, and which policy objectives are accepted by the actors. For this thesis, it is important to define the various problems and goals for the governance of the heating transition.

The multiple instruments in the policy strategy, which investigate the various policy instruments that are available that can be implemented and help to achieve the strategy. This element is relevant for this research as it focuses on the strategic aspects of the actors involved and which policies are available.

The multiple responsibilities and resources for implementation, which focus on the governance in which there are multiple responsibilities and resources. This element focuses on which organization is responsible for the implementation of the policy and what authority and resources have been formed to implement and monitor it. This element is also relevant for the heating transitions as the governance of responsibilities and resources are important for this research.

Besides these elements of governance, the property and use rights determine the positions of the actors in the process. Property rights and use rights can be water or land resources (De Boer & Bressers, 2011). Hence, the structural context covers the institutional context and governance of the process.

2.2.5 Wider Context

The most outer layer is the wider context. The wider context consists of the political, economic, cultural and technological context of the implementation of policy in that location. These contexts are very often very stable, cover a whole country and apply to all actors involved. This layer has an indirect influence on the key characteristics and the process. However, the fact that this layer is very stable and has indirect influence, does not always mean that changes cannot happen to this layer and that it is unimportant. Sudden changes or crises can quickly and sharply shift the context and thus key characteristics of actors. Examples of such changes in real life in recent years are the financial crisis of 2008 and the corona outbreak of 2020 that have sharply changed the context.

2.3 Governance Assessment Tool

The Governance Assessment Tool (GAT) of Bressers is based on the Contextual Interaction Theory (Bressers, 2016). The GAT is a comprehensive tool to analyze the interactions of multi-actor and multi-level situations and is arguably the best tool to analyze the polycentric governance (Hoppe, 2021). The GAT is a qualitative tool that makes use of a set of questions to analyze the governance of a specific project in a specific geographical location. The GAT can be conducted with a series of questions with the actors involved to assess the quality of governance of an implemented policy. The GAT covers key governance dimensions like the vertical governance dimensions such as the levels and scale from the structural context, and the horizontal dimensions such as actors & network from the structural context. It also covers the problem perceptions and goals, strategies and resources from the governance elements of the CIT (Hoppe, 2021).

The GAT makes use of the five elements as described in *section 2.2.4*. These five governance elements are *levels and scales, actors and networks, problem perspectives and goal ambitions, strategies and instruments, and responsibilities and resources.* These five elements have an influence on the implementation of policy, the process and the three key characteristics of actors' *motivations, cognitions and resources.* Bressers et al. (2016) specified four criteria to which the five governance elements can be assessed. These criteria are e*xtent, coherence, flexibility* and *intensity,* and together with the five elements they form the GAT. With these five elements and four criteria, the governance can be assessed whether these elements enhance or decrease the quality of governance and whether the governance support or restrict the implementation of policies.

2.3.1 Criteria

The criterium *extent* looks to the completeness of the regime of the process (Bressers, 2016). This criterium examines whether all relevant levels, actors, perceptions, instruments and resources are all involved in the process.

The criterium *coherence* focuses on whether the various elements of governance structure together are strengthening or undermining the governance. In addition, especially for the heating transition study, this criterium looks at how the multiple layers of government interact with each other and how they influence each other as multiple layers of government are involved in this study. Next, when the various actors have different problem perceptions, coherence means that these actors can integrate these perceptions and are able to find a common ground for future cooperation.

The criterium *flexibility* assesses the flexibility of the various elements and whether these elements are adaptive. A governance that is flexible typically is based on decentralization of power and trust, rather than hierarchical structure and command & control. Moreover, flexibility also looks at whether multiple roads are leading to the goal and whether this is supported or not.

The final criterium is *intensity,* which assesses the degree to which the governance elements are able to challenge the status quo and can accomplish changes. According to Bressers et al. (2016), the first two criteria could be sufficient to analyze the quality of governance and whether the governance supports or restricts the implementation of change if the environment is simple and stable.

However, when the environment is complex and dynamic, the latter criteria are needed to analyze governance structure and arrangements.

A GAT analysis is performed with a general set of questions that is represented in the matrix, which consists of five elements and four criteria. In each box of the matrix, a set of specific questions is shown to assess each of the elements to each of the criteria. The complete matrix consisting of the five elements of governance, four criteria and an example of the specific set of questions can be found in *Appendix A.* For this study, the questions presented in the matrix will be used to analyze the governance of the heating transition in the municipality of Middelburg.

2.4 Co-Creation

In this section, the concept of co-creation will be examined. The literature review will start with the concept of public participation and from there the concept of co-creation will be reviewed.

2.4.1 Public Participation

Public participation is the inclusion of citizens in a certain project. The IAP2 (International Association for Public Participation) defines public participation as a process that directly engages citizens in problem-solving or decision-making to influence the decision-making of a certain public project (International Association for Public Participation, 2010). Public participation has been embraced as a means to involve citizens in public projects, to increase support from the public, and make the public service more effective (Liu et al., 2020; Brandsen et al., 2020). Liu et al. (2020) found that public participation in renewable energy projects enhances public support for the project if citizens can influence it and they perceive the process as fair. The current Dutch government (the Rutte III administration) has put in its coalition agreement that it wants to give citizens more opportunities to create public participation in their local setting (Rutte et al., 2017). And the WRR (Wetenschappelijk Raad voor het Regeersbeleid; *in English: The Scientific Council for Government Policy;* translation by the author) has advised in its report that policymakers should commit more to public participation as active citizens are increasingly want to take more responsibility in their local setting (WRR, 2012). There has been a lot of research on the topic of public participation. And in the literature, many terms have often been used interchangeably to describe the collaboration between public authorities and citizens such as public participation, citizen participation, co-creation, and co-production (Voorberg et al., 2015, Itten et al., 2021, Brandsen et al., 2015).

2.4.2 Ladder of Participation of Arnstein

In 1969, Arnstein (1969) published the article '*Ladder of Participation'* on public participation in which she categorized the citizen power on the ladder of participation. In her article, she considered public participation as a categorical term for citizen power. Arnstein defined eight levels in her ladder ranging from the categories citizen power to non-participation (see figure 3). The higher the level in the ladder of participation, the more influential citizens are in the participation process. The ladder starts from the lowest level to the highest level and is *manipulation, therapy, informing, consultation, placation, partnership, delegated power* and *citizen control*. Arnstein categorized these eight levels into three categories as shown in *Figure 3.* The first two levels of the ladder are

manipulation and *therapy* and Arnstein considered these two levels to be nonparticipation. In these levels, the goal of the participation process is to educate the citizens in the participation process rather than to let them participate. In this participation process, the powerholders decide the whole process, in which the citizens do not have any power. The next three levels in the ladder consist of *informing, consultation* and *placation* and are categorized as tokenism. Powerholders in this category inform the public about a certain project and citizens can voice their opinion and give advice to the powerholders. However, the powerholders in this category can still make their own decision and may process some or none of the feedback received from the public. An example of this participation process is an information event where the government invites citizens to the event to inform the public about a certain public project plan, in which citizens can voice their opinion at the event. On the level of *placation*, citizens may sit in an advisory committee and advice, however, they still have no decision-making power. The highest levels of participation in the ladder are *partnership, delegated power and citizen control,* and are categorized by Arnstein as 'citizen power'. At these levels, citizens have influence and decision-making power in the participation process. At the *partnership* level, the planning and decision-making power are shared with citizens where citizens can negotiate with powerholders. An example is a joint committee where government and citizens have equal power. At the *delegated power* level, citizens hold even more power than at the partnership level. At this level, citizens have more decision power than the public authorities and are responsible for the planning and management of a certain project. At the highest level, *citizen control,* citizens have been given full control of a public project by the public authorities and are solely responsible for the management and implementation of the public project. An example of this participation process is energy cooperatives.

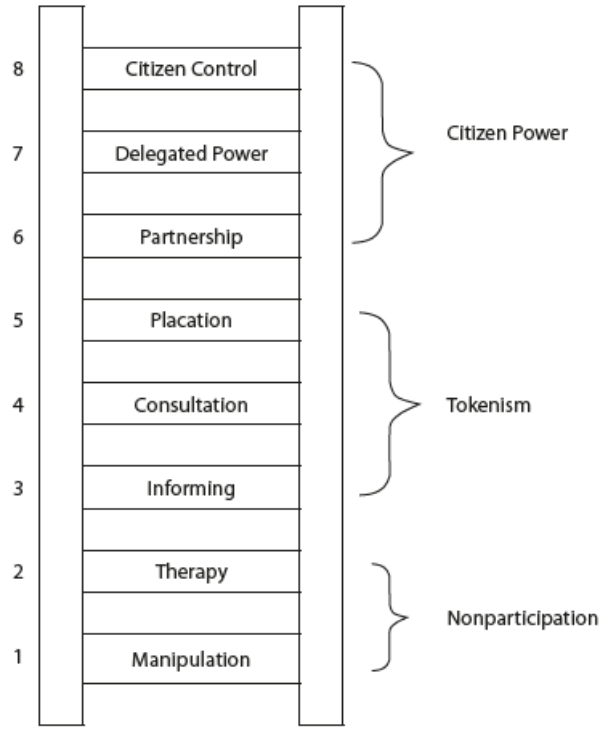

Figure 3: Ladder of Participation by Arnstein (Arnstein, 1969)

However, Arnstein's participation ladder has also drawn a lot of criticism from the literature. Tritter & McCallum (2006) criticize the ladder for concentrating only on the power dimension, whereas participation should focus more on the evaluation of the sharing experience and the evaluation on how much impact citizens have in the process. Moreover, they argue that the ladder fails to address feedback systems and how to ensure the participation process keeps satisfying the citizens involved during the process. In addition, Connor (1988) and Carpentier (2016) point out that the levels of the ladder are not distributed neatly in the real world and that it consists of more than eight levels to cover the real range of public participation. A limitation of the ladder is that the participation process and intensity can change over time during the process, where the level of participation can move from one phase of the process to another phase, which the ladder does not account for (Carpentier, 2016). Furthermore, Connor (1988) and Carpentier (2016) argue that the ladder fails to explain how the progression from one level to another level can be achieved. Another criticism is that the participation processes at higher levels of the ladder do not necessarily mean that they will yield better results than processes at the lower level of the ladder. Some public projects will generate better results from lower levels of participation than from higher levels of participation.

2.4.3 The Concept of Co-Creation

The concept of co-creation can be seen as a collaboration between citizens and public authorities within the upper levels of the ladder of Arnstein (Itten et al., 2020). Voorberg et al. (2015) contrast the concepts of co-creation and public participation by referring to co-creation as the active involvement of citizens, whereas they refer to public participation as the passive involvement of citizens. The concept of co-creation is rooted in the business industry by Parahald and Ramaswamy (2004), in which collaboration is defined as "*a joint creation of value between the company and customers"* (Prahalad & Ramaswamy, 2004, p.8). The customers or end-users play a central role in the process of creating value with the company. Co-creation gives partnership between the company and the end-user, in which the company stimulates the end-users to be actively involved in the whole production chain, from giving ideas to the company, to the testing of products (Prahalad & Ramaswamy, 2004; Voorberg, 2015; Itten et al., 2020). In this way, the end-users are considered a new competence source for companies which will strengthen the relationship and loyalty between the company and its end-users. Co-creation gained popularity in public administration during the 21st century as a way to engage citizens to enhance the quality of services (Brandsen et al., 2020). And in 2009 Elinor Ostrom received the Nobel Prize in Economics for her work analysis of economic governance on common goods highlighting the importance of co-creation (Ostrom, 2009).

Co-creation can also be applied to the public domain, where the public authorities replace the company, the citizens fill in the role of end-users and public services are the products (Itten et al., 2020; Voorberg et al., 2015; Brandsen et al., 2015). As such, co-creation in the public domain is about the partnership between citizens and public authorities. Voorberg et al. (2015) define co-creation as "*the involvement of citizens in the co-initiator or co-design level"* (Voorberg et al., 2015, p.24). Co-creation can be seen as the involvement of citizens in public services where they have the freedom to introduce citizens' initiatives. It can be seen as a participatory process where citizens, public authorities, and other stakeholders can give input to achieve a beneficial outcome for all parties. Voorberg et al. (2015) identify three types of co-creation, the degree of citizen involvement, that are: 1) citizens as co-implementer, 2) citizens as co-designer and 3) citizens as initiator. Citizens as co-implementer are the involvement of citizens at the implementation phase of public services.

Citizens as co-designer mean that the citizens are directly involved in the design of public services with public authorities. Citizens as co-initiator are the involvement of citizens at the earliest moment, in which citizens are the initiator of a public project and the public authorities that follows (Itten et al., 2020). Itten et al. (2020) define co-creation as "*Citizens and professionals sharing power and responsibility to work together in equal, reciprocal and caring relationship"* (Itten et al., 2020, p.22).
Combined with definitions of co-creation, co-creation in this research is defined as follows: ***Citizens and public authorities sharing power and responsibility to work together in an equal, reciprocal and caring relationship for the heating transition.***

2.4.4 Co-Production

In contrast to co-creation, co-production is rooted in the public service management literature. The term co-production was first described by Ostrom in the 1970s (Miller & Wyborn, 2020). In her work, Ostrom developed an institutional analysis for the common pool resources problem. The idea of Ostrom was that governments were not able to produce public services anymore, but that consumers had to become co-producers of public services (Miller & Wyborn, 2020). End-users are not only consumers of energy anymore, but may also contribute to the production of energy and become co-producer (Wolsink, 2020). Ostrom defines co-production *"as the process through which inputs used to produce a good or service are contributed by individuals who are not in the same organization"* (Ostrom, 1996, p.1073). Co-production is the collaboration of citizens and public authorities in the implementation of public services and to make the public services more effective (Ostrom, 1996). In the literature, there is a large overlap between the concepts of co-creation and co-production and these concepts are often used interchangeably to describe the collaboration between public authorities and citizens and involvement of citizens in public services (Voorberg et al., 2015; Gebauer et al., 2010). Both concepts refer to the collaboration between citizens and public authorities giving citizens direct input in shaping public services as end-users. Some authors try to distinguish the two concepts by specifying co-production as the collaboration between citizens and public authorities during the implementation phase, whereas co-creation is more associated with collaboration at the strategic level (Brandsen et al., 2020). Voorberg et al. (2015) in their research try to give clarity by distinguishing the concepts of co-creation and co-production. They define co-creation as mentioned as "*the involvement of citizens in the co-initiator or co-design level"* (Voorberg et al., 2015, p24)*,* co-production is defined as *"the involvement of citizens in the (co-)implementation of public services*" (Voorberg et al., 2015, p.24). It means that co-creation is about the active involvement of citizens at the early phase of the process where the initiation and strategic planning of the public service is discussed and that co-production is about the involvement of citizens at the end phase of the process where the focus is on the implementation of the public service.

2.4.5 Co-Creation in Practice

The concepts of co-creation and co-production have been given in *Section 2.4.3* & *Section 2.4.4* and in this section, the co-creation process for the heating transition will be investigated. Moreover, the benefits and drivers of co-creation will be explored in this section on the one hand, and drawbacks and risks of co-creation on the other hand.

Co-creation is one of the most important theories for the governance of sustainability (Miller & Wyborn, 2020). It is considered as one of the essential methods to secure social acceptance for

energy projects from communities. Co-creation has gained popularity in the last two decades (Itten et al., 2021; Miller & Wyborn, 2020). It challenges the traditional top-down approach, where the focus is not on the decisions of public authorities, but on the interactions between local government and citizens (Torfing et al., 2016). The main reasons for the push of co-creation for the heating transition are the increased complexity of policy demands that local authorities have to cope with, disruptions in the local heating market, the increase of energy cooperatives by citizens, mean to increase legitimacy and solution to diminishing resources (Itten et al., 2021; Leino & Puumala, 2020). Co-creation encourages the exchange of ideas and knowledge between local government and citizens and will give a better understanding of each other perspectives. Through co-creation, solutions that are agreed upon have more support among citizens and are likelier to be more effective (Itten et al, 2021).

From the literature, co-creation has experienced many benefits. Leino & Puumala (2020) highlighted that co-creation has changed the public perception of the local government positively and has democratized the governance of public services. Liu et al. (2020) found in three experimental studies in the Netherlands that through co-creation, the public perceived procedural fairness, which enhanced the public acceptance of energy projects. Moreover, co-creation can also find unexpected solutions that can be combined with other problems such as housing and health (Itten et al., 2020). Furthermore, Torfing et al. (2019) found that co-creation has empowered citizens, strengthened the social cohesion of communities, and enhanced trust between local government and citizens. Finally, a positive effect of co-creation is that co-creation has forced public authorities, citizens, and other stakeholders to enhance their knowledge to participate in the co-creation process and to understand each other perspectives better through interactions (Brandsen et al., 2020). In this way, decisions get broader support from all participating parties as consensus has to be built.

However, drawbacks of co-creation have also been identified by the literature. Brandsen et al. (2020) describe them as the 'dark side' of co-creation. The first point is that by going through the co-creation process, public authorities deliberately reject or avoid their responsibility by placing much of the responsibility on the citizens. This is mostly done under the cover of minimizing governments' responsibilities ideologically or through financial cuts. An example of this is the '*Participatiesamenleving'* (*English: Participatory society)* implemented by the Dutch government of Rutte-II, in which citizens were given more responsibility and to actively contribute to society (Knoop, 2020). In addition, through shared responsibility, the responsibilities and accountability get unclear when things go wrong. Another drawback of co-creation is rising transaction costs. Co-creation takes a lot of time and resources from both local governments and citizens. These costs can also be financially from local government and citizens to organize meetings. Itten et al. (2020) also mentioned the costs of hiring independent professionals. They highlighted that there are limits for every co-creation project and that at some point, all stakeholders have to agree and make a decision. The question then arises as 'what is acceptable enough'. Another critical risk is that due to multiple actors involved in the process, it is important to manage expectations (Itten et al., 2020). The different stakeholders involved each have different perspectives and objectives, but may also hold different expectations of possible outcomes. Therefore, it is important to manage expectations through the whole process from the start until the end. Itten et al. (2020) also highlight the risk of an unequal balance of power between the stakeholders, in which one party may have power over the other party. The risk of an unequal balance of power is that one party may completely ignore the

objection of another party and may push an alternative and discouraging them. Brandsen et al. (2020) highlight the risks of asymmetrical information knowledge that lead to an unequal balance of power between stakeholders. In addition, according to Brandsen et al. (2020) formal positions, especially exercised by public authorities, may pose barriers to the quality of co-creation as citizens often look up to public authorities. Not only formal position may scare citizens, but the level of education between citizens may give highly educated citizens a dominant position towards less educated citizens. Another drawback pointed out by Torfing et al. (2019) is that the citizens that participate may not be representative, but biased as the citizens that have a clearer opinion or are higher educated are likelier to participate. And finally, Brandsen et al. (2020) point to the possibility that for some public services, co-creation may not benefit the quality of public services and that for some public services, citizens are better off without a co-creation process.

It can be concluded that the usage of co-creation for sustainability in academic studies has risen over the last decades. This is mostly driven to enhance the public support of sustainable energy projects and to involve citizens more as a way of democratization. From the literature, there are many benefits identified as a way to enhance public support and make energy projects more effective. However, multiple drawbacks of co-creation have also been identified like failing accountability, rising transaction costs, and unequal power balance between the involved parties. Taking into account the possible negative side of co-creation, it is, therefore, important to come with solutions to overcome the possible drawbacks. Brandsen et al. (2020) have provided some recommendations to challenge the drawbacks or risks of co-creation. First, since traditions of public participation differ between countries or even cities within a country, it is important to understand the local traditions. Differences between public administration management or governances change how co-creation should be implemented. Pestoff (2019) reinforces that argument and points out that politics and policy are important factors for the form of co-creation. The next recommendation from Brandsen et al. (2020) is that public authorities should be clear in their communication to citizens and should define the clear expectation of the co-creation process. The public authorities need to manage expectations carefully from the start until the end of the co-creation process. In addition, citizens are likelier to participate when they see the advantages of engaging in such a process. It is, therefore, useful to link the heating transition to other topics that citizens care for or have urgency.

2.5 Co-Creation Framework of Voorberg et al. (2015)

Although there are plenty of studies that analyze co-creation, Voorberg et al. (2015) analyzed 122 studies on co-creation and co-production and concluded that there were two dominant important factors that influence co-creation. Voorberg et al. (2015) in their research have developed a theoretical framework to analyze co-creation and assess its quality based on that research. In the model, Voorberg et al. (2015) distinguish two groups of factors that influence the level and quality of co-creation: 1) organizational factors and 2) factors from the citizen side of co-creation.

2.5.1 Organizational Factors

From the organizational side of co-creation, four factors are identified that influence co-creation. The first factor is the *compatibility of public organizations to citizen participation*. This factor refers to the organizational structure or infrastructure of the public organization. It looks at whether the

public organization has an organizational structure of infrastructure to communicate with its citizens and vice versa. In short, this factor focuses on the presence or absence of communication channels between the public authorities and their citizens. The second factor identified by Voorberg et al. (2015) is *the attitude of public officials to citizen participation*. The attitude of public officials is a very important factor mentioned by many studies for the success or failure of co-creation and to what extent co-creation can take place. When public officials are positive towards public participation, the extent of co-creation is larger than when public authorities are hesitant towards public participation. According to Ryan (2012), public authorities must accept citizens as equal and eligible partners to achieve co-creation. The third factor does not only focus on the attitude of public authorities towards public participation, but also focuses beyond that on the influence of the risk-averse and conservative administrative culture of the public organizations. A public organization that is traditionally used to engage its citizens has the institutional infrastructure to engage its citizens easier and is likelier to accept them as equal partners. Whereas, a public organization that is not traditionally used to engage its citizens will struggle more to create co-creation. The final important factor from the organizational side is having clear incentives for co-creation. Based on Voorberg et al. (2015) 122 studies analysis, it is often unclear which objectives public authorities want to achieve with co-creation. Public authorities must know what they want to achieve with co-creation for co-creation to be successful. For example, public authorities should be clear about which public services should be improved and to which extent to its citizens. However, very often objective of co-creation is not mentioned and is just used to involve citizens as a virtue in itself.

2.5.2 Citizens Factors

Taking the citizens' perspective, Voorberg et al. (2015) identify four important factors that influence co-creation. The first important factor is the characteristics of citizens that participate in the co-creation process. Voorberg et al. (2015) argue that the characteristics of citizens such as intrinsic values have a large influence on whether citizens are willing to participate in the co-creation process. These values can be a civic duty to the community, curiosity, trust, cooperation, involvement, loyalty, and the desire to improve public services. Moreover, Sundeen (1998) found that the education of the citizens is an important factor that influences the willingness to participate as well. Citizens that are higher educated are likelier to participate as they have more knowledge, are better able to articulate their views, are better able to process the input of other participants, and possess administrative skills to participate than people that are less educated. The second factor is *customer awareness* or more precisely citizens' or end-users awareness for this research. Citizens that are more aware of the need to improve public services feel more responsible to participate to improve the services. The principle sense of ownership plays an important role. When citizens feel they have a responsibility for public service in their vicinity, they are likelier to 'own' that public service and are more willing to put effort to improve the service. To achieve that, citizens should first feel their responsibility and secondly feel that they can influence the process. The next factor is social capital, which is needed to achieve a successful co-creation process. Social capital is the positive product of shared values that allow people to cooperate for public services in this research. It is not only important to get citizens to participate, but to also keep them engaged and motivated the whole process (Ostrom, 1996). The final factor is the *risk aversion by citizens*. Citizens often try to mitigate the risks, especially if it affects them economically or if they perceive organizations as an authority (Voorberg et al., 2015). Therefore, it is important that citizens have trust in the co-creation and that they can participate as equal partners.

The factors influencing the level and quality of co-creation can be found in *Figure 4,* where on the left side the organizational factors are found and the on right side of the figure the citizens' factors. This model of Voorberg et al. (2015) presumes that there is a risk-averse and conservative environment from the academic literature to achieve co-creation from the public authorities on one side and citizens on the other side. This is not surprising as co-creation is still being viewed as a relatively new participatory method. Public authorities lack the experience required to actively engage with citizens for public services. On the other hand, the role of citizens has evolved as well, from end-users without much a say to citizens that actively participate to improve public services. However, even though citizens are more willing to participate or are asked by public authorities, they often lack the knowledge and experience to engage effectively. The participation costs for citizens are often too high. So it's not surprising that the theoretical model on co-creation of Voorberg et al. (2015) presumes the risk-averse and conservative environment.

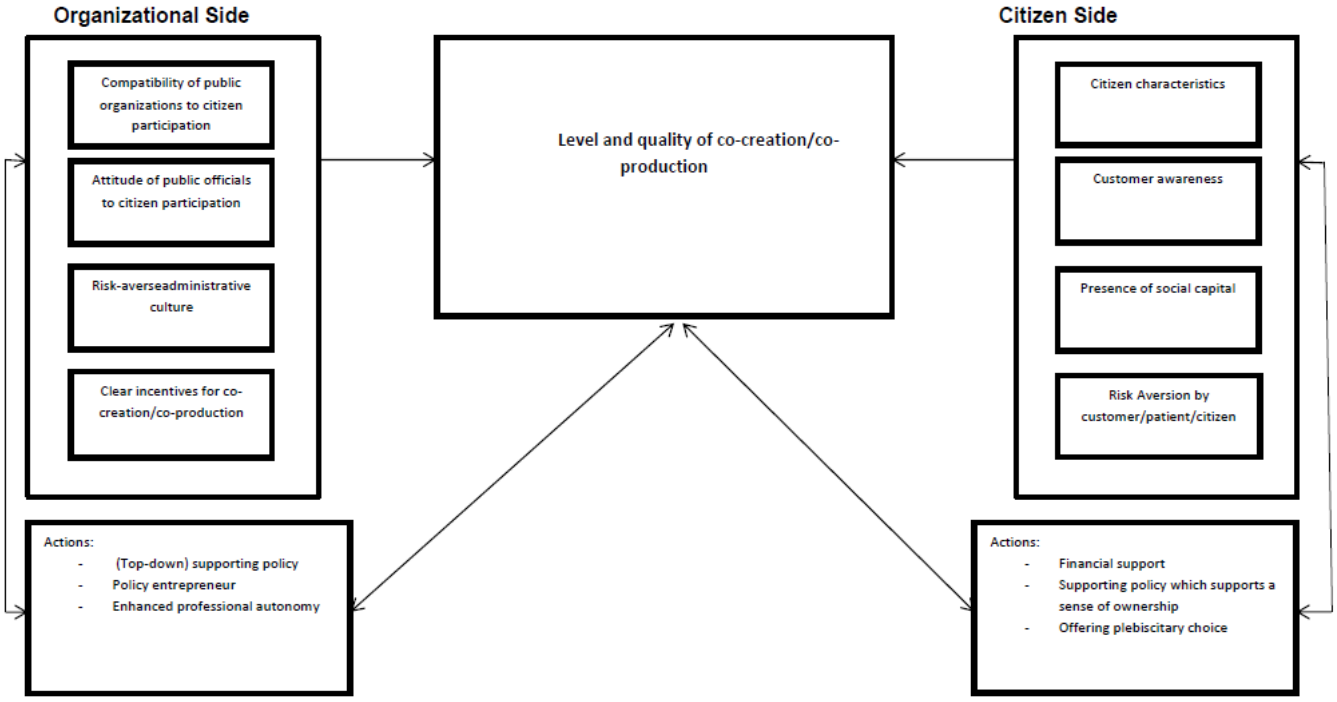

Figure 4: Co-Creation Framework of Voorberg (Voorberg et al., 2015)

2.5.3 Possible Actions

Voorberg et al. (2015) in their model have identified possible actions from the literature to overcome these barriers and to increase the level and quality of co-creation from both the organizational side as the citizen side as shown in *Figure 4*. From the organizational side, a top-down supporting policy that supports co-creation by the public organization is suggested. It means that the public organizations have to stimulate that co-creation is always the option to use to improve public services. Supporting policies by public authorities is essential to promote public participation and co-creation (Pestoff, 2019). Another suggested action is the establishment of a policy entrepreneur. The

role of the policy entrepreneur is to explore incentives for co-creation and to promote the initiative (Voorberg et al., 2015). And the final suggested action is to enhance professional autonomy within the public organization. Public officials should have the freedom to take initiative and make decisions, which will increase the quality of public services (Gill et al., 2011). However, an important condition is that the public officials have to have the requisite knowledge to have autonomy and making decisions.

On the citizen's side, actions are suggested to lower the participation costs for citizens to stimulate citizens to participate in the co-creation process. These costs can be seen as time and financial costs participants have to invest to stay within the process. The actions suggested by Voorberg et al. (2015), though, are actions that the public authorities have to take and not the citizens themselves. The first potential action is to provide financial support or rewards to participants to participate. This is seen as a means to lower the participation costs of participants and could stimulate citizens to participate. However, from the literature, it is not clear whether financial rewards will stimulate citizens to participate or whether it will increase the effectiveness of the co-creation process. The results from the literature are mixed, for example, Alford (2002) in his research in Australia found that the motives of participants to participate are rather more intrinsic than financial. He argued that it may not be effective to give financial incentives to participants, but it's better to focus on the intrinsic values of participants such as trust, civic duty to the community, in which participants feel they can make an actual difference. The second action, which is also mentioned by Ostrom (1996) is to make a policy that supports a sense of ownership. When citizens take ownership of public services, they are more willing to take action to improve the public service and to engage with each other. The third action is offering a plebiscitary choice to the citizens involved so they can make decisions instead of discussing complicated policies (Voorberg et al., 2015).

Surprisingly, Voorberg et al. (2015) fail to mention that an important prerequisite for citizens to participate is that they should have a sufficient level of knowledge to participate as an important factor that influences co-creation (Brandsen et al., 2020). Information asymmetry between public authorities and citizens is according to Williams et al. (2016) one of the barriers to an effective co-creation process. Ostrom also describes that the production of knowledge was an important part of the co-creation process to perform (Miller & Wyborn, 2020). Information asymmetry makes it necessary to train citizens so they can fully participate and give input in the process. Therefore, actions relating to enhancing the knowledge and skills of citizens involved are needed, which the model of Voorberg et al. (2015) fails to identify. An example to enhance the knowledge and skills of citizens can be workshops. Next, this model is limited as it does not account for the contextual or institutional factors or governance that may affect the model and quality of co-creation. According to Pollitt (1999), governance structures affect how the government responds to identical problems. And according to Brandsen et al. (2020), governance and institutional factors have a big influence on the co-production process as they often shape conditions in which the co-creation has to take place, affect the motivations and power dynamics between the actors, and could affect trust-building. Moreover, the Brandsen et al. (2020) suggest that the use of independent mediators can be used to enhance co-creation process as they are independent and trusted and can provide opinions that is viewed as unbiased.

3. Theoretical Framework

In *Chapter 2*, the concepts of co-creation and polycentric governance have been introduced separately. In this chapter, the similarities and connections between these two concepts will be explored. And later in this chapter, this chapter aims to combine both concepts into one new theoretical framework to strengthen the analysis of co-creation under polycentric governance.

3.1 Connection Co-Creation and Polycentric Governance

The concepts of co-creation and polycentric governance have arisen to challenge the hierarchal top-down approach of the 20th century and a way to give public authorities less power and shift the balance of power more to the citizens. Co-creation emerges from the shift in public administration management, in which the citizens as end-users gained more power through the belief that collaboration with citizens is needed to improve the production of public services. While polycentric governance rises through the multi-level polycentric and complex systems that emerge from common goods. Both concepts emerged when the problem became more complex, in which collaboration is needed to tackle the problem and to solve it. Furthermore, both concepts aim to decentralize the power structure, co-creation wants to achieve that by involving citizens in the process, where citizens can negotiate with public authorities and can influence the process of production of distribution of public services or goods. For both concepts, the interactions between the actors are central and the managing of the interaction is important to keep the process ongoing. In addition, the benefits of both concepts are quite similar to each other. Both concepts encourage the exchange of ideas, knowledge and perspective between the actors, create more (public) support for the policy, enhance the principle of checks balances and aim to enhance the trust between the actors.

However, there are also differences between both concepts. First of all, co-creation does not account for the contextual and institutional factors that may affect its analysis, whereas the contextual and institutional factors of the polycentric governance are relevant that influence the key characteristics of actors. Moreover, the interactions between citizens and public authorities are central under co-creation, whereas within polycentric governance the interactions between all the actors involved are relevant. And finally, the most important difference is that co-creation is a collaboration process, whereas polycentric governance is about the governance.

3.1.1 Co-creation and Polycentric Governance in the Literature

From the literature, the concepts of co-creation and polycentric governance are sometimes linked to each other. Both concepts come from the works of Ostrom, so it's not surprising that she has connected both concepts in her work. Ostrom (1996) argues that even though there are many advantages of co-creation, there are still some disadvantages or obstacles of co-creation that co-creation has to overcome to be successful. She identifies three disadvantages or obstacles: legal options not available due to centralized systems, commitment needed from participants, and incentives from both public authorities and citizens are needed to encourage input and create effective collaboration. She believes that these obstacles will disappear in a polycentric system

rather than in a monocentric system (Ostrom, 1996). She argues that a polycentric system allows citizens to organize better with many governing units, which are independent of public authorities. These units are then able to make and enforce rules for a specific area and make actions more tailored to local areas. In addition, these units are also able to design effective incentives that will encourage co-creation. Moreover, Ostrom (1996) suggests that the co-creation of public services and goods in a polycentric system can create higher levels of wealth in developing countries, especially for poor people. And finally, Ostrom (1996) also argues that when large polycentric governing units are created, these units can become more efficient for infrastructure through economies of scale, which is not possible within a monocentric governance. In addition to Ostrom (1996), Itten et al. (2021, p2) connect co-creation with polycentric governance stating that *"Co-creation draws on the concept of polycentric governance systems in which there are 'multiple, semi-autonomous decision-making centers held together with effective mechanisms of coordination which resist fragmentation or centralization and which have the capacity to self-correct".*

3.2 Theoretical Framework

As is shown in the work of Ostrom (1996), she clearly distinguishes both concepts by describing co-creation as a process and polycentric governance as a system, in which the process is performed. She explains the conditions that counteract the co-creation process and explains how the conditions are formed by the governance system and how a change from monocentric governance to polycentric governance can change the conditions to be more favorable to co-creation. So for this research, the concept of polycentric governance is the input and factor that influence concept co-creation which aligns with Ostrom's thoughts as illustrated in a simple model in *Figure 5.*

Figure 5: Relationship Polycentric Governance and Co-creation

However, even though Ostrom has connected the concepts of co-creation and polycentric governance in her work and highlighted the importance of polycentric governance for the success of co-creation, she has never combined both concepts into one analytical framework to analyze both concepts. From existing literature, only one scientific paper was found that incorporates both concepts into the analytical framework. Vedeld et al. (2021) investigated the polycentric urban climate governance, and how the institutional design can foster self-governance & co-creation in climate change actions in Oslo. In their research, Vedeld et al. (2021) make use of the term polycentric urban climate governance and define it as "*the ways in which public, private and civil society actors and institutions articulate climate goals, exercise influence and authority, and manage climate planning and implementation processes*" (Vedeld et al., 2021). This definition is more specific towards climate action than the definition of polycentric governance stated in *Section 3.1.1.*

Moreover, Vedeld et al. (2021) research focuses more on (urban) leadership. The analytical framework of Vedeld et al. (2021) can be found in *Figure 6.*

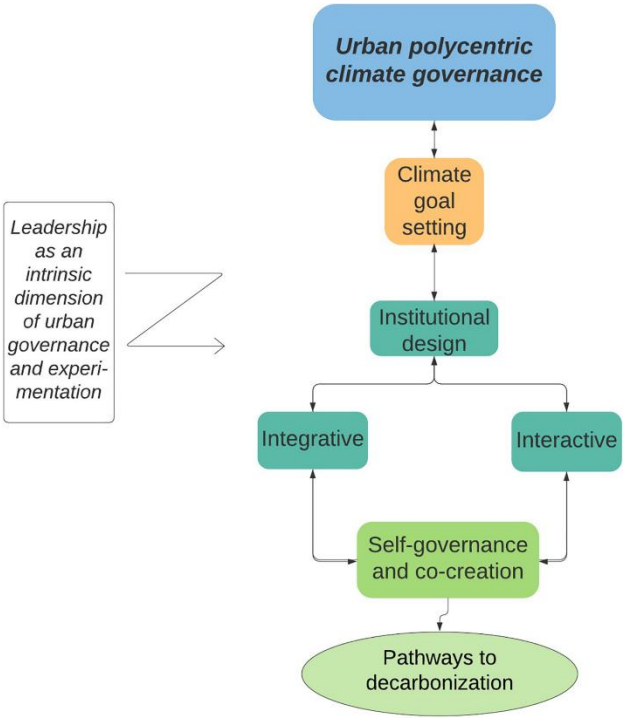

Figure 6: Co-creation Model based on polycentric Governance from Vedeld (Vedeld et al., 2021)

As shown in *Figure 6*, the analytical framework of Vedeld et al. (2021) indicates that the urban polycentric climate governance influences the climate goal setting by experimental urban leadership. From the climate goal-setting, the institutional design is chosen. From the institutional design, two forms of governance are required to solve climate change. The integrative governance directs attention to the need to integrate the climate responses of various policies and resources across multiple internal municipal entities. The other governance is the interactive governance, which directs the need to form autonomous interdependent units from public and private actors at multiple scales and levels to organize within the polycentric system. The interactive governance is closely related to the concept of co-creation. Both these governance forms together facilitate or enhance co-creation and self-governance. The co-creation and self-governance process, in the end, will lead to decarbonization pathways. Again, this research shows that there is a relationship between polycentric governance and co-creation and that the co-creation process is influenced by polycentric governance. Parts of this model fall outside the scope of this research such as the integrative governance and pathways to decarbonization. For this research, the focus will be between polycentric governance and co-creation.

For this research, the co-creation framework of Voorberg et al. (2015) will be used to analyze as the framework is more comprehensive for the analysis of co-creation. The theoretical framework will be adjusted to incorporate the polycentric governance factor that is missing now. The theoretical framework of this research can be found in *Figure 7.* The polycentric governance will, firstly, be

assessed by the characteristics from the GAT. Next, the GAT will be used to analyze the quality governance elements from the structural context. For this research, the governance assessment analysis will also be conducted on the heating transition for the municipality of Middelburg. And finally, the governance assessment analysis for this research will be used as contextual factors for the level and quality of co-creation.

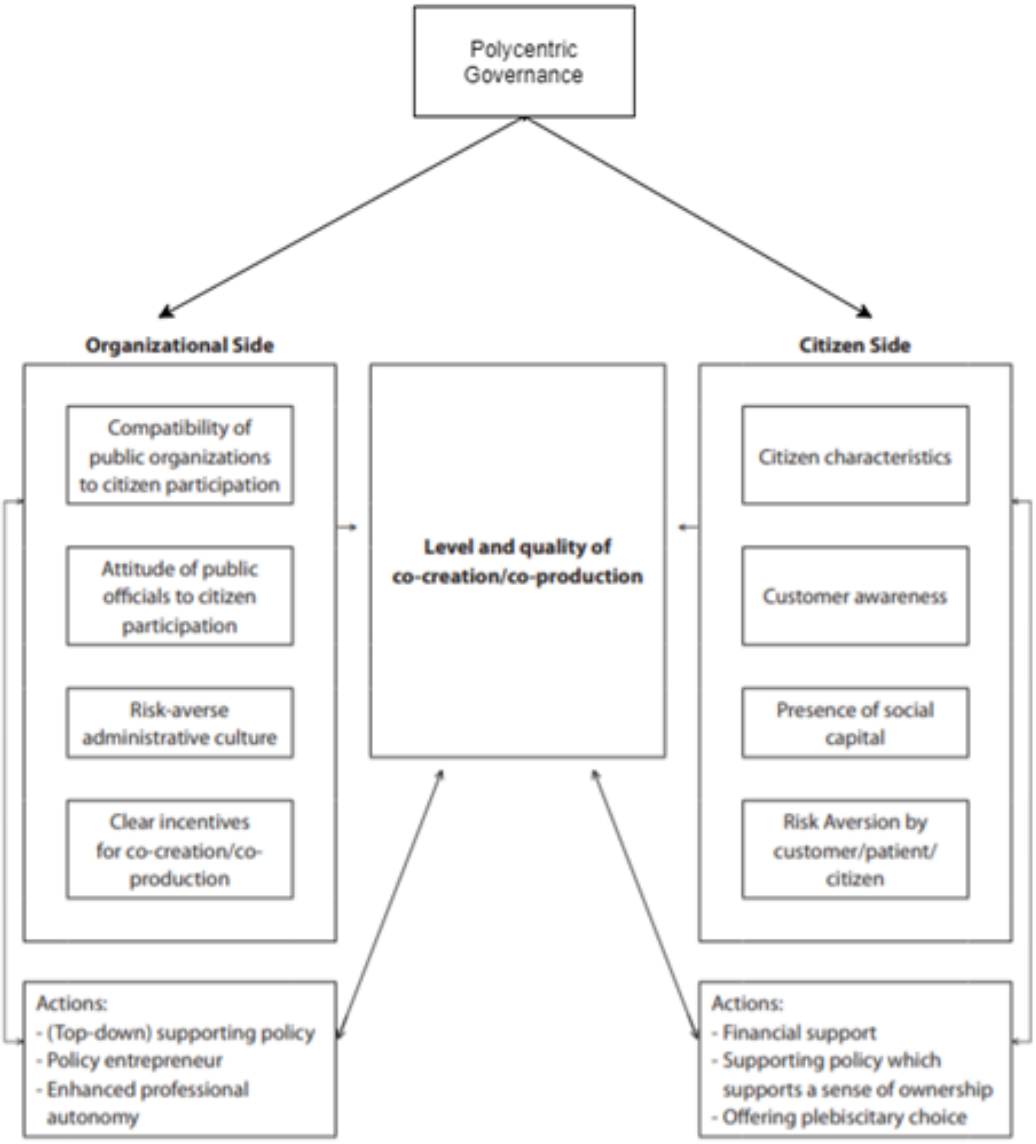

Figure 7: Co-creation Framework for this study based on Voorberg et al. (2015) and Vedeld et al. (2021)

3.3 Operationalization of Co-Creation

In this section, the factors from the theoretical framework that influence co-creation will be operationalized. The operationalization of the categories will start from the organizational side of the framework.

3.3.1 Compatibility of Public Organizations to Public Participation

The compatibility of public organizations to public participation refers to whether the public organization has communication channels to its citizens in its organizational structure (Voorberg, 2015). Communication between public organizations and citizens can take place in several ways, they can take digitally on an online platform organized or social media by public organizations, or public organizations can reach out to citizens with the use of more traditional methods like a letter (Meijer, 2012). Communication does not only mean that the public organization can only provide information to its citizens, but that the citizens can communicate to the public authorities as well. So the category factor *compatibility of public organizations to public participation* can be divided into sub-categories *infrastructure*, and *communication channels*. The sub-category *Infrastructure* refers to the presence or absence of communication channels of the local government and whether the communication structure is one-way, where local governments can only provide information to its citizens, or two-way, in which citizens can also communicate back to the local government. The sub-category *communication channel* will be used to determine the types of channels that exist. Brody et al. (2003) provide a list of possible communication methods such as press conferences, letters, newspapers, newsletters and websites.

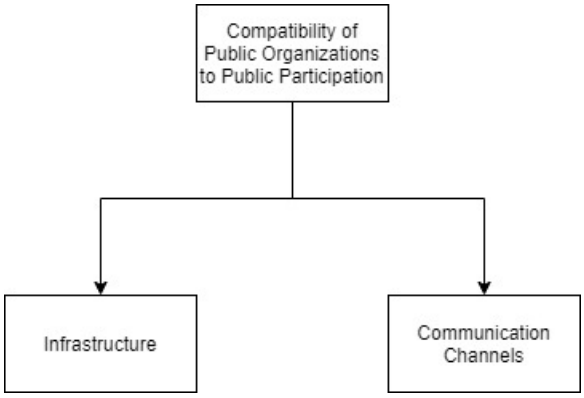

Figure 8: Compatibility to public participation

3.3.2 The Attitude of Public Officials to Public Participation

According to Voorberg et al. (2015), the attitude of public authorities is an important category for the quality of co-creation and determines to what extent co-creation can take place. When public authorities have a positive attitude towards co-creation, they are likely to encourage co-creation and give citizens more influence and say during the process. In contrast, when public authorities are reluctant towards co-creation, public authorities are less likely to support co-creation and are reluctant to give citizens influence say during the process (Roberts et al. 2013). In such cases, public participation will take place at the lower level of Arnstein's ladder. Two sub-categories will be

constructed for the category attitude of public officials to public participation: *stance* and *form of participation*. The sub-category *stance* will present the attitude of public authorities to co-creation, whether it is positive or negative. And the sub-category *form of participation* is used to determine which level of participation the public authorities are planning to use. The form of participation can range from citizen power to non-participation from Arnstein's ladder.

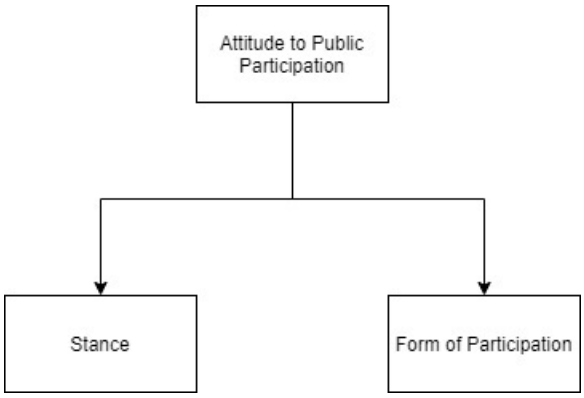

Figure 9: Attitude to public participation

3.3.3 Administration Culture

Next to the attitude of public officials, the administrative culture influence the level and quality of co-creation. This category will mainly be used to focus on whether the public authorities have put out policies to stimulate citizen engagement and whether citizen engagement has been used in the past for other projects (Voorberg, 2015). A public organization that is traditionally used to engage its citizens has the institutional infrastructure to engage its citizens. Brody et al. (2003) state that public organizations should have resources committed for public participation. First, public organizations should have a general written plan for citizen involvement. Second, public organizations should have trained their officials in citizen engagement techniques and have officials assigned for public participation. Public organizations can also hire an external consultant for this task. Therefore, the subcategories for administration culture are *history, written plan* and *staffing.*

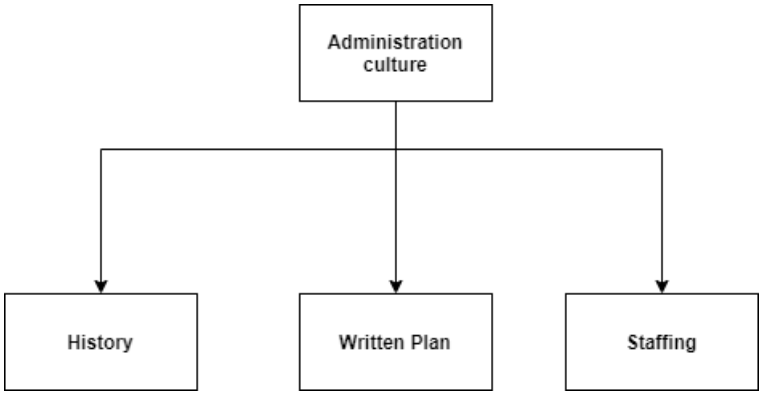

Figure 10: Administration Culture

3.3.4 Purpose for Co-Creation

Finally, the purpose and objective of the co-creation should be made clear to ensure that the co-creation process is successful (Brandsen et al., 2020; Wilcox, 1994). The purpose of co-creation can be divided into two main actors in the process, the purpose for the initiator of the co-creation process, which in this study is the municipality of Middelburg. And the purpose for participants, and in this study, the main participants are the citizens. The municipality and citizens each will have to view different purposes and objectives for the co-creation process. Without a clear purpose and objective for co-creation, the initiator and participants will not see the usefulness of the process. Therefore, the purpose for co-creation has to be identified and should be made clear to these two main actors by the municipality that will organize the process. The initiator of the co-creation purpose can be to improve public service, enhance public support and educate participants (Brandsen et al., 2020; Wilcox, 1994; Brody et al., 2003). Participants' purpose by the literature can increase the quality of public service, democratize the process, having influence at the project and enhance skills participants (Brandsen et al., 2020; Wilcox, 1994; Brody et al., 2003). So two sub-categories will be constructed for the category purpose for co-creation: *Municipality* and *citizens*

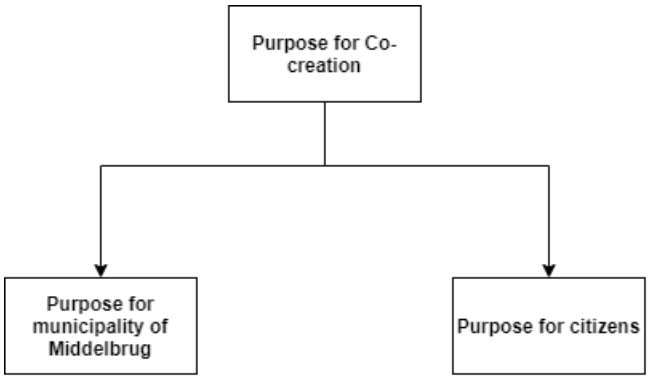

Figure 11: Purpose for co-creation

3.3.5 Citizen Characteristics

From the citizens' side, Voorberg et al. (2005) identified four important factors that influence co-creation. First, the characteristics of citizens are viewed as essential for the quality and level of the co-creation process. Voorberg et al. (2005) argued that the characteristics of citizens such as intrinsic values have a large influence on whether citizens are willing to participate in the co-creation process. These values can be a civic duty to the community, curiosity, trust, cooperation, involvement, loyalty, and the desire to improve public services. Moreover, Sundeen (1998) found that the education of the citizens is an important factor that influences the willingness to participate as well. Citizens that are higher educated are likelier to participate as they have more knowledge, are better able to articulate their views, are better able to process the input of other participants, and possess administrative skills to participate than people that are less educated. Administrative skills are considered important in a co-creation process as it is essential that participants are able to organize,

communicate and negotiate during the process with other participants. Therefore, the three sub-categories will be constructed: Intrinsic values, education and administrative skills

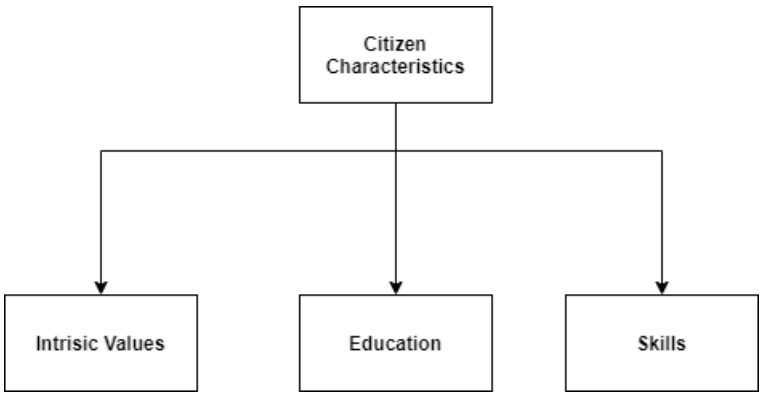

Figure 12: Citizen Characteristics

3.3.6 Citizen Awareness

Citizens that are more aware of the need to improve public services feel more responsible to participate to improve the services. The principle sense of ownership plays an important role in the heating transition. When citizens feel they have a responsibility for public service in their vicinity, they are likelier to 'own' that public services and are more willing to put effort to improves the services. To achieve that, citizens should first feel their responsibility and secondly feel that they can influence the process. In sum, two sub-categories have been constructed: *onwership of problem* and *influence*

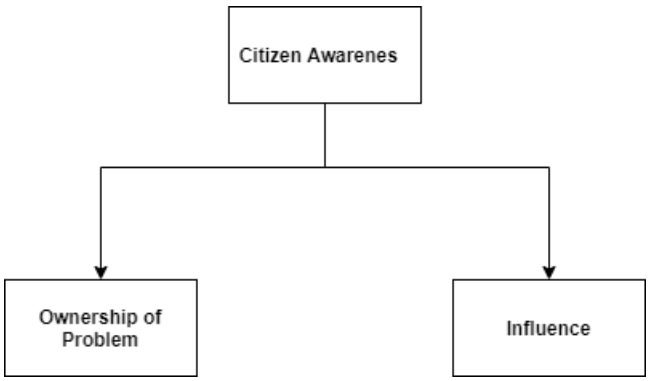

Figure 13: Citizen Awareness

3.3.7 Social Capital

Social capital is the positive product of shared values that allow people to cooperate with each other for public services in this research. It is not only important to get citizens to participate, but to also keep them engaged and motivated the whole process when they are participating (Brandsen et al., 2020; Ostrom, 1996). So social capital is needed to keep citizens engaged and to improve the performance of the group. The literature has identified two forms of social capital, namely cognitive

social capital and structural social capital (Nahapiet, 1998). The cognitive social capital dimension is intangible, which refers to share understandings, in which participants have shared language, values, goals and vision. Whereas, the structural social capital relates to tangible relationships and structures like network ties, roles, rules and procedures.

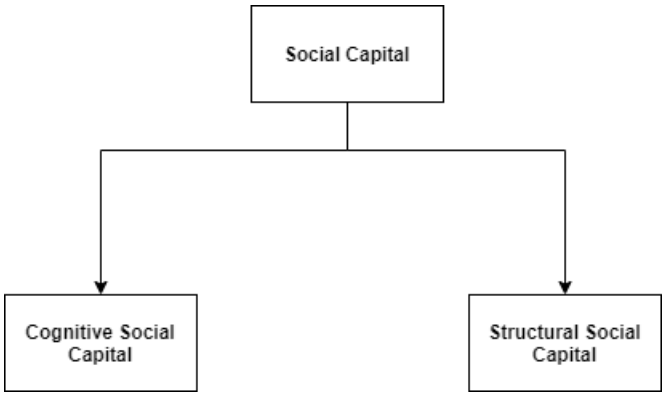

Figure 14: Social Capital

3.3.8 Risk Aversion of Citizens

The final factor is the risk aversion by citizens. Citizens often try to mitigate the risks, especially if it affects them financially or if there is a lack of trust with authorities (Voorberg et al., 2015). Citizens that are expected to participate will be risk-averse when the expected outcome of the co-creation process will cost them financially to improve public services. Next, trust between the initiator and participants is identified as an important factor in co-creation (Brandsen et al., 2020; Voorberg et al., 2015). It is important that citizens have trust in the co-creation and that they can participate as equal partners. As research has shown that participants will have a substantial risk-averse attitude towards co-creation when they do not trust the authority (Voorberg et al., 2015).

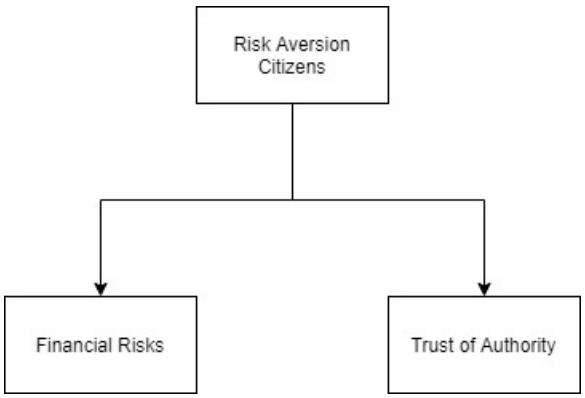

Figure 15: Risk Aversion Citizens

4. Methodology

In this chapter, the methodology for this research will be outlined. The methodology gives structure to the research and describes the research approach for this study. Furthermore, it describes the data acquisition process, the way the data will be used to analyze for this study and how it can contribute to this research. This research will make use of a case study. This chapter will start with the research approach in *Section 4.1*, *Section 4.2* will cover the case study methodology, *Section 4.3* will address the data collection for this study, while *Section 4.4* will focus on the data analysis and finally *Section 4.5* will describe the data validation.

4.1 Research Approach

This study will focus firstly on the current polycentric governance of the heating transition in Middelburg. Secondly, the study will focus to understand the co-creation process and how it is or is planned to be used for the heating transition. Next, it will explore the context of the heating transition in Middelburg, and its neighborhoods Griffioen and Dauwendaele. By understanding the governance of the heating transition, the context of the research, co-creation process will be examined. And finally, based on the analysis of the co-creation, an improved co-creation design will be presented in this study. For this research, a qualitative method will be used. A qualitative research approach fits this research as it examines the experiences and interactions individuals or organizations have with each other in a given context.

4.2 Case Study Methodology

This study will make use of a case study approach to get an in-depth insight into how the municipality of Middelburg approaches co-creation and the heating transition and how the polycentric governance influences co-creation. A case study is defined by Yin (1984) *"as an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident"* (Yin, 1984, p13). So a case study explores and analyzes a phenomenon within its real-life context and gives comprehensive information about the phenomenon. Yin (2012) identifies three distinct types of case studies: *Exploratory, descriptive* and *explanatory*. The goal of this study is to explore the influence of polycentric governance on the co-creation process for the heating transition in the municipality of Middelburg. Therefore, the selected type of case for this study is the exploratory approach. Given the definition of a case study, it is important to give a clear scope of the case study. The scope of the case study for this research is the heating transition in the municipality of Middelburg. This scope case study will consist of two parts, a general analysis of the heating transition of Middelburg on the municipal level and two specific analyses at the neighborhood level.

4.3 Case Study Selection

The municipality of Middelburg is participating in the EU-Interreg 2 Seas SHIFFT Project with other cities as Brugge, Mechelen, Fourmies and Norwich. The municipality of Middelburg has selected two neighborhoods Dauwendaele and Griffioen for the SHIFFT project where co-creation for the heating transition will take place. Therefore, for this case study, a general analysis will be made for the co-creation process and heating transition for the municipality of Middelburg and two specific cases studies will be made for the two neighborhoods Dauwendaele and Griffioen.

The municipality of Middelburg is currently working to form the heat transition strategy for the city of Middelburg. This strategy is based on the Regional Energy Strategy (RES) of Zeeland made in 2019. The municipality of Middelburg has co-written the RES of Zeeland with other stakeholders and, therefore, the case study will also examine the interactions of the municipality with the RES Zeeland. The fact that the municipality of Middelburg is participating in the SHIFFT project, the municipality has placed a strong emphasis on public participation in the heating transition.

The neighborhood Dauwendaele participates in the Program Natural Gas-free project from the national government. It is currently investigating the feasibility of the heat network that will be part of the heating transition. When the feasibility test of the heat network is positive, the municipality will make use of co-creation to create public support by encouraging residents to participate and connect with the heat network.

For the neighborhood Griffioen, there is currently no specific plan for the heating transition or co-creation. The neighborhood is known to be well off, that has some citizens that are very active on sustainability. The goal for this neighborhood is to organize a co-creation process with citizens that are very active on sustainability and want to make their neighborhood natural gas-free.

4.4 Data Collection

This section will describe the data collection method for this study. Three methods to collect data have been chosen for this study: desktop research, semi-structured interviews and indirect observations during meetings.

4.4.1 Desktop Research

A literature review will be conducted to collect data for this research. The desktop research will make use of grey literature that can be found publicly on the internet. Examples of such literature are policy documents such as documents from the municipality of Middelburg, the national government, the province of Zeeland and the RES Zeeland. Moreover, demographic data from Statistics Netherlands (CBS), documents from consultancy firms and information from organizations such as Zeeuwind will be used for this research. Internal documents will also be used for this research, these are documents from the municipality of Middelburg that are confidential, mainly used for internal use or draft documents that are not finalized yet to be publicized for the public.

4.4.2 Semi-Structured Interviews

There are three types of interviews: structured, semi-structured and unstructured interviews (Bolderston, 2012). The structured interview only consists of predetermined questions, while the unstructured interview consists of none of the predetermined questions and the semi-constructed interview consists of both (Onencan, 2013). This study has chosen semi-structured interviews to conduct interviews to gather information. The semi-structured interview type is the most suitable type for this study and is chosen as it includes predetermined and non-predetermined questions. In this way, it gives direction to the flow of the interview while having the flexibility to ask deeper questions or to deviate and explore new areas for this study.

The data for this case study are obtained from 12 in-depth interviews and 10 short interviews through semi-structured interviews. The interviews were conducted between May and June of 2021 and were conducted online through Microsoft Teams. The interviewees of the in-depth interviews are selected through the stakeholder analysis or by the fact they participated in the focus group TVW. The in-depth interviews took approximately 1 hour, while the 10 short interviews lasted around 10 minutes. The 12 interviewees represent a wide range of actors like civil servants from multiple government levels, energy leaders within the municipalities, external consultancy firms, environmental movements and energy cooperatives. An overview of the conducted interviews is given in *Table 1.*

The interview questions were prepared in advance and mostly consist of the same questions, while of course several questions were adjusted for each interviewee. This research follows the ethical standards of research of the Delft University of Technology guidelines. A data management plan has to be approved by the data steward for the faculty Technology, Policy and Management. A letter of consent was made for each interview, which the interviewee has to sign to approve the interview. A template of a consent letter can be found in *Appendix B*. The interviews were recorded and the recordings will be deleted after this research. Transcripts of the interviews have been made and can be made public. And the identity of the interviewees has been made anonymous for this study. No contact data is made public and only their job position is mentioned in this study.

Table 1: Overview interviews

Date of Interview	Organization	Function	Code
20-5-2021	Zeeuwind	Managing Director	R1
25-5-2021	Province of Zeeland	Staff Member Sustainability	R2
26-5-2021	Inhabitant of Griffioen	Participant in focus group TVW	R3
28-5-2021	Municipality of Middelburg	Neighborhood manager Dauwendaele	R4
4-6-2021	Municipality of Middelburg	Project manager energy transition	R5
11-6-2021	Inhabitant of Griffioen	Energy leader in Griffioen	R6
14-6-2021	Inhabitant of Middelburg	Participant in focus group TVW	R7

15-6-2021	Overmorgen	Adviser	R8
16-6-2021	Woongoed	Strategy adviser	R9
22-6-2021	ZMF	Projectleader energy transition	R10
24-6-2021	Inhabitant of Middelburg	Participant in focus group TVW	R11
25-6-2021	Inhabitant of Middelburg	Participant in focus group TVW	R12
29-6-2021	Inhabitant of Dauwendaele		R13
29-6-2021	Inhabitant of Dauwendaele		R14
29-6-2021	Inhabitant of Dauwendaele		R15
29-6-2021	Inhabitant of Dauwendaele		R16
29-6-2021	Inhabitant of Dauwendaele		R17
29-6-2021	Inhabitant of Griffioen		R18
29-6-2021	Inhabitant of Griffioen		R19
29-6-2021	Inhabitant of Griffioen		R20
29-6-2021	Inhabitant of Griffioen		R21
29-6-2021	Inhabitant of Griffioen		R22

4.4.3 Observations

Inactive observations were also conducted during meetings with the municipality. Reports of these meetings were made and gave useful information about these meetings.

Table 2: Overview Observations

Date	Meeting	Code
23-3-2021	Focus group TVW meeting 1	Appendix D
25-5-2021	Focus group TVW meeting 2	Appendix E
6-7-2021	Meeting with Department of Communication of the municipality of Middelburg	Appendix F

4.5 Data Analysis

The data analysis will be based on the data gathered from the desktop research, interview data and observation data as described in *Section 4.4.* The gathered data is used to describe the case study and to analyze the polycentric governance and co-creation process of the heating transition in the municipality of Middelburg. The case-study analysis will mainly be based on desktop research that contains of grey literature and internal documents. The description of the heating transition in the municipality of Middelburg is conducted based on policy papers of the municipality that can be found publicly or internally. The case study describes the sustainable policies the municipality of Middelburg has conducted or is involved so far. The analysis for the polycentric governance and co-

creation will be mainly based on the interview data conducted for this research. The interview data are from interviewees who are part of official organizations and have official functions within the organizations. The interview data give insight into how the different stakeholders view the governance and co-creation process of the heating transition in Middelburg. After the interviews have been conducted a transcript of each of the interviews is constructed to be analyzed. The transcripts of the interviews were then analyzed with the use of the software Atlas TI. And given the huge amount of data that is generated from this research, the interview data was organized with the use of codes based on the analytical framework in *Section 3.2* (*figure 7*). Interview questions were designed and focused to analyze the organizational and citizens factors that influence the level and quality of co-creation based on the analytical framework. The use of codes was used to maintain structure and to systematically analyze each of the categories that influence co-creation. The codes to analyze the qualitative data reflect the categories and sub-categories that are operationalized in *Section 3.3.* Within each sub-category of the main categories, codes are created to present and explain each of the sub-categories. The data is reviewed several times to evaluate the governance and co-creation process and to find common themes and insights.

4.6 Data Validation & Reliability

For this research, several strategies were conducted to validate the results obtained. First of all, triangulation of data was conducted from semi-structured interviews and policy documents to validate the findings of this research as much as possible. Moreover, each of the analysis was validated through interviews with a civil servant of the municipality of Middelburg who is directly involved in the heating transition in Middelburg and who is the project leader for the SHIFFT project in Middelburg. This person has knowledge about the heating transition in Middelburg to validate the findings and is, therefore, a reliable source for validation. In addition, the design of the co-creation (*Chapter 8)* will also be validated by the same civil servant to check whether the design of the co-creation process can be used for the municipality. The validation will be conducted by an interview of one hour to discuss the design. Afterward, the design has been altered according to suggestions made by the civil servant. The reliability of the data is maintained through the detailed description of the methodology. Moreover, all the documents used for this research can be found in the *Bibliography.* In addition, the organizations and functions of each of the interviewees are given in *Table 1* so that another researcher can repeat this study.

5. Case Study Description

In this chapter, the case study for the municipality of Middelburg and its neighborhoods Dauwendaele and Griffioen will be introduced. This chapter will focus on the socio-demographics, historic overview of climate change actions taken or planned by the municipality, the actor analysis and the participatory process. This will provide context for the heating transition for the municipality of Middelburg.

5.1 Demographics Middelburg

Middelburg is located in the province of Zeeland and is the capital city of its province. Middelburg is an old and historical city located close to the sea and is known for its monuments. It is a former VOC (Verenigde Oostindische Compagnie; *English: Dutch East India Company*) trading city. It is situated in the southwest of the Netherlands. The municipality of Middelburg consists of the city of Middelburg and three villages: Arnemuiden, Sint Laurens and Nieuw- en Sint Joostland. And the city of Middelburg consists of eight neighborhoods including Dauwendaele and Griffioen. The municipality has 48.977 inhabitants of which 39.695 are from the city of Middelburg (CBS, 2021). The total surface area of the municipality is 53,04 km^2.

The socio-demographic and housing data of the municipality of Middelburg are presented in *Table 3.* Demographically, there are no big differences between the municipality of Middelburg and the average of the Netherlands. Notably, the average income of the inhabitants in Middelburg (€25,500) is lower than the national average (€35,500). This can be explained by the fact that Middelburg is situated at the peripheric of the Netherlands, which on average has less wealth and less industry. The housing data does give some striking differences like the average value of a house in Middelburg (€189,000) is also significantly lower than the national average (€270,000). Moreover, there are also differences in the type of building like there are more terraced housing and fewer (semi)-detached housing in Middelburg than on average in the Netherlands. This is logical by the fact that Middelburg is a small city, whereas the average figures include villages where there is much more space.

Table 3: demographic and housing data (Allecijfers quoting CBS, n.d.; wijkpaspoort, n.d.)

	Middelburg	**Netherlands**
Annual Average Income (€)	25,500	35,500
Age (%)		
0-25 Years	28	29
25-65 Years	50	51
>65 Years	22	20
Cultural Background (%)		
Native Background	81	76
Migration Background	19	24
Education (%)		
Higher Education (HBO & VWO)	33	32

Lower Education (MBO & lower school)	67	68
Housing (%)		
Privately Owned	61	58
Private Rent	11	13
Social Rent	28	29
Average Value of House (€)	189,000	270,000
Type of Building (%)		
Terraced House	34	24
Apartment	24	25
Detached house	9	14
Semi-detached House	6	9
Other	27	29

5.1.1 Demographics Dauwendaele & Griffioen

The neighborhood of Dauwendaele is situated in the south of Middelburg and has 6,280 residents, while the neighborhood of Griffioen is located to the northwest of Middelburg and has twice as few inhabitants as Dauwendaele (3,095 residents). The exact location of these neighborhoods can be found in *Figure 16.* There are large socio-demographic differences between these neighborhoods. Firstly, the average income of the inhabitants of Griffioen is in line with the average income in the municipality of Middelburg, whereas the average income in Dauwendaele is significantly lower. Secondly, there is a big difference in the cultural background of the inhabitants between the neighborhoods. More than 1/3 of the inhabitants in Dauwendaele have a migration background, which is almost thrice more than in Griffioen. Moreover, there is also a striking difference in the education level between the inhabitants of the two neighborhoods. The inhabitants of Griffioen are on average higher educated than on average in the Netherlands, whereas the education level in Dauwendaele is a bit lower than the average in Middelburg or the Netherlands. These data are not very surprising as the neighborhood of Dauwendaele is known to be a somewhat 'social weaker' and poorer neighborhood in contrast to Griffioen.

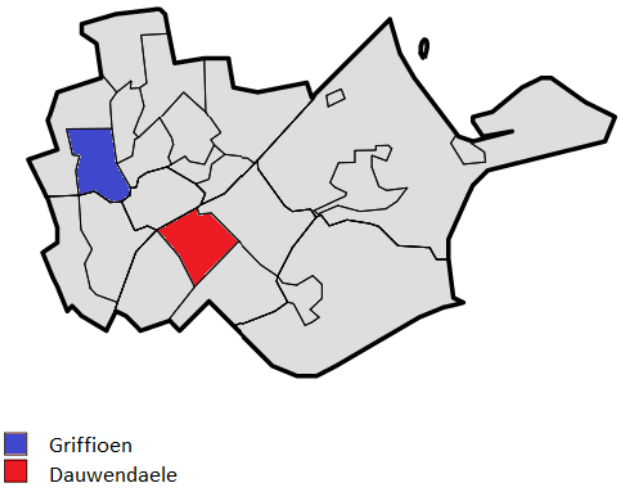

Figure 16: Map of Middelburg with its neighborhoods

There are also some significant differences between the housing data. The average housing price in Dauwendaele is much lower than in Griffioen or the rest of Middelburg. One outstanding figure is that much more social housing is found in Dauwendaele encompassing 66% of the total housing. Next, the type of housing is also different between the neighborhoods, Dauwendaele has significantly more terraced houses and apartments than Griffioen, whereas Griffioen has more (semi)-detached houses. This can be explained as Griffioen is wealthier than Dauwendaele.

Table 4: demographic and housing data (Allecijfers quoting CBS, n.d.; Kadaster, n.d.)

	Dauwendaele	**Griffioen**
Inhabitants	6,280	3,095
Annual Average Income (€)	20,000	26,100
Age (%)		
0-25 Years	30	25
25-65 Years	50	45
>65 Years	20	30
Cultural Background (%)		
Native Background	66	87
Migration Background	34	13
Education (%)		
Higher Education (HBO & VWO)	28	41
Lower Education (MBO & lower school)	72	59
Housing (%)		
Privately Owned	39	66
Private Rent	11	11
Social Rent	50	23
Average Value of House (€)	127,000	198,000
Type of Building (%)		
Terraced House	45	31
Apartment	29	16
Detached house	1	10
Semi-detached House	9	9
Other	16	35

5.2 Overview Climate Actions by the Municipality of Middelburg

5.2.1 Environmental Vision

In the environmental vision of the municipality of Middelburg for 2013-2018, the municipality initially has set the target to be energy neutral by 2030 (Gemeente Middelburg, 2013). Its goal was more ambitious than the goals of the national government that has set the goal to be energy neutral at 2050. However, the municipality noted in its environmental vision noted that the year 2030 may be not feasible in the current economic conditions as the economic conditions were not great at the beginning of the 2010s. It has, therefore, set another goal to reach it in 2050 and if possible accelerate it sooner to 2030. The municipality saw two ways to become energy neutral, firstly by saving energy and secondly by generating energy from sustainable resources. It saw the largest

energy-saving opportunity in the built environment like making homes and offices energy neutral. In addition, the municipality has convinced 50 companies to sign a letter of intent in which they promise to save 10% energy in three years. On the energy production side, the municipality identifies solar energy and wind energy as the largest opportunities. It set the goal to provide 2,500 homes with solar energy by 2018.

In the fourth environmental vision for 2019-2025, the municipality emphasizes the goal to achieve a sustainable environment in the municipality. Next, it wants to embed climate change actions in a broader policy agenda. The municipality sets two targets for sustainability (Gemeente Middelburg, 2019). For the short term, the municipality emphasizes the principle of trias energetica. The trias energetica means firstly limit the energy consumption, secondly consume energy from renewable sources and thirdly use fossil energy as efficiently as possible. In addition, the vision also states that it will draft the heat transition vision and the implementation of the RES of Zeeland and the heat transition vision. For the built environment, the goal is that all new construction to be energy neutral by 2025. For the long term, the municipality wants to be energy neutral at 2050, which was less ambitious than goals in the previous environmental vision of 2030.

5.2.2. Sustainable Projects

In 2017, the largest solar park was built in Middelburg (Versol, 2021). It is located in the neighborhood Mortiere situated south of Dauwendaele. The solar park covers an area of approximately 12 hectares with 55,000 solar panels in total with a total capacity of roughly 14MW. The park provides sustainable energy for approximately 4,500 households and it leads to a reduction of 7,000 tons of CO_2 per year. It is hereby, the largest solar park in the province of Zeeland. Part of the solar park is the 'postcoderoosproject' that contributed 700 solar panels to the solar park in Mortiere (Versol, 2021). The 'postcoderoosproject' is an arrangement, in which citizens can invest in solar panels without having to install them on the roof of their homes. In this way, they can participate in solar projects and can financially participate. For the context of Middelburg, this arrangement is convenient as many buildings and houses in Middelburg are monuments, which are not fitted for solar panels on the roofs. A participation process is used for the 'postcoderoosproject', where participants and stakeholders are invited to the process to discuss and negotiate the initiation of such a project. And at a later phase of the process, when it is decided that the project will be started, residents get the opportunity to financially participate in the construction of the solar parks.

Next to the 'postcoderoosproject', the municipality is also offering subsidy schemes from the national of provincial government to stimulate people to make their homes more sustainable. The 'Nul-op-de-meter' arrangement is a program that provides a subsidy to 43 homeowners to make their homes energy neutral (Impuls Zeeland, n.d.). In total, the municipality made 23,000 euros subsidy available for this arrangement. The largest subsidy scheme is the Investment Subsidy Renewable Energy (ISDE) for homeowners who want to invest to make their homes more sustainable (Rijksdienst voor Ondernemend Nederland, n.d.). Homeowners can apply for the subsidy for thermal home insulation, sustainable energy generation such as heat pumps or solar water heating or connecting to a heat network. Another support scheme is the Energy Saving Loan from the national government (Rijksdienst voor Ondernemend Nederland, 2021). This arrangement allows homeowners to borrow money at low interest to invest in thermal insulation and solar panels. This national fund has a budget of €1.1 billion. The province of Zeeland has a similar arrangement that is even more attractive to the national arrangement. It provides the same loan, but at a 0.5% lower

interest rate than from the national Energy Saving Loan (Energiebespaarlening, n.d.; R2, personal communication, 2021).

5.2.3 SHIFFT

The municipality of Middelburg takes part in the EU-Interreg 2 Seas SHIFFT (Sustainable Heating Implementation of Fossil-Free Technologies) project. The SHIFFT project involves five cities (Middelburg, Brugge, Mechelen, Norwich and Fourmies) from four countries (The Netherlands, Belgium, the UK and France). These cities work together with two universities (TU Delft and the University of Exeter) to research the implementation of fossil-free technology on homes through co-creation with local communities. This research focuses on work package 2, which consists of pilot projects (SHIFFT, 2020). The municipality of Middelburg has assigned two neighborhoods Dauwendaele and Griffioen for the pilot projects. The goal for Dauwendaele is to make 550 houses natural gas-free and for Griffioen approximately 580 houses through co-creation with stakeholders. The 550 houses in Dauwendaele were built between 1966-1970 and are a mix of social and private terraced housing, about 2/3 are rental and 1/3 are private property. For Griffioen, 530 residential homes were built around 1970, while 50 were built in 1920. The houses are terraced houses of which 1/4 are private. So far, co-creation process has not started yet in both neighborhoods and a co-creation process is, currently, being formed with the heat transition strategy by the municipality.

5.2.4 RES Zeeland and Heating Transition Vision Strategy

In 2020, the regional energy strategy vision for Zeeland was developed that consists of goals and agreements derived from the national Climate Agreement (RES Zeeland, 2020). The Regional Energy Strategy (RES) Zeeland consists of five main parties: The province of Zeeland, all municipalities of the province of Zeeland, waterboard Scheldestromen, distributed network operator Enduris and Impuls Zeeland, a development company. Next to the five main parties, multiple stakeholders are also involved in the RES like energy cooperatives as Zeeuwind, environmental group ZMF (Zeeuwse milieufederatie; *English: Zeeuwse environmental federation;* translation by author), housing associations, commercial real estate and Techniek and Bouwend Nederland representing the private real estate. The cooperation within the RES is institutionalized with three core tables: building environment, electricity and mobility. And within these core tables, sub tables are also formed. And within these tables, the five main actors and stakeholders discuss and negotiate the RES of Zeeland. For the built environment it is agreed that by 2030, the CO_2 emission should be reduced by 34% in the province of Zeeland and phasing out natural gas from buildings. By the end of 2021, every municipality in the Netherlands has to formulate its heat transition strategy (*Dutch: transitievisie warmte;* translation by author). With the heat transition strategy, the municipality has to describe for each neighborhood how and the timeline every neighborhood will be natural gas-free until 2050. The heat transition strategy will be updated every five years for changes that will occur.

5.2.5 Heat Transition Map

On behalf of the municipality of Middelburg, consultancy firm Overmorgen has investigated which alternatives to natural gas are most promising for each neighborhood in Middelburg for the heat transition strategy (Bureau Overmorgen, 2021). Overmorgen has mapped the alternatives out in a transition map indicating which alternatives are, at present, most promising for each neighborhood. The analysis for these alternatives is based on the technological and houses characteristics of the neighborhood and when comparing the alternatives, the alternative that has the lowest financial

costs will be chosen on the map. The transition map can be found in *Figure 17.* From the transition map, it can be seen that for the neighborhood of Dauwendaele and Griffioen it says recalibrate. It means that that it is currently not clear yet which alternative to natural gas fits best for these neighborhoods and that multiple alternatives score close to each other. Overmorgen explains that in a number of neighborhoods, the financial costs for all-electric and heat networks are close to each other. The advice of this map is to switch to gas-free options individually and to recalibrate after five years to explore whether the most promising alternative can be found then. According to Overmorgen, these neighborhoods should move to all-electric when a heat network in the future is not feasible, while a temporary solution is the use of hybrid heat pumps. As it is shown in the transition map, a small part of Dauwendaele is categorized as testing ground Dauwendaele, which the heat network will possibly be built. Furthermore, the map shows that the most promising alternative for most neighborhoods in Middelburg is hybrid meaning switching to hybrid heat pumps. And finally, the map shows two neighborhoods that should switch to all-electric.

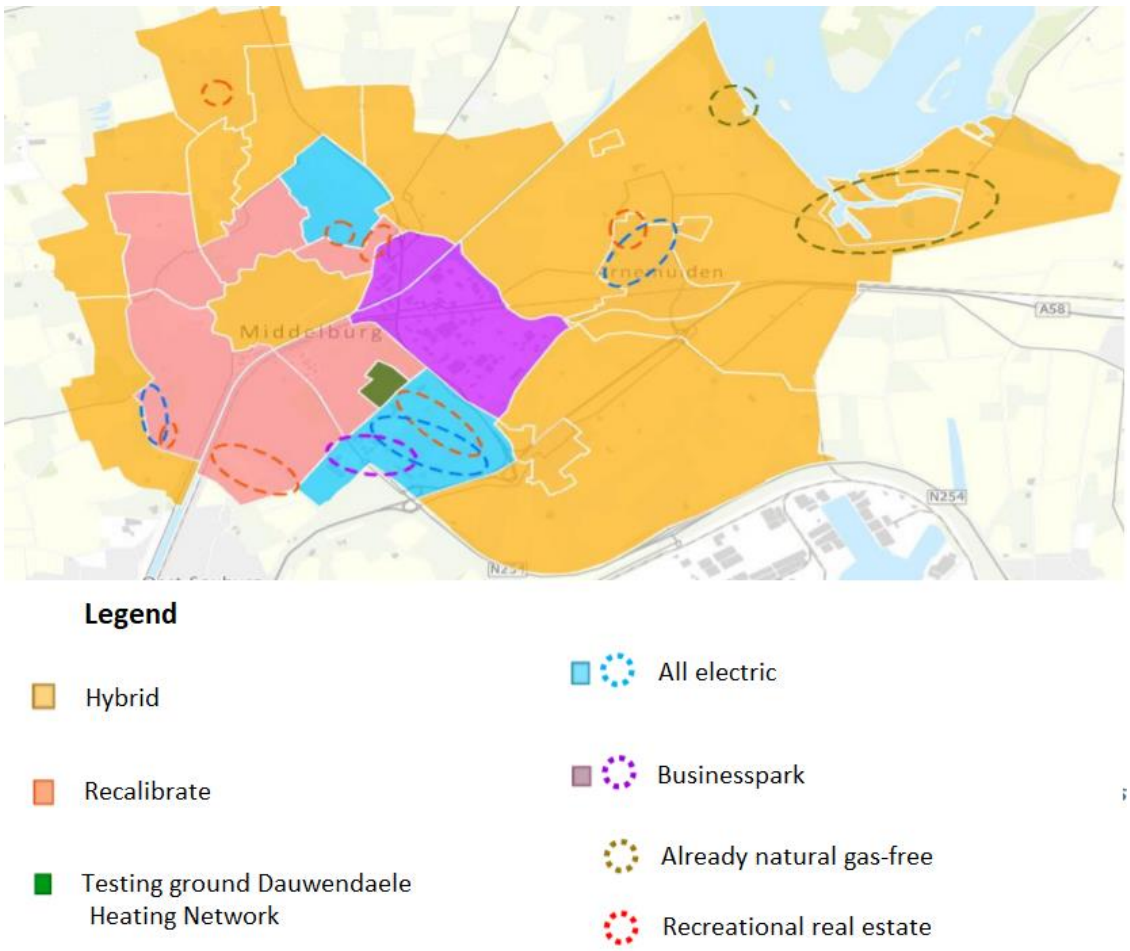

Figure 17: Heat Transition Map. Adapted from (Bureau Overmorgen, 2021)

5.3 Actor Analysis

In this section, an actor analysis will be conducted with the relevant actors involved for the heating transition in Middelburg.

- The municipality of Middelburg is the problem owner of this study. It has to form and implement the heat transition strategy in Middelburg. Furthermore, it has to come up with a participation plan to facilitate co-creation and it also takes part in the RES of Zeeland.
- Province of Zeeland takes part in the RES of Zeeland, it provides support schemes like Energy Saving Loan and coordinates with the municipality about the heating transition.
- Zeeuwind is an energy cooperative that has 2,700 members and is active in the province of Zeeland. Its goal is to promote, operate and develop sustainable energy projects in the province. It is also informing and helping its members about the heat transition and it takes part in the RES of Zeeland to pressure parties to be ambitious about sustainability.
- Zeeuwse Environmental Federation (ZMF) is an environmental group that promotes sustainability in the province of Zeeland. It takes similar to Zeeuwind part in the RES of Zeeland to pressure parties to be ambitious about sustainability. And it informs and helps members and citizens with sustainability.
- Enduris is the distributed network operator that distributes energy to residents in Zeeland. It has to ensure that the network is reliable and capable to transport energy throughout the network.
- Woongoed is the largest housing association of the municipality of Middelburg possessing more than 6,000 buildings in the province of Zeeland. It has to ensure that all its buildings have to be energy neutral by 2050. Furthermore, Woongoed is taking part in the discussion with the municipality in shaping the strategy for the heating transition.
- The neighborhood team consists of volunteers that represent the neighborhood. Each neighborhood has a neighborhood team. they organize meetings twice a year with residents to discuss relevant topics in the neighborhood. Next, they offer support and draw attention to the municipality when something happens within the neighborhood.
- The neighborhood manager is part of the municipality. Each neighborhood has a neighborhood manager. The neighborhood manager is the first direct contact of the neighborhood team to the municipality to communicate with. That person communicates a lot with the neighborhood team and passes the information to the right department within the municipality.
- Overmorgen is a consultancy firm that is helping the municipality with shaping the heat transition strategy and the participation process.
- The industrial heat provider (that will not be named for confidentially in this study) will provide the residential heat to the heat network in Dauwendaele when the heat network is built and finished.
- Homeowners eventually have to take part in the heating transition. They will have to make the large investments needed to make their houses natural gas-free. Their role is important when co-creation will happen.
- Welzijn Middelburg is a welfare organization that is active in the neighborhoods and is a natural point of contact for residents.

5.4 Heat network Dauwendaele

The municipality of Middelburg has designated the neighborhood of Dauwendaele for the 'Program Natural Gas-free Neighborhoods' (Dutch: Programma Aardgasvrije Wijken) of the national government. In total 50 municipalities in the Netherlands are participating in this program. Within this program, municipalities, supported by the national government, make their neighborhoods natural gas-free and the goal is to experiment and to explore how the neighborhood-oriented approach can be set to make these neighborhoods natural gas-free.

The goal for Dauwendaele is the construction of a heat network located in the district Dauwendaele II. The exact location of the heat network can be found in *Figure 18.* For the neighborhood of Dauwendaele, it is planned that 900 houses will take part in this program and will eventually be connected to the heat network (aardgasvrijewijken, n.d.). 600 of these houses are rental mostly owned by housing association Woongoed, while 300 are private houses. The program started in 2018 and the total subsidy from the 'program natural gas-free neighborhoods' is €3.3 million plus an additional €400,000 by the Ministry of the Interior and Kingdom Relations (Kole, 2021).

Figure 18: location of Heat network in Dauwendaele. Adapted from (DWA, 2019)

The stakeholders that are involved in the planning of the heat network are the municipality, industrial heat provider, energy cooperative Zeeuwind, district network operator Enduris and housing association Woongoed. The civil servants of the municipality form a workgroup together with other stakeholders. Since the start of the program, the workgroup has decided not to inform the public about the heat network under the pressure of Woongoed and the industrial heat provider (R5, personal communication, 2021). At the start of the program, the municipality of Middelburg hired research agency DWA to investigate the financial and technical feasibility of the heat network in Dauwendaele. The boundary conditions for the heat network were that the financial and operational costs of the heat network are not too high for the municipality, Woongoed and residents. Secondly, the heat network had to be reliable during the whole year. Thirdly, there has to be a positive business case for the investor and exploiter of the heat network and the return of network must be at a minimum of 8% per year(DWA, 2019; Kole, 2021).

By spring 2020, the results of the feasibility research conducted by DWA were found insufficient to start the heat network by the municipality and its stakeholders. The total costs of the construction of the heat network were estimated at €12.5 million (Kole, 2021). The network connection costs were estimated at €5,000 per house that homeowners and Woongoed were expected to contribute, which was seen as too high for Woongoed and homeowners to participate. Next, the 8% return of the project was not reached making it uninteresting for market parties. In addition, DWA found that the current annual consumption of natural gas by these 900 houses is 1,272 m^3 (DWA, 2019) and that the industrial heat provider's available power may not be sufficient to provide enough heat. Finally, the risks were deemed too high that not all homeowners want be connected to the network.

However, the workgruop decided not to give up on the heat network and asked for new feasibility research for the heat network that will be conducted by DWA and Greenvis in the spring of 2021 (Kole, 2021). The boundary conditions were changed for this research as the return of the network was adjusted to 4% per year. The results of this research were more positive this time (Kole, 2021). The total investment costs are still €12.5 million. However, the network connections costs were estimated €2,000 per house lower than the previous research, which makes it interesting for Woongoed and homeowners to participate. However, the return of the project was 4% annually making it less attractive for market parties to construct and exploit the heat network.

Therefore, the workgroup came up with three alternatives to solve these problems:

- The first alternative is that the municipality will become the owner of the entity that will invest and exploit the heat network. Hereby, the municipality will borrow money at the Bank Dutch Municipalities (BNG), which it can borrow at low interest.

- The second alternative is that the municipality will borrow the money from the BNG and will lend the money to an entity that will invest and exploit the network.

- The third alternative is that the municipality will guarantee the loan from an entity that will invest and exploit the network.

The risks for the municipality to invest and exploit can only partly be covered by the subsidy ‘program natural gas-free neighborhoods’ (€3.7 million), the contribution to the network connection costs (€1.8 million) and the ISDE subsidy. The municipality, therefore, prefers the second and third

alternative as it reduces the risks for the municipality. The plan is that district network operator Enduris will become the (partly) owner and exploiter of the heat network and that housing association Woongoed will connect all its buildings to the heat network. Energy cooperation Zeeuwind with the municipality will take care with the participation process and Zeeuwind will possibly become co-owner of the network. Additionally, the workgroup is trying to discuss with the province of Zeeland and the national government to co-finance the heat network, though the national government has indicated not to give additional funds. The workgroup assesses that risks will be manageable with this plan with the 'program natural gas-free neighborhoods' subsidy in its risk analysis. The planning is that in the 3rd quarter, the workgroup will come with a well-developed plan and will present it to the city council where the final decision will take place.

5.5 Participatory Process in the Municipality of Middelburg

The municipality of Middelburg has created two groups to discuss the heat transition strategy and strategies to increase public support through co-creation. The first group is the project group TVW, in which civil servants involved with the heat transition and sustainability, housing association Woongoed, consultancy firm Overmorgen and district network operator Enduris are the members of the group. Within this group, the heat transition strategy is formed through research by Overmorgen and discussions and negotiations between the civil servants, Woongoed and Enduris.

The second group is the focus group TVW, in this group the civil servants involved with the heat transition, neighborhood teams & managers, citizens that are leading in sustainability and Overmogen take part in this group. The citizens that are leading in sustainability are called energy leaders for this research. These energy leaders are chosen by the civil servants through networking as these leaders are known by the municipality through their enthusiasm for sustainability. The focus group consists of approximately 15 people. The goal of this group is to discuss the experiences of the energy leaders when they made their homes more sustainable, get their view on the heating transition and discuss together with the neighborhood representatives (neighborhood teams & manager) how co-creation can be used for the heating transition. So far two meetings have been organized to discuss these topics. From the discussions, some interesting ideas came forward like the use of 'energy ambassadors' to encourage ordinary to make their homes more sustainable. These energy ambassadors are citizens that already have made their homes sustainable, which they can show ordinary citizens how to achieve. Another idea is the use of an independent mediator or party that will examine the citizens' homes and give independent advice on how residents can make their homes more sustainable including the costs. In the future, the civil servants want to expand the focus group with more members and in particular ordinary citizens to discuss the heating transition. The reports of these meetings can be found in *Appendix D & E.*

In addition, the municipality has also organized one information meeting on the 3rd of June 2021 with ordinary citizens where the municipality informed the citizens about the heat transition strategy. In addition, two energy leaders from the focus group were invited to speak to the public about their experiences to make their homes more sustainable. This meeting was organized online and about 50 citizens attended the meeting.

6. Polycentric Governance Analysis

In this section, the current governance of the heating transition in the municipality of Middelburg will be assessed by the Governance Assessment Tool (GAT). The GAT will assess the five dimensions of governance as described in *Section 2.3.* It will assess these dimensions with the use of four criteria described in *Section 2.3.1.* A full description of the five dimensions of governance and four criteria can be found in *Section 2.3.1*. With the GAT, the governance elements can be assessed whether these elements enhance or support or decrease or restrict the quality of governance. The GAT is performed with a set of questions that can be found in *Appendix A*. A comprehensive table of the GAT analysis can be found in *Table 5.*

6.1 Levels & Scales

6.1.1 Extent

The heating transition in Middelburg involves actors from the private and public sectors from four governance levels. On the national level, the national government is mainly involved with the development of the Dutch Climate Agreement. In the Agreement, the national government has formulated the sustainable goals of goals 2030 and 2050 (Ministry of Economic Affairs & Climate Policy, 2019). It has also formulated policies like phasing out natural gas in the built environment. Next, the Ministry of Economic Affairs and Climate Policy is involved in phasing out natural gas with government agency or programs as Program Natural gas-free neighborhoods and National Program RES (Regional Energy Strategy).

The governance of the energy transition at the regional level plays an important role in the heating transition in Middelburg. The RES Zeeland consists of five main actors as described in *Section 5.2.4*. Next to the five parties, multiple stakeholders are also involved in the RES as mentioned in *Section 5.2.4.* In the RES Zeeland, the five main actors and relevant stakeholders develop the RES of Zeeland. The RES of Zeeland consists of goals and agreements regarding the energy transition that are negotiated with the main actors and stakeholders involved.

On the local level, the municipality of Middelburg is required by the national government to develop the heat transition vision strategy on how to implement the goals derived from the RES of Zeeland The heat transition strategy has to be formed by the end of 2021. In the heat transition strategy, the municipality has to formulate a transition strategy and explain how it will make all buildings in the city natural gas-free, specify the technology it will implement and what the timeline will be for each neighborhood within the municipality. The municipality of Middelburg cooperates with a consultancy firm Overmorgen, who assists the municipality to form the heat transition strategy together with RES Zeeland and all municipalities in Zeeland. Moreover, two project groups are formed by the municipality to help the governance of the heating transition. Project group TVW consists of the municipality, external consultancy firm Overmorgen, housing association Woongoed and distributed network operator Enduris. Together they discuss and negotiate the heat transition strategy of the municipality. The focus group TVW consists of civil servants of the municipality, energy leaders and neighborhood representatives across Middelburg. This focus group was created to discuss possible strategies and ways to increase public support through co-creation.

The heat transition strategy will be implemented at the local level. Each neighborhood in Middelburg has a neighborhood team that represents the neighborhood. They consist of volunteers from the neighborhood and represent the neighborhood and offer support to its citizens. They organize meetings twice a year with their citizens to discuss topics that are relevant to the neighborhood and its inhabitants (R6, personal communication, 2021). One of the topics that sometimes is discussed is sustainability. Next, a neighborhood manager is also involved, the neighborhood manager is from the municipality and its role is to "*act as a lubricant between the municipality and the neighborhood team*" (*Dutch: fungeert als smeerolie tussen de gemeente en wijkteam)* (R4, personal communication, 2021). In sum, the extent is assessed positive and supportive to the governance.

6.1.2 Coherence

The cooperation between the levels is mainly found between the regional level and local level, and between the local level and neighborhood level. Although there are some dependencies between the national level and the other governance levels, the level of cooperation is low. National agencies, for instance, only have to approve the RES of all 30 regions and the heat transition strategies of all municipalities in the Netherlands and they provide support schemes to realize the heating transition.

The deepest cooperation is found between the provincial level and local level within the RES Zeeland to create the RES of Zeeland. The cooperation within the RES is institutionalized with three core tables and within the core tables, sub tables are formed where the five main actors and stakeholders negotiate the RES of Zeeland. Moreover, an administrative core team (Dutch: bestuurlijk kernteam; translation by the author), where decisions are made, and a civil service core team (Dutch: ambtelijk kernteam; translation by the author), where policies are discussed, are established (R3, personal communication, 2021). All respondents (Zeeuwind, Province of Zeeland and Municipality of Middelburg) indicate that they see the cooperation within the RES as a success (R1 R3, R5, personal communication, 2021). They view the RES as a great platform to discuss sustainability with all relevant public and private parties, parties "*who normally do not talk with each other like the big industry, the electricity network cooperation, the big energy produces, but also citizen cooperations like Zeeuwind. So there were a lot of parties involved and it was very important to know the several perspectives they will bring*" (R1, personal communication, 2021). Moreover, they all indicated that there is a lot of trust between the parties involved. And finally, all the municipalities of Zeeland use the RES Zeeland to discuss their heat transition strategies with each other and discuss what is working and not working within their municipality (R5, personal communication, 2021).

The cooperation between the municipality and citizens or citizens representative lies at the focus group TVW, the roles of the neighborhood manager and neighborhood team, and yearly meetings in the neighborhood. The focus group TVW has just been created at the beginning of 2021 and so far only energy leaders are invited for this group. Although the plan is that the focus group TVW will be expanded later with ordinary citizens. All involved parties are positive about the creation and the process within the focus group. The cooperation between the neighborhood team and municipality with the neighborhood managers is also regarded as positive although there is some criticism. For example, the neighborhood team of Dauwendaele complains about the lack of information coming from the municipality about the possible heat network for Dauwendaele (R6, personal communication, 2021). *I have heard from some residents that they complain about the lack of information about the heat network, and I am afraid it will possibly damage the trust when the municipality wants to build the heat network* (R6, personal communication, 2021). Moreover, from

interviews with ordinary people and energy leaders, they also complain about the lack of communication from the municipality and a number of citizens, therefore, trust the municipality less (R13-R22, personal communication, 2021). So it can be concluded that the coherence is mostly positive and thus supportive to the governance, especially the cooperation between the provincial and local level, even though, trust between the local level and neighborhood level is somewhat lacking.

6.1.3 Flexibility

There is flexibility for the heating transition in Middelburg, and it is possible to move the issue up or down on the governance level (national, regional, local) given the issue at stake. The formulation of the RES of Zeeland is discussed and negotiated at multiple core and sub tables. And the approval of the RES is decided at the city councils of each of the municipalities of Zeeland and the province of Zeeland. Next, the RES of Zeeland has to be approved at the national level as well by the National RES. The implementation of the RES is situated at the local level, which has to formulate the heat transition strategy for the municipality. Currently, the heat transition strategy is discussed and negotiated with the project group TVW. Moreover, the focus group TVW also discusses the heat transition strategy that will be used as input at the project group with the formulation of the heat transition strategy. This heat transition strategy also has to be approved at the national level as well. So the flexibility is assessed as positive and supportive to the governance of the heating transition.

6.1.4 Intensity

The local level has the strongest impact on the heating transition in Middelburg. The municipalities have to negotiate the RES at the regional level and then have to implement the heating transition at the local level. According to the Climate Agreement and RES, the burden of the heating transition lies at the local level. All parties interviewed agreed that the municipality has the biggest role. According to a civil servant of the municipality of Middelburg, *"the municipalities actually have the largest influence (at the RES) as they are the ones that have to implement them*" (R5, personal communication, 2021). And according to Zeeuwind *"the success of the RES lies with the implementation of the heat transition strategy at municipalities"* (R1, personal communication, 2021). However, it does not mean that the other main actors or stakeholders have no influence or cannot change the status-quo. As every two years, the RES of Zeeland has to be updated and agreed upon by all actors and stakeholders and approved by the National RES. So it can be concluded that the intensity is positive and supportive for the heating transition.

6.2 Actors & Networks

6.2.1 Extent

At the development of the RES, several private and public organizations are involved as mentioned in *Section 6.1*. Although the decision-making power lies with the five main actors of the RES Zeeland, other stakeholders are involved with the discussion and negotiation at the sub tables. Zeeuwind is very positive about the process as the RES includes many stakeholders from the public and private sectors that would never have participated if the RES did not exist. According to the province of Zeeland, all relevant parties that want to join are included at the several thematic tables of the RES and she could not name a stakeholder that was not involved in the RES. However, she admits that citizens are not involved in the creation of the RES, even though they consume a lot of energy. The

RES is trying to involve citizens more in various ways like surveys and participation platforms, but citizens have a hard way finding them (R2, personal communication, 2021).

On the local and the neighborhood level, all relevant stakeholders are included in the project group TVW or focus Group TVW. Next, Zeeuwind and the intended industrial heat provider are currently discussing the possible heat network for Dauwendaele. At this stage, which is still at the start of the process, the municipality of Middelburg has decided with Woongoed and the intended heat supplier to not inform the public yet about the possible heat network as long as no decision has been agreed upon the heat network. The decision to not inform the public yet about the heat network is criticized by Zeeuwind, the neighborhood representatives, and the inhabitants based on the interviews. Zeeuwind, for example, stated that they think it is better to inform the public like they are currently doing it for a similar heat network project in Zierikzee, where they see a lot of support for the heat network through communication (R1, personal communication, 2021). Zeeuwind is afraid that the lack of involvement of citizens will create future resistance. The neighborhood representatives complain about the lack of information provided by the municipality about this topic, while they get questions about the heat network from its inhabitants (R4, R6, personal communication, 2021). However, the neighborhood manager partly understands the decision not to inform the public yet, as unrest could be created for a project that may not even happen. Though he points out that just informing that the municipality is investigating the option may be enough. *"I always say to the municipality, always show what you're doing, that's important. That you are in the process of investigating this. The residents should know that for sure*" (R4, personal communication, 2021). The province of Zeeland also agrees with that statement, stating that it is better to inform inhabitants than to surprise them (R2, personal communication, 2021). Moreover, residents of Dauwendaele interviewed for this research also complain about the lack of information from the municipality and some even question the idea of a heat network and whether it should be built (R13-R17, personal communication, 2021).

So it can be concluded that the extent of actors and networks is somewhat mixed and not supportive or restrictive to the governance. The extent is somewhat mixed as the extent at the RES Zeeland is very positive, while the extent at the municipality and neighborhood level is mixed with the exclusion of inhabitants of Dauwendaele so far.

6.2.2 Coherence

The cooperation within the RES, as described before, is regarded as very positive. It has given a platform to parties that normally do not interact with each other. In this way, parties learn each other perspectives and understand each other interests and motives better. Within the RES, there is a clear structure as mentioned previously in *Section 6.1*. Moreover, all parties have indicated to trust each other and the relationship between the stakeholders is strong so far. However, Zeeuwind is somewhat skeptical about the implementation of the RES at the local level as it is afraid that the formulation and implementation of the heat transition strategy will not be ambitious as Zeeuwind wishes it to be. Zeeuwind is especially skeptic about politicians that are populistic and are afraid to take unpopular measures regarding sustainability (R2, personal communication, 2021).

On the local level, the relationship between the municipality and housing association Woongoed is also regarded as positive. Both indicated that they trust each other and are positive about the cooperation. Moreover, the people in the focus group view the group as a positive platform to share

their opinion within the group regarding the heating transition. However, there is some mistrust between ordinary citizens and the municipality as citizens complain about the lack of communication coming from the municipality and some energy leaders have experienced some negative aspects when trying to communicate with the municipality about sustainability in the past.

In sum, it can be concluded that the coherence is rather mixed for the heating transition. The interaction at the provincial level at the RES is mostly positive, however, Zeeuwind perceives some mistrust at municipalities. And on the local level, some mistrust is perceived by citizens towards the municipality, especially regarding the communication from the municipality.

6.2.3 Flexibility

The RES consists of several private and public organizations and each of the stakeholders is involved at multiple sub tables. According to the province of Zeeland, stakeholders can ask to join any sub table as they want to and there are no hard conditions for any stakeholder to join a sub table (R2, personal communication, 2021). Also, Woongoed has indicated that the fact they are currently not involved in the RES is by their own choice rather not being invited (R9, personal communication, 2021). At the focus group so far, the energy leaders are chosen by the civil servants as it is known that these residents are active on the topic of sustainability. So far, the municipality has not decided at what stage the municipality will involve ordinary citizens and how to choose them in the future. These questions are important as the involvement of ordinary citizens is seen as important for the implementation of the heat transition strategy. Moreover, only energy leaders that are known by the municipality are invited, whereas leaders that are not known have not been invited. So the flexibility is assessed positive and is supportive for the governance of the heating transition.

6.2.4 Intensity

According to Zeeuwind, the municipality of Middelburg and the province of Zeeland, all actors and stakeholders within the RES agree with the goals, and their interests align as well at the sub table built environment (R1, R2, R5 personal communication, 2021). There have been no large disagreements observed. However, even though, there were no large disagreements within the RES, Zeeuwind and ZMF believe that the RES could have been more ambitious, and they see it as their role to push other actors to be more ambitious (R1, R10, personal communication, 2021).

At the local and neighborhood level, there is not much intensity found for the heating transition. The municipality of Middelburg so far has not found a group of citizens that is willing to introduce initiatives yets to make their neighborhood more sustainable. There is, currently, a group of energy leaders that individually have made their houses more sustainable. However, even they do not have the ambition to make their neighborhood more sustainable. A majority of the residents is not interested in sustainability and is passive, even though, most of them see the need for sustainability (R13-R22, personal communication, 2021). Nonetheless, It is expected that most citizens will take more action and will participate when the municipality will push them more. Next, the interviewees are also skeptical about the role of housing association Woongoed regarding sustainability. According to the neighborhood manager, Woongoed is just doing the bare minimum, while an energy leader felt ignored by Woongoed when he wanted to make his home more sustainable (R4, R11, personal communication, 2021). And finally, Zeeuwind and two energy leaders are skeptical about the implementation of the heat transition strategy as they perceive the council of the

municipality to be too conservative implying that the municipality will not do everything to achieve the goals from the RES Zeeland.

In sum, it can be concluded that the intensity is mostly viewed as negative and restrictive as the citizens are mostly waiting to take measures, while the housing association Woongoed is perceived not to be very active nor ambitious. And finally, the perception of the municipality is seen to be conservative and risk-averse by Zeeuwind. However, the municipality is currently working hard to formulate the heat transition vision strategy and the civil servants are ambitious.

6.3 Problem Perspectives and Goal Ambitions

6.3.1 Extent

According to the interviewees of Zeeuwind, ZMF, the province of Zeeland and the municipality of Middelburg, all parties involved at the RES Zeeland acknowledge the goals of the National Climate Agreement (R1, R2, R5, R10, personal communication, 2021). However, as Zeeuwind noted, "*the RES is not very specific*" (R1, personal communication, 2021). The RES has to be seen as a set of goals that have been agreed upon with each other, but they do not specify the means to reach the goals and how each party should reach them. Zeeuwind is, currently, seeing, not all of the municipalities including Middelburg have made plans to implement them accordingly, but each "*point to the municipalities next to them*" (R1, personal communication, 2021). As long as municipality individually has to formulate their regional strategy, discussions will arise between municipalities arguing each other whether which part of the RES should be implemented at which location.

Similarly, this pattern can also be found at the local level where all involved parties acknowledge the problems, agree with the goals to implement the heating transition, but disagree with the details to implement them. A majority of the residents is passive even though most of them acknowledge the problems of climate change and the urgency of the heating transition. Woongoed agrees with the RES, but is very reluctant to support the heat network as it sees the costs of it as too high (R9, personal communication, 2021). And finally, political preference plays a major role at the city council, whereby ideologies play a role in which actions are taken, for example, whether wind and solar energy have to be supported (R1, personal communication, 2021).

In sum, it can be concluded that the problem perspectives and goal ambitions are taken into account for the heating transition. However, problems arise when it comes to the implementation as the goals are not specific. Each actor interprets the goals differently giving actors opportunities to implement these goals at their discretion. So, therefore, the element extent of the problem perspectives and goal ambitions will be assessed as negative and restrictive for the governance.

6.3.2 Coherence

As described before, the problem perspective of the actors aligns with each other within the RES. However, the goals of the RES are not very specific giving actors opportunities to implement these goals at their discretion. This can cause friction as Zeeuwind, for example, describes the implementation of solar energy in Zeeland (R1, personal communication, 2021). The production of solar energy goal is determined at the RES, but it does not state how much solar energy each municipality has to generate. Conflicts can occur as high densely populated municipalities prefer the division of solar energy by area rather than by population, whereas lower densely populated municipalities will argue the opposite. Currently, some coordination is taking place between the

municipalities and the RES to coordinate such conflicts, but Zeeuwind and ZMF still see problems at the implementation phase, see the NIMBY effect and see that politicians acting populistic (R1, R10 personal communication, 2021). Conflicts of interest can also occur for the heating transition at the municipality or the neighborhood level, as the heat source has not been determined yet within the RES (R3, personal communication, 2021). For example, a company may push for hydrogen as a new heat source, from which the company will profit, whereas it may not be in the interest of the citizens to choose hydrogen as a new heat source as the collective costs may be too high. For these reasons, the coherence will be assessed negatively and restrictive to the governance of the heating transition.

6.3.3 Flexibility

The main goals of the RES are derived from the National Climate Agreement. So, therefore, the goals are likely fixed until 2050. However, the subgoals can be altered on the national level after governments are formed after each election. The RES has been given flexibility, in which the RES is updated every two years to accommodate developments of new techniques and new insights. The flexibility is also applied to the heat transition strategy, in which municipalities are required to update the strategy every five years. This is necessary for several neighborhoods in Middelburg as it is still not clear which technology is the most cost-efficient in that neighborhood as more research is required and the development of technology can impact the choice.

6.3.4 Intensity

The heating transition will be one of the largest governance changes in the history of the Netherlands. The natural gas system has been embedded in the Netherlands since the discovery of the Groningen Gas in 1959 and more than 90% of the current buildings are now at present heated by natural gas. The ambition to make all buildings by 2050 natural gas-free is very large and will require a fundamental change to the Dutch energy system and the way we heat buildings and the governance of it. According to the Economic Institute of Construction, the average cost of making one house natural gas-free is around 40,000 euros, which most people cannot pay (Arnoldussen et al., 2021). The intensity is, therefore, assessed as positive for the governance.

6.4 Strategies & Instruments

6.4.1 Extent

For the heating transition, the provincial and national governments are providing support schemes to support the heating transition. The most important subsidy is the Investment Subsidy Renewable Energy (ISDE), more details can be found in *Section 5.2.2*. Another support scheme is the Energy Saving Loan, which provides homeowners the opportunity to borrow money at low interest to make their homes more sustainable. Moreover, the province of Zeeland offers a similar support scheme to the Energy Saving Loan, but at 0.5% lower interest rate. For the heat network in Dauwendaele, the municipality participates in the National Program Natural Gas-free neighborhoods to explore how the neighborhood-oriented approach can be set to make these neighborhoods natural gas-free. For this, the municipality gets €3.7 million subsidies. Finally, the municipality of Middelburg formulates the environmental vision, in which it sets the energy transition targets in the coming years.

However, even with the support schemes, all respondents stated that the financial costs are the largest obstacle for the heating transition, especially for low-income families. According to the municipality of Middelburg, it, currently, does not have the resources to provide additional support

for the heating transition (R5, personal communication, 2021). Next, it is still uncertain whether the heat network will be built in Dauwendaele, as the municipality is still investigating the feasibility of the network. Moreover, the budget of the municipality of Middelburg has been hit by cuts from austerity in recent years, in which the budget for climate policy has been decreased from 150,000 euro to 50,000 euro in 2012 (Gemeente Middelburg, n.d.a). However, the budget for climate policy is expected to increase again in the coming years to increase the staff.

Moreover, there are hardly any monitoring and enforcement instruments made for the heating transition at the RES. A civil servant from the province of Zeeland acknowledges that at present, the RES does not have any instrument to monitor and enforce the implementation of the RES. Most of the monitoring is currently executed by trust between the stakeholders (R2, personal communication, 2021) and the fact *"it is easy to contact each other"* (Dutch: de lijntjes zijn kort; translation by the author). At most, the RES so far has written a letter reminding municipalities of the goals of the RES. According to this civil servant, the RES is currently thinking about instruments to monitor and enforce the implementation of the RES, Zeeuwind and the ZMF are worried about the lack of oversight from the RES to the municipalities and see that the implementation of the RES is not executed ambitiously as they called it. At the local level, the municipality has so far not developed any monitoring or enforcement instrument for public participation and the heating transition. It can be argued that the municipality is busy coming up with the process and has not reached the phase yet to develop these instruments.

Based on the analysis of the extent of the strategies and instruments, the assessment for the element extent is negative and restrictive as the municipality of Middelburg lacks the resources to support the heating transition and that there are currently no monitoring and enforcement instruments available at the RES or the municipality.

6.4.2 Coherence

Even though the municipality is lacking the resources for the heating transition and cannot support citizens or initiatives financially, the support schemes from the national and provincial governments do provide support to stimulate citizens to make their houses more sustainable. The current support schemes are not perceived as sufficient to encourage citizens as the costs of making their homes sustainable are still viewed as too high. In addition, a complaint mentioned by many energy leaders and citizens is the fact that support schemes are only available for a short period of time, which makes it difficult for many citizens to make use of it. According to the respondents, "*clarity about the subsidy schemes is necessary so citizens can make plans for it"* (R7, personal communication, 2021). Another complaint mentioned during the interviews was the constraints of the ISDE scheme, in which the subsidy is only allocated when measures are carried out by a certified company. Residents are not financially incentivized to carry out these measures, which usually are cheaper. And they may, therefore, not take action, because of the constraints of the ISDE subsidy. From the housing association side, Woongoed stated that the landlord levy imposed by the national government is obstructing housing associations to make their buildings more sustainable (R9, personal communication, 2021). Therefore, the coherence of the strategies and instruments is assessed as fairly negative and restrictive to heating transition.

6.4.3 Flexibility

The RES makes use of existing policy instruments and programs that are provided by the provincial and national governments. The support schemes like the ISDE and Energy Saving Loan from the provincial or national government can be combined. The current way to monitor from the RES is by discussions at meeting with all relevant stakeholders. This is mostly done based on mutual trust, but in the future when instruments for monitoring and enforcing are designed and available. Therefore, the flexibility of strategies and instruments is assessed as positive

6.4.4 Intensity

For the heating transition in Middelburg, there are some support schemes provided as described earlier. However, the subsidy schemes are not perceived as sufficient and the municipality does not have sufficient resources to support the heating transition. For Woongoed, the expected costs to participate in the heat network were viewed as too high. Moreover, it stated it is thwarted by the landlord levy to make their buildings more sustainable (R9, personal communication, 2021). For these reasons, the intensity of the strategies and instruments is not sufficient as it requires stronger financial instruments for the heating transition and is, therefore, assessed negatively.

6.5 Responsibilities & Resources

6.5.1 Extent

The responsibilities within the RES Zeeland is clearly structured, in which the responsibilities of five main actors of the RES and its stakeholder are defined. Moreover, the division of work and responsibilities between the civil service core team and the administrative core team is structured. The responsibility for the heating transition is given to the municipalities. And from here, the municipalities have to formulate the heat transition strategy stating their plans for each neighborhood. The municipalities have to cooperate with the inhabitants of the neighborhoods through co-creation for the implementation of the heating transition. And here the responsibilities are becoming less clear as it is not clear how much involved the citizens are going to be. Questions remain, for example, which parties want to take responsibility to finance the heat network in Dauwendaele, will energy cooperatives take ownership of the heating transition, or will the municipality of Middelburg take full responsibility?

In addition, municipalities will require more resources like finance and staff to facilitate co-creation and to implement the heat transition strategy. Municipalities need resources to provide support in the form of subsidies to the heating transition. They also need to enlarge and strengthen their staff for the co-creation process. And all interviewees stated that the municipalities need more resources and that more subsidy support is required to simulate citizens. In conclusion, the responsibility at the RES is clear, but becomes less clear at the local and neighborhood levels. The resources required are currently considered insufficient to facilitate the heating transition.

6.5.2 Coherence

Within the RES, the responsibilities of the five main actors and the stakeholders are clearly defined. Therefore, there are no contradictory within the responsibility of the stakeholders. Moreover, Zeeuwind, ZMF, the municipality of Middelburg and the province of Zeeland all indicated during the interviews of the present study that their input at the RES is taken seriously within the sub tables

and can find their input in the final version of the RES (R1, R2, R5, R10, personal communication, 2021). Therefore, these parties can be considered legitimate by the parties involved.

At the local and neighborhood level, the responsibilities of the neighborhood team manager are also clearly defined and are respected by residents of Dauwendaele. The meetings organized by the neighborhood team were well attended and it is estimated that approximately 80-100 residents were visiting them. This proves that the neighborhood team had legitimacy from its residents. For the neighborhood of Griffioen, the neighborhood team has recently fallen apart and communication between the neighborhood team and residents is limited. Residents feel less involved with the neighborhood team (R3, personal communication, 2021). Moreover, very recently a new neighborhood manager was appointed to the neighborhood. In sum, the coherence is, therefore, assessed as positive and supportive to the governance of the heating transition.

6.5.3 Flexibility

Even though, the resources of the municipality of Middelburg are limited, the municipality cooperates with other municipalities and pursues joint purchasing to lower the overall costs for sustainability (R5, personal communication, 2021). Moreover, these municipalities have hired the same consultancy firm Overmorgen to assist them with the heat transition strategy. Next, the province of Zeeland, Zeeuwind and ZMF all stated they are willing to assist the municipality of Middelburg by providing the municipality advice, expertise and knowledge (R1, R2, R10, personal communication, 2021. So even without much resources, the actors are able to pool their resources to a certain extent to help the heating transition. The flexibility is assessed as fairly positive for this element as the municipality can pool resources to a certain extent.

6.5.4 Intensity

From the interviews conducted, it is clear that the current support scheme for the heating transition is not sufficient for the heating transition. As described in *Section 6.4,* the municipality lacks the resources to provide subsidies. Furthermore, the municipality needs more staff to organize co-creation, though its financial statement indicates that the budget for climate policy will be increased to facilitate that (Gemeente Middelburg, n.d.a). Woongoed also indicated that it and other housing associations nationwide have trouble making all their buildings sustainable. It argued it is thwarted by the landlord levy imposed by the national government. Woongoed aims for cost-efficient solutions and is currently skeptical about the heat network as the estimated costs are viewed too high, though new research estimating lower costs may persuade them. And finally, most citizens perceived the costs for the heating transition as too high and the earnings from annual lower energy costs as too low to earn the investment back. So, it can be concluded that the intensity of the element responsibilities and resources is assessed fairly negatively and restrictive to the governance as the amount of allocated resources is not perceived as sufficient to implement the heating transition successfully.

6.6 Concluding Section

An overview of the GAT for the governance of the heating transition for the municipality of Middelburg can be found in *Table 5.* In general, all relevant stakeholders are actively involved in this phase of the process, with the exception of citizens, who are at this stage not involved yet. There is

disagreement among actors whether citizens should be involved in this phase of the process, especially for the possible heat network in Dauwendaele. Some actors like Zeeuwind, ZMF and neighborhood representatives argue that the municipality should have already included the inhabitants of Dauwendaele. While the municipality of Middelburg, Woongoed and the intended industrial heat provider hav decided not to involve the residents yet as long as no decision has been agreed upon the heat network of Dauwendaele. The governance of the heating transition faces the problem perspectives and goal ambitions. Even though the problem perspectives align with each other among all parties, the problem arises as the goals of the RES are not specific and actors can implement the goals from the RES at their discretion possibly interpret the goals of the RES differently. Moreover, there is a possibility of conflict of interests as the actor may have an interest in a particular alternative and may persuade other parties to move towards that alternative. Large problems of governance are found at the elements *strategies and instruments*. Currently, there is no instrument to monitor and enforce the RES. And some parties see indications that some municipalities may not implement the RES as ambitious as stated in the RES. And finally, there is a clear lack of resources among the actors that have to implement the heating transition. Subsidy schemes provided by the national and provincial governments are perceived as insufficient for most citizens. And they insufficiently stimulate citizens to make their houses more sustainable. The municipality of Middelburg is lacking resources to provide additional subsidies and even has trouble finding ways to finance the heat network in Dauwendaele. In addition, housing association Woongoed has initially dropped from the heat network as it considered the costs as too high, but may be persuaded back as the research has shown the costs may be estimated lower. Besides, the heat network, Woongoed finance is also restricted by the landlord levy imposed by the national government

Table 5: GAT Analysis Table

Governance Dimension	Extent	Coherence	Flexibility	Intensity
Levels and Scales				
Actors and networks				
Problem perspectives and goal ambitions				
Strategies and instruments				
Responsibilities and resources				

7. Co-Creation Analysis

In this chapter, the current co-creation process will be analyzed for the heating transition in the municipality of Middelburg with its inhabitants. The level and quality of co-creation will be analyzed using the co-creation framework described in *Section 3.2*. A full description of the factors can be found in *Section 2.5.* From the organizational side, the analysis will be based on the current organizational structure of the municipality. From the citizen's perspective, it is more difficult to analyze the variables as public participation for the heating transition is just at the start of the process, in which hardly any ordinary citizen has participated yet. Therefore, the analysis will also be based on the policy preparation of the participation process. The analysis will be mostly based on focus group TVW and information gathered from the interviews.

7.1 Compatibility of Public Organizations to Public Participation

The municipality of Middelburg has organized neighborhood teams and neighborhood managers for each neighborhood to serve as a link between the municipality and its inhabitants. The role of the neighborhood team is to represent the neighborhood and have contact with its inhabitants (R6, personal communication, 2021). The team is the place where inhabitants can contact them if have questions. The team will then pass the information to the neighborhood manager who will contact the appropriate department of the municipality to solve the problem. The role of the neighborhood manager is to act as a mediator between the municipality and the neighborhood team who will pass information between the two parties. The neighborhood team organizes meetings twice a year, in which the municipality and the inhabitants are invited to discuss the current affairs in the neighborhood. From the respondents, these meetings were well attended, with approximately 100 citizens attending them (R4, R6, personal communication, 2021). So the municipality has organized communication channels indirectly with citizens through the neighborhood team and manager to reach out to other target audiences.

The municipality has also organized direct communication channels to communicate with its inhabitants. The most popular website is *"middelburgers.nl''*, in which the municipality informs its citizens by putting news on it. The municipality also informs its citizens with the use of social media like Facebook. In addition, it has set up a digital platform known as *"doemee.middelburgers.nl*", in which citizens can participate online. With this platform, citizens can give their opinions about certain projects and topics. And for some projects, they can participate by proposing ideas and having the ability to vote between the given alternatives that are approved by the municipality. Moreover, the agenda of the project is given, where the participatory process is described with its progress and results so far. This online platform is not limited to sustainability topics only, but also consists of a wide variety of topics such as construction and education. Moreover, the municipality is also making use of traditional communication channels such as newsletters and newspapers to inform citizens. Furthermore, the municipality has organized an information meeting about the heating transition with its citizens. In addition, it cooperates with the network RES Zeeland to

increase public participation and has set up an online platform *"zeeuwsenergieakkoord.nl" (Energy Agreement for Zeeland; translation by the author)* for the province of Zeeland. On this platform, citizens can find information about the heating transition of Zeeland, can find the agenda of meetings they can attend and can give input about the heating transition.

So the municipality has established communication channels between the municipality and its citizens that are two-sided. However, based on the interviews with energy leaders, neighborhood representatives and ordinary citizens, the quality of the communication channels is perceived poorly. For example, they stated that many citizens are unaware of the existence of the d platform *"doemee.middelburgers.nl*" that was recently created (R13-R22, personal communication, 2021). All energy leaders and ordinary citizens expressed that they have not received any information from the municipality about it. Moreover, the energy leaders and the neighborhood representatives all claimed not to have been informed about it as a citizen of the city. But they were only informed of its existence by their role or the fact it was mentioned in the focus group TVW (R4, R6, R7, personal communication, 2021). The project manager for the energy transition of the municipality of Middelburg admitted that the platform is unknown by citizens and that it is not widely used by many citizens (R5, personal communication, 2021). She estimated that just 100 citizens (is 900 after the interview) have signed up for the platform. In addition, the low reach of the communication channels was demonstrated when an online meeting was organized by the municipality of Middelburg about the heating transition, which saw attendance of only 50 citizens. The municipality made use of online channels like social media and the website *"middelburgers.nl''* and more traditional channel as the newspaper *De Faam of De Bode* to inform the citizens about the meeting. And at the meeting with the communication department, the municipality staff admitted that the communication used to inform the citizens about the meeting was insufficient (*Appendix F*).

One energy leaders criticized the municipality stating that in general, most citizens do not use online platforms, but that the "best way to inform is still the use of a letter in the mailbox" (R7, personal communication, 2021). Another energy leader criticized the lack of communication of the municipality towards the citizens stating that, "*the municipality communicates too slow and gives too little information about projects and often citizens do not get the information but have to search for it"* (R11, personal communication, 2021). Another complaint is that it is difficult to reach the municipality. Even a citizen that is employed by the municipality sees the communication of the municipality as a problem. This is exemplified by this quote from the person, *"As a citizen, I would say, even though I work at the municipality, but I would actually not know how to contact the municipality and which person if I did not work at the municipality. Fortunately, I know as I work at the municipality, but many citizens would have known"* (R7, personal communication, 2021). One more energy leader criticized the communication of the municipality about feedback when the person contacted the municipality about sustainability (R12, personal communication, 2021). *"I had an idea about sustainability and tried to contact the municipality, however, I never received an email from the municipality in return"* (R12, personal communication, 2021).

Looking specifically to the neighborhood of Dauwendaele, the neighborhood representatives, Zeeuwind, ZMF and citizens criticized the lack of communication from the municipality about the possible heat network in Dauwendaele. Citizens have read about the heat network in newspapers a few years ago, but ever since the information has been spread by media around (in 2019), the municipality or housing association Woongoed chose to not inform its residents. Woongoed argued

that, *"as long we do not have solid plan, we choose not to communicate and to cause unrest among residents "* (R9, personal communication, 2021). However, Zeeuwind, ZMF and two energy leaders disagreed with this statement and stated that it is better to inform and just simply updating them is already enough (R1, R7, R10, R12 personal communication, 2021).

For the neighborhood of Griffioen, problems have occurred at the neighborhood team of Griffioen as they have recently been disintegrated (R7, personal communication, 2021). Moreover, a new neighborhood manager was just appointed in the spring of 2021. According to one resident of the neighborhood Griffioen, the communication of the (previous) neighborhood team was not great as he did not see any communication for example about any meeting (R7, personal communication, 2021). However, according to another resident of Griffioen, the neighborhood association of Griffioen is very active and many citizens are involved including an energy club for people that are interested in the topic of sustainability (R3, personal communication, 2021).

The focus group TVW makes use of contacts of the civil servants of the municipality that are energy leaders that are known by the municipality. The municipality communicates to the participants of the focus group via e-mails, where they inform them about the meetings, ask when participants are available for a meeting and send reports of the meetings.

So it can be concluded that the municipality has established several communications channels to communicate with citizens, indirectly through the neighborhood teams and managers, and directly through their communication channels. However, the digital platform 'doemeemiddelburgers' is unkown to most citizens and the number of citizens that have signed up at the website was very small. Moreover, citizens mostly experienced poor communication from the municipality. In addition, the respondents also complain about the fact that the municipality is difficult to reach.

7.2 The Attitude of Public Officials to Public Participation

This section will cover the attitude of the municipality to public participation. The civil servants of the municipality of Middelburg believe that public participation and co-creation are necessary for the implementation of the heating transition (R5, personal communication, 2021). To encourage co-creation, the municipality has established the focus group TVW. It invited energy leaders and neighborhood representatives to discuss the heating transition and co-creation should be implemented to involve citizens in the local heating transition *(Appendix D & E).* So far two meetings were organized. During these meetings, energy leaders and neighborhood representatives have provided input on how to engage ordinary citizens towards co-creation. A general meeting targeting citizens of Middelburg has been organized by the municipality to inform them about the heating transition. Another sign of the positive attitude of public officials to co-creation was the fact that the municipality is partaking in the EU-Interreg 2Seas taking in the SHIFFT project. Within the project, the municipality of Middelburg cooperates with other cities in the EU 2 Seas region and universities to develop local heat transition strategies with the use of co-creation.

Thus far, the municipality is using the methods of informing and consulting as forms of public participation at the current stage of the process. Ordinary citizens have been given the chance to be informed at the general meeting in the form of informing, while energy leaders and neighborhood representatives are given the chance to participate at a higher level where they can give suggestions,

feedback on the heat transition strategy. It is important to know that the heating transition is still taking place at the start of the process. In the future, the municipality wants to expand the focus group to include ordinary citizens. In addition, the municipality wants to use the 'doemeemiddelburgers' platform where citizens can participate from the pre-planning phase until the implementation phase.

The attitude of the city council of the municipality of Middelburg towards sustainability and the heating transition is perceived mixed by Zeeuwind and two energy leaders. The municipality has shown ambition for sustainability and initially had the goal to be energy neutral in 2030, but had changed it to 2050 as the goal to achieve this in 2030 was considered as not feasible (Gemeente Middelburg, 2013 & Gemeente Middelburg, 2018). However, the municipality has not taken many measures to achieve this goal. It has recently cut the budget for climate policy from 150,000 euros to 50,000 euros, due to austerity. Although, it plans to increase the budget again by an unknown amount of money in the future to hire more staff. Citizen cooperative Zeeuwind is critical of the sustainability policy of the municipality stating that it lacks ambition, especially at the implementation phase (R1, personal communication, 2021). Zeeuwind states that the current majority of the city council is not ambitious towards sustainability and stated that *"even PV installations do not have a chance in the municipality council at this moment"* (R1, personal communication, 2021). An energy leader agrees and states *"the (national) cabinet is right-wing and conservative and is hardly taking actions against climate change, and you see the same in Middelburg, where there is also a right-wing and conservative council that is also not taking many actions against climate change"* (R12, personal communication, 2021). Here, there is tension within the municipality of Middelburg. The politicians, the decision-makers, at the city council are less ambitious than the civil servants, who are more ambitious, that formulate and execute sustainability plans, In addition, several parties including Zeeuwind, citizens and neighborhood representatives perceive housing association Woongoed, not as a very ambitious actor.

7.3 Administration Culture

The municipality of Middelburg has one experience with public participation regarding sustainability. It has one notable sustainable project in Middelburg, the so-called 'Postcoderoosproject', where public participation was applied. With the Postcoderoosproject, a solar park was built that could provide energy for 4,500 houses in Middelburg (Versol, 2021). A participatory process was developed for this project, where citizens, neighborhood teams, energy companies, private companies, environmental organizations and cooperatives were invited to participate. The idea was initiated by a group of enthusiastic citizens and Zeeuwind that wanted to develop solar parks in the municipality (R5, personal communication, 2021). In the end, these citizens participated through the Postcoderoosproject in the form of financial participation. The participation process and the project were considered successful projects by both the municipality and citizens (R3, R5, personal communication, 2021).

The municipality of Middelburg has no general formal plan or policy regarding public participation (R5, personal communication, 2021). So far, it is using various methods like 'doemeemiddelburgers' and focus groups to increase public participation. The municipality has hired consultancy firm Overmorgen to analyze which strategies to use. Overmorgen has first analyzed the sustainable

behavior of citizens and has created sustainable profiles using a survey in 2020. Next, it created communication profiles that describe how the municipality should engage with these groups of people for the heating transition and mapped it out in small areas of the municipality. So the municipality has hired Overmorgen to analyze the participation process and to come up with a participation and communication plan for the heating transition, which will be part of the heat transition strategy of Middelburg. According to Overmorgen, the municipality is leading compared to other municipalities in the Netherlands in the heat transition process by drafting a participation and communication plan that has yet to become policy (R8, personal communication, 2021).

Currently, the municipal staff for the heating transition is rather small due to budget cuts. However, it will be increased when the budget will be increased in the future. Many of the tasks are currently outsourced to Overmorgen that assists the municipality with the writing of the heat transition strategy. Overmorgen is seeing that most municipalities including Middelburg have insufficient capacity to implement the heat transition strategy (R8, personal communication, 2021). Overmorgen is also worried that municipalities like Middelburg do not have sufficient knowledge about participation and will struggle with the co-creation process *"I see communication experts, but I see too few participation experts at the municipality"* (R8, personal communication, 2021).

7.4 Purpose of Co-Creation

Based on the interviews, the normative purpose of the co-creation process for the municipality of Middelburg is that it has to implement the heat transition vision strategy based on the RES of Zeeland and the National Climate Agreement. The goal is to make all buildings in the built environment energy neutral and natural gas-free by 2050. It is viewed as a necessity for the municipality to implement the heat transition strategy successfully. The substantial purpose is that through co-creation the quality of the alternatives for the heating transition will be enhanced that best fits the specific neighborhood. The instrumental purpose is viewed by all respondents as the most important. According to all respondents, the heating transition can only be successful if there is sufficient public support and that citizens are willing to participate. Additionally, it enhances the awareness of citizens and helps to increase the sense of ownership among citizens. However, based on the interview, a consultant of Bureau Overmorgen stated: *"that it is nor necessary to apply co-creation everywhere"*. He pointed out that the main goal is a successful heating transition and that in some situations it is better to use other forms of participation like just informing or consulting that lies lower at the ladder of Arnstein (R9, personal communication, 2021). Other respondents also expressed similar remarks, like Zeeuwind stated that public participation should be applied differently for each neighborhood as each neighborhood and its inhabitants are different and require different strategies (R1, personal communication, 2021).

For citizens, the purpose of co-creation is to increase the influence of citizens in the heating transition, gain knowledge about the transition and find solutions that are cheaper through economies of scale. For example, when the costs of a heat network for each individual will decrease, more people will participate. So far the purposes of the co-creation have not been made clear as the municipality is still working on the participation plan.

Based on the focus group meetings, the municipality has made the purpose and objective of the group meetings clear to all the participants. The purpose of civil servants is to come up with participation strategies for the heating transition. And the purpose of the participants is to give their view to the plans of the municipality for the heating transition and co-creation.

7.5 Citizens Characteristics

The energy leaders and neighborhood representatives that participate within the focus group are either very enthusiastic about sustainability or feel responsible to represent their neighborhood in the local heating transition. The energy leaders are motivated to participate through intrinsic values such as civic duty to the community and desire to improve public services (R12, personal communication, 2021). They often took measures to make their houses more sustainable, want to share their experiences with the municipality and help it to encourage other citizens to do the same. They give feedback to the municipality and describe what opportunities and obstacles they face when they made their houses sustainable. The neighborhood representatives are participating as a way of loyalty to represent their citizens and discuss which participation plan will fit these neighborhoods best, which problems or opportunities lie as they know the neighborhood and its inhabitants best. As one neighborhood representative said: *"I am here to represent the inhabitants of the neighborhood in the heating transition"* (R6, personal communication, 2021).

The energy leaders are often very informed about the heating transition and are likely very educated. They have gathered information about sustainability and are able to come up with solutions for their specific situation. The neighborhood representatives also possess a lot of knowledge as they have to represent their inhabitants. The participants also possess skills to articulate their idea and be able to process the input of the participants as they need these skills to manage and communicate with their inhabitants. During the meetings, a lively discussion was often held between the participants about the heating transition. Moreover, the meetings reveal that the participants, especially the neighborhood representatives possess administrative skills. Often the meeting report is shared and discussed among the group members. Participants often give feedback to the report or give suggestions in a form of mail before the discussions to share their views.

The citizen characteristics seem to be different for ordinary citizens compared to participants of the focus group. Based on the interviews with ordinary citizens in Dauwendaele and Griffioen, it suggests that about half of the citizens look positive towards public participation for the heating transition. These people are motivated by having influence as citizens in the process, wanting to democratize the decision-making process and see it as a way to share knowledge with the community to come up with the best solutions that best fit their community. (R13, R15, R18, personal communication, 2021). Nevertheless, the majority of the interviewed citizens does not see the advantages of participating stating it *"is a waste of time and energy"* (R14, personal communication, 2021), is currently too busy with other things in their lives, (R23, personal communication, 2021), or mistrust whether the municipality is willing to listen to its citizens (R21, personal communication, 2021). All of the interviewees stress that the co-creation process should be genuine, in which citizens have a say and can influence the process, and not be a *"mock participation"* process. Citizens want to be able to influence the process. Some even go further and

suggest that the municipality should also hold a referendum to guarantee that citizens have influence (R13, R20, personal communication, 2021).

In addition, based on the interviews with ordinary citizens, eight out of ten expressed that they have little knowledge about the heating transition (R13-R22, personal communication, 2021). When asked seven out of ten interviewees look positive towards sustainability in general, but lack knowledge about what it entails and means for them individually. For example, this is illustrated by one respondent who said, *"I see that climate change is a problem for the future for my children, but I, unfortunately, do not possess the knowledge on how I best individually can contribute can combat that in my environment"* (R15, personal communication, 2021). Also, people have little knowledge about the heating networ. This is illustrated by another respondent stating *"I am undecided about the heat network (in Dauwendaele), because I do not have knowledge about what a heat network entails and how it affects me as a person"* (R18, personal communication, 2021). However, it is important to note that the fact that many ordinary citizens lack knowledge about the heating transition does not mean that they are less educated, but that it will be hard for them to discuss, articulate their views and process the input of other participants in the co-creation process.

The knowledge of the heating transition of ordinary citizens was also addressed by other interviewees. An energy leader was very concerned about the technical knowledge of the citizens and how it could hamper the participation process stating *"I am very concerned about the knowledge of the general population towards sustainability in general, many people I have experienced lack the knowledge about it and to ask them to discuss with them and participate will be a big obstacle as they will not able to discuss with facts and it either will lead to nowhere or they will be ignored by people that do have knowledge"* (R12, personal communication, 2021). Another energy leader is more skeptic stating that *"people (in the Netherlands) are proud that they do not possess technical knowledge"* (R3, personal communication, 2021). The civil servants of the municipality are also worried about the knowledge of its inhabitants and are trying to find strategies to increase it. They believe that if the knowledge of its inhabitants is increased it will lead to better co-creation and more support of the heating transition (R5, personal communication, 2021).

At the neighborhood level, interviewees like neighborhood representatives, civil servants within the municipality, Overmorgen and Zeeuwind all point out to education levels of its inhabitants. The general level of education among residents is lower in the neighborhood of Dauwendaele than in Griffioen and they implied it may affect the co-creation strategies for these neighborhoods (R1, R4-R6, personal communication, 2021). Based on the interview, the municipality of Middelburg sees it would require more effort and strategy to activate the inhabitants in Dauwendaele to participate as it is a low-income and low-educated neighborhood with many immigrants (R5, personal communication, 2021). Some immigrants may not even speak or understand Dutch and the municipality suggested it may even need interpreters to communicate with these citizens.

7.6 Citizen Awareness

The participants of the focus group all see the problem of climate change and feel responsible to combat that through the heating transition. In addition, participants also have the feeling that they have influence at the process and that their input is taken seriously by the municipality. As quoted

by a participant, *"It is great that the municipality has invited some energy leaders to the (focus) group to even discuss our view and input and I see in the report, but also feel that our input is taken seriously by the municipality"* (R11, personal communication, 2021). Another participant was also content about the focus group "I think it's great that the focus group is created in which energy leader can have influence and perhaps even convince the municipality to alter its strategy" (R3, personal communication, 2021). From the interviews, it is clear many participants are aware of the problem of climate change, take ownership of it, and feel they can influence the process.

From the interviews with the ordinary citizens, it seems that people are aware of the problems of climate change, however, they feel less responsible to combat it. As one energy leader stated: *citizens see it as a collective problem and not induvial problem and they will not act on in as long they do not see as individual problem* (R3, personal communication, 2021). Most respondents see financial constraints as the costs of making their homes are considered too high for ordinary citizens and the subsidy is too insignificant to encourage them (R13, R15, R18, R20, R22 personal communication, 2021). Respondents also indicated they lack the knowledge to take measures (R13, R15 personal communication, 2021). Or they indicated that the housing association should take responsibility (R14, R15 personal communication, 2021). In addition, many citizens mistrust the municipality and are not convinced they have influence in the co-creation process. This is illustrated by respondents who said: "*I am afraid it will be mock participation process where citizens will not be heard"* (R14, personal communication, 2021), "*I think it's staged" (*Dutch: *Ik denk dat het voor de bühne is;* translation by the author*)* (R13, personal communication, 2021).

7.7 Social Capital

So far the focus group has only had two meetings with energy leaders and neighborhood representatives, that consist of roughly 15 people, making it difficult to analyze the social capital and how the municipal staff is trying to keep the participants engaged and motivated the whole process. During the process thus far, no participant has left the process and all participants seem to remain engaged. From the structural social capital, it can be observed that a majority of participants have some prior relationships with each other regarding discussing sustainability. The civil servants involved with the heating transition have strong ties with the neighborhood representatives in Middelburg. The relationship between the civil servants and the energy leaders is also strong as the municipality chooses the participants so the fact the municipality has chosen these energy leaders indicates that the municipality and energy leaders have a prior history. The relationship between the energy leader is less strong, as they mostly have no prior history with each other. From the cognitive social capital perspective, it seems so far there is shared value and goal between the participants. Until now, based on the interviews there is also mutual trust among the participants. And there seems to be also shared language as the participants of the focus group all have knowledge about the subject and can easily communicate with each other on that particular subject.

For the heating transition, there has only been one meeting with ordinary citizens with the municipality, a general information event, in which the municipality informed the citizens about the heating transition in general. So no analysis on the analyze the social capital here is possible.

7.8 Risk Aversion of Citizens

From the focus group meetings, it is clear that the energy leaders. that have taken measures to make their houses more sustainable, are not risk-averse by their actions (Appendix X). They have trust in the heating transition. Most energy leaders have taken measures to make their houses more sustainable and some even made investments that cost thousands of euros. Even the neighborhood manager of Dauwendaele has made big investments to make his house more sustainable (R4, personal communication, 2021). However, one energy leader noted that they would have not taken these measures without the support of subsidies from the national government or municipality (R4, personal communication, 2021). In addition, based on the interviews the participants also seem to have some trust in the municipality as an authority on knowledge. Two out of four energy leaders stated that they think the municipality has knowledge of how to handle the heating transition especially with the support of Overmorgen. However, the energy leaders criticize the role of the municipality or national government regarding the subsidy support they give to stimulate citizens to make their houses more sustainable. They criticize that the subsidies are only available for just a short period of time. They argue that it takes time to plan actions to make houses more sustainable and that often the period of time is too short and expires too soon (R3, R7, R11, personal communication, 2021). In addition, they indicated that the conditions of the subsidy are too strict, for example, the ISDE subsidy requires that measures are carried out by a certified company and it does not apply if you carry these measures by yourself.

Based on the interviews with ordinary citizens representatives, the financial costs of the heating transition are mentioned as a big obstacle for many people that want to make their houses more sustainable. They are risk-averse and some state that they will wait for like ten years hoping the costs will be reduced through innovations and experiences of energy leaders. According to Zeeuwind, *"finance is critical, when you want citizen participation, the government should give guarantees that the citizens do not lose their money"* (R1, personal communication, 2021). In addition, as already mentioned earlier, many citizens have little trust in the municipality and the process it runs. They are afraid that it will be a mock participation process, in which citizens are not given influence in the process.

Moreover, the risk aversion of citizens can be mitigated beside the financial costs. Trust between the citizens and the municipality is viewed by one energy leader as vital for the co-creation process (R11, personal communication, 2021). He suggests that the use of independent mediators can increase the trust as the mediator is seen as independent and trustworthy without other interests. Moreover, the use of energy ambassadors is suggested by during the focus group TVW (*Appendix D & E*). Energy ambassadors like energy leaders have made their homes more sustainable, but energy ambassadors can show ordinary citizens how they did it and share their experiences so citizens will be encouraged to make their homes more sustainable as well.

7.9 Concluding Section

Table 6 provides an overview of the results of the co-creation process for the municipality of Middelburg using the theoretical framework in *Chapter 3*. It gives an overview of the co-creation processes in general of the municipality of Middelburg, specific co-creation processes for the

neighborhood Dauwendaele and Griffioen and the processes in the focus group TVW described in the previous sections. From the co-creation analysis, it is clear that the reach of the communication channels is perceived as low, while on the other hand opportunities for co-creation are found with the use of neighborhood representatives. The municipality has a positive stance towards co-creation, however, there is tension within the attitude municipality towards sustainability. The city council is somewhat conservative towards sustainability, whereas the civil servants are found to be more ambitious. The municipality has experience with co-creation with the *'postcoderoos projects'*, in which citizens participate financially. However, the municipality, currently, has no written plan for public participation or co-creation, though it is forming one now with the help of Overmorgen. On the citizen side, it can be concluded that most ordinary citizens do not have much knowledge about sustainability or the heating transition. They are aware of the problems of climate change, but take no ownership of it. This will be a big challenge for the municipality to motivate citizens to participate with the heating transition. And finally, the citizens perceive the financial costs as the biggest risk for the heating transition and it prevents them to take measures to make their homes more sustainable.

Table 6: Overview Co-Creation Analysis

		Municipality of Middelburg	Focus Group TVW	Dauwendaele	Griffioen
Compatibility					
	Infrastructure	Neighborhood manager and neighborhood teams	Contacts of civil servants	Neighborhood manager and neighborhood team, but lacking information about the heating transition	Neighborhood manager and neighborhood team, but neighborhood team is somewhat disintegrated + neighborhood manager is new
	Communication Channels	Middelburgers.nl, *zeeuwsenergieakkoord.nl* doemee.middelburgers.nl, social media, newsletter, newspaper	e-mail containing information of meeting and report of it	See Middelburg + wijkteamdauwen -daele.nl	See Middelburg + De Griffioen
Attitude to Public Participation					
	Stance	Positive stance towards co-creation, but budget for energy transition has been cut and city council is perceived somewhat skeptic about the energy transition	Focus group come up with ideas for the heating transition and public participation	Positive stance towards co-creation, but has not informed the public yet about heat network until decision is taken	Positive stance towards co-creation
	Form of participation	Very early phase, just one general information session	Energy leaders and neighborhood representatives are consulted, and they can give input and their view towards the heating transition and how to increase	No public participation until the status of the heat network is decided upon, and not informing public until a decision has been taken regarding the heat network	Has not started yet

			public support with the use of co-creation		
Administration Culture					
	History	Postcoderoosproject	First focus group	No public participation yet	No public participation yet
	Written Plan	No general written plan, but a participation plan and communication plan are currently being drafted with the help of Overmorgen	No written plan	SHIFFT application form with a rough plan	SHIFFT application form with a rough plan
	Staffing	Three civil servants present following recent budget cuts, but more will hired in the future. Hired Overmorgen to assist	Two civil servants + neighborhood managers	No specific staff allocated yet beside neighborhood manager	No specific staff allocated yet beside neighborhood manager
Purpose for Co-creation					
	Municipality	Successful implementation of heat transition strategy, increase sense of ownership and increase quality of outcome	Come up with participation strategies for heating transition	No particular plan yet, see Middelburg column. Want purpose to increase support and participation for heat network if decision has been positive	No particular plan yet, see Middelburg column
	Citizens	Influence in the heating transition, gain knowledge, find economically feasible solutions	Influence on the municipality plans and give their view of public participation and heating transition	No particular purpose yet, see Middelburg column	No particular purpose yet, see Middelburg column
Citizen Characteristics					

	Intrinsic Values	Having influence, democratize the decision-making process, sharing knowledge	Civic duty, desire to improve public services, loyalty to its inhabitants and sharing knowledge	No additional information specific for Dauwendaele see Middelburg	No additional information specific for Griffioen see Middelburg
	Education	Difficult to assess, knowledge of the heat network seems to be lacking for the general population	Highly educated, have high knowledge about sustainability, able to articulate their views	Suggest that level of education is lower than in Griffioen	Suggest that level of education is higher than in Dauwendaele
	Skills	Not possible to assess yet	Possesses administrative skills, especially with the neighborhood representatives	Not possible to assess yet	Not possible to assess yet
Citizen Awareness					
	Ownership	Hardly any sense of ownership, too many obstacles to act are envisioned; argues that housing association should take more ownership	Participants feel ownership of the problem and feel urgency to take actions	No additional information specific for Dauwendaele see Middelburg	No additional information specific for Griffioen see Middelburg
	Influence	Afraid of not having any influence and that the participation process feels not genuine	Participants feel they have influence and that their input is being listened	No additional information specific for Dauwendaele see Middelburg column	No additional information specific for Griffioen see Middelburg column
Social Capital					
	Cognitive Social Capital	No participation process yet	Shared values, goals and language	No participation process yet	No participation process yet
	Structural Social Capital	No participation process yet	Many relationships already being established prior to the group	No participation process yet	No participation process yet
Risk Aversion Citizens					

	Financial	Too many perceived financial risks, investments too high, subsidy too low, and uncertainty of it	See some financial constraints, but willing to take some risks. Still see financial risks too high for ordinary people	No additional information specific for Dauwendaele see Middelburg	No additional information specific for Griffioen see Middelburg
	Authority	Lack in trust of authority	Have trust in authority especially with consultancy agency Overmorgen	No additional information specific for Dauwendaele see Middelburg	No additional information specific for Dauwendaele see Middelburg

8. Integration & Co-Design of the Co-Creation Process

8.1 Integration

In this section, the analysis of the polycentric governance and co-creation will be integrated to develop a co-design of the co-creation process. It will show how the polycentric environment and governance affect the co-creation of the heating transition in Middelburg. The polycentric governance and the case study analysis show that there is a polycentric environment for the heating transition in Middelburg. There are multiple centers of semi-autonomous decision-making opportunities that can be utilized for the heating transition. First of all, the heating transition is a complex issue, in which collaboration between multiple actors from multiple levels is needed, where the position between the municipality and its citizens is central for this research. In the next paragraphs, the polycentric characteristics of multiple centers of decision-making will be explained and how they can be linked to co-creation on the neighborhood, the local and the regional level.

On the neighborhood level, the neighborhood team and manager can be utilized for co-creation. They represent the neighborhood, interact with its residents and organize meetings with them. Co-creation for the heating transition can, therefore, be facilitated with the use of the neighborhood teams and be decentralized, which both the concepts of co-creation and polycentric governance aim for. The neighborhood representatives possess the skills, such as administrative skills, necessary for co-creation and have the ability to think with the residents and find a solution that fits the community. They are motivated and trusted by the residents than the municipality.

In the neighborhood of Griffioen, there are even larger opportunities for polycentrism and co-creation as they have their energy association within the neighborhood. Members of the energy association in Griffioen should know about sustainability and the heating transition, and some of them have taken actions to make their houses more sustainable. Moreover, meetings can potentially be organized with the use of the energy association to inform and discuss the heating transition with residents. And finally, the energy association can be used for co-creation. The polycentric environment at Griffioen gives energy leaders and citizens the opportunity to interact with each other or the municipality and negotiate the rules and norms without centralized coordination. However, so far, during the meetings and interactions with the residents in Griffioen, it has not produced many discussions about the heating transition or sustainability. On the other hand, the neighborhood team of Griffioen recently has been disintegrated.

On the local level, the municipality has formed two working groups for the heating transition. The project group TVW and focus group TVW can be seen as polycentric decision-making centers. The latter group can be seen as a form of co-creation as energy leaders and neighborhood representatives can

exchange their ideas and come up with suggestions and therefore can influence the heat transition strategy of the municipality.

On the regional level, polycentric governance is found at the RES of Zeeland. At the RES of Zeeland, multiple tables are organized, where multiple actors from different backgrounds discuss and negotiate the energy strategy on the regional level. Co-creation does not take place with citizens within the RES, but a form of co-creation takes place between main actors and the stakeholders. Though the RES of Zeeland tries to involve citizens in the process with the use of an online platform. The discussions and negotiations within the RES between the actors and stakeholders take place without centralized coordination. The process within the RES is dynamic as municipalities of Zeeland often use the RES to exchange ideas, knowledge and experiences about public participation and co-creation.

8.1.1 Governance Assessment Tool and Co-Creation

The GAT analysis was used to analyze five governance elements that influence the implementation of policy. The actors of this study can be seen as the participants of a co-creation process theoretically.

Based on the GAT analysis, the elements *levels and scales* are seen as supportive. All levels are involved in the process, from the neighborhood level to the regional level and the cooperation between the levels. The RES is created to facilitate the cooperation between the regional and local levels and the neighborhood teams and managers are created to facilitate the cooperation between the local and neighborhood level. This element has a positive effect on co-creation as co-creation can be created with the use of neighborhood representatives as they have good contact with both the residents and the municipality.

Next, the elements of *actors and networks* are mostly seen as supportive. All relevant actors and stakeholders are involved in the process on the regional, local and neighborhood level and they work together well and mostly trust each other. However, one important actor is not always fully involved on some levels, the citizens. On the local level, only energy leaders are involved in the process through the focus group TVW, which is still at the planning phase. Currently, there is no citizen engagement with ordinary citizens and this effect could be seen in the co-creation analysis (*Chapter 7*). Firstly, the municipality's compatibility with public participation is somewhat lacking to communicate with its residents. Communication channels of the municipality, especially the online platforms, are not known by all citizens. This can also be seen by the risk-averse administrative culture of the municipality where there is, currently, no general written plan for co-creation. It should be noted though that the municipality is still planning to engage citizens later in the process and that a participation plan is currently being developed with the help of Bureau Overmorgen. On the citizen side, the effect of not involving ordinary citizens yet is felt as there is a lack of awareness and urgency from most ordinary citizens to climate change. Only energy leaders are feeling the urgency to get involved and make their houses more sustainable. Secondly, even though there is a lot of trust between most actors especially at the regional level and between citizens and neighborhood teams, there is some mistrust between citizens and the municipality, which makes citizens risk-averse. This is mostly caused by the lack of communication and information provided by the municipality, especially regarding the potential heat network in Dauwendaele. Moreover, interviewees have indicated that they are skeptical about public

participation as they are afraid it will be a staged or mock participation process, where citizens are not given the influence.

Thirdly, the elements *problem perspectives and goal ambitions* were analyzed as being mixed, neither supportive nor restrictive. All actors and stakeholders see the necessity to combat climate change, but many fail to act on it. The majority of ordinary citizens interviewed for this research are mostly passive towards sustainability and the heating transition even though most of them see the problem of climate change. They see it as a collective problem instead of an individual problem. So citizens are aware of the problem of climate change, but fail to take ownership of the problem. Only the energy leaders so far feel the urgency of climate change and the heating transition. From the organizational side, it is clear in Middelburg that there is an institutional conservative view towards the energy transition within the city council of the municipality of Middelburg. The municipality of Middelburg has cut a substantial amount of the budget for climate action not so long ago. And the conservative problem perspective towards sustainability in general of the municipality explains why climate actions are lacking behind. In addition, this element also affects the purpose of co-creation. The problem perspective and goal ambitions are not completely coherent for the heating transition in Middelburg as conflicts of interest can occur. This can affect the purpose of the co-creation process in the co-creation framework. The municipality has its view for co-creation like successful implementing the heat transition strategy, however, stakeholders or citizens may see other purposes for co-creation like financial issues or having an interest in a particular technology.

The GAT analysis shows that the elements *strategies and instruments* are restrictive to the governance of the heating transition in Middleburg. Currently, there are subsidy support schemes from the national, provincial and local levels like the ISDE subsidy and Energy Saving Loan that can be used to support the heating transition. However, these support schemes are not sufficient for the majority of the citizens to stimulate them to make their houses more sustainable. The financial costs are seen by all respondents as the largest obstacle to the heating transition. The lack of subsidy support schemes makes citizens more risk-averse on the citizen side of the theoretical framework as it is uncertain whether the investment made can be earned back. Next, there is also a lack of coherence within the subsidy schemes from the governance of the heating transition. Respondents complain that the conditions of the subsidy schemes are restrictive as they require measures to only be carried out by a certified company to get the subsidy. Citizens feel a lack of trust from the government as they are restricted to carry out these measures by themselves, which often are cheaper than by certified companies. In addition, there are no institutionalized monitoring and enforcing instruments made at any governance level to enforce the implementation of the RES and the heating transition. The actors, in particular, at the regional level have built trust with each other. However, it should be noted that monitoring and enforcing instruments are currently being discussed and designed at the RES Zeeland. At the local level, the municipality has so far not developed any monitoring or enforcement instrument for public participation and the heating transition as the process so far has not reached the implementation phase yet.

And finally, the elements *responsibilities and resources* show that there is a clear lack of resources like money and staff to facilitate co-creation and to implement the heat transition strategy. And therefore, the element is seen as restrictive to the governance. There is a clear lack of resources to support the

heating transition in Middelburg. The municipality does not have the financial resources to give sufficient subsidy support to citizens, while Woongoed is financially restricted by the landlord levy imposed by the national government. This has an effect on the variable risk-averse by citizens, which is again explained in the previous paragraph as the lack of financial resources from the municipality but also from other government levels impacts the willingness of citizens to invest in sustainability in their environment.

8.1.2 Concluding Section

So it can be concluded that the heating transition in Middelburg is taken place in a polycentric environment. Moreover, the governance of the heating transition is, in general, conservative and risk-averse and that negatively affects the quality and level of co-creation. This is in line with the co-creation model of Voorberg et al. (2015) that assumes that co-creation is taking place in a conservative and risk-averse environment from both the organizational and citizen side. The neighborhood teams are opportunities to organize the co-creation process. There is a big opportunity for co-creation in the Griffioen as there is an energy association active in the neighborhood, where leaders meet to discuss the topic of sustainability and it is a place to inform residents about sustainability. The level and quality of co-creation are currently negatively affected by the communication channel reach of the municipality. Next, based on the GAT and co-creation analysis, it is important to involve all parties including citizens as soon as possible. From the citizen side, by not fully engaging them, citizens do not feel the urgency to take action against climate change, there is a lack of sense of ownership of the problem. In addition, the lack of knowledge about sustainability and heating transition from citizens can hamper the co-creation process. And finally, the lack of financial resources to support citizens with the heating transition is affecting the attitude of citizens making them more risk-averse as the financial costs of the investment are currently high, whereas it is uncertain it is possible to earn the investment back.

8.2 Co-Design of the Co-Creation Process

In the previous chapter, the polycentric governance, and the co-creation process of the heating transition for the municipality of Middelburg were analyzed based on the case study and interviews. In this section, a general co-creation process for the heating transition in Middelburg will be co-designed based on the current polycentric and co-creation analysis. This will be conducted based on the analytical framework in *Chapter 3.2. Section 8.3* will give co-design for the co-creation process specific for Dauwendaele and Griffioen.

8.2.1 Compatibility of Public Organizations to Public Participation

From the co-creation analysis, it is clear that the compatibility of the municipality of Middelburg to co-creation has to be improved. The infrastructure of neighborhood teams and managers is, currently, in place and should be utilized. It is positive that neighborhood representatives are at present involved in the focus group TVW to discuss the heating transition and co-creation. And a large role for the neighborhood representatives has to be given by the municipality in the process. By cooperating with the neighborhood representatives, specific plans can be designed for specific neighborhoods like Griffioen and Dauwendaele that fit these neighborhoods. A co-creation process should initiate with the

help of neighborhood representatives. In addition, the municipality should (partly) give communication responsibility to the neighborhood representatives as they know their inhabitants best and know how best to approach them. These steps have to be done at the early phase of the process

Next, the communication channels reach of the municipality has to be improved as communication is crucial for the heating transition. Currently, most residents are not aware of the presence of certain online platforms like '*middelburgers',* '*doemeemiddelburgers'* and '*zeeuwsenergieakkoord'*. So the municipality should make the platforms better known for the residents. The municipality should start a municipal-wide campaign to inform residents about these platforms. The municipality can also ask the neighborhood teams to inform its residents about these platforms as they possess the contact information of many residents (R6, personal communication, 2021). The next step is to help citizens with the online participation platform of '*doemeemiddelburgers'* with guidelines so they can get used to the platform. The municipality can enhance participation by rewarding for example prizes to citizens that participate most on the platform to encourage people to participate. In addition, it will also be recommended to put all the information on the heating transition in one place on the website of the municipality, which is easy to find. This can help ordinary citizens as a majority of citizens lack the knowledge about the heating transition and have trouble finding trustful information about it online. These steps have to be taken at the early phase of the process. It is important to overcome barriers that are found with E-participation tools like lack of low demand and lack of interest (Toots, 2019). Therefore, it is necessary that the municipality keep the platforms flexible and adaptable so platform can be adjust to fulfil the needs of the participats.

8.2.2 The Attitude of Public Officials to Public Participation

The municipality has a positive attitude towards co-creation, and the municipality should expand the focus group TVW with ordinary citizens in the process. The expansion of the focus group should be decided with the cooperation of the neighborhood representatives. They may know people that are motivated to participate and could be representative to the rest of the inhabitants of the neighborhood. In addition, it is recommended that the municipality will encourage sustainability by leading by example to stimulate ordinary people and create a positive attitude towards the energy transition. In addition, co-creation for the heating transition can also be stimulated by starting public participation at a smaller scale for another topic like health care or poverty. In this way, possible synergy can be found for the heating transition. This can be done in cooperation with Welzijn Middelburg, which is an active welfare organization that promotes social projects in the neighborhoods of Middelburg.

8.2.3 Administration Culture

The municipality has recently shown that it tries to let citizens participate as the *'postcoderoosproject'* has shown. The municipality should try to engage citizens more with more participation projects that can be done with the online platform '*doemeemiddelburgers'.* Participation can be stimulated by giving possible rewards to active participants. In addition, the professional autonomy of civil servants has to be enhanced, especially as the civil servants are more ambitious than the city council. The professional autonomy of civil servants can be enhanced by giving civil servants more freedom to take initiative and make decisions that are more detached from the city council. In addition, the municipality has to

increase its staff for the heating transition when the budget is increased. A participation expert, that has expertise in co-creation processes, must be hired for the process to organize the co-creation process.

8.2.4 Purpose of Co-Creation

It is very important that the purpose for co-creation is made clear beforehand and that the municipality knows the desires of the citizens for the co-creation. First, the municipality should investigate whether there is a need for co-creation or public participation and at what level it should take. This research should be done in cooperation with the neighborhood representatives to estimate which co-creation strategy should be used for the neighborhood. And based on that estimate, a decision can be made to formulate the co-creation strategy and its purpose. In addition, the municipality with the neighborhood representatives should find topics that can be used to try to link them with the heating transition to establish synergy. In this way, purposes for the residents are also found to motivate residents to participate in the co-creation process for the heating transition. Furthermore, it is important to start the co-creation process at the initiation and preparation phases of the process with citizens and all stakeholders. In this way, the boundary conditions for the co-creation and alternatives can be discussed and set with all stakeholders and it gives residents the most influence in the process. It will give clarity and will create trust between

8.2.5 Citizen Characteristics

The municipality has to increase the knowledge of sustainability and the heating transition of the residents, and especially residents participate in the co-creation process. Participants can only participate meaningfully in the process if they possess the same knowledge as the civil servants or other stakeholders. The municipality should organize information meetings and workshops to increase the knowledge of the residents and reduce the knowledge gap between the participants. This should be done before the participation phase of the co-creation process takes place. Moreover, the participants also need administration skills to be able to participate. These can also be enhanced by organizing workshops. In addition, the selection of participants is relevant for the co-creation process. In the most optimal scenario, the participants should be diverse and be representative of the entire neighborhood. This should be done in cooperation with the neighborhood representatives.

8.2.6 Citizen Awareness

One of the most important steps for a successful co-creation process is first to increase citizen awareness of the heating transition and secondly to design policies so they take ownership of that transition. A majority of the citizens acknowledge the problems of climate change and this could be more emphasized by the municipality. The municipality can create a sustainability page on the current online platforms like '*middelburgers*' and emphasize real-life news and connect them to climate change and sustainability. Examples are emphasizing and linking the floods in Limburg to climate change, emphasizing and linking the high energy prices to the need for sustainability, or emphasizing and linking the causes of forest fires to climate change. Secondly, the sense of ownership of the climate change and the heating transition has to be accomplished. This can be accomplished by starting small or linking it to other topics as the focus group TVW discussed during the meetings so residents can identify them

easier. Examples of this are like having a meatless day once a week as it is also good for your health or replacing compact fluorescent lamps with LED lamps as a way to save energy and money. More up-to-date are the high energy prices, which is an individualistic problem for every resident. A campaign to save money by saving energy can be started to encourage residents to make their houses more sustainable. This can range from taking a shower one minute shorter up to the purchase of heat pumps to save money by saving money.

8.2.7 Social Capital

When a co-creation process has started, it is in the interest of the process that the participants stay engaged and that they will not leave the process early. As mentioned before a participation expert can be a way to keep the social capital high during the process as that person can see that if the process is not going smooth anymore and can intervene to raise the social capital back.

8.2.8 Risk Aversion of Citizens

The perceived financial risks are viewed as the largest obstacle to the heating transition. The municipality has to lower the perceived financial risks of the heating transition. This will be a big challenge as the municipality, currently, does not have the resources to give additional support to residents. But the municipality can inform the citizens about the subsidy schemes like ISDE, SDE+, and the national and provincial Energy Saving Loan schemes. This can be done by informing the residents about each of these subsidy schemes and making them easily accessible for residents in one place. In addition, the municipality can use its soft power to request additional funds for the heating transition from the national government. They can try by forming a coalition with other municipalities and energy regions of the Netherlands to lobby at the national government. Furthermore, the municipality can try to form a coalition to pressure the national government to soften the conditions of the ISDE subsidy and ask them to drop the requirement of a certified company to get the subsidy. And finally, the municipality can with its limited resources offer discount coupons for small measures that make homes a little more sustainable to every household. An example is discount coupons for LED lamps or radiator foils.

Next, trust between the citizen and municipality can be increased through an independent mediator that examines the homes of residents and gives independent advice. Residents trust an independent mediator more as that person is independent and has more eye for the interests of residents as the municipality has to weigh more interests or is perceived as less trustworthy. The municipality can cooperate with a few independent mediators that will check a number of houses per year. Moreover, the municipality should make use of energy ambassadors, so they can inform citizens about the heating transition and their experiences. These energy ambassadors can be energy leaders that are participating in the focus group now. In this way, citizens will be able to see what the heating transitions mean personally and can easily replicate them and they trust fellow citizens more than the municipality.

And finally, the quality of the co-creation process can be enhanced by offering a plebiscitary choice between the alternatives that fit boundary conditions. In this way, participants will have the feeling they can have influence at the process. And it will also increase the public support for an alternative as the alternative that will be chosen will have the most choice.

8.2.9 Summary of Co-Design

An overview of the general co-design of the co-creation for the heating transition for the municipality of Middelburg can be found in *Figure 19.* On the left side of the overview, actions have been found from the co-design process that positively affects the factors that influence the quality and level of the co-creation process from the organizational side. While on the right of the overview, actions that positively affect the factors from the citizens' sides have been found that influence the quality and level of the co-creation process. These actions each are part of the co-design that will improve the co-creation for the heating transition in the municipality of Middelburg.

A summary of the co-design process will be based on Wilcox's (1994) work that distinguishes four phases of public participation: Initiation, preparation, participation and continuation. A simple overview of the co-design of the co-creation can be found in *Figure 20.* The final phase continuation will not be presented as the evaluation of co-creation lies beyond the scope of this research. At the initiation of the co-creation process, the municipality of Middelburg should first make use of the neighborhood representatives to discuss the initiation of the co-creation process. At the same time, the municipality has to enhance the reach of the communication channels. There are big opportunities with the online platform of *'doemeemiddelburgers'* where there is a low threshold for people to participate on the platform.

The preparation phase of the co-creation process is the most important phase. During this phase, participation strategies have to be formulated. These strategies will be discussed with the neighborhood representatives and energy leaders that are involved in the focus group TVW. During this phase, the focus group has to be expanded with ordinary citizens that are interested to participate. It is best to select these participants that are motivated to be representative of the neighborhood. At this phase with the help of these early participants, the exact purpose for the co-creation process has to be formulated. In addition, links to other topics can be sought to find synergy. The municipality at this stage should have a participation expert that oversees the preparation and find possible weak spots of the formation of the co-creation process. When the participants have been selected, just before the participation phase. The knowledge and skills of the participants must be enhanced at the same level as the other participants so meaningful participation can occur at the participation phase. In this way, the knowledge gap between the participants has to be reduced so no asymmetrical information knowledge will exist during the participation phase.

(Participation phase can be found at page 90)

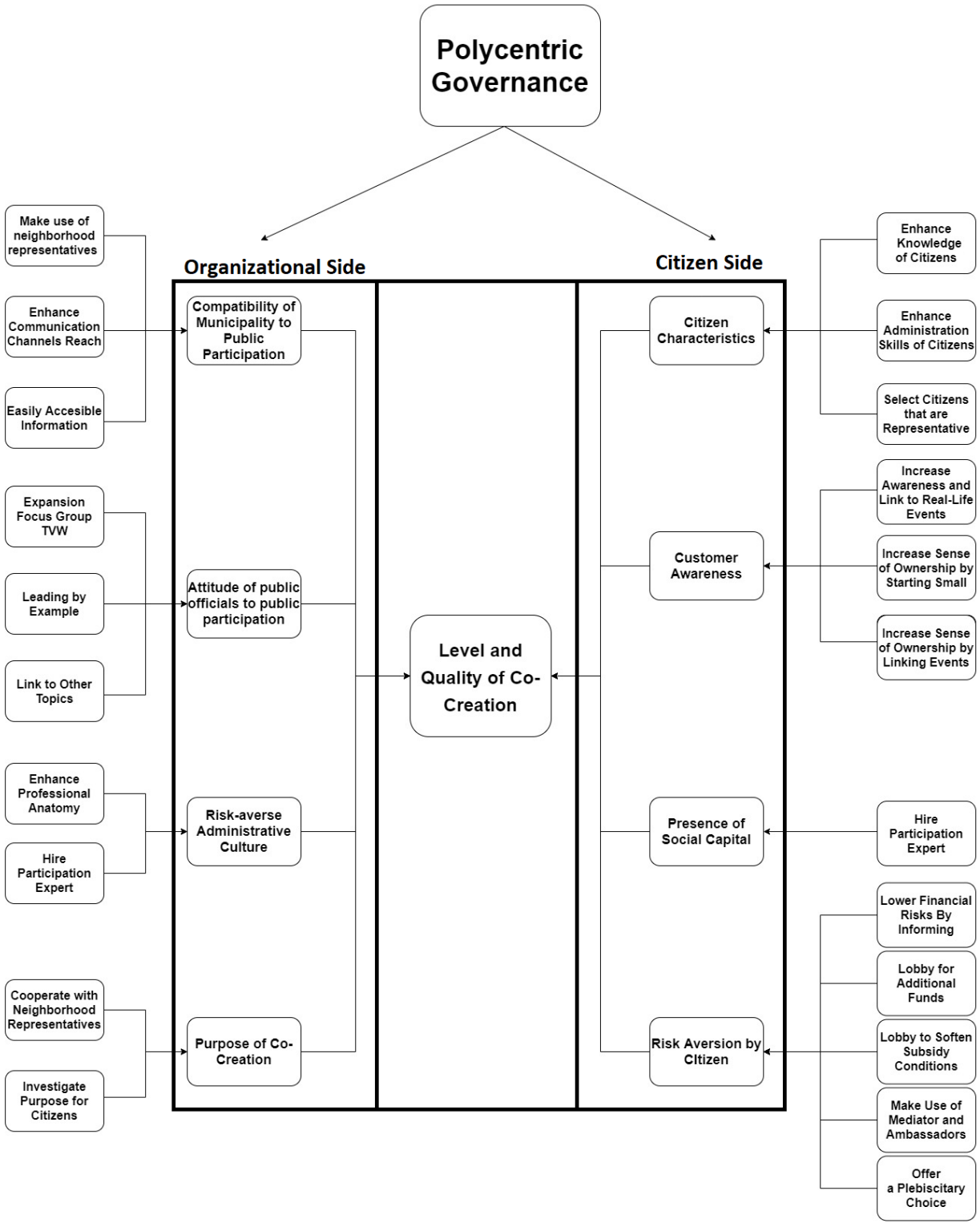

Figure 19: Co-Design Overview

During the participation phase, the participation expert will have an important role to keep the social capital during participation high so no participants will leave the process. It is important to monitor the social capital so the process can continue in harmony without much disturbance or participants leaving in the middle of the process. The use of an independent mediator is helpful to increase trust between the citizens and municipality and other stakeholders. Moreover, it is recommended that the municipality will make use of energy ambassadors, so they can inform citizens about the heating transition and their experiences. In this way, citizens will be able to see what the heating transitions mean personally and can easily replicate them. And finally, a plebiscitary choice between alternatives can be offered to the public to increase the support of the chosen alternative. Moreover, in this way trust can be built as it shows that the public can have a real influence on the process. Outside the co-creation process, it is recommended to find policies to increase the sense of ownership of the problem so people feel the urgency to act. In addition, the municipality has to find a way to lower the perceived costs of the heating transition. They can do this by trying to form a coalition to pressure the national government.

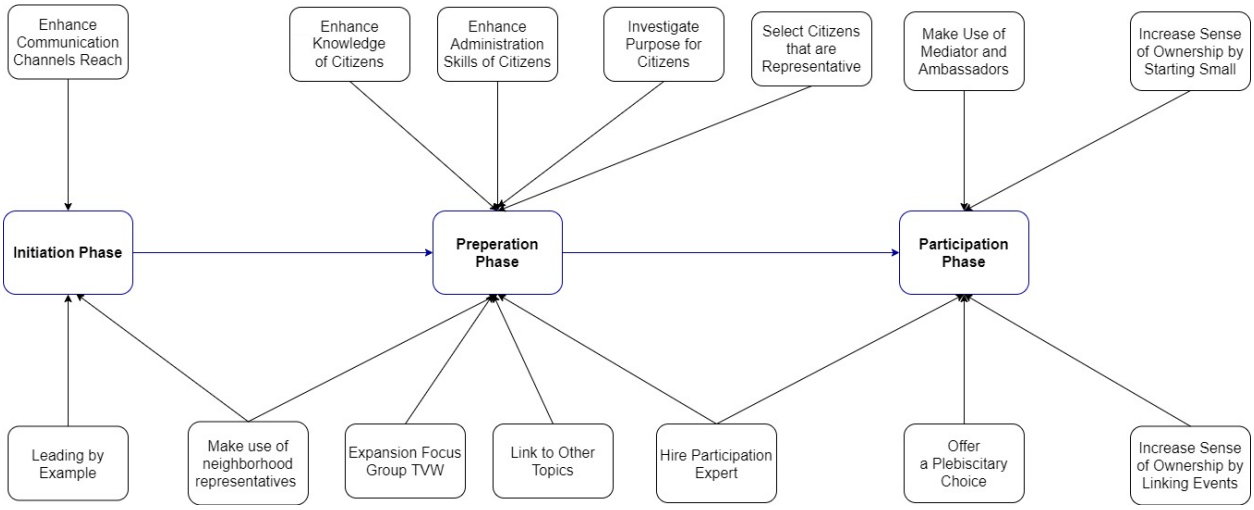

Figure 20: Co-Creation Co-Design with the different phases of the process

8.3 Co-Design of the Co-Creation Process Specific to Neighborhoods

In this section, the co-design of the co-creation process will be presented specifically to the neighborhoods of Dauwendaele and Griffioen based on the case study and co-creation analysis. This section will only present findings in the neighborhoods that differ from the general co-creation co-design.

8.3.1 Co-Design for Dauwendaele

For the neighborhood of Dauwendaele, the current situation regarding the heat network is as described earlier still uncertain. The municipality has decided together Woongoed and the industrial heat provider not to inform the public yet or even give an update about the status of the heat network before a decision has taken place. It is recommended that the municipality will be as transparent as possible and share the information as soon as possible. If it is not possible to fully inform the public yet, It is recommended that the municipality, if possible, will inform the neighborhood representatives in confidence about the current status of the network so a communication plan can be designed to inform and involve residents with the decision. In addition, the municipality should investigate possible alternatives so it can show the residents that the possible heat network is the best alternative for the residents compared to other alternatives. INext, the municipality will have to cooperate closely with Woongoed. A good relationship is necessary as 2/3 of the users will be tenants of Woongoed. Moreover, the municipality should also communicate clearly to the other 1/3 users that are mainly homeowners. The municipality has to inform these homeowners about all possible subsidy schemes that are available to them from the provincial and national governments. The ISDE subsidy is important as it gives subsidies for homeowners that will connect to a heat network.

The municipality of Middelburg will have a difficult task communicating with the citizens in Dauwendaele. The number of immigrants is higher than on average, and the education level is lower on average. The use of interpreters may be necessary to communicate with these citizens as they may not communicate well in Dutch. Moreover, it is likely that these residents will receive less information and will check the newsletter and online platforms less often as well. So, it will be a big challenge to establish proper communication channels with these inhabitants. The municipalities with the neighborhood representatives have to intensify the communication with these citizens and intensively inform them about the communication channels and their importance.

Finally, based on the co-creation analysis, it is clear that public participation at a high level on Arnstein's ladder is unlikely to succeed. The municipality should use a lower form of participation to engage with the residents in a meaningful way like in the case of Rotterdam South (Buitelaar & Heeger, 2018). The municipality should take more control of the process and should mainly inform and explain to the citizens more about the heating transition.

8.3.2 Co-Design for Griffioen

A great opportunity for co-creation is found for the neighborhood of Griffioen as there is an energy association active in the neighborhood, which consists of several citizens interested in sustainability and probably also energy leaders. If co-creation can take place from the citizens, chances are high that it will take place at the energy association. The municipality should, first, fully restore the neighborhood team so the municipality can know what is going on in the neighborhood. If the neighborhood team and manager have fully integrated into the neighborhood, the municipality should try to organize meetings with the energy association to find out whether residents are interested in participating in the heating transition and encourage them to participate. Unlike Dauwendaele, the municipality can better facilitate the co-creation at Griffioen as the education level there is higher and there are more citizens active that have an interest in sustainability.

9. Conclusion

9.1 Conclusion

During the last decade, the concept of co-creation has emerged to sustainability topics in the academic literature such as the heating transition. At the same time, the governance of sustainability topics has become more polycentric as systems become more complex involving multiple actors at multiple levels where decisions are taking place in semi-autonomous centers. This thesis aims to combine the concepts of polycentric governance and co-creation into one new framework to strengthen the analysis of co-creation for the heating transition within polycentric governance. Co-creation offers opportunities to develop solutions that are supported by all stakeholders as equal partners. And the heating transition will be one of the largest changes to the governance of energy in the history of the Netherlands. The following research question was used for this thesis:

How can the municipality of Middelburg implement co-creation within the polycentric governance environment to develop an effective heat transition strategy on the local level?

To answer the main research question, four sub-questions were used through the research that has to be answered first, which will be addressed in the following paragraphs.

The first sub-question: ***What is polycentric governance and how can it be used to analyze the heating transition in the municipality of Middelburg?***

This question was addressed in the literature review in *Chapter 2.* The polycentric governance is a system in which multiple governing organizations and private parties interact with each other to decide on a specific geographical location through a system of negotiated rules and norms to solve a problem efficiently with multiple semi-autonomous centers of decision making. It means that activities and decision-making processes are decentralized spread across multiple government levels such as the local, provincial and national governments. There are several advantages of the polycentric governance as it spread power, creates more checks and balances, offers more flexibility and opportunities and makes the system more adaptable to social and environmental changes.

The polycentric governance can be analyzed with the Contextual Interaction Theory (CIT) that examines the governance and interaction between all actors involved in the system. With the use of the Governance Assessment Tool (GAT), it can analyze the governance elements for the heating transition for the municipality of Middelburg. It examines the governance of the heating transition between the local and provincial levels where the Regional Energy Strategy (RES) of Zeeland is created. And it can examine the governance of the heating transition between the local and neighborhood level, where co-creation will be implemented.

The second sub-question: ***What is co-creation and how can it be conceptualized to analyze the level and quality of co-creation?***

The concept of co-creation was also introduced in the literature. Co-creation can be seen as the collaboration between citizens and public authorities within the upper levels of the participation ladder of Arnstein. In contrast to public participation, the collaboration between the citizens and public authorities is on an equal level as equal partners where they share power and responsibility to work together with each other for a public project. Within the academic literature, there has been much research to identify the influential factors that influence the co-creation process. Voorberg et al. (2015) presented a framework for co-creation where the relationships between the influential factors to the level and quality of co-creation were given. Voorberg et al. (2015) distinguished eight factors that influence co-creation into two groups, influential factors from the organizational side and factors from the citizen side of co-creation. The factors on the organizational side are the compatibility of public organizations to *public participation, the attitude of public officials to public participation, risk-averse administrative culture* and *clear incentives for co-creation,* while the factors on the citizen side are *citizen characteristics, customer awareness, presence of social capital* and *risk aversion by citizens.* These factors were conceptualized and operationalized in *Chapter 3.3.*

The third sub-question: ***What are the polycentric governance characteristics of the municipality of Middelburg in the heating transition?***

The polycentric analysis, which is based on the interviews, showed that there is a polycentric environment and governance for the heating transition. Multiple semi-autonomous decision-making centers in the system were identified where multiple government levels are involved in. The largest one is the RES of Zeeland, where five main actors take part, the municipalities in Zeeland including the municipality of Middelburg, Province of Zeeland, Impuls Zeeland, district network operator Enduris and the waterboard Scheldestromen. In addition, relevant stakeholders were also involved at the RES Zeeland like housing association Woongoed, environmental movement ZMF and energy cooperative Zeeuwind. Within the RES Zeeland, the Regional Energy Strategy of Zeeland was developed through multiple tables where the five main actors and stakeholders discuss and negotiate the RES of Zeeland. The polycentric governance also showed that there is a polycentric governance between the local and neighborhood level, where neighborhood representatives organized meetings to discuss various topics such as sustainability and have much interaction with residents and the municipality. In the neighborhood of Griffioen, there was even an energy association active that can be used for polycentric governance with energy leaders.

The GAT analysis showed that there are elements within the polycentric governance of the heating transition that are positively impacting or supporting the governance of the heating transition. Moreover, some elements are negatively impacting or obstructing the quality of governance of the heating transition. The elements *levels and scales* were seen as positive as the governance of the heating transition is incorporating all governance levels from the neighborhood level to the national level. The elements *actors and networks* were mostly positive as nearly all relevant actors are involved in the process. However, the role of ordinary citizens has been very small so far in the process. Citizens

have not been directly involved yet in the process, even though the role of citizens is paramount in this process. The ele*ments problem perspective and goal ambitions* were assessed mixed by the analysis. On the positive side, there were opportunities within the governance to re-assess the goals and challenge the status quo of the system that helps the governance of the heating transition. However, there were also obstructive elements on the coherence side as there may be a conflict of interests between the actors in the system. Moreover, for the extent of the element, when it came to the implementation of the policy, problems may arise as the goals are not specific enough and actors have the opportunities to implement them at their discretion. And finally for the elements of *strategies and instruments* and *responsibilities and resources* were assessed as mostly negative and obstructive to the governance of the heating transition in Middelburg. The resources, the municipality had for the heating transition are very small due to recent budget cuts, and so far according to the municipality, it is still uncertain whether the heat network in Dauwendale is financially feasible. In addition, within the system, there was a limited amount of monitoring and enforcement instruments available to enforce the policy strategies. However, these monitoring and enforcement instruments were being developed by the RES of Zeeland. And finally, the coherence of the subsidy schemes like ISDE did not encourage residents to take actions by themselves as they are required to hire certified companies to carry the measures to get the subsidies.

The fourth and final sub-question: ***How do the polycentric governance characteristics affect co-creation in the municipality of Middelburg?***

The co-creation analysis showed that there is an infrastructure of neighborhood representatives for the compatibility of the municipality for public participation. The reach of the communication channels towards citizens was low as most citizens are not aware of online platforms like '*doemeemiddelburgers'*. The attitude of the municipality towards public participation was positive, it organized the focus group TVW to come up with a participation strategy for the heating transition and has experiences with participation with the postcoderoosproject. However, the attitude of the municipality of Middelburg towards the energy transition was rather mixed. It had cut its budget for the energy transition and the view of the city council was considered to be conservative and skeptic about the energy transition. From the citizen side, there was awareness of the problem of climate change, however, a majority of the citizens did not feel the sense of ownership for the heating transition as they mostly saw it as a collective problem rather than an individual problem. Moreover, citizens were afraid that they would not have much influence in the participation process. In addition, there was a large knowledge gap from citizens towards sustainability and the heating transition. Next, the attitude of citizens was risk-averse as they perceive the financial risks as too high to participate in the heating transition, the subsidy schemes are perceived not sufficient by citizens. And finally, the analysis showed that there is a lack of trust in the authority of citizens.

On the regional level, the municipality of Middelburg participated within the RES Zeeland. From the RES Zeeland through negotiations with other main actors and stakeholders, the RES for the province of Zeeland is formulated, which can be seen as a semi-autonomous center of decision making. From the RES of Zeeland, the municipality of Middelburg had to formulate its heating transition vision strategy. Within the RES Zeeland, experiences of co-creation for the heating transition were shared between the

municipalities of Zeeland. And together they hired consultancy firm Bureau Overmorgen to assist them with the heat transition vision strategy. Moreover, the RES Zeeland offered the online platform 'zeeuwsenergieakkoord', which allowed citizens to participate with the regional heating transition.

The co-creation analysis could be explained by the polycentric governance. The neighborhood teams were opportunities to organize the co-creation process as the neighborhood teams were close to the citizens. The polycentric governance showed that the resources and instruments for the heating transition were insufficient and that had affected the quality and level of co-creation. And it created a conservative and risk-averse environment for co-creation, in which on the one hand the municipality had cut its budget for the energy transition and was understaffed, while on the other hand citizens perceived the financial risks too high. In addition, the GAT analysis showed that the governance of not fully involving citizens can have a negative effect on the quality and level of co-creation. From the organizational side, the communication channels were, therefore, not optimized, while by not fully engaging citizens, citizens did not feel the urgency to take action against climate change, there was a lack of sense of ownership of the problem. And finally, the lack of communication created mistrust between citizens and the municipality. The results were in line with the premise of Voorberg et al. (2015) co-creation framework, in which he placed the co-creation process in a risk-averse and conservative governance environment.

Main research question: **How can the municipality of Middelburg implement co-creation with the polycentric governance to develop an effective heat transition strategy on the local level?**

The polycentric governance of the heating transition showed that the heating transition was mainly taking place in a conservative and risk-averse environment. Given the polycentric governance, the level and quality of the co-creation process had not fully been optimized yet for both the organizational and citizen sides. The analysis showed that there is a need for higher and stable funding for the heating transition for both the municipality and the citizens to alter the risk-averse attitude. Secondly, the relationship and communication between the municipality and its citizens had to be improved so a successful co-creation process can be initiated.

So a co-design for the co-creation will first have to improve the communication channels of the municipality, its reach of online platforms has to be extended to all residents. The presence of neighborhood representatives offers big opportunities for co-creation as they are trusted and know the neighborhood best. Understanding the community is vital as it can attribute shared values and goals, which motivate citizens. This is especially the case for the neighborhood Griffioen, where an energy association is active in the neighborhood. Informing the neighborhood representatives of Dauwendaele in confidence about the heat network can help in developing a participation process that best fits the community. Next, when the municipality is planned to extend the staff for the heating transition, it is recommended to hire a participation expert to support the co-creation process. Furthermore, it is important to examine the purposes of the co-creation on the citizen side and see which form of participation can best be used. Each neighborhood is different and that will require different co-creation strategies that will suit the neighborhood. Moreover, it is vital to start the co-creation at the initial

planning phase of the process with citizens and key stakeholders to develop alternatives that suit the specific neighborhood.

From the citizen side, the selection of residents that will participate in the co-creation is vital for the process. These residents have to be motivated, diverse and are representative of the neighborhood. Social capital has to be built and maintained as shared values and goals motivate participants to collaborate with each other. Next, the knowledge gap between the participants has to be reduced so no asymmetrical information knowledge exists and to ensure that the balance of power is equal between the actors. In addition, policy to increase the sense of ownership has to be found so people feel the urgency to act and find a way to lower the costs of the heating transition or make residents perceive that the costs are lower. The use of an independent mediator is helpful to increase trust between the citizens and municipality. Moreover, it is recommended that the municipality will make use of energy ambassadors, so they can inform citizens about the heating transition and their experiences. In this way, citizens will be able to see what the heating transitions mean personally and can easily replicate them. And finally, a plebiscitary choice between alternatives can be offered to the public to increase the support of the chosen alternative.

9.2 Academic Discussion

This study contributes to the growing academic literature on co-creation and polycentric governance. From the literature, multiple authors linked both concepts, but none of them has combined these concepts into one framework (Ostrom, 1996; Itten et al., 2021). This thesis is one of the first studies that combined both concepts into one new framework to strengthen the analysis of co-creation for the heating transition within the polycentric governance environment. Co-creation for the heating transition is a novel topic that has not been researched unlike co-creation for other topics such as health care, sustainability and education (Brandsen et al., 2020). This study confirms that co-creation for the heating transition is taken place in the municipality of Middelburg in a polycentric environment (Ostrom, 1996; Itten et al., 2021; Hoppe, 2019; Hoppe & Miedema, 2020). Polycentrism is especially found at the regional level at the RES of Zeeland, where multiple governments and stakeholders from different governance layers interact with each other.

The study has shown that co-creation for the heating transition is still a novelty, in which municipalities are still experimenting to prepare their co-creation process. This study shows that even though co-creation is a new phenomenon, the framework can still provide in-depth insight into the initiation and preparation of the co-creation process the municipalities are currently taking. These phases are important as the municipalities use these phases to prepare for the co-creation process for the heating transition that will have a huge effect in the coming decades. These results are likely to be found at the other municipalities and energy regions in the Netherlands as well, as they do not differ culturally and institutionally much from Middelburg. The lessons and recommendations provided by this present study can be used for other Dutch municipalities and energy regions to improve the co-creation process.

For the polycentric governance analysis, the GAT was used to analyze the different dimensions of governance. The GAT is a comprehensive tool to analyze the interactions of multi-actor and multi-level situations and is arguably currently the most comprehensive and most well-suited theoretical framework to analyze the multiple dimensions of polycentric governance. Hoppe (2021) also used this framework to analyze the energy transition governance of thirty energy regions in the Netherlands. The results of his findings were fairly similar to the findings of this study as both studies confirm that the resources are lacking, enforcement instruments have hardly been designed, problem perceptions are not fully aligned due to NIMBY (Not In My Backyard) and that there is an underrepresentation of energy consumers at the RES.

This study is also contributing to the co-creation framework of Voorberg et al. (2015). This study found that the co-creation process for the heating transition is taking place in a conservative and risk-averse governance environment. This is similar to the assumption of the framework of Voorberg et al. (2015), which assumes that the co-creation process will take place in a risk-averse administrative culture, in which public officials are averse to public participation. Moreover, it also assumes that the citizens as participants are also risk-averse to the process. This is also confirmed by this study's findings as it is shown in the co-creation analysis that citizens see high risk financially as the heating transition is perceived as very costly and are skeptical towards the municipality. Another contribution is that this study found that one of the largest barriers that have to be overcome is the knowledge gap. The knowledge about sustainability or the heating transition among ordinary citizens is found to be small and the knowledge of these participants has to be enhanced to increase the level and quality of co-creation. And thus, this study identified another action to overcome barriers to co-creation.

And finally, this study offers a framework for the design of the co-creation process that is applied for a specific case study. Voorberg et al. (2015) found that most academic studies focus on the identification of factors that influence co-creation. Only a handful of studies focus on the result of the co-creation process There is currently a lack of an analytical framework to analyze and improve co-creation. Voorberg et al. (2015) made an analytical framework to analyze co-creation, but so far in the academic literature, no paper can be found that analyzes co-creation with this framework. This study shows that this framework can be used to analyze co-creation for a specific topic

9.3 CoSEM Relevance

This study has shown that the heating transition is taking place in a complex and multi-actor environment. The scope of the heating transition ranges from multiple governance level, from the national level, where the big policies are formulated to the neighborhood level where the heating transition has to be implemented. In this study, the municipality of Middelburg is involved at multiple governance level, participating at the regional level with the RES of Zeeland to form the RES and participating at meetings at the neighborhood level to discuss the co-creation process. This study involves public parties such as governments and semi-governmental organizations and private parties

such as the heat provider and producers of energy. Moreover, citizens will have lot of power in this process as their role is viewed as vital for the heating transition.

Furthermore, this study has shown that the heating transition is a multi-disciplinary issue, in which the heat network or other technological alternatives have to be economically feasible for all participating parties. There are several alternatives to natural gas that can be utilized for the heating transition like heat pumps, all-electric, hydrogen and heat networks. But not all alternatives are feasible for every neighborhood. The investment costs of these technologies have to be bearable to all parties and even to low-income citizens. Secondly, the heat networks or other technological alternatives have to be technologically feasible as well as the network or other technologies have to be able to provide heat at all times and these alternatives have to comply with all existing regulations legally. In addition, the technology part of this study is important.

So it can be concluded that the heating transition involves complex multi-actor network, economic and technological aspects, and that it therefore suits the CoSEM study and makes this study also CoSEM relevant.

9.4 Limitations

This study has run into several limitations due to the phase of the heating transition, research method and time constraints. The study was conducted during the period of the Covid-19 pandemic, in which working from home was mandatory and in-person interaction was not possible. Meetings and interviews were conducted online with the use of Teams. This has limited the internship during the study as it limits the informal interactions like small talk and limits the observations of stakeholders and its relationship between the stakeholders outside the meetings. This study made an attempt to mitigate it by focusing on the relationship between the stakeholders during the interviews.

Another limitation is the number of interviews that were conducted for this study. Due to time constraints, it was only possible to conduct twelve in-depth. Additionally, the selection of respondents was biased towards energy leaders, which consisted of four out of twelve interviews. They were chosen as they were involved at the focus group TVW, were easier to reach and responded positively to the interview requests. The energy leaders had much knowledge about sustainability and the heating transition and had a positive view about it, which may not be represented for all citizens in Middelburg. The bias of energy leaders was mitigated by conducting ten short interviews with ordinary citizens in Dauwendaele and Griffioen to gain insight from ordinary citizens about the heating transition and public participation. However, due to the low sample, the respondents may not necessarily be representative of the residents of Dauwendaele and Griffioen. This could also apply to interviewing other stakeholders as each interviewee shared their view, which could be slightly subjective and bias by their perceptions. This is one of the limitations of conducting a qualitative research approach that is based on conducting interviews.Another limitation is that no neighborhood representative of the neighborhood Griffioen was available for interviews. The neighborhood manager declined the invitation stating that she has just started and does not know much about the neighborhood yet and had no knowledge about the heating

transition or public participation. Moreover, it would have been better if a member of the City Council was interviewed for this research as they are the main decision-makers and their role was mentioned frequently during the interviews. This unfortunately was realized too late. Therefore, the perspective of the City Council is taken from the other interviews, which could be biased.

The heating transition has not started yet and is at the planning phase of the process. Moreover, public participation for the heating transition has just been introduced at the very early stage of the preparation phase with the focus group TVW. So far, only energy leaders have been invited to two meetings, while ordinary citizens have had the opportunity to attend one general information meeting. This makes it very difficult to analyze the co-creation process at this stage of the process. The co-creation analysis is based on interviews who have only attended two meetings at the focus group, have some experience with the 'postcoderoosproject' or simply gave their view of public participation and co-creation. Their view may be premature and could change during the later stages of the co-creation process. Moreover, most of these interviewees have no or hardly any experience with public participation and co-creation.

Finally, the co-creation framework of Voorberg et al. (2015) has limits as it focuses mainly on the initiation and preparation of the co-creation process, but it does not focus on the co-creation during the participation phase. The framework only takes into account the social capital and that it is important to keep social capital high. However, the framework does not properly analyze the participation and which level of co-creation is needed during each phase of the process to have a successful co-creation process. Moreover, this framework assumes that when the higher the level of co-creation is created, the better the co-creation process will be. However, it is very unlikely that the highest level of co-creation and keeping it as high as possible is always the best.

9.5 Suggestions for Future Research

This study has been conducted at the very start of the heating transition and the co-creation process is just at the beginning of the planning phase. The heat transition strategy is currently being formed, in which the implementation strategy and timeline are given for each neighborhood. For these reasons, it is recommended to conduct this research again after the preparation phase of the co-creation and the heating transition process. At that stage, co-creation with ordinary citizens can be analyzed in a more advanced way and the co-creation design will be less speculative and more based on real experiences between the stakeholders. In this way, the drivers and barriers of co-creation can be analyzed more sophisticatedly and mapped out.

Next, Voorberg et al. (2015) identified providing financial rewards as one of the actions that can lower the participation costs from citizens. However, little research has been conducted about the effectiveness of financial rewards for participation. And none has researched how much financial rewards are needed to get citizens to participate or what the willingness to accept is for citizens.

Quantitative research that investigates whether financial rewards increase citizen's willingness to co-creation for the heating transition and how much the willingness to co-create is, will be interesting. This could provide useful information on whether financial rewards stimulate people to co-create for the heating transition and if so how much per meeting in the process is the most optimal.

The third suggestion is that the literature on co-creation is mostly conducted on case studies within one country. It would be interesting to conduct a case study project through multiple countries and then to compare these cases from different countries. In this way, research can be conducted to investigate how governance structures and rules and norms in different countries influence the co-creation process.

9.6 Recommendations

This study has investigated co-creation for the heating transition in Middelburg. In this section, several recommendations for policy-makers will be presented based on this study and the internship

- Communication is very important and it is vital the municipality is able to reach all its residents. The online platform *'doemeemiddelburgers'* is a wonderful online platform that involved residents with several projects within the city. It is recommended to communicate to the citizens about the existence of the platform
- Trust in governments in the Netherlands is declining, therefore, it is recommended that the municipality has to build trust with its residents. The best way to do it is to have open communication with residents and be transparent towards them. Moreover, in general, the municipality should be open about suggestions from citizens and they have to give citizens the feeling that their voice and concern are heard. For the case of the heat network in Dauwendaele, it is recommended that the municipality inform the residents as soon as possible about it. Moreover, the municipality should present a strong case for the heat network by providing the analysis of other alternatives and thus proves that the heat network is the best alternative.
- The municipality should make use of neighborhood representatives as they know the neighborhood best and its residents. They also know which co-creation strategy will fit or not. Moreover, for the neighborhood of Griffioen, it is important that the neighborhood team is fully established again and that they should cooperate with the energy association of Griffioen. As it is expected that a high level and meaningful co-creation can be achieved there.
- The municipality should use surveys or other data collection to research the citizen's perspectives regarding the heating transition and public participation. This should be done simultaneously with neighborhood representatives to validate the data and get input from it.
- The municipality should clearly define the boundary conditions of the co-creation process and the heating transition at the start. The municipality should give participants the freedom to design alternatives given the clear boundary conditions. Moreover, the municipality should be very clear about the role of the participants and what is expected from them. Expectation management is crucial for the process and it influences the social capital of the process.

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Appendix A. GAT Table Questions

Governance dimension	Quality of the governance regime			
	Extent	Coherence	Flexibility	Intensity
Levels and scales	How many levels are involved and dealing with an issue? Are there any important gaps or missing levels?	Do these levels work together and do they trust each other between levels? To what degree is the mutual dependence among levels recognised?	Is it possible to move up and down levels (upscaling and downscaling) given the issue at stake?	Is there a strong impact from a certain level towards behavioural change or management reform?
Actors and networks	Are all relevant stakeholders involved? Are there any stakeholders not involved or even excluded?	What is the strength of interactions between stakeholders? In what ways are these interactions institutionalised in stable structures? Do the stakeholders have experience in working together? Do they trust and respect each other?	Is it possible that new actors are included or even that the lead shifts from one actor to another when there are pragmatic reasons for this? Do the actors share in 'social capital' allowing them to support each other's tasks?	Is there a strong pressure from an actor or actor coalition towards behavioural change or management reform?
Problem perspectives and goal ambitions	To what extent are the various problem perspectives taken into account?	To what extent do the various perspectives and goals support each other, or are they in competition or conflict?	Are there opportunities to re-assess goals? Can multiple goals be optimized in package deals?	How different are the goal ambitions from the status quo or business as usual?
Strategies and instruments	What types of instruments are included in the policy strategy? Are there any excluded types? Are monitoring and enforcement instruments included?	To what extent is the incentive system based on synergy? Are trade-offs in cost benefits and distributional effects considered? Are there any overlaps or conflicts of incentives created by the included policy instruments?	Are there opportunities to combine or make use of different types of instruments? Is there a choice?	What is the implied behavioural deviation from current practice and how strongly do the instruments require and enforce this?
Responsi-bilities and resources	Are all responsibilities clearly assigned and facilitated with resources?	To what extent do the assigned responsibilities create competence struggles or cooperation within or across institutions? Are they considered legitimate by the main stakeholders?	To what extent is it possible to pool the assigned responsibilities and resources as long as accountability and transparency are not compromised?	Is the amount of allocated resources sufficient to implement the measures needed for the intended change?

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Appendix B. Consent Form Sample"

1. **Purpose of the Study**

   This master research explores how the municipality of Middelburg can work towards an effective heat transition strategy with the use of co-creation from a how polycentric perspective. The purpose of this interview is to get insight into the perspectives of all relevant actors regarding the heating transition. At the end of this research, a heat transition strategy will be formulated to enhance the public participation of local citizens in the heating transition. This master's thesis will outline what factors contribute to the engagement and participation and possible co-creation of citizens.

   Participants in the study will be interviewed to obtain qualitative data to understand the topic. MS-Teams or Zoom will be used as the platform to conduct and record interviews.

2. **Benefits of participating**
   By participating in this study, you are aiding to an ongoing research into heating transition for the municipality of Middelburg

3. **Procedures for Withdrawal from Study**
   To withdraw from the study, you may inform the researcher at any time during the project duration (March 2021 – August 2021).

4. No personal data will be processed as part of this research.

5. Anonymized data will be used during the research. Access to interviews and transcriptions will extend only to the Researcher and Supervisor for the duration of the study. In the event that results from the research will be published, anonymized data will be stored for 10 years or more, in accordance with the TU Delft Research Data Framework Policy. This data can only be reused in the context of educational purposes.

6. **Contact details of the researcher**
   Researcher: Roland Nguyen (r.h.c.nguyen@student.tudelft.nl)
   Supervisor: Thomas Hoppe (t.hoppe@tudelft.nl)
   Faculty Data Steward: Nicolas Dintzner (N.J.R.Dintzner@tudelft.nl)

Yes No

lease tick the appropriate boxes

Taking part in the study

I have read and understood the study information dated [DD/MM/YYYY], or it has been read to me. I have been able to ask questions about the study and my questions have been answered to my satisfaction.	○	○
I consent voluntarily to be a participant in this study and understand that I can refuse to answer questions and I can withdraw from the study at any time, without having to give a reason.	○	○
I understand that taking part in the study involves an audio-recording the interview, which will later be transcribed and summarized as text for analysis of this research.	○	○
I understand that the recording and transcripts will be stored for the duration of the project. In the event that the results of the research are published, then the data will be stored for 10 years or more, in accordance with the TU Delft Research Data Framework Policy.	○	○

Use of the information in the study

I understand that information I provide will be used for academic research purposes in understanding public participation for the heating transition for the municipality of Middelburg.	○	○
I understand that personal information collected about me that can identify me, such as name and job position, will not be shared beyond the study team and will be deleted after the research is finished.	○	○
I agree that my answers can be quoted in research outputs.	○	○
I agree that job position, but not name, can be used in research outputs	○	○

Future use and reuse of the information by others

I give permission for the answers that I provide to be securely archived in anonymised transcripts so it can be used for future research and learning.	○	○

Signatures

_____	_____	_____
	Signature	Date

I have accurately read out the information sheet to the potential participant and, to the best of my ability, ensured that the participant understands to what they are freely consenting.

_____	_____	_____
Roland Nguyen	Signature	Date

Study contact details for further information: Roland Nguyen, +31 6 24398917, r.h.c.nguyen@student.tudelft.nl

Appendix C. Interview Questions

Introductie

1. Kunt u kort over uzelf of uw organisatie introduceren?
2. Hoe bent u betrokken met de energietransitie?

Institutionele context

3. Hoe is uw relatie met de gemeente en andere instanties
4. Hoe beschrijft uw relatie met gemeente en andere instanties?
5. Zijn ze makkelijk te bereieken en heeft u het gevoel dat de gemeente naar u en andere bewoners luistert?
6. Hoe kijkt u naar de milieu beleid van de gemeente? Positief/negatief?
7. Heeft u contact met uw wijkteam of vertegenwoordiger?
8. Heeft u het idee dat de wijkteam goed naar u luistert en u ook informeert? Is het ooit gegaan over milieu of energietransitie?
9. Weet u hoe uw buren denken over milieu en energie vraagstukken? Zijn er initiatieven die u bekend zijn?
10. Heeft de gemeente ooit contact gezocht met u om te om te praten over de warmtetransitie?
11. Zo ja, wat is uw mening van het proces?
12. Is de gemeente duidelijk in haar communicatie en wordt er voldoende informatie gegeven door de gemeente?
13. Is de informatie makkelijk beschikbaar?
14. Denkt u dat iedereen bij betrokken is?
15. Was het duidelijk welk invloed bewoners of wijkteams hebben in het proces?
16. Hebben bewoners invloed op het proces? Wat zijn andere belangrijke actoren?
17. Wat is uw mening over de rol van de gemeente in het duurzaamheid
18. Worden de zorgen serieus genomen?
19. Hoe denkt u dat gemeente burgers moet betrekken voor duurzaamheid
20. Bent u bekend met de site doemeermiddelburg.nl? Wat is uw mening erover (mogelijk na uitleg)

Warmtetransitie Griffioen/Dauwendaele

21. Hoe zult u uw wijk willen beschrijven
22. Is er veel betrokkenheid van burgers over vraagstukken naar duurzaamheid
23. Zijn er duurzaamheid projecten/initiatieven geweest in uw wijk
24. Gemeente wil in Griffioen/Dauwendaele initiatieven ondersteunen voor de warmtetransitie, hoe denkt u dat de gemeente het beste kan aanpakken?

25. Is er veel steun voor de warmtetransitie binnen de wijk? Heeft u veel contacten binnen de wijk?
26. Zijn er initiatieven bekend bij uw?
27. Bent u bekend met het feit dat de gemeente eventueel een warmtenet wil aanleggen in Dauwendaele?
28. Wat is uw mening daarover?
29. Heeft de gemeente of andere partij hierin gecommuniceerd?
30. Vindt u dat de gemeente u hierover meer moet betrekken of is dat al goed zo?
31. Hoe denkt u dat de gemeente het beste deze initiatieven kan faciliteren? Hoe kan de gemeente de bewoners het beste helpen?
32. Wat is uw mening van burgerparticipatie?
33. Heeft u ervaring met burgerparticipatie?
34. Bent u bereid om te participeren? Denkt u dat andere bewoners bereid zijn hierover
35. In welke omstandigheden bent u bereid om deel te nemen?
36. Wat zijn volgens u de grootste kansen en obstakels van burgerparticipatie?
37. Hoe denkt u dat de gemeente burgerparticipatie moet aanpakken?
38. Vind u dat de gemeente een stimulerende rol moet hebben waarbij de gemeente meer bepaalt, of moet de overheid een faciliterende rol hebben waarbij het burgers helpt om initiatieven te nemen.
39. Welk participatie methode denkt u dat het meest kansrijk is voor uw wijk?
40. Is er behoefte aan 3^{e} onafhankelijke partijen zoals Zeeuwind of andere partij tussen bewoners en overheden?
41. Denkt u dat het een goed idee is dat de gemeente voorbeelden moet geven van de warmtetransitie? Denkt u dat het gebruik van ambassadeurs die hun voorbeelden geven een goed idee is om mensen te overtuigen?
42. Hoe denkt u tegenstanders van de warmtetransitie tegemoet te komen?
43. Denkt u dat de gemeente lessen kan leren van andere gemeenten?

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Appendix D. Focus Group Meeting 1

Verslag online Teams overleg focusgroep bewoners over de warmtetransitie in Middelburg

Datum: 23 maart 2021, 15:00-16:30 uur

Aanwezig: 15 personen: medewerkers van de Gemeente Middelburg en bewoners met veel interesse of ervaring in verduurzaming van hun eigen woning en/of vanuit hun beroep.

Afwezig:

Verslag

1. **Welkom door Civil Servant 1 (Gemeente Middelburg)**
   Civil Servant 1 heet iedereen welkom en geeft een korte inleiding. Het doel van de bijeenkomst is om met bewoners in gesprek te gaan over de Middelburgse visie op de warmtetransitie. In de bijeenkomst wordt er met de deelnemers gekeken naar de mogelijkheden, kansen, belemmeringen en zorgen m.b.t. de warmtetransitie.

2. **Korte voorstelronde**

3. **Presentatie**
   Civil Servant 2 houdt een presentatie waar onderstaande punten in worden besproken (zie verder de bijlage):
   a. Wat is een TVW?
   b. Hoe ziet het proces eruit en waar staan we nu?
   c. Concept kaart met warmteoplossingen per wijk.
   d. Kaders
   e. Vragen

   Bewoner2: Waterstof en Groen Gas zijn alleen voor de huizen die niet op andere manier verwarmd kunnen worden (b.v. monumenten), want vermoedelijk zal er niet voldoende beschikbaar zijn voor grotere hoeveelheden woningen. Verder vindt hij dat we open moeten staan voor kleine warmtenetten in de provincie, zelfs als die door de modellen van Overmorgen (nu nog) niet als beste oplossing wordt gezien.

4. **Met elkaar in gesprek**
   Civil Servant 1 heeft een aantal vragen aan de deelnemers:
   a. Wat zijn jullie eigen ervaringen met verduurzamen, wat ging goed, waar zaten hobbels? Hoe kijken buren/kennissen hier naar?
   b. Wat voor verwachtingen hebben “we”?
   c. Wat voor zorgen heb jij / je buren/kennissen?
   d. Waar is behoefte aan?

   Het begin van het gesprek gaat over de ervaringen en tips van de deelnemers om zelf energie te besparen of duurzaam te zijn. Hierbij werden verschillende voorbeelden genoemd zoals de

badkamer verwarmen door een infraroodpaneel door Henk. Volgens Henk werkt het paneel heel snel, waardoor je enkel verwarmt tijdens gebruik en niet de hele dag. Ander voorbeeld van Bewoner1 was dat hij vloerverwarming heeft voor zijn badkamer. Daarnaast heeft hij zijn eigen huis tochtvrij gemaakt door isolatie in zijn gehele huis (10 cm aan de binnenkant) en een WTW-box geplaatst voor geforceerde ventilatie. Verder wil hij zijn huis gasvrij maken in de toekomst en heeft hij zijn radiatoren vervangen door lage temperatuur radiatoren. Dat komt later, want een warmtepomp is duur en daar heeft Bewoner1 momenteel de middelen nog niet voor. Een tip om te testen of je klaar bent voor lage temperatuur verwarming: zet je CV op 50, en test of het warm genoeg wordt.

Het gesprek ging hierna over kosten van verduurzamen. Bewoner1 beaamde dat zijn huis duurzaam maken hem veel heeft gekost, maar dat hij gebruik heeft gemaakt van een subsidieregeling waarbij 50% van zijn kosten bekostigd werden door subsidie van de gemeente, provincie en EU regelingen en hijzelf 50% heeft moeten bekostigen om het te realiseren. Bewoner1 is begonnen met zonnepanelen (met overproductie), daarmee heb je meteen de meeste besparing (financieel) wat hij heeft gebruikt om de rest van de maatregelen te financieren. Maar helaas zijn de subsidieregelingen niet meer geldig. Bewoner1 gaf aan dat hij zonder de subsidieregelingen niet de gewenste maatregelen kon doen in zijn huis. Maar dat hij behoorlijk veel energie heeft kunnen besparen in zijn huis en het bespaarde geld telkens weer geïnvesteerd heeft in verdere verduurzaming van zijn woning.

Specialist1 bracht de trias energetica naar voren. Eerste stap is ‘isoleren’ (beperk de vraag), tweede stap daarna is gebruik duurzame energiebronnen en derde stap is gebruik niet duurzame energiebronnen zo efficiënt mogelijk (oude CV ketel vervangen bijvoorbeeld). Specialist1 adviseert de gemeente om duidelijk aan bewoners te maken om eerst de energieverbruik te verminderen voordat je zonnepanelen aanschaft. Andersom kan je mogelijk teveel zonnepanelen aanbrengen voor je eigen verbruik en bovendien stimuleert het mensen niet om energie te besparen. “Zonnepanelen onderdrukken slecht gedrag”.

Verder ging Specialist1 in over de wisselende beleid van de overheid wat ervoor zorgt dat veel mensen geen maatregelen durven nemen en mensen passief maakt. Voorbeeld is dat een subsidieregeling maar voor even geldig is, waar sommige mensen juist tijd nodig hebben om tot een plan te komen waarna de regeling voorbij is. Hij pleit voor langer durende subsidieregelingen.

Bewoner2 vertelt dat hij heeft zijn oude huis geïsoleerd en voorzien van zonnepanelen. Maar hij benadrukte dat het erg veel geld kost om de volgende stappen te doen, wat het niet interessant maakt. Bewoner2 pleit dat er een praktische aanpak nodig is van de gemeente, mensen kijken als eerst naar hun portemonnee. Op de vraag waarom hij de maatregelen heeft gedaan, geld of duurzaamheid, antwoordde Bewoner2 dat hij het vooral gedaan heeft voor

duurzaamheid en het mag een beetje geld kosten. Hij heeft ervoor gekozen om een aanvullende hypotheek te nemen, die wordt afgelost door de bespaarde gaskosten. Ook comfort is belangrijk, hij heeft HR++ gas, schuifpuien vervangen, warmtepomp en vloerisolatie. Boven geen verwarming maar wel infrarood panelen. In zijn ervaring zijn de mensen in zijn omgeving nog erg afwachtend over duurzaamheid. Mensen vinden het wel interessant, maar staan ver van de warmtetransitie af. Volgens Bewoner2 zijn de meeste mensen nog afwachtend, omdat ze ten eerste zien dat het veel geld kost in bijvoorbeeld media en ten tweede geeft het gedoe, het huis moet verbouwd worden en het is een verandering en veel is nog onbekend. Bewoner4 beaamde het verhaal van Bewoner2, ook in zijn eigen omgeving merkt hij soortgelijke punten. Comfort is een goede reden om nu te investeren. Verder vertelt Bewoner4 dat hij ziet dat Woongoed veel huurhuizen duurzamer heeft gemaakt door isolatie en zonnepanelen, wellicht hebben zij inzicht op de financiële kosten, wat kan je van hun ervaringen leren.

Specialist1 was het niet helemaal eens en vindt dat Woongoed nog onvoldoende meedoet en alleen kleine stapjes doet. Hij vindt het niet nuttig om woning met label F & G naar label A, B of C te maken maar dat het juist beter is om op termijn deze woningen te slopen en beter om woningen energieneutraal te maken. De gemeente is terughoudend met slopen volgens Civil Servant 1 i.v.m. circulaire doelen.

Volgens Specialist2 zijn mensen die een monumentenhuis kopen nog niet erg bezig met duurzaamheid. Oudere mensen zijn in zijn ervaring meer bezig met duurzaamheid dan jongere mensen die een huis kopen. Ze zijn zelf wel erg bezig met het onderwerp duurzaamheid, maar dat is nog te duur. Maar in het algemeen leeft het onderwerp duurzaamheid niet echt onder huizenkopers. Mensen weten doorgaans niets over trias energetica, mensen kijken meestal eerder naar zonnepanelen dan naar isolatie, coaching zou nuttig zijn volgens hem. Bewoner3 zou graag voorbeelden hebben om een monument te verduurzamen. Dit zou eigenaren kunnen overtuigen. Denk b.v. aan een duurzame huizenroute.

Stagiair1 ziet in zijn eigen omgeving dat jongeren zelf nog niet bezig zijn met duurzaamheid omdat ze of thuis wonen of niet de financiële middelen hebben.

Bewoner4 heeft wel de indruk dat het leeft, mensen lopen met vragen rond. De wijktafels zouden een goede aanleiding kunnen zijn om voorlichting te geven.

5. **Rondvraag en prikken van nieuwe datum volgend overleg**
   Tweede bijeenkomst met focusgroep bewoners: 25 Mei 2021 van 15:00 tot 16:30 uur. Andere deelnemers zijn welkom.
   Verder willen Bewoner3 en Bewoner2 ook deelnemen in de projectgroep TVW. Bewoner4

geeft aan wel in te willen vallen als Bewoner3 of Bewoner2 niet kunnen.
Civil Servant 1 sluit de bijeenkomst af en bedankt iedereen voor zijn enthousiaste deelname!

Appendix E. Focus Group Meeting 2

Verslag online Teams Tweede overleg focusgroep bewoners over de warmtetransitie in Middelburg

Datum: 25 Mei 2021, 15:00-16:30 uur

Aanwezig: 15 personen: medewerkers van de Gemeente Middelburg en bewoners met veel interesse of ervaring in verduurzaming van hun eigen woning en/of vanuit hun beroep. ‘

Afwezig:

Verslag

1. **Welkom door Civil Servant 1 (Gemeente Middelburg)**

Civil Servant 1 heet alle deelnemers welkom en geeft overzicht van het programma van de bijeenkomst.

2. **Presentatie door Civil Servant 2 (Gemeente Middelburg)**

Civil Servant 2 houdt een powerpoint presentatie waar de onderstaande punten worden besproken:

a. Ontwikkelingen t.o.v. vorige bijeenkomst
b. Gebiedsgerichte en brede aanpak
c. Uitvoeringsplannen
d. Vragen

3. **Met elkaar in gesprek**

De volgende vragen staan centraal in het gesprek:

a. Waar moeten we starten en waarom?
b. Wat voor acties zouden jullie komende 2 jaar willen zien op het gebied van besparen en transititiegereed?
c. Hoe kan hybride/all electric gestimuleerd worden?
d. Hoe kunnen we mensen informeren en betrekken?
e. Wat zou jij of jouw organisatie kunnen doen?

a. In het begin van het gesprek heeft Deelnemer vraag over de financiële kant van de warmtetransitie, investeringen die gedragen worden door bewoners die mogelijk het niet kunnen dragen. Deelnemer vraagt of de gemeente of Rijk hiervoor steun kan geven, want hij vreest dat de warmtetransitie niet goed kan verlopen zonder steun van de overheid. Civil Servant 1 kan daarover nog geen duidelijkheid geven. Civil Servant 1 wil van de deelnemers weten waar de warmtetransitie het beste kan starten en waarom, moeten we starten bij huizen die makkelijk te isoleren zijn, of moeten we starten in een bepaalde wijk zoals Dauwendaele of moet er een brede gemeente aanpak komen?

Specialist 1 pleit voor een brede aanpak van de gemeente door verschillende wijken met pioniers, want als er alleen gefocust wordt op een bepaalde wijk, dan zullen veel mensen uit andere wijken afwachten. Verder denkt Specialist 1 dat het mogelijk verstandig is om te starten waar de energiewinst het grootst is afhankelijk van de technieken. Specialist 2 denk dat het beste is om te starten bij monumentpanden, die het meest energie slurpen, om te starten met isoleren. In het algemeen zijn bewoners van monumentpanden hoog opgeleid, zijn

ouder en hebben hoger inkomen en hebben meer middelen voor het energiezuiniger maken van de woningen, maar de kosten van het energiezuiniger maken van de panden zijn veel hoger deze bewoners kijken dan ook de kat uit de boom. Specialist 3 denkt dat het beter is om te starten met huizen die makkelijk te verduurzamen is en dat door succesverhalen andere mensen gestimuleerd worden, maar denk dat subsidies van de overheid noodzakelijk is. Specialist 4 denkt dat het verstandig is om te beginnen waar de kosten voor het verduurzamen van woningen het goedkoopst is, waardoor het resultaat het snelst duidelijk is.

b. Specialist 1 vindt dat er over vergunningen nagedacht moet worden en dat het goed geregeld moet worden door de gemeente. Specialist 5 vindt dat het naast financieel verhaal dat er ook brede voorlichting gegeven moet worden gegeven naar bewoners die zich nog niet verdiept hebben, zodat mensen actiever worden en de noodzaak zien. Specialist 3 denkt dat ook het goed is om bewoners te informeren en te adviseren wat het de bewoners het allemaal kan opleveren en hoe dat bereikt kan worden. Civil Servant 1 voegde daarop toe dat bij het monumentenproject ook dezelfde conclusies werden getrokken dat we de bewoners aan het handje moeten nemen, en werd de monumentencoach in het leven geroepen. Verder voegde Specialist 1 toe dat het noodzakelijk is dat de adviseur onafhankelijk is en dat er tijd besteed moet worden (50 uur, maar meestal minder) om voor ieder huis een plan te maken met de bewoner voor een persoonlijk advies. Maar benadrukt dat het lastig om een groep bewoners samen te laten werken aangezien elke bewoner andere plannen heeft en tijdschema. Andere deelnemers denken dat een persoonlijk advies waardevol kan zijn, en dat het niet noodzakelijk 50 uur hoeft te zijn.

c. Er is nog onduidelijkheid hoe All-Electric in de praktijk gaat uitpakken in Middelburg, hoe zit het met de leidingen en mogelijke piekvragen in de elektriciteitsleiding. Civil Servant 1 is daar niet bang voor, omdat volgens verwachting mensen heel geleidelijk zou gaan overgaan met hun cv-ketel en wordt er per straat toezicht gehouden of er versterking van de leiding nodig is.

d. Publicaties in huis en huis bladen werkt meestal niet om mensen te betrekken, wat beter werkt is het bezorgen van brieven naar huizen met praktische informatie, omdat het persoonlijk is. Verder liggen er kansen op social media om mensen te betrekken, zeker op de pagina's van de gemeente Middelburg of 'Wij zijn de Stad' is er vaak respons. Daarnaast zijn publicaties van succesverhalen een goede stimulator en is het goed idee om gebruik te maken van ambassadeurs om te promoten. Tenslotte, moet de publicatie van energietransitie eerlijk moeten worden weergegeven, waarbij niet alleen successen moeten worden benoemd, maar moeten ook lessen die geleerd zijn worden benoemd.

e.Specialist 2 is eigenlijk al ambassadeur, en andere deelnemers dragen een steentje al bij. Verder zijn diverse ideeën al genoemd bij de vorige vragen.

4. Rondvraag en prikken van nieuwe datum volgend overleg

Civil Servant 1 geeft overzicht over de bijeenkomst van 3 Juni. Civil Servant 1 vraagt aan de deelnemers of een van de deelnemers bereid is om tijdens de bijeenkomst van 3 Juni zijn situatie en ervaring voor de warmtetransitie wil presenteren. Kim en Jurgen zijn hiervoor bereid.

De datum van de volgende bijeenkomst moet nog worden besloten, hiervoor wordt de datumprikker gebruikt.

Appendix F. Communication Session"

COMMUNICATIEFRAME – Aardgasvrij wonen

INTERNE SITUATIE (Wat speelt er bij ons? Welke stukken zijn vastgesteld? Hoe denkt men over het project?)

- Parijs (2016) -> Landelijk klimaatakkoord (2019)

Zeeuws:

- RES (regionale energiestrategie) (2020)-> alle provincies, waterschap
  - Zeeuws Energieakkoord- RES producten (2019/2020))(www.zeeuwsenergieakkoord.nl)

Middelburgs:

- Middelburgse Milieuvisie (2019) met als hoofdonderwerpen:
  1. Klimaat (hitte droogte/ klimaatadaptatie), **2. Energie (duurzaam opwekken, gasloos) -> transitievisie warmte**, 3. Verkeer en vervoer,4. Afval. 5.Luchtvervuiling, geluidsoverlast, 6. Biodiversiteit 7, Gezondheid

Transitievisie Warmte:

- Gaat over de weg naar een gasloze bebouwde omgeving in 2050. De visie moet eind 2021 worden vastgesteld samen met een pakket uitvoeringsplannen. De uitvoeringsplannen worden in 2022 opgesteld. Andere projecten lopen al en sluiten hier op aan. Bijvoorbeeld Restwarmte Dauwendaele.
  - Visie wordt participatief tot stand gebracht, o.a. met focusgroepen (via wijktafels). Dit proces wordt geleid door Bureau Overmorgen
  - bureau Overmorgen heeft Zeeuwsbreed een communicatieplan geschreven, met daarin o.a. een doelgroepenbenadering. Daarnaast hebben ze ook een

STAKEHOLDERS (Wie moet het prettig vinden, wie moet je intern meenemen?)

- College
- Raad
- Wijkmanagers
- Portefeuillehouder Chris Dekker
- Ambtelijke organisatie: denk aan link met bijvoorbeeld armoede, geven van het goede voorbeeld.
- Projectgroep (met vertegenwoordigers van Enduris en Woongoed)
- Focusgroep (inwoners)
- Wijkteams
- Overkoepelend: provincie: (Zeeuws Energie Akkoord) Jasmijn (provincie) Talitha (Goes) Carola Helmendach (Programmamanager RES, Impuls Zeeland)
- Sociale warmte atlas (kijken waar de haakjes zijn)
- Drie VVE's
- Energie coalitie: ZMF en Zeeuwind
- Energieke gemeenten: (zie: zeeuwsenergieakkoord.nl)

VISIE (op communicatievak en eigen bijdrage)

Samen op zoek naar de JA De visie op communicatie van de gemeente Middelburg speelt in op externe ontwikkelingen waarbij onze inwoners en de Middelburgse(netwerk)samenleving centraal staan. Communicatie draagt bij aan een goed contact en helpt bij het waarmaken van de (participatie)koers met als ultieme vraag: 'Hoe maken we met elkaar de gemeente Middelburg?' Hierin gaan we samen op zoek naar wat wel kan, de bedoeling: de JA. Inwoners worden gehoord, kunnen hun mening geven, participeren, weten waarom bepaalde keuzes worden gemaakt en zien dat de gemeente zorgvuldig omgaat met hun belangen. De gemeente participeert op haar beurt in de initiatieven uit de samenleving. De medewerkers van de gemeente spelen hierin samen met college-en raadsleden een essentiële rol en zijn een belangrijke succesfactor. Trotse en betrokken ambtenaren en bestuurders onderhouden contacten met onze inwoners en dragen de cultuur van de professionele gemeente uit. Zij maken het verschil.

Onze merkwaarden zijn:

- **Open**: transparant, openbaar, betrouwbaar, tijdige en duidelijke communicatie.
- **Betrokken**: persoonlijk, empathisch, omgevingsbewust, (duurzaam) samenwerkingsgericht en verantwoordelijk.

EXTERNE SITUATIE (issues en humeur, maatschappelijke trends & ontwikkelingen, maatschappelijke humeur erover)

Algemeen:

- Energietransitie is voor velen een ver-van-mijn-bed show. Een gedeelte loopt zeker voorop, maar er is ook een groep waar kennis over de energietransitie beperkt is waardoor het gevoel voor urgentie ook nog niet zo groot is. Wel staat deze groep positief tegenover het feit dat er iets tegen de klimaatverandering moet gebeuren. Wil je echt het draagvlak voor beleid versterken, dan is het de kunst juist om déze groep mee te krijgen. Ook voor jongeren is 'groen gedrag' niet zo vanzelfsprekend als je wellicht zou verwachten.
- Dilemma's
- Communicatie over onderwerpen is niet altijd duidelijk
- Het is een complex onderwerp, en speelt over een lange tijdsperiode (30 jaar), dat maakt mensen ook afwachtend.